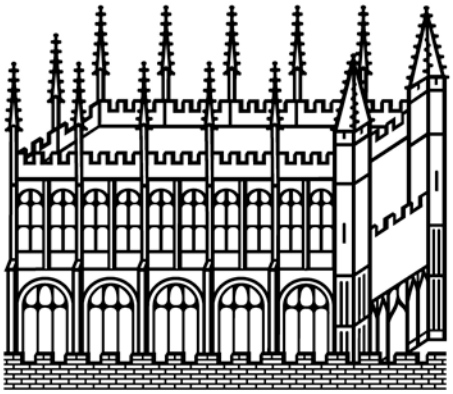


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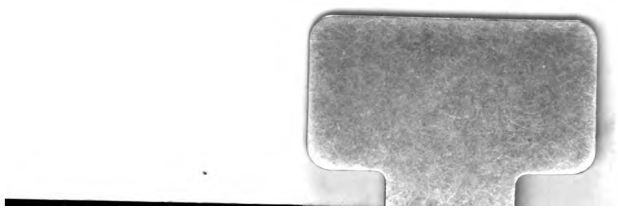
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FOR

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ARCHÆOLOGISTS, ARTISTS, STUDENTS,

## BUILDERS, CLERKS OF WORKS,

AND

## BUILDING ARTIFICERS,



CONTAINING A COPIOUS VOCABULARY AND PRACTICAL EXPLANATION OF THE USUAL TERMS CURRENT IN THE ARCHITECTURAL PROFESSION AND ALLIED TRADES,

*WITH OBSERVATIONS AND ILLUSTRATIONS.*

BY

WYVILL JAMES CHRISTY,
ARCHITECT AND SURVEYOR.

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# PREFACE.

So far as regards the nature of this work no excuse is needed for introducing it to notice, for something of the kind has long been required. That it is a step in the right direction will be admitted by all cognizant of the array of terms current amongst constructors, and met with in the columns of the weekly papers devoted to their interests and instruction. Excepting the learned and voluminous work, entitled The Dictionary of Architecture, there is no book which exclusively contains, in alphabetical order, a fair approach to a complete repertory of architectural and building artificers' phraseology and terms. Without, however, trenching upon the province and privileges of that valuable contribution to professional literature, and leaving it to pursue its destined way to a successful climax, this work will proceed on its own course, with as much originality as is customary in works of like nature, and provide the desideratum of a comprehensive and reliable vocabulary of technical terms for the use of architects, civil engineers, surveyors, builders, clerks of works, students, artisans, and others engaged either with building operations, or with building lore.

Whilst the vocabulary comprises, as far as possible, all terms strictly within an architect and surveyor's practice, as well as those employed in construction, it has been necessary to ignore the cant expressions of workmen, and to include ancient and other terms associated with architecture, and of interest to the scholar, archæologist, and artist. On the one hand there can be no use in retaining words which confuse and vulgarise, and which it is the business of education to extirpate, and, on the other, there happily exists on the part of professional men no uncertain taste for the historical, archæological, and artistic phases of their calling.

Moreover, to thoroughly understand the theodolite and other surveying instruments, there must be a certain familiarity with astronomical terms. Hence, some are introduced. The presence of optical terms is similarly accounted for, but on better grounds, since the employment of the microscope to peer into the mysterious texture and constitution of building materials, and of the photographic camera as the draughtsman's best copying instrument, add lively incentives to acquire their signification. Finally, the importation of a few chemical terms needs no apology. For chemistry is the science which treats of the nature and properties of all descriptions of matter, and therefore a knowledge of it is

essential to those whose special function is to pile up contiguously, and for permanency, if possible, heterogeneous materials, since it is only by its means that their composition can be disclosed with certainty, and the corroding influences, which are brought about by their mutual action, and by that of the atmosphere and weather, anticipated and minimised. But of still greater importance is the aid which chemistry contributes to the elucidation of the question how to construct habitations, which shall prove to be unequivocally healthy, in fact, rather than in conception. To solve this strictly professional problem, without extraneous help, and to establish on a sure basis so vital a condition of "well building," there exists on the part of architects the necessity of maintaining, not only sound fellowship with the doctrines of drainage and ventilation, but also an intimate acquaintance with the composition of gases, and the nature and effects of heat. Terms, bearing on these subjects, are consequently incorporated.

A list of the works, from which most of the facts contained in the dictionary have been acquired, will be given on its completion, which will probably be accomplished with the issue of Part 24. Further, it is to be observed that instead of becoming less comprehensive and complete towards its latter stages, as is sometimes the case with compositions that are issued in parts, preparations have been made to secure, during the publication of the present work, the introduction of all terms likely to enhance its value as a book of reference, altogether irrespective of the particular letter of the alphabet under which any of them may have to appear.

*Southsea, April, 1879.* W. J. C.

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# UNIVERSAL DICTIONARY

FOR

# ARCHITECTS, CIVIL ENGINEERS, SURVEYORS, AND BUILDERS.

*** In the following pages, every term commencing a paragraph, whether it consists of only one word, or is compound, or reversed, occurs in alphabetical order. Thus, *Arch Band* does not immediately follow *Arch*, because *Archæology* and other terms take alphabetical precedence, and for the same reason, the reversed term *Angles, Plumbing*, is placed before *Angle Staff*. If this is not observed words might be thought to be omitted which in fact are not.



**Aaron's Rod.** A name applied to a species of decoration, worked in plaster, or otherwise, to represent a rod bearing buds and foliage, and more or less resembling some of the forms given to the caduceus, or wand of Mercury.

**A.A.S.** An abbreviation for "Architect and Surveyor." See ABBREVIATION.

**Abaciscus.** A small abacus, or any flat and square member similar to one, as, for instance, a square tessera of a tessellated pavement.

**Abaculus.** An abaciscus. 2. A tessera, or a little piece of mosaic work, or tessellated pavement, of any geometrical form.

**Abacus.** The upper member of the capital, or the level tablet at the top of a column. Sometimes it is square, or of a regular oblong form, and sometimes it has moulded curved sides or edges, as is shown in Fig. 1., which represents

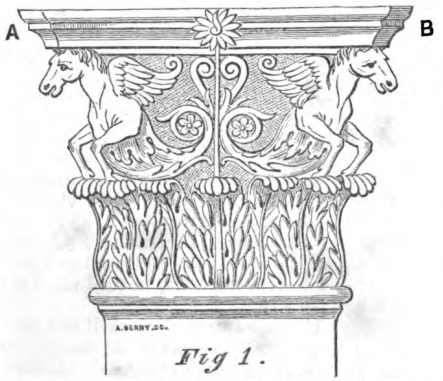


*Fig 1.*

a complete capital*, whereof A B is the abacus. 2. The name occasionally given to the whole Gothic cap. 3. A marble or mosaic slab, tablet, or field let into walls or floors. In "measuring up" or "taking off," the abacus, as well as the necking, is included in the cap.†

**Abaiser.** Ivory black.

**Abamurus.** A buttress or counterfort.

**Abandoned.** Works contemplated and intended to be carried out, but changed for others, or altogether relinquished before breaking ground, are said to be abandoned. In the latter case the commission due to the architect, for preparing the complete set of drawings and specification, is 2½ per cent. upon the estimated cost, with an addition of ½ per cent. for tenders, should they have been received in accordance with the wish or directions of the employer. See ARCHITECT'S CHARGES.

**Abated.** An old term for work sunk, incised, or depressed beneath the surface.

**Abatement.** Deduction. Formerly a term in carpentry, signifying loss of material in bringing timber to the required form.

**Abat-jour.** A French word, meaning a trunk-light, or sky-light of peculiar form. See TRUNK-LIGHT.

**Abaton.** A building alluded to by Vitruvius, and so named from its being strictly inaccessible to all comers. It was situated at Rhodes, a city famous for the beauty of its architecture, and remarkable for the grandeur and variety of its statues, which included the brazen Colossus, one of the seven so-called wonders of the world‡

* From the ruins of the Temple of Mars the Avenger at Rome. The diagram is copied out of an old edition of Palladio's *Architecture*.

† See, amongst many other works, Parker's *Glossary* and Gwilt's translation of *Vitruvius*, for further particulars concerning this important member.

‡ The other six were the Pharos of Alexandria, the Mansoleum at Halicarnassus, Jupiter's Statue by

**Abattoir.** A public building where animals are slaughtered for human food, the offal being reduced on the premises to different substances, such as gelatine, oil, glue, tallow, &c. The chief distinction between an abattoir and an ordinary slaughter house is, that the former contains several of the latter, besides other additions, such as scalding houses, stables, apartments, and accommodation for the manager and butchers, as well as proper adjuncts for the conversion of offal into the trade necessaries above enumerated.

**Abat-voix.** A French term, signifying a sounding board or canopy over a speaker, to aid the voice, by causing the reflected sound to reinforce the primary sound.

**Abbatial Residence.** Abbot's lodgings, or abbey proper. In early ecclesiastical architecture an entire and separate house, communicating with the church, and designed and equipped as a fit residence for the head of a large religious establishment. Fig 2 is an approximate plan of a Cistercian Abbey. 1. Church. 2. Cloister Garth. 3. Chapter House. 4. Refectory. 5. Abbot's Lodging. 6. Fratery. 7. Domus Conversorum.

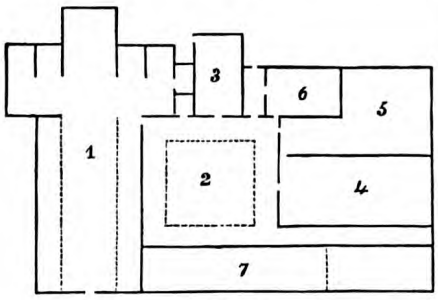



*Fig 2.*

**Abbess.** The lady superior of a nunnery or convent for nuns.

**Abbey.** The name usually given to the collection of buildings, which together constituted a monastery or convent. Sometimes the word is to be understood as meaning only the attached church, and sometimes only the abbatial residence. The beautiful ruins of Fountain's Abbey, Yorkshire, furnish, from their excellent preservation and completeness the best and most instructive lesson which the architectural remains of this country can teach as to what used to be the arrangements and interior economy of a monastic institution. See MONASTERY.

**Abbot.** The governor or superior of an abbey or monastery, ranking with a bishop.

**Abbreviation.** One or more letters used for a word. Thus, C.E. is the abbreviation for Civil Engineer, and others generally employed will be found alphabetically distributed in the following pages. It is not yet satisfactorily explained why architects have not by this time familiarised the public with a corresponding abbreviation for their own calling. It being a well-known fact in the profession that an architect ought to understand surveying, whether he chooses to practice it or not, there does not appear to be any valid reason why architect and surveyor should not be contracted into A.A.S., or why the abbreviation should not be recognised by all architects whose unity of action is alone wanted to accustom the public to its use. In 'measuring,' abbreviations are highly useful when well understood by all parties entrusted with the dimension book, but otherwise they must be used sparingly.

**Abditory.** A place for secreting or preserving goods.

**Abele.** The Abel-tree. A variety of the white poplar (*Populus alba*). Poplar wood generally is tough, is not apt to swell or shrink, does not readily split, and in seasoning does not warp. It is used by cabinet makers, toy makers, turners, and for flooring. Vitruvius remarked that it was not fit for large timber. Latterly the tree has not flourished in Britain. S. G., when dry = 0·47.

**Abercarne Stone.** A dark bluish gray Monmouthshire sand stone, weighing about 168lbs. per cubic foot. It bears a good character, but as might be expected from its density, the cost of working it fair is about half as much again as that of the same labour on Portland stone.

**Aberdeen Granite.** A durable and excellent stone when of perfect quality, sound, and free from large crystals. It is much employed on important buildings, and varies in tint from gray to blue, and from pink to red. The quarry is almost inexhaustible. Immense blocks of stone are first loosened by boring and blasting, and then divided into scantlings by placing iron wedges in a row of holes and driving home with ponderous hammers. See GRANITE.

**Aberration.** Spherical aberration is the confusion of image caused by the rays in a pencil of light issuing from any point of an object, and passing through a lens, not all meeting again in the same point. The result is that the image appears more or less indistinct, but, usually two lenses are arranged in a telescope to correct each other's aberration. See APLANATIC. Chromatic aberration arises from the pencil of light being resolved by the lens into coloured rays of different refrangibility, which gives to the image the appearance of being bordered with a fringe of variegated colours. See ACHROMATIC.

**Aberthaw Lime.** A blue lias lime, obtained from the place near Cardiff, Wales, after which it is named. It is an hydraulic lime, but like all the blue lias limestone, its quality depends upon what bed it belonged to before it was burnt, as the relative proportion of carbonate of lime and silicate of alumina vary in each bed. About 18 per cent. of the latter in the whole mass would be the proper quantity to make the lime hydraulic, or a medium between moderately and eminently hydraulic lime. For characteristics of good lime, see LIME.

**Abezzo.** Strasburg turpentine. A resin, obtained from the silver fir, and used in varnish in combination with naphtha, linseed oil, &c.

**Abies.** See FIR.

**Ability, Professional.** The skill and knowledge necessary to properly discharge any duties that may be undertaken. Ability is quite distinct from the lustre that may be acquired by passing examinations, or obtaining diplomas, the chief benefit of which to architects, if to possess them were to become

Phidias at Athens, the Hanging Gardens at Babylon the Temple of Diana at Ephesus, and the Pyramids of Egypt.

the rule, would lie in the increased importance with which their holders would be regarded by those who, whether they willed or not, could not begin life without one. It is too much to say that diplomas would lead the public to more highly appreciate than they do at present a body of men collectively second to none in the kingdom in skilled knowledge in all that appertains to the application of design to constructional purposes. What is wanted is a broad and comprehensive national increase of architectural taste, which would soon cause plenty of professional ability, at present unrequisitioned, to be evinced, whilst common building would cease to satisfy.

**Ablutionary Appliances.** Washing basins, single or in ranges, baths, water-troughs, or similar contrivances for cleansing the body.

**Abnormal.** Not normal. Irregular. Not according to rule, use, or custom. Anything exhibiting a redundancy of ornament, or anything that is insipid, coarse, or opposed to taste, would, in art, be considered abnormal.

**About-sledge.** The largest hammer used by blacksmiths' hammermen.

**Abozzo.** An Italian term identical with the French frotté, and meaning dead-colouring, which see.

**Abradant.** A material used for grinding, polishing, and sharpening. Grindstones, hones, chalk, crocus, tripoli, pumice, putty powder, sand, glass, and emery are a few out of many abradants.

**Abrasion.** Wearing or rubbing off, or diminishing by friction. Also the substance so lost.

**Abraum.** A red ochre found in different parts of the kingdom and used by cabinet makers in lieu of lime water to darken mahogany.

**Abraxas Stones.** Stones cut in different forms, with symbols and the word abraxas or abrasax upon them. It is supposed that most were made in the middle ages to serve as talismans, though some are quite as old as the third century.

**Abreuvoir.** A temporary plaster or clay trough, luting, or channel located to conduct grout between the beds of stone to complete the joint. 2. A horse pond or place for cattle to obtain water.

**Abruption.** A sudden or violent separation or breaking away.

**Abruptness.** A term applied to skylines, outlines, strings, tracery*, or similar ornament when rendered peculiar by too sudden a change in the direction of their parts. The eye is falsely led by abruptness to expect a smooth and rapid traverse and then forced to take a changed or reversed course, quite inconsistent with grace or beauty. Towers whose spires are only contemplated, institutions minus a wing, and chimneys raised to overgrown proportions from their pristine height, are often to be met with as illustrations of a particular form of this departure from architectural propriety.

**Abscess.** A disease of the sapwood of trees caused by fungi and the wounds of insects producing excrescences, and doing injury to the fibre.

**Abscissa.** A part of the axis, or diameter, or other line, drawn in a given position through a curve, and which is intercepted between a given fixed point and an ordinate. It is sometimes inelegantly written absciss. In Fig. 3, if P

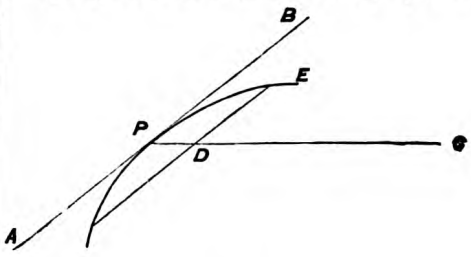



*Fig 3.*

be any point in a curve, A P B the tangent, and P C a diameter passing through P, then if any ordinate E D be drawn parallel to A B, cutting P C in D, P D is an abscissa of the diameter P C. See CO-ORDINATES.

**Absis.** See APSE.

**Absolute Beauty.** The goal of art, and the aim and support of the science of æsthetics.

**Absolute Cold.** The temperature at which there is no heat. It is found that for each degree of heat above freezing point a gaseous body receives an increase of elastic force; therefore, if the same law holds good below this point, a temperature must be reached at which there is a total absence of elastic force, and consequently of heat; but there are no means of determining what the law is below freezing point.

**Absolute Motion.** Actual change of place in space.

**Absolute Strength.** The same as cohesive strength, or the power with which a building material, &c., resists the effort to lengthen it when pulled from opposite ends.

**Absorbed.** When the canvas of an oil painting has imbibed or sucked up sufficient oil to leave the colour dead-looking, and the delicate parts of the picture indistinct, the oil is said to be absorbed.

**Absorbent.** A substance which imbibes or soaks up fluid matter.

**Absorbent Grounds.** A method of priming canvas or other surface to be painted upon by means of a mixture of paste or chalk, moistened with size or flour-paste. The grounds assist in hastening forward work by absorbing part of the oil with which the pigments are applied.

**Absorbing Well.** See DEAD WELL.

**Absorption.** In chemistry, the solution of gases by water and other liquids.* The absorption of any constituent of a mixed gas depends only upon the share it takes in the pressure upon the absorbing fluid. Thus, nearly four-fifths of the pressure of the air upon water being due to the nitrogen it contains, no more oxygen is absorbed than that due to the pressure of about one-fifth of an atmosphere. 2. A method of creating a vacuum by the condensation of steam.

**Absorption of Heat.** A molecular internal action dependent upon the energy with which the molecules of a substance emit heat, since it is obvious that if a body with greater radiating

* See Brandon's *Analysis of Gothic Architecture*, p. 28.

* Air-bubbles in ice, rock-crystal, and other solids, are the remains of air or vapour held by them by absorption when liquid, but caught and confined in the act of escaping during the process of solidification.

powers, is confined with others where a given temperature is maintained, it must absorb as much heat as it emits in order to maintain such temperature. Absorbed heat, when it proceeds from a luminous body is influenced in its effects by the colour of the absorbing body, and the best absorbers are the worst reflectors. The effect of the absorption of the sun's rays by the earth during the day lasts longer, owing to the clouds reflecting back the radiating heat, and what is radiated is further retarded in its escape by the great heat-absorbing power of the aqueous vapour of the atmosphere. Glass absorbs, according to its composition, a greater or less quantity of heat rays passing through it. See GLASS and HEAT.

**Absorption of Water.** A faculty possessed by stone, brick, and other materials of appropriating rain and vapour in varying degree. The deleterious results that follow are dampness, vegetable growth, and disintegration. Those bricks that absorb little and reluctantly, and that quickly dry, are obviously the safest, since absorbent bricks are incompatible with a dry house, and machine-made bricks for this reason compare favourably with those that are hand made. It is rarely that building stones are rejected simply for being absorptive. A good brick should not take up more than half-a-pint of water, and that with difficulty, and when soaked with rain, *in situ*, should quickly dry on the re-appearance of fine weather. With respect to timber, "whole" can scarcely ever be bought seasoned, and as a rule it is used containing both natural sap, and water absorbed from having lain floating in the docks, &c. Care must, therefore, be taken in executing works that the shrinkage is an understood thing, anticipated and provided for, so that no evil may ensue when it occurs. See AREA DRAIN; BRICK; CAPILLARY ACTION; DAMP COURSE; SEASONED TIMBER; SEASONING TIMBER; STONE; WALL.

**Abstersoria.** Hand towels used by the priest at the piscina for washing his hands, and rinsing the Chalice. They were likewise called manutergia.

**Abstract.** In "quantities" all the items taken from the dimension book, and arranged under their several headings in order to find the total of each, reduced to the proper standards, for transference to the bill. The items should occur in the order, or rotation, in which they are to appear in the bill, and the figures must be preserved from becoming crowded by a judicious arrangement of space. Cubes, supers, runs, and numbered articles is, with few exceptions, the order usually followed, the least expensive of each item being placed first, followed by the remainder, in order of value.

**Abstracting.** Making an abstract. It is the second of the three operations that are performed in preparing the tabulated list of work and materials called the "bill of quantities," which builders price out and tender by. The other two operations are "measuring up" or "taking off," and "billing."

**Abstraction of Heat.** The act of drawing heat from a body, which may be accomplished by radiation, conduction, or convection.

**Abstract Mathematics.** Pure mathematics, which see.

**Absurd.** See REDUCTIO AD ABSURDUM.

**Absurdity.** Absence of propriety. It is questionable whether Gothicists in their objectionable carvings as exhibited in many dripstone terminations, gargoyles, and misrepresentations of the human form, are to be considered more guilty of this kind of disrespect to the admonitions of art than the Classicists, who, during the last century, endeavoured to resuscitate a dead style by swathing the framework of its effigy with stucco, and bedizening it with the plasterer's plastic productions.

**Abuse.** A term of wide range, signifying the misapplication, neglect, or tergiversation of correct principles of design, in order to satisfy a craving for something novel or original, so as to please the untutored minds of those who, either from accident or wilfulness, are blind to the teachings of true art.*

**Abut** (to). To touch, rest, or adjoin for support. Usually applied to the end of a piece of framing, &c., and often contracted into "but."

**Abutment.** The surface or part of a solid against which a body abuts, buts, or presses under the stress of a compressive force due to its own weight, to a load, or other cause. The abutment of an arch, sloping roof, or anything which conveys and communicates this kind of force is that part which receives the outward lateral thrust and sustains part of the weight. It may be either artificial or natural, but it is generally the former in all works of magnitude, and the greatest care is needed in every case to render it immovable by using material strong enough to resist crushing, by uniting the courses with dowels or cement to make it practically monolithic, and by giving it weight enough to defy overturning, or in other words, motion round an axis. The latter essential is often obtained in bridges by extending or developing the abutment into an arch with wing walls, or where the rise is sufficiently small, by continuing the voussoirs right down to a good natural or carefully-piled foundation. In ecclesiastical and domestic architecture the same resistance is gained by surmounting the abutment with pinnacles, &c. The term abutment, sometimes contracted into butment, is in the case of bridges technically limited to the end supports, and is not given to any intermediate ones. See BRIDGE, PIER, WING-WALL.

* In the instructive essay accompanying Alfred Bartholomew's invaluable "Specifications," attention is called to a few forms of abuses in building, which are fair examples of the meaning of the term. Windows in the frieze of an architectural order, and mezzanine windows; stopping entablatures abruptly, and thereby giving them the appearance of being either tenoned into a vertical mass, or else on the point of slipping down, instead of having them properly returned or mitred round; placing the supporting columns of an entablature at an unreasonable distance apart, so as to give the idea of sinking, or else doing worse by introducing consoles into the walls between the columns, to heighten such idea, by showing that without their kindly interposition the entablature must fall; combining in the same façade columns and much narrower pilasters or improper pilasters—are each and all courageously denounced as abuses of correct taste and judgment. In the same category are classed quarter partitions when they reach the ground, instead of fulfilling their functions in upper storeys by supporting and stiffening, when properly trussed, heavy floors and ceilings without impeding underneath rooms with upright supports; and, also, the practice of filling in the tympanum of a pediment with thin stones, running up from the level cornice to the soffit of the raking one, which resembles pavement, instead of building in properly laid ashlar, in horizontal courses of moderate height—the plan that is at once correct and effective.

**Abutment.** In carpentry, the end of a piece of timber, when cut and shaped to fit against another piece, to form a joint, is called its abutment. See ABUTTING JOINT.

**Abutment Arch.** An opening or aperture in an abutment in the form of an arch, which is sometimes introduced when the wing walls are very massive. It is occasionally called a land arch. See HORIZONTAL ARCH.

**Abutment (Circular).** When the end of a timber which buts against another, or that of a post which supports a beam or longitudinal bearer, is not square but rounded off, its abutment is said to be circular.

**Abutment Cheeks.** The surfaces usually at right angles to the cheeks of a mortise, and upon which the shoulders of the tenon bear.

**Abutment of a Plane.** The projection, or shoulder, which, together with the wedge, keeps the iron in position.

**Abutment Plate.** In timber bridges a cast iron plate bedded on the skewback, at the springing, to hold the arched ribs.

**Abuttals.** The limits and boundaries of land.

**Abutting.** Lying close to or resting upon for support.

**Abutting Blocks.** Pieces in centres against which the struts abut.

**Abutting Joint.** In carpentry, a joint constantly met with in framing, connecting together two timbers in any position at or near the extremity of one at least, and consequently independent of the relative direction of the fibres of the pieces. For example, in a truss, the joint by which a principal rafter is connected with the tie-beam, is an abutting joint, and though the fibres of the pieces are in a sense at right angles to the plane of the joint they are not in the same straight line nor at right angles to one another. When wall plates, however, are halved together on the wall in the direction of their length, the connecting joint is also an abutting joint, whilst the fibres of the pieces are in the same straight line and at right angles to the plane of the joint. Again, a binder or tie-beam notched down to a wall plate, or wall plates halved upon one another at the quoins or at any other angle of a building, or a binder framed into a girder, are other instances of abutting joints, but in these cases the fibres of the timber are usually at right angles to one another, whilst some of them are parallel and others perpendicular to the plane of the joint. Generally, when the end of a timber is halved, or tenoned, or notched into another at right angles to it, the connection constitutes a square abutting joint, or briefly, a square joint, and when the pieces are oblique, or in the same line, or parallel, the joint is called an abutting joint. The names but-joint, butt-joint, or butting joint have, likewise, been given to the same kind of connection.

**Abutting Power.** A name given to the power of a bridge abutment to resist a horizontal thrust, and which depends upon frictional stability, which see.

**Acacia.** Sometimes called Locust Tree (*Robinia pseudo-acacia*). A good wood for tree-nails, fences, posts placed in the ground, and window sills. S.G., dry = 0·71.

**Acacia Catechu.** A true acacia of small size, abundant in Indian jungles from the heart-wood of which is prepared by maceration, decoction, and evaporation, the colouring matter catechu called also kutt or cutch, and terra japonica or Japan earth. See CATECHU.

**Academic.** Accordance with the style or manner of an academy.

**Academician.** A member of the managing body of a society of philosophers and artists called an academy.

**Academist.** An academician. 2. A pupil of an academy.

**Academy.** A name in the first instance borne by Plato's school, from the grove near Athens, named after its owner Academus, where the great philosopher walked and talked with his scholars and followers, but now generally signifying any society for the pursuit and advancement of science, literature, art, and kindred subjects. Associations of this nature have existed in some form or other for 2000 years, and in the present day almost every capital has one or more. Lectures and the bestowal of academical honours are the chief means of maintaining amongst the members high intellectual and professional excellence. The Royal Academy of Arts in London was instituted in 1768 for the promotion of the fine arts, painting, sculpture, design, &c., and now includes 40 academicians, who are picked artists of celebrity. There are in Dublin the Royal Irish Academy for the advancement of science, history, and literature, and the Royal Hibernian Academy for the pursuit of art; whilst Edinburgh possesses the Royal Scottish Academy.

**Academy Figure.** Any conventional figure employed in academies to show form, outline, colour, position, muscular action, &c.; or a drawing or design in a composition from the nude, or from a model, &c.

**Acanthine.** Pertaining to the acanthus, or containing representations of it.

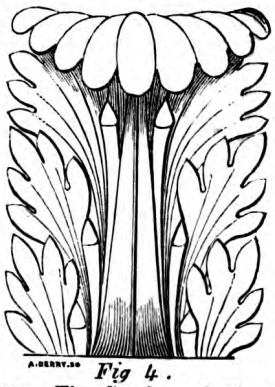


*Fig 4.*

**Acanthus.** The Greek and Roman name for the plant whose leaves have been so well sculptured in the adornment of Corinthian capitals. The tendency to spirally ascend which these plants had, and the elegance and graceful symmetry of their leaves, were no doubt amongst the reasons which led them to be considered peculiarly fit for artistic imitation.*

**Accelerated Motion.** The motion of a body is said to be accelerated when the successive portions of space passed over in equal times are increased.

* See *Guide for Drawing the Acanthus*, by I. Page. The wood-cut represents the leaf as applied to the

**Accelerating Force.** Motive force, or pressure, which by its continuous action generates a constantly increasing velocity in a body. Gravity is a uniformly accelerating force.

**Acceleration.** The increase of velocity of a body in motion caused by the continuous action of an accelerating force.

**Acceptance.** A bill of exchange accepted so as to bind the accepter to make payment. 2. An agreeing to terms or proposals.

**Acceptance of Tender.** The act completed by the signing of the contract or agreement, but binding upon the accepter as soon as he takes steps to notify the acceptance. The words "the lowest or any tender not necessarily accepted," or similarly explicit ones, are a complete bar against the lowest tenderer claiming remuneration should all be declined, but in case of a tender being accepted, and another contractor employed to do the work, the first party may establish a claim for compensation. Architects, builders, and clients should all be mindful of the pernicious tendency of low tenders. Many of the first have been ruined, and many of the second wounded in reputation by them, whilst many of the last have been grossly deceived by such words as "materials and work, the very best of their respective kinds." A sufficiently near approximation to the cost of execution of the intended work can always be made by the architect, who should further assure himself that low tenders in any particular instance really spring from genuine and sound business calculations and economy. See ARCHITECT'S ARBITRATION.

**Accepted.** Agreed to. Received as a bill of exchange.

**Accepted Tender.** A tender becomes accepted the instant steps are taken by the party to whom it is offered to acknowledge its acceptance, and thenceforth neither party can be released from the obligations of the contract without the concurrence of the other. See ACCEPTANCE OF TENDER.

**Access.** Means of reaching. Hence, passages must not only be provided, but sufficiently well lighted. Pipes, wires, revolving shutters, &c., should be enclosed in such a way as to be readily got at for inspection and repair. Hoarding preventing direct access to adjoining houses subjects the party requiring its erection to an action for damages. See RIGHT OF WAY.

**Accesses.** An old term for passages, avenues, or corridors connecting the different apartments of a building.

**Accessible.** See INACCESSIBLE.

**Accessories.** In construction, things that are usually understood to accompany a subordinate member or part of a building, rendering it usable or complete. In painting, accessories or accompaniments are aids to the production of effect, the composition being complete without them, though upon their choice and treatment depend much of the charm, richness, and success of the picture.

**Accident.** Either something innocuous and perhaps advantageous, occurring without design, or a casualty involving loss that happens without being foreseen, or without the possibility of having been foreseen. In the former category are classed those discoveries that are made in carrying out all descriptions of work, whether in design or execution, which, followed up, lead to greater skill and dexterity and occasionally to fame. The latter class includes structural accidents, some of which are preventible whilst others are not. To the first description belong in all probability the majority of scaffold accidents, and those casualties directly attributable to an ignorance of the mechanics of construction, whilst not a few annually take place from palpable disregard of the mighty agents, electricity, and wind, whose destructive power is too readily forgotten, except when raging, amid the genial serenity which characterises our clime. Yet, as a matter of fact, when a thundercloud is within striking distance of a building it must be struck if destitute of a proper conductor, and when a chimney stack is out of plumb, and the joints rotten, it must fall when a gale occurs of sufficient but not unprecedented violence from the quarter to which it is most exposed.

**Accidental Colour.** A colour dependent upon the eye and not upon the quality of the light or surface gazed upon. The eye having steadfastly viewed a patch of colour will not, upon being transferred to another, be able at once to discern what colour it is but, on the contrary, will see what seems to be its complementary—or what, in this instance, is denominated its accidental—colour.

**Accidental Load.** The load on a roof occasioned by snow or the pressure of wind is called an accidental or dynamical load. It is usual to construct large roofs for a uniformly distributed load of 40lbs. per square foot, 35lbs. being the allowance for wind, and 5lbs. that for snow. It is obvious, however, that unlike the weight of the roof, which is a permanent or statical load, the accidental load may act upon one side only, and therefore in works of any size it is proper to test the ribs not only with a uniform load distributed throughout their length for the permanent load, but also with another one applied to only one-half of it to represent the accidental load.

**Accidental Point.** In perspective, a vanishing point not on the horizontal line.

**Accidentals.** In measuring, a term sometimes given to jobs connected with reparations, alterations, &c., and not altogether new. Piecing, raising, underpinning, stripping, reinstating, making good disturbed work, &c., are so classed. In painting, the term is given to light and shade depicted as emanating from sources of light which are themselves depicted.

**Acclamation.** In archæology, a representation in statuary, or upon medals, of people in a posture of joy.

**Acclimatisation.** The habituation of anything to a climate foreign to its natural one. It is alleged, apparently on good grounds, that fresco painting cannot be acclimatised in this country owing to a moderately high and uniform temperature being required for the preservation of its very delicate surface.

**Acclivity.** The reverse of declivity, which see

**Accommodation.** A popular expression for the substance of what is meant by the architectural term fitness. This leading necessity

modillion of a cornice of the time of Constantine, and is copied from D'Agincourt's Architecture, reproduced in *The Architect.*

strikes at the very root of comfort, and when in defect, often undermines health. No structure is equal to its purpose that is wanting in accommodation, which should be fairly distributed in relative shares throughout all the apartments and thoroughfares. In designing and planning any private or public work, the architect must remember that notwithstanding the scrutiny of local boards, and the directions and suggestions of interested parties, he has the comfort, convenience, and health of other users to look after, whose unrepresented claims must be called to mind and carefully considered.

**Accompaniments.** Accessories, which see. 2. Accessories essential to a composition, whose presence is not optional but a necessary outcome of the artist's subject, design, or plan.

**Account, Weekly.** An account of day-work not included in a contract, and which, not admitting of measurement, is reported to the architect once a week through the medium of the account, in order that it may be duly checked.

**Accouplement.** An old carpenter's term for a brace, or a braced frame. In columniation, coupling. See COUPLED COLUMNS.

**Accretion.** The act of growing to another so as to increase it. Hence those things which increase by continual external increments grow by accretion.

**Accubitus.** Primarily a couch, but subsequently a term applied to a room attached to a church for the refreshment and repose of the ecclesiastics.

**Accumulation.** (1). Accumulation of electricity. When a thunder-cloud approaches sufficiently close to a building it causes, by induction, free electricity of the opposite kind to that with which it is charged to accumulate on the surface of the building, if not protected by a lightning conductor with a finely plated point, so that the cloud and building become oppositely electrified. See LIGHTNING CONDUCTOR. (2). Lateral accumulation of waves. By agitating water in a cistern with vertical sides it will be noticed that particles of fluid heap up against, and move along them. Mr. Scott Russell has given the name of lateral accumulation to this phenomenon, which is one rendered peculiarly interesting by its having an exact parallel in the motion of waves of sound. The whispering gallery in St. Paul's cathedral owes its name to sonorous waves gliding along its curved surface for a considerable distance with sufficient energy to be distinctly heard.

**Accuracy.** Precision, the result of care. This important acquirement, the fit associate of business aptitude, though useful in all transactions, is especially needed when getting out working drawings, and in duties connected with quantities and in levelling. A whole treatise might be written on the advantages of accuracy and how it has assisted to fortune and renown those who have studiously cultivated it. Extensively embellished drawings are generally wanting in accuracy, but license in this respect is currently permitted in those quarters where strictness in more important matters is enforced. No trifling with the principles of design can ever be tolerated where there exists an innate desire to practically apply a well grounded, accurate, and discriminating knowledge of their aim and uses, and to impress on the minds of pupils and assistants their high and exceeding value in acquiring that mental illumination as to the æsthetics of construction, which constitutes the gulf between an architect and a builder. It must be remarked also, that in experiments to test the strength of materials, extreme accuracy is particularly needed, for no tinge of suspicion as to their exactness in any one point can arise without rendering them next to worthless, for which reason it is customary to experiment upon three or more specimens of similar figure and quality under precisely identical conditions.

**Acer.** See MAPLE.

**Acerra.** A box for incense of an oblong or square shape used by the Romans. Acerra thuraria is a vessel used for the same purpose in connection with sacred rites.

**Acetabulum.** A Roman measure, and also the name of a vessel for holding vinegar for the table, having a large open mouth. A vinegar cruet.

**Acetate.** A salt formed by acetic acid combining with an alkali or a metal.

**Acetate of Copper.** Verdigris, usually made by exposing to the air for some time copper plates covered with the marc of grapes. It has been tried as a wood preserver with but little success. See VERDIGRIS.

**Acetate of Lead.** A salt obtained by dissolving litharge in acetic acid. It resembles loaf sugar, and having a sweet taste has received the name of sugar of lead. In painting it is used as a dryer, and when in sufficient abundance, it will in conjunction with colouring matter constitute a paint applicable to zinc when used externally.

**Acetic Acid.** An acid sparingly found in animal fluids and the juices of plants, but it is the most common of the vegetable acids. It is useful in photography, and may be obtained by the destructive distillation of vegetable products. Proof vinegar should contain five per cent. of it.

**Achelor.** An old term for ashlar.

**Achievement.** An escutcheon, or the ensigns armorial of a person. Sometimes corrupted into hatchment.

**Achiler.** } Old terms for ashlar.
**Achlere.** }

**Achromatic.** Literally without colour. The name given to telescopes and other optical instruments through which objects can be seen without a coloured fringe. Practically, however, there are always to be found slight traces of one.

**Achromatic Lens.** A compound lens usually formed by combining a concave lens of flint glass, B Fig. 5, with a convex one A of crown glass, having different dispersive powers but sufficiently concordant to refract white light to a focus without decomposition. The bands of colour, however, which pass through these lenses not being of the same width there is only complete achromatism with the red and violet or outside colours, so that faint fringes are still left but to no inconvenient extent.

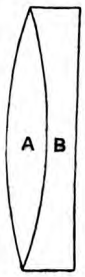


*Fig 5.*

**Achromatism.** The condition of being achromatic.

**Acid.** A chemical compound characterised by forming a salt when uniting with a base. Besides which, it is as a rule distinguished by corrosive action, solubility in water, sour taste, and by reddening some vegetable blues. The destructive effect of the atmosphere upon building materials is largely due to the occasional presence in it of hydrochloric acid, nitric acid, and the acids of sulphur, as well as to the instrumentality of carbonic acid which is always present. See ATMOSPHERE, ACTION OF.

**Acid Gases.** Acids in the form of vapour, in which state they are generally present in the atmosphere.

**Acisculis.** A small pick or mason's tool with a rounded head, pointed at one end and flat at the other, or with a flat face and pointed peen. Sometimes it is written acisculus.

**Aclinic Line.** The magnetic equator, or line round the earth where the magnetic needle has no dip. It is an irregular double curve progressively moving from east to west.

**Acolyte.** In the ancient church a subordinate attendant, but now in the Roman church a consecrated candidate for the priesthood.

**Acorn.** The fruit or nut of oak trees. It is often cut on the Roman ovolo. See EGG AND DART.

**Acoustic.*** Acoustical. Something that pertains to the ears and hearing.

**Acoustical.** Acoustic.

**Acoustic Canopy.** A sounding board or reflector of sound in the form of a canopy.

**Acoustic Pottery.** Jars, or earthenware pots, found in some old churches under roof plates, choir stalls, or built into the masonry with the object of augmenting the resonance of the building, but with what effect is unknown.

**Acoustics.** The science which treats of the production, transmission, and perception of sound. Sound is produced by a stroke upon the air, or other elastic body, throwing it into a sufficiently rapid vibratory motion. The undulations thus caused are transmitted by the excitation of other similar movements in the air, or other vehicle, and, extending on all sides, they eventually reach the drum of the ear, or tympanum, which continues the vibration and excites by the most exquisite process sympathetic agitation in the fluid contained within the labyrinth of the ear, which acts on the auditory nerve, and by being thus rendered sensible, causes the sensation of sound. The importance to the architect of a proper acquaintance with acoustics arises from the necessity of constructing public buildings so that preachers, orators, lecturers, actors, singers, musicians, &c., may be distinctly and everywhere heard, which is a feat not easily accomplished, owing to the limit of the power of the voice, to the different influence of surfaces in reflecting sound, and to the often opposite effects of aerial currents, chandeliers, columns, gallery fronts, draperies, lofty ceilings, cushions, &c. See AUDITOR; ECHO; CONDUCTION; RADIATION; REFLECTION; REINFORCEMENT; RESONANCE; REVERBERATION; SOUND; SOUNDING-BOARD; VIBRATION; VOICE; WALL-WAVE.

**Acoustic Tubes.** Speaking tubes, or tubes to convey the voice to particular spots. See SPEAKING TUBE.

**Acoustic Vessels.** In ancient theatres, bell-shaped brazen vessels of all tones included within the compass of voice and instruments, which rendered the performance audible throughout the buildings. See ECHEA.

**Acre.** A measure of land, containing four roods or 160 perches or 4840 square yards. Gunter's chain being 22 yards long, the acre contains exactly 10 square chains. 640 acres equal 1 square mile.

**Acreage.** The area of a given surface expressed in acres.

**Acrolith.** A transition description of carving practised by the earliest Greeks, consisting of statues partly of wood and partly of stone. The exposed extremities were of marble, whilst the trunk, or the part covered with drapery, was merely of wood.

**Acropolis.** Literally, the highest point of the city. Generally, a stronghold, occupying a lofty position.

**Acroteral Ornaments.** See ACROTERIUM.

**Acroterium.** Sometimes written acroter, acroteria. Originally a pedestal on a gable, parapet, or coping, on which a statue was placed as represented in the accompanying illustration.

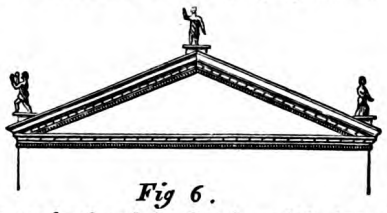


*Fig 6.*

It is rarely found in Greek architecture, but abundantly in Roman, and sometimes in Gothic canopy work. The term is now often applied to the statue as well, and to ornaments generally on the summits of buildings. Hence the appellation "acroteral ornaments."

**Actinic Rays.** Rays of the sunbeam, which are most capable of stimulating chemical power. See ACTINISM.

**Actinism.** It is found that beyond the violet end of the spectrum there are certain invisible rays, giving feeble light and producing marked chemical action, from which it is concluded that the sunbeam includes a principle of action distinct from heat and light to which the provisional name of actinism has been given; but it must be understood that the actinic rays are not the only ones endowed with chemical properties.

**Action.** In painting and sculpture, attitude, position, and expression, conveying the idea of a person acting or taking more than a passive part in the subject represented. In fact, upon the action of the piece its effect depends. In law, a suit or process in the prescribed form for the recovery of a right.

**Action and Reaction.** Equal and opposite forces necessarily co-existent since two bodies must be implicated in the action of one force, and, therefore, what is action in one body is called reaction in the other. The terms, however, are very vague, for if two horses of exactly equal power pull against one another at the opposite ends of a rope, the tension of the rope

* In pronouncing this word, the second syllable accords in sound with house.

is that due to the action of one horse only, the action of the other horse being in this instance reaction only, or the same as if one end of the rope were firmly fastened to a wall. A correct knowledge of the principle herein involved is of considerable use in investigating the deflection of beams, since it helps to explain the nature of the reaction of the supports.

**Action of Atmosphere.** See ATMOSPHERE, ACTION OF.

**Action of Fire.** See FIRE.

**Action, Osmotic.** See OSMOTIC ACTION.

**Act of Parliament.** A decree or statute law passed by monarch, lords, and commons, binding upon every one to whom it relates, and irrevocable unless changed, suspended, or abrogated by the same authority. Each Act consists usually of title, preamble, section, and clauses, and is referred to the year of the monarch's reign in which it was passed and by the chapter of the statutes for that year to which it is allotted. Thus, the Metropolitan Buildings Act is alluded to as 18 and 19 Victoria, Chapter 122.

**Actual Energy.** Whilst force is the power which produces energy, the energy so produced is potential only so long as it is merely ready to become active, but it is called actual energy immediately it starts into activity. See POTENTIAL.

**Actus.** A Roman road, serving for cattle or for a small carriage, and named after a measure 120 feet long and 4 feet wide, used in surveying land.

**Acuminated.** Terminating with a point usually tapering and sharp.

**Acus.** In ancient works of art a pin or needle.

**Acute Angle.** An angle less than a right angle.

**Acute Angled Triangle.** A triangle having all its angles acute. Fig. 7 represents one.



*Fig 7.*

**Acute Arch.** Another name for the lancet arch, which see.

**Acute Quoin.** A quoin formed by two walls making an acute angle at their junction.

**Adamant.** A name given to the diamond or to anything almost impenetrable.

**Adamantean Pavement.** A pavement as hard as adamant.

**Adamantine Clinker.** A clinker with the qualities of adamant. 2. A neat and compact clinker, resisting wet and weight, made of silicious fire-clay, and suitable for stables, warehouses, &c.

**Adaptability.** The quality of fitness. The architect's judgment has often to be exercised in respect to the likelihood of benefit or economy arising from the alleged adaptability of new building materials, appliances and apparatuses, but whilst strictly guarding his client from expense, or the inconvenience of a profitless trial, he should take every legitimate opportunity to give fair play to meritorious novelties and inventions.

**Adaptation.**—In an architectural sense, making suitable by alterations for another purpose. In combining existing work with old, as well as in the removal of parts not required, or that would clash too much with what is to be new, the point to be considered is whether all had better come down and be commenced *de novo* rather than incur the expense of constructing patchwork that can never give satisfaction, and only half meet required wants. Men of experience testify that alterations once begun, pertinaciously go on and create by their very carrying out urgent reasons for others. If, however, adaptation be finally decided upon, it must be effected by conforming the new work as far as possible to the pervading spirit of the old, by adjusting any modification of style so as not to let the transition appear dislocated, and by nicely fitting to the original and unrestored portions, wherever practicable, a description of ornament that will tastefully accord with the decoration of the additions.

**Add.** In "quantities," the abbreviation for additions.

**Addice.** See ADZE.

**Additional Works.** By this term is generally meant works undertaken by the contractor, exceeding what he agreed to execute when signing the contract, and of a magnitude beyond the usual extras. See EXTRAS.

**Additions.** The term either applied to the rooms, parts, or appendage by which an existing structure is increased in size. or to the alterations imported into current contract work, by which it is extended. The Gothic architects almost always kept to the prevailing style when making additions, excepting in completing a building, and then they yielded their own bias—the bias of artistic progression—in favour of uniformity. In "quantities," the abbreviation for additions is "add," and it should be noted that in plumber's work the exact dimensions are always taken and nothing granted by way of additions.

**Adherence.** In painting, a term applied where sufficient relief has not been given to parts requiring it.

**Adhesion.** The attraction between surfaces of matter when at insensible distances, or the union of surfaces when in contact caused by attraction. Of its real nature nothing is known. It is distinct from gravitation, cohesion, or the pressure of the air around a vacuum, and it is probable that the gaseous envelope which is supposed to surround every object, however minute, may have much to do in influencing adhesion.

**Adhesive Force.** The force of adhesion, or the degree of strength with which bodies unite by adhesion. It is measured by the force required to separate the two surfaces, and is usually expressed in lbs. in the case of nails, and in lbs. per square inch in the case of glued and other surfaces. The adhesive force of limes is greater than their force of cohesion, but that of Portland cement is less than its cohesive force; and therefore gauging it with sand weakens it, but the presence of sand with shingle in concrete may perhaps be a safeguard against honeycombing, and do more good by such agency than harm in reducing the cohesion.

Experiments, however, on the point are wanting. As to the adhesive force of ordinary mortar at the joints of brick or stonework, this naturally springs into being immediately the contact there occurs, but it can only be determined when the mortar has become hard, and then only roughly, for it is impossible to tear from a coarse surface like that of bricks or hewn stone, once dipped in such a moist substance as mortar, all that adheres to it, which probably explains why there are no exhaustive researches on the subject. The hardening is due most likely to recarbonisation, or what is tantamount to the same thing, to the lime crystallizing or solidifying into a carbonate. The fresh mortar in the first place sets by parting with its superabundant water not required for hardening, and then continues slowly to harden by imbibing carbonic acid through the porous* blocks, whilst at the same time it yields up by degrees its remaining water, having none left by the time the lime becomes saturated with carbonic acid. The fixation of the porous brick or stone to the external film of the mortar takes place by adhesion and cohesion as soon as the process of recarbonisation has sufficiently indurated it, though, as has been already observed, the union at the surfaces of contact must be almost instantaneously accomplished by adhesion. In the body of the mortar joint the carbonate unites by cohesion, and the sand is fixed by adhesion, whilst the process of absorbing carbonic acid commences and proceeds most rapidly at the surfaces of the joints, as well as at the exposed faces of the work, owing to the air being better able to gain access to them than to the heart of the joints. The adhesive force existing between lead and the rough boarding on which it is laid is the cause of the swelling and cracks which inevitably occur on flats, &c., for the sheets, heated and expanded by the sun, cannot move laterally against the frictional adhesion caused by such conditions of contact, and, therefore, they swell up and crack. Screws owe their efficiency to the resistance of a shearing force as well as to the action of adhesive force.

**Ad Infinitum.** Without end.

**Adit.** The approach to a building, or even the doorway itself. 2. The horizontal opening to a mine.

**Adjacent Angles.** The angles on one side of a straight line made by another meeting or cutting it. 2. Two angles formed by lines meeting in the same point, and having one line common to both.

**Adjection.** Adding, addition. 2. A projection on the shaft of columns, commonly called entasis, but not intended by Vitruvius, who merely thus alludes to it, to stand for its synonym.

**Adjoining Owners.** See PARTY WALL.

**Adjuncts.** Appendages. A term given to the immediate attachments of a building, such as the terrace wall, lawn, parterre, carriage-porch and entrance court of a rural mansion; all of which, besides being artistically handled, should be made the means of uniting the stately mass of the edifice with the irregular and natural beauty of the adjoining landscape.

**Adjustable Shoe.** See SPRING HINGE.

**Adjusting Level.** In surveying, making the bubble of the spirit level remain in its centre, during a complete revolution. This is done by placing the legs of the stand, as nearly as possible, on a horizontal plane, bringing the bubble to the centre by means of the parallel plate screws, then turning the telescope half round, and doing the same, and repeating the operation until the bubble remains constantly at the centre whilst turning the instrument wholly round. See ADJUSTMENTS.

**Adjusting Screws.** Screws for adjusting gauges, &c.; as, for instance, those used in brick machinery to keep the rollers apart at any distance, according to the degree of fineness required in the clay.

**Adjustment.** The application of proportion to a building, so as to evolve symmetry. 2. Suiting the various portions of any work to the whole and to each other. 3. The choice and disposition of draperies in a picture.

**Adjustments.** In surveying, the operations required to place the level or theodolite in working order. The telescope itself has to be adjusted for parallax and collimation, and the levels set to indicate verticality and horizontality of the azimuthal axis and the line of collimation, respectively. See COLLIMATION; INDEX ERROR; PARALLAX.

**Adjutage.** See AJUTAGE.

**Admeasurement.** The measuring up of artificers' work, or the amount of work measured up.

**Adobe.*** A brick, made of clay and sand, dried in the sun, and used without being burnt. It is met with on the continent of America, in dry climates, in parts not thickly populated. See PLASTICITY OF CLAY.

**Adornment.** A somewhat obsolete term, meaning ornament, but occurring sufficiently often to merit notice here. Marble used in columniation, in panelling, in pavements, and in shafted jambs, is always a splendid agent in accomplishing chaste adornment when properly subordinated to, or well balanced by a correct distribution of sculpture and painting. No trivial concealment of masonry by marble veneer should ever be suggested even by the effect, lest it generate the provoking thought of constructed decoration. Nor should adornment bear upon its beauteous face aught but the placidity of repose—the outcome of perfect unity between the embodiment of the designer's idea and the mantle with which the artist cleverly overspreads it.

**Adrian, St.** The symbol of this saint is an anvil, with or without an axe or sword. They were the instruments of his martyrdom.

**Adrian's Villa.** A ruin near Tivoli, now interesting from affording a good specimen of brick construction at the time of the Roman empire, but at one time a gorgeous building replete with magnificence.

**Adulteration.** Corrupting by foreign admixture. Portland cement is easily debased by adding slag dust or ground hydraulic lime, or any similar powder. Red lead and white lead are adulterated with brick dust and whitening

* Since metals possess the power of absorbing gases, or, what is the same thing, since some gases exercise such remarkable influence over metals as, under certain conditions, to compel their absorption, no surprise can be felt at the moistened laminæ of brick and stone, in contact with the mortar, conducting by capillary transpiration carbonic acid to the hydrate of lime.

* Pronounced, *doe-by*.

respectively. Sulphate of baryta, a heavy powder, in the form of Venice white, Hamburgh white, and Dutch white is used to corrupt white lead, besides which the white lead of commerce often contains a preparation of common litharge, a substance soluble in water. Linseed oil is not always crushed from pure seed. Varnish is particularly open to adulteration, arising from the time that must elapse before its quality is known, and the number of cheap and soft gums that are to be had in the market. The admixture of silver with lead in mediæval times, with the supposed object of preserving it when laid over oak boarding, can scarcely be called an adulteration. See BARYTES.

**Ad Valorem.** According to the value.

**Advancing.** A colour is said to be an advancing one when it comes forward and catches the eye, making those near it appear to recede. White and light tints are advancing colours, but white the most notably so.

**Adventitious.** Something introduced into a work of art for the sake of effect. Shadows in a picture are adventitious.

**Advertising Architects.** As generally understood architects who advertise to supply plans, specifications, and superintendence at a cheaper rate or at a less commission than that advocated by the Institute. Advertising, in itself, is simply a matter of taste, and it obviously must be left to the judgment of each member of the profession as to whether he should inform the public or not of his existence through the medium of newspapers. There can be no doubt, however, that there is occasionally practised another peculiar mode of advertising which takes different forms. Sometimes it is manifested in dissertations on ability to the prejudice of other practitioners, and sometimes it is to be met with in competitions, either in the profuse elaboration and splendid finish of the drawings, or in their unmistakable style and handling, or in a certain something about the motto which renders it not wholly unknown to some of those upon whom the selection devolves. It is obvious that such advertising as this may be quite accidental, yet it goes far to show that competitions exercise a pernicious influence, notwithstanding that they deserve to be credited with a few advantages, which will be alluded to when the subject comes under more immediate notice. Though there may be two opinions on the point it is probable that the popular estimation of any particular profession depends upon the ability, education, and tone of its members viewed in the aggregate, and that it cannot be affected by the practice or avoidance of so harmless an act as legitimate advertising. On the other hand, the unprofessional taint attached to the act when not done to underbid or injure others would seem to consist in some kind of fancied social descent, yet when all are aware of the necessity of an honest livelihood, and that often the same end has to be reached by different means, it ought to be quite clear that the architect's passport into society must be a moral and intellectual one, as much independent of an annual income as of any predilection he may choose to exhibit for informing the public as to the whereabouts of his offices.

**Adytum.** The secret dark chamber of an ancient pagan temple.

**Adze.** Formerly addice. An edge tool represented in Fig. 8, differing from an axe in having its blade curved or arched, and the edge



*Fig 8.*

at right angles to the handle. The edge is not bevelled on the outside. The adze is used by carpenters for chipping.

**Ædes.** A building, consisting of one room or apartment, either for pagan deities or for men. 2. A public or a private building.

**Ædicula.** The diminutive of ædes. A small building, temple, chapel, dwelling, room, or chamber.

**Ædile.** A magistrate in ancient Rome who superintended public and other buildings, and regulated the police and public shows.

**Ægicranes.** Skulls or heads of goats or rams, sculptured on altars, friezes, &c. This word is sometimes improperly written ægricanes.

**Æginetan Sculptures.** Ornaments that at one time decorated the pediments of the temple of Minerva at Ægina. They are now at Munich, and are valuable for the position they occupy in the growth of Grecian art before the time of Phidias.

**Ægis.** A goat skin attached to the shield of Jupiter, and by a figure of speech the shield itself.* In decoration the name is given to a shield or breastplate.

**Ægyptilla.** An Egyptian ornament or gem, having the device lighter than the ground, which was either black or dark blue.

**Æmasia.** A strong fence or hedge.

**Æneatores.** Sculptures representing military musicians.

**Æolian Harp.** A musical instrument, having its origin in a harp, upon which a stream

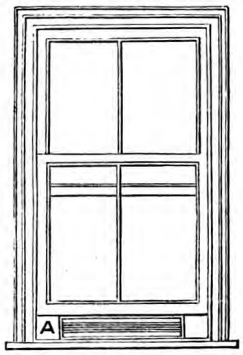



*Fig 9.*

or current of air impinged. It is usually made in the form of a frame of thin wood, with or without a sounding-board, to place between a window sash and sill, as shown in the illustration. The strings, which may be ordinary violin or guitar strings, and from four to fifteen in number, are tuned by pegs at one end.

* See Smith's *Dictionary of Greek and Roman Antiquities.*

**Æolipile.** Anciently, a hydraulic machine for discovering the nature of air. It was a kind of rotary steam engine, consisting of a sphere on pivots, with arms oppositely bent, from which

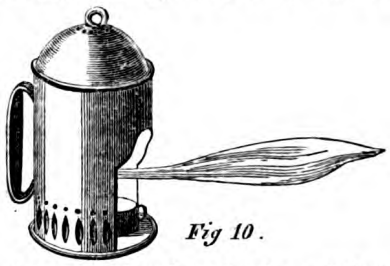


*Fig 10.*

the steam issued and produced revolution by reaction. Now the name is applied to a useful contrivance, used by plumbers, in the form of a small dark lantern, having the action of a blow-pipe. See Fig. 10. It consists of two spirit lamps, one fixed above the other. When the lower one is lighted it almost immediately boils the other, causing the vapour, which is led round to the flame of the lower lamp by a small curved pipe from its top, to ignite and dart out in a horizontal jet of great heat, by which soldering is easily performed. Painters sometimes use the same kind of instrument for softening old paint, which will readily scrape off when hot. It is ordinarily called by workmen a blowing apparatus.

**Æolus.** Amongst the moderns, a ventilator.

**Ærarium.** In ancient Rome, the public treasury.

**Aerial Figures.** Those which occur in painting with the object of representing, as far as ponderable pigments will permit, the imponderable creations of the artist's fancy.

**Aerial Perspective.** That branch of perspective which treats of the effect produced upon the appearance of objects by the atmosphere, and teaches how due diminution in the strength of light, shade, and colour, may be made in their delineation. Light does not spread with equal intensity over an object receding from the eye. The lights are most brilliant, the colours most intense, and the shadows the deepest, at the parts which receive the light nearest the eye, and they gradually become paler, and merge into each other as the parts recede or become more remote. The artist avails himself of this fact, and gives his picture the expanse and retiring look of nature.

**Aeriform Fluid.** Air, and all other elastic fluids, in the state of gas.

**Æro.** A wicker basket, used by the Roman excavators in carrying earth.

**Æruca.** Verdigris, or acetate of copper. Artificial ærugo.

**Ærugo.** A compound containing carbonate of copper, constituting the bright green, brown, vermilion, or light blue colour, produced by time and the atmosphere upon metallic statues, &c. Age increased its richness, and being much prized it was often imitated, See ATACAMITE.

**Æs.** Primarily, any metallic compound not in the form of ore, or anything made from such a compound. From this the meaning was subsequently enlarged until it signified prepared copper, brass, or bronze, in the form of columns, porticoes, plates, &c.

**Æsculus.** See CHESTNUT.

**Æs Cyprium.** The ancient name of copper, which became modernized into cuprum.

**Æsthetic.** Pertaining to æsthetics, which see.

**Æsthetic Design.** A name in vogue amongst certain admirers of architectural eclecticism to express that variety of design which bears upon its face the stamp and impress of thoroughness and originality. It is merely another name for the spirit of the Gothic style in its best form appropriated to the requirements of to-day. The leading characteristics may be summarised as the exhibition rather than the concealment of construction, and the suppression, by lively and vigorous treatment, of everything that jars with utility and effect. The reasons are not very clear which led the constructors of the eighteenth century to follow a style, totally at variance with the well digested principles so ably carried into execution by the cunning artificers of the middle ages; but there can be no doubt that the comparatively recent return to them again with open arms resulted from a keen perception of the value of so rich a bequest and of the unworthiness of the style that had prompted its more immediate recipients to discard it. Constructional and manifest repose, so essential to architecture, is not to be obtained by brick box building. That it is a mode suited to the requirements of people who build without any idea of anything else but satisfying their own common-place wants is willingly granted, but people are not so selfish as all that; and, therefore, the explanation of so much aptitude in brick box building, which the builders of the last century exhibited, must be sought for in the then paucity of qualified architects, in the limited amount of intelligence and skill requisite for running up a brick or plastered domicile, square on plan, and pierced with openings topped by huge splayed headings, and finally in the ease with which the cavalier habit of grafting the high sounding appellation of Italian on so tasteless and crude a structure could be acquired. The hearty welcome that has been for some years past accorded to æsthetic design has not, however, stamped out, as it should have done, the continued evil of brick box building as the environs of most towns too lucidly testify, and until some large hearted capitalists come forward and provide for the masses, blocks of dwellings, fitted with all necessary appurtenances, and designed and decorated externally and internally in accordance with the pure and simple teachings of Art, these boxes with their low ceilings, insufficient accommodation, and dispiriting surroundings will probably exist to disfigure the ground, and to stunt, and dwarf, and nip the buds of artistic blossom as they shoot out of the honest minds of their diverse occupants. Still, the progress that has been made in the gratifying recognition and reception of the principles of design for all ordinary purposes of building, which is evidenced by the great increase in the number of practising architects, must be continued and hastened forward by holding fast to the tenets and maxims of "well building," as laid down by Gwilt and other writers of depth and discernment. It should be observed that

where care has not been shown in strictly adhering to economy of material with due regard to effect, it may be taken for granted that care has likewise been wanting in providing for comfort with due regard to economy of space, and many other similar things might be affirmed to point to the necessity of striving for perfection in design in every direction, and not in one only. It is undoubtedly a good plan to avoid parapets when practicable, since projecting eaves and cornices are more picturesque, much cheaper, and better coverings for the walls, but gable ends, projecting chimneys—recessed and panelled, broken wall surfaces with recessed piers and jamb projectures for lateral strength, windows of varied shape with heads of variegated form, bay and oriel windows, a tiny conservatory rather than none, and a free use of terra cotta and stained glass, are amongst some of the more noticeable features of the animated outcome of modern taste, based on æsthetics. Truth, it must be remembered, is never yielded up. Each material is artistically valued and utilised, and whether in the majestic dome or elegant spire, in intricate vaulting, or in other less imposing details—not forgetting that splendid masterpiece of science, the arched rib, which can be made to span any void—construction is not concealed, but brick and stone, timber and iron, plaster and paint, are all constrained to publish, through the designer's skill, how art and science can force them to proclaim their individual usefulness.

**Æsthetic Illusions.** See OPTICAL ILLUSIONS.

**Æsthetic Ornaments.** Ornaments which depend for effect upon their symmetry, harmony of colour, and beauty, and not upon extraneous associations or aids. See SYMBOLIC ORNAMENTS.

**Æsthetics.** The philosophy of taste and feeling in their art signification. Baumgarten, who is styled the founder of the philosophy of art, gave this name (from Gr. aisthanomai, I perceive) more than a century since to his view of the Beautiful, which he conceived required for its correct apprehension the incitation of the faculty of sense in every possible manner and by every possible manifestation. Schiller subsequently endorsed the same idea in describing the æsthetic quality of anything to be that which relates to our sensuous condition, physically, logically, and morally, inclusively rather than through either way separately. Living artist-psychologists appear disposed to substantiate and extend such subtle doctrine by propounding æsthetics as including in its wide area the occult link which joins mind to matter. Looking, however, at these interpretations, together with others that are to be abundantly found in the writings of various authors, as dispassionately as one can, and giving due consideration to the years of patient labour that have been devoted by so many great minds to the pursuit and elucidation of further associated intricacies, it is obvious that the whole subject of æsthetics is surcharged with a good deal of needless complexity and difficulty that must be swept away before it becomes palatable, either to artists, or to any but enthusiasts. Indeed, Gwilt, in his admirable encyclopædia, goes so far as to observe, "There has lately grown into use in the arts a silly pedantic term under the name of æsthetics, founded on the Greek word aistheticos, one which means having the power of perception by means of the senses; said to be the science whereby the first principles in all the arts are derived, from the effect which certain combinations have on the mind as connected with nature and reason; it is, however, one of the metaphysical and useless additions to nomenclature in the arts in which the German writers abound, and in its application to architecture of least value; because in that art form is from construction so limited by necessity that sentiment can scarcely be said to be further connected with the art than is necessary for keeping the subordinate parts of the same character as the greater ones under which they are combined; and, further, for thereby avoiding incongruities."* Some additional interest may be imparted to these observations by the consideration that architectural writers differ as to what is precisely meant by the term in question. If it is to be explained as the science which treats of beauty without expression, then it is difficult to see the force of any reasoning that advocates the introduction of its principles into architectural design, which, if expressionless, is simply vapid, however rich it may be in abstract beauty of form; yet, where an object—a town hall, for instance—quite devoid of beauty of form, does nevertheless fascinate by summoning into agreeable activity the play both of the imagination and understanding, there, to a certainty, absolute beauty must be present in some condition, though it does not convey to the mind a definite representation of anything. See ABSOLUTE BEAUTY; BEAUTY; EXPRESSION; FITNESS; STABILITY.

**Æsymnium.** A monument erected by Æsymnius, in Megara, to the memory of his countrymen who perished in battle.

**Æthiops Mineral.** A mixture of mercury and sulphur, so called because of its blackness.

**Æthousa.** A porch or entrance to a Greek mansion, covered above, open on three sides, and supported by pillars.

**Ætiaioi.** The names of the stones forming the face of the tympanum of a Greek pediment.

**Aetoma; Aetos.** See FASTIGIUM.

**Affectation.** In architectural composition, the opposite of simplicity. An overdone imitation, or a plethora of contrast. The term also embraces sham or affected simplicity. See SIMPLICITY.

**Affinity.** The chemical force of attraction at insensible distances by which new substances are generated. In all other cases of molecular attraction there is no change of character in the material of the bodies which mutually act upon each other, but when affinity occurs between substances, new ones are formed, possessing very different, and often quite opposite qualities and characteristics. Affinity never takes place without heat being either produced or made non-existent, and it is very much influenced by the action of light.

**Affinity Tables.** The name given to the tabulated forms, showing the degrees of relationship which exclude marriage.

**African Green.** See COPPER GREENS.

**African Timber.** Besides African oak and teak, which are chiefly imported from Sierra Leone for shipbuilding, there are other woods from the same continent, which will probably

* *Encyclopædia of Architecture*, by Joseph Gwilt, F.S.A., &c., Ed., 1867, p. 795.

ere long entice customers in the home markets. Mr. Stanley speaks of the illimitable forests through which he passed in his remarkable travels, and it is said that a careful analysis, drawn from authentic sources, places beyond doubt the fitness of the timber for home uses.* In certain parts of Natal also fine timber-yielding trees are found.

**After.** In painting, sculpture, or design, a word used to signify a work that is not original in conception or mode of execution, but some kind of copy handled after the style of a notable master or piece.

**After Fittings.** See FITTINGS.

**After Gothic.** A name given to the waning Gothic style after its spirit had partially died out, and different vices had become manifest in it. It was of a low spiritless character, but endowed with fertility of invention, for it greatly enriched the resources of architecture, and it can only be called impoverished when its treasury of valuable features is compared or contrasted with the fertile riches of its incomparable predecessor. It is known in England as the Perpendicular style, which gradually merged into the Classic, and when the fusion was complete the compounded style constituted the English Renaissance or Elizabethan style. See PERPENDICULAR STYLE.

**Agalma.** A Greek word signifying a statue of a pagan deity or ornament in a temple.

**Agalmatolite.** The name given to a soft stone used by the Chinese for carving into images, and hence called figure-stone.

**Agaric Mineral.** Chalky carbonate of lime formed in fissures of limestone and clefts of calcareous rocks.

**Agate.** A chalcedonic variety of quartz, with its colours in spots, lines, or clouds. It is very pretty when polished, jasper, common quartz, and amethyst sometimes occurring in it. In ancient times it was used in mosaic work, and much more recently, in this country, in what was called agate inlaid work. The stone referred to in the Bible under this name is in some instances probably the oriental ruby.

**Agatha, St.** This saint is represented in Christian art with her breast lacerated with shears or pincers or holding the instruments of her cruel torture; or she is sometimes holding a salver upon which is a woman's breast, or holding an eye with pincers and a pan of coals by her side.

**Age.** The whole time of the existence of anything up to any period of its duration. In regard to building materials the effect of age cannot be regarded apart from that of the atmosphere. Mortar and cement increase in strength with age, at first quickly, and then slowly, until they eventually become weakened by repeated onslaughts of the weather, or the constant action of forces. It is a moot question at what age trees decay. Oak and chestnut are much longer lived than beech, ash, and sycamore, which rarely arrive at 500 years. The age for felling oak is about 100 years; for felling ash, larch, and elm between 50 and 100; and for poplars from 30 to 50. Spruce and pine are felled in Norway when from 70 to 100 years of age. It may be added that even the age of animals is involved in construction, for glue increases in strength, according to the age of the animals contributing the skins for its manufacture.

**Ageing.** Placing prepared clay, or slip, intended for pottery, under cover for a certain time, to temper and ripen. Fermentation setting in causes the evolution of carbonic acid and sulphuretted hydrogen, and the process generally improves the clay both in quality and texture.

**Agency.** The office or business of a person intrusted with the affairs of others. Some architects of standing incorporate a house and estate agency with their orthodox calling. The argument in favour of this coalition depends for its cogency upon the guarantees which it affords for properly preserving existing structures of merit and for judiciously and tastefully altering them when necessary. The charge for letting buildings for any term not longer than seven years, if the rent be less than £100 per annum, is 5 per cent. on the full rental. For higher rentals a lower fee may be taken. In a lease exceeding seven years, two years' rental may be charged as well as 2½ per cent. on the premium, if any. All agreements, inventories, and schedules are charged for at a guinea or more each, and for managing property and receiving rents 5 per cent is charged on the sums collected. See LETTING BUILDING GROUND.

**Agent.** One authorised to transact business for another. The appointment may be general or special, circumscribed by instructions, or quite discretionary. Responsibility always rests upon the agent to be reasonably zealous in the furtherance of his principal's business. 2. In chemistry anything whose presence determines combination or decomposition.

**Agent's Room.** A room in some mansions for the bailiff or land-steward, adjoining the business room of the master of the house.

**Agger.** A heap made of rubbish, earth, wood, stone, &c., to form a mound or fill up a pit. It may be loose or consolidated by grouting. 2. A rough roadway.

**Agglutination.** Junction by means of glue or other tenacious substance. See GLUE.

**Aggregate.** A body formed by the union of other smaller ones of the same kind. 2. An assemblage of particulars. 3. A term employed to designate the non-cementing ingredient of mortar or concrete.

**Agiasterium.** The sanctuary of a basilican church.

**Agnes, St.** This saint is represented with a sword in her hand or throat, and carrying a lamb, or a lamb is at her feet. Sometimes she is pourtrayed holding the palm-branch, with or without an olive-branch.

**Agnus Dei.** Latin words of mighty import, signifying Lamb of God. The name given to the figure of a lamb whose head is encircled by a nimbus containing a cross, and which bears a staff terminated by a cross. It is the symbol of St. John the Baptist. Whatever views Christians may hold as to the wisdom or utility of such symbols, it would be well were all our hearts fired with the devout love that prompted their introduction.

**Agonic Lines.** The term given by Professor August to imaginary irregular curved lines drawn on the earth's surface through those places where there is no declination of the

* *Building News*, Vol. xxvii., p. 400.

magnetic needle, or where the needle points due (geographic) north and south. Two of these lines of no variation are supposed to exist and move progressively over the globe. One passed through London in 1660, and attained its maximum western variation in 1818, which amounted to 24½ degrees. The needle there, now (A. D. 1878) points about 18° 50′ west of the true north pole, and the variation is decreasing at the rate of about eight minutes annually. See ISOGONIC LINES.

**Agora.** A Greek market place where people gathered to buy and sell, and where assemblies were held and justice administered. It comprised temples, colonnades, and various buildings by which it was surrounded.

**Agrafe.** A French word, meaning a hook, and applicable to any building device having the functions of one. 2. A name given to the ornamental sculpture on the keystone of an arch when representing in some way or other the form or office of a hook or clasp, but, like many other details, its character is often lost through extravagance or too free treatment.

**Agreement.** A term used to denote the conformity and concordance of parts with one another, and the whole both in eurythmy, character, arrangement, and decoration, and comprehending also fitness for the intended object so as to establish completion and completeness.

**Agreement.** In architectural jurisprudence, a contract between two parties, which imposes reciprocal obligations and implies the performance of them on both sides. In many instances an agreement is framed either too vaguely, or with too much severity, thereby attaching to the builder more than a fair share of responsibility. The consequence is that, if the clauses are insisted upon, litigation follows. On the other hand, some agreements are much too minute in certain points, and relieve the builder from contributing a full amount of his skill and special knowledge to the work. Care must, therefore, be observed in drawing out an agreement that it is equitably worded, and as concise as possible, and should it be done by a solicitor, as is frequently the case, the suggestions of the architect may go far to make it perfectly applicable and suitable. At all events, when drawn out, it should be approved of by the architect and the intending contractor, but it is well known that builders often enter into contracts, taking for granted that all is right, whilst quite ignorant of the conditions to which they assent, instead of being perfectly cognizant of them, and holding in their own possession a duly authenticated and signed duplicate of the document. Two copies of the agreement should be always prepared, one stamped and executed by the contractor, the other by the employer, which the builder ought to hold. The architect holds the former. There are three different ways of entering into agreements, viz: by day-work, by measure and value, and by contract, of which the two first will be noticed under their respective heads. Agreement by contract may be either in one sum for all the trades, or for each trade separately. The advantage of the separate trade system consists in each master having only one profit and more skill in his own department than a general builder could be expected to have, unless it happened to be his own trade; but the drawbacks being considerable, including not only the difficulty of defining the limits of each contract, but also more complicated duty on the part of the architect, as well as extra trouble to the building owner in paying many more instalments, it is generally discarded in favour of the lump contract system. This works well where sub-contracting is strictly prohibited, since it is manifest that if it be tolerated where unlimited competition has reduced the anticipated profit of the builder to the least possible dimensions, there can be no honest way left to meet the demands of middle-men. The Form of Agreement, when it includes all the conditions of contract, is sometimes a lengthy document, but often a great part of the conditions are contained in a separate form, and annexed to the specification, in which case measures must be taken to insure that they are legally tied together, and, of course, what has previously been said of the agreement applies to the conditions. The following is a form of contract that may be adopted, with any necessary alterations, when appended to the conditions:—"It is hereby agreed, this —— day of ——, in the year ——, between W. X. (the employer), on the one part, and Y. Z. (the contractor), on the other part, that he, the said Y. Z. (the contractor) for his executors and administrators, doth hereby promise and agree to and with the said W. X. (the employer) to do and perform all the works of every kind mentioned and contained in the accompanying specification, and according and subject to the *conditions* above recited, and according to the plans prepared and referred to in the said specification, at and for the sum of ——— pounds; and the said Y. Z. (the contractor) doth hereby agree to abide by and be subject to the several clauses, conditions, and penalties hereinbefore referred to. In consideration whereof the said W. X. (the employer) doth hereby promise and agree to pay to the said Y. Z. (the contractor) on the certificate of the architect, the aforesaid sum of ——— pounds, in five separate payments, as follows:— one-fifth when the joists of the first floor are fixed, one-fifth when the timbers of roof are fixed, one-fifth when the roofs are completed, floors laid, and the plastering finished, one-fifth when the whole of the works are completed, and the remaining one-fifth within three months of the final completion of the works. In witness whereof the said parties have hereunto set their hands, the day and year first above written." It should be borne in mind that no specification, letters, articles of agreement, documents, or drawings forming part of or referring to a contract, can be received as evidence in a court of law unless duly stamped, though the non-stamping of any particular paper does not prevent the admission of other evidence to prove the fact of its existence, if it can be done without the production of the unstamped article. The correct plan is, therefore, to fasten all the documents and drawings relating to the contract together, and annex them to the agreement at the time of stamping and executing, in which case it has been decided by a court of law that one sixpenny stamp is sufficient to cover all. But the most prudent course to follow, where any complication exists or is apprehended, is either to use a sufficiency of stamps rather than one only, or else to

deposit all the plans and documents when signed, at the stamp office, so that the stamping may be effected by impressment within 14 days of date. The penalty for not stamping is considerable on each plan or paper, which must be paid before putting it in as evidence. £10, with a fee of about £1, is the usual fine. It should be added that the essence of an agreement is that neither party conceals from the other what was essential to be known before it was entered into. If the concealment practised be enough to make the agreement fraudulent, it cannot be enforced, but a court of law must determine whether it was enough. It is necessary to repudiate it as soon as fraud is discovered, otherwise work may be performed under it, and no payment recovered.* See ARCHITECT'S CERTIFICATE.

**Agreement.** The name of the document under which houses are held. Generally it is unsealed, that is to say, it is not a deed. An unsealed agreement, however, though void at law as a lease, may operate as an agreement for repairs. Anyone may charge for drawing one out, but no one except a qualified lawyer can legally charge for a lease or deed, and it is laid down that a lease required by law to be in writing shall be void at law unless made by deed.

**Ague.** A shivering illness produced and aggravated by bad drainage and damp houses.

**Aguilla.** An obelisk or spire.

**Aha.** Generally written haha. A sunk fence, not seen a short way off, formed by digging a trench with sloping sides, and running the fence along the bottom of it. The name originated from the cry a-ha! or ha-ha! ejaculated by people suddenly confronted with the unexpected obstacle.

**Aidan, St.** A crouching stag is the emblem of this saint.

**Aiguille.** A tool used for boring stone.

**Ailantus.** A timber tree yielding a wood which withstands the effects of the weather unusually well.

**Aile or Aisle.** The wing of a building, or the part flanking another, which is generally more important, and separated from it by an arcade or colonnade, but not necessarily. The nave of a church is sometimes incorrectly called the middle or central aisle, whilst the lateral parts flanking it are termed side aisles instead of being simply denominated aisles. It is, however, customary to call a church either a three-aisled or a five-aisled edifice, according to the number of longitudinal divisions into which it is divided by two or four rows of pillars, as the case may be; but though there are many five-aisled churches on the Continent, strictly speaking there are none here. Ala is the Latin name for aisle, and isle, ile, alley, and yle are some of the old ways of spelling it. See AISLE.

**Aileron.** A French term, meaning little wing, and originally given to the termination or half-gable end of the roof of an aisle. When, however, this was treated so as to assume an ornamental contour that occasionally became so excessive as to reach the ground in the form of a large console, or modillion, standing on end, the name was still retained and applied even to similar decorations on a much smaller scale, such as the scrolls and curvilinear ornaments so often to be noticed at the sides of dormer windows. An aileron is shown at A, Fig. 11.



*Fig 11*

**Ailettes.** Pieces of tough leather worn on the shoulders of combatants during the Decorated Period of Gothic architecture. They are found sometimes delineated on monumental brasses.

**Air.** See ATMOSPHERE.

**Air.** Amongst artists, a term applied to a picture, which is said to have air when the objects represented stand, as in nature, well out from the background, and clear of one another.

**Air-brick.** A hollow case occasionally of earthenware, but usually of cast iron, and generally made the same size as an ordinary brick, built into the face of a wall to admit air under floors, into rooms, and to fire-places. The face, which appears outside, is perforated, and often the four remaining sides or frame is cut away or reduced. Special forms and sizes that will bond properly in brickwork are, however, made for prisons and other buildings. Sometimes to admit more air the openings behind are splayed.

**Air-bubble.** A small quantity of air confined in a solid substance. The blown varieties of glass are subject to air-bubbles, especially the description called crown. The best quality of British plate is generally free from them, but, if present, they are exactly spherical, whereas in patent plate they are always oval or irregular in form. The air-bubbles in ice are caused by the absorbed air which the water yields up on becoming congealed. In metal castings air-holes are denominated air-bubbles.

**Air-chamber.** A space under the floor of a room, communicating with the fire-place. 2. The bulb or space near an atmospheric gas burner, in which the air and gas mix before being burnt. 3. A hollow vessel attached to pumps, hydraulic rams, &c., partly filled with air and partly with water. The elasticity of the imprisoned air enables the pump to eject a continuous instead of a broken stream of water. It must be remembered, however, that as water absorbs air, the air-chamber may become exhausted of it, or nearly so, in which case the chamber must be unscrewed, emptied of water, and replaced.

**Air-drain.** Called more properly sky-drain, dry-drain, and dry-area. A narrow hollow space from six to eight inches wide round the external walls of a building made by an outer wall, which prevents the earth from touching the building. It should commence quite as low as the foundations, and requires ventilation and drainage, and ought to be covered in such a manner as to be easily cleaned out. This kind of drain must on no account be confounded with an *area-drain*. An air-drain is correctly an air-flue, which see.

**Air-escape.** A contrivance for enabling trapped air to escape from a water-pipe. A hollow ball is inserted in a top bend of the pipe

* Vide Glen's *Law of Contracts*.

in which a ball-cock acts in such a way that the latter will only keep the air-valve attached to it shut when it floats at a certain level. If the accumulated air in the hollow ball exceeds that for which the ball-cock is set, the level of water is at once lowered by its pressure, and the excess of air escapes through the valve.

**Air-exhauster.** An air-trap which enables air to escape from large pipes, or a contrivance by which foul air can be drawn out of any place.

**Air-filter.** A device for arresting solid impurities of air by causing it in the first place to pass through a fine screen and then to impinge against the surface of water.

**Air-flue.** A channel or tube made in the ground or through brickwork, &c., to conduct either warm or cold air to air-chambers, fire-places, foul-air cases, air-trunks, air-shafts, &c., as the case may be. Sometimes called an air-passage, especially when short and employed for ventilating larders, &c. It is often fitted with grooved frame and slide. See VENTILATING FLUE.

**Air-furnace.** A furnace through which air is conducted by means of a funnel or chimney, in contradistinction to one having bellows or some such apparatus to increase the draught.

**Air-grating.** A perforated iron plate surrounded by a rim or flange and built into brickwork or masonry to admit air. It is of larger size, and of proportionately slighter make than an air-brick, and not necessarily adapted in size to bond with the work. The term, however, is often used synonymously with air-brick.

**Air-hole.** A hole made for admitting air into a building, and usually covered with an air-brick. The name is also given to roof ventilators protected by louvre boarding. In cattle houses they are necessary in the roofs, and are often visible in the walls of barns, &c.

**Airing-yards.** Inclosures attached to prisons and asylums for exercise.

**Air-lock.** A small receiver placed at the summit of a siphon or of a bend in a water pipe to collect the air diffused throughout the water, and which is from time to time discharged by means of a self-acting or other valve. See AIR ESCAPE.

**Air-machine.** A contrivance in a building for introducing, changing, or extracting air. See PUNKAH.

**Air-passage.** An air-flue. 2. A name humourously given to the empty space left in the mortar joint under the thicker bricks when a bricklayer, in using bricks of different thickness, merely "butters" them to keep them down to the same gauge as the thinner ones.

**Air-pipe.** A ventilating pipe attached to the outlet side of a trap or to the conducting pipe of a valve closet for the double purpose of ventilating the pipe and to supply the air requisite to prevent the formation of a vacuum therein that might be occasioned by the rush of water through some fitting in use, and which often sucks out the water from other traps in the same stack of soil or waste pipe. The air-pipe should commence at the foot of the soil or waste pipe, receiving branches from other traps as it ascends. An air-pipe should be attached to the container of a W.C. apparatus.*

* The subject of air-pipes is well discussed in *The Plumber and Sanitary Houses*, by S. Stevens Hellyer.

**Air-plant.** A plant which grows without any nutriment but that derived from the air. The gray, yellow, and brown stains on old walls are produced by minute lichens beginning to vegetate by feeding on the air alone.

**Air-proof.** A floor is said to be air-proof with respect to a cellar ceiling below when the latter is covered with a coat of coarse stuff or rough plastering.

**Air-shaft.** A main ascending passage in large buildings for used or vitiated air.

**Air-slacked; Air-slaked.** If lime be ground and then laid on a floor, and turned over every day with a shovel or rake for a week or so, it will imbibe sufficient moisture from the air to become slaked, and it is then said to be air-slaked. The floor should be dry and properly protected from the weather. Grinding is not essential with fat limes.

**Air-stove.** An enclosed fire-place, into which a stream of cold air passes, and, after traversing a certain course, issues forth warmed and rarefied, communicating to an apartment a genial temperature.

**Air-strainer.** See AIR-FILTER.

**Air-tight.** Impermeable to air. In ordinary glazing, the putty renders the squares air-tight, but the same end is accomplished with large squares of plate-glass by means of leather and screwed fillets. In the case of grooves in stone, strips of india rubber or other elastic material should be fixed in the grooves, or the glass may be bedded in putty made partly of olive oil, the grooves being first sized to protect the stone from becoming stained.

**Air-tint.** In painting, the imitation of the effect upon the magnitude and colour of objects, which is produced by the density and transparency of the air. It often takes the form of a bluish gray tone.

**Air-trap.** A device for preventing contaminated air from escaping out of a drain or sewer whilst liquid enters it. It usually consists of a double bend in a pipe, or some equivalent arrangement, whereby enough water is always retained to lock or trap the foul air against escape. Rounded traps are more cleanly in operation than rectangular ones. The air-trap, however, to be quite efficacious ought always to be assisted by an air-pipe.

**Air-trunk.** A small air-shaft, or large pipe or tube placed as upright as possible, to convey away, without draught, heated or vitiated air from a theatre, public-room, hospital ward, &c.

**Air-vessel.** A contrivance fixed to force-pumps, and often made of copper to remedy the defect of an intermittent stream. The reaction of the confined air in the vessel forces the water steadily forward whilst the pump plunger is preparing for another stroke. See AIR-CHAMBER.

**Aislaby Stone.** A warm light brown sandstone, weighing about 127lbs. per cubic foot. It is quarried near Aislaby, Yorkshire.

**Aisle.** In modern religious edifices a name often given to any passage between rows of seats.

**Aisled.** Furnished with aisles.

**Aisle-lights.** The openings between the mullions in the windows of aisles.

**Ajambe.** The French term for a window having one or more mullions crossed by a transom, and a sash hung on hinges with

fastenings complete in every division so formed.

**Ajutage.** A tube through which water is discharged, such as the spout of a funnel, or the piece fixed to the aperture of a fountain to give to a jet any desired play.

**Ala.** An old term for aile, which see.

**Alabaster.** The name of a carbonate of lime, deposited as stalagmites, and constituting a marble, often variegated with beautiful colours, called sometimes for the sake of distinction oriental alabaster, and the name also of a white or coloured gypsum or hydro-sulphate of lime, which is readily turned and cut into vases and vessels and various ornaments of more or less merit. When gypseous alabaster is quite pure, it is spotless white. The finest is found only in Italy, and is there manufactured into very beautiful works of art, but screens and other fine works are also produced in it in this country. The common kinds of alabaster are burnt to make plaster of Paris. Composition:—sulphuric acid, 46½; lime, 32½; water, 21.

**Alabastron.** The name of a village in Egypt, after which, it is said, alabaster is called. See ALABASTRUM.

**Alabastrum.** The ancient name of a box or vase for holding perfumes and precious ointments. It was also callen Alabaster and Alabastron.

**A la Grecque.** A fret ornament used in cornices, floor-cloths, pavements, &c., formed by a series of right angles, like an embattled fret, and copied from ancient pavements, or an ornament with a rounded and notched outline produced by twisted strips or ribbons.

**Alarm.** A contrivance for giving audible warning. A burglar-alarm consists of something that can be easily attached to a door or window, so as to make a noise when disturbed by any but lawful means. A gas-alarm calls attention to an escape of gas, and a fire-alarm, by the destruction of suspension cords or the absorption of heat by an apparatus, gives loud warning in case of a conflagration.

**Alarm Bell.** A loud toned bell easily accessible to the inmates of a dwelling for sounding an alarm. One judiciously placed and easily rung dispenses to a certain extent with the necessity of strict attention to house fastenings. See DEPREDATION.

**Alarum.** A word of the same meaning as alarm, and applied to various articles for audibly calling attention to time and occurrences.

**Alba Creta.** White chalk. The term, however, was applied by early writers to gypsum.

**Albano Stone.** A greenish brown stone, now called Pepperino, from the resemblance it bears to powdered pepper, once held in much favour by Roman builders. It is of volcanic origin, having undergone intense heat, and was ordered by Nero to be used for facing purposes after the great fire which occurred in his reign. The blocks were united together with metal cramps.

**Alban, St.** The emblems which accompany the representation of this saint, who is usually depicted as carrying his head between his hands, are a cross, a sword, and a crown.

**Albarium Opus.** The Latin name for whitewash, and, perhaps, for the plastered surface as well. Marble was used by the Romans in plastering. Masons' chips were pounded, and, after being well sifted, the coarser particles were used up with sand and lime, the finest being worked in last, which brought the surface to a fine polish.

**Albite.** A mineral similar to feldspar, excepting that it contains a good deal of soda, say 9 per cent. When albite is a constituent of granite, instead of feldspar, it often causes the rock to be light coloured.

**Album.** Anything white. Amongst the Romans a white tablet, or white part of a wall, on which the prætors published their edicts, and the pontifex registered the remarkable events of the year. In mediæval times it was a name given to a register or catalogue.

**Albumen.** A nitrogenous substance which forms the chief part of the solid constituent of blood, and which occurs in the organs of animals and in almost every part of vegetables. Its exact composition is not known. Vegetable albumen exists in timber, especially in that part of it called sapwood. It can be coagulated by creosote, which renders it insoluble in water, and therefore capable of resisting the detrimental action of intermittent wetness. Chloride of mercury (corrosive sublimate) also coagulates it.

**Alburn.** The old way of spelling auburn, the name of a saffron tint.

**Alburnum.** Sapwood, or the part of exogenous trees situated between the bark and the heartwood. It is usually soft, or bluish, pale or white, even if the heartwood be dark, as in ebony. It is the part of the tree where the vegetable liquids are active, and consequently the timber thereabouts is not so consolidated or durable as the duramen or heartwood. This, however, takes time to completely mature, and therefore the line of demarcation between the two kinds is not always clearly defined, whilst in some cases, as just remarked, it is at once evident. The relative proportion of sapwood in firs, oaks, and chestnuts when full grown is nearly as the numbers 4, 3 and 1. Blue-wood is a name sometimes given to it.

**Albus.** An old name for white lead.

**Alchymy.** A name given by old painters to yellow orpiment after an orange hue had been imparted to it by heat.

**Alcohol.** A colourless limpid liquid of pungent and agreeable taste and odour, and very inflammable. It consists of 12 parts of carbon, 3 of hydrogen, and 8 of oxygen. It has never been frozen, has great attraction for water, and is a powerful solvent, dissolving resins, essential oils, and other organic substances, which renders it useful in spirit varnishes, and in forming drying oils and colors. By its means gamboge is made useful to the artist.

**Alcoran.** A Persian name for the tall, slender, and elegant tower attached to a mosque, and usually called a minaret.

**Alcove.** A word derived from the Arabic, meaning a tent, and usually applied to a projection from a building with a curved or coved roof, or to a recess at one end of a room formerly very common in France, Spain, and Italy, when the size of the apartments rendered it necessary for warmth to close off a portion during repose. Though no longer in fashion in this country for sleeping purposes, owing to difficulties connected with its proper ventilation, it can often be made a welcome feature in the design of the bedroom, provided the bed is not placed therein. With a window of its own it consti-

tutes an excellent dressing room, and may be taken advantage of in some instances to be utilised as a kind of improvised sitting room. A recess at the end of any day room is now called an alcove when not too insignificant. The word also is used for an enclosed garden seat.

**Alder.** A tree of the genus *Alnus*, furnishing a wood of little use to the builder, excepting for work under water, where it lasts a long time. Its texture is fine and close, and it is much esteemed by cabinet makers. The Romans employed it for piles.

**Aldine Letter.** In signwriting, a deep and narrow letter, with serifs, suitable where a long inscription has to be written.

**Aleatorium.** In ancient Roman architecture, an apartment appropriated to players at games of chance.

**Ale-bench.** An ale-house bench.

**Ale-house.** See PUBLIC HOUSE.

**Aleois.** Loopholes for the discharge of arrows.

**Alexandrian Period.** The age during which Alexandria in Egypt was the home and centre of learning and science in the ancient world. Greek ornamental forms were elaborated, the simple serpentine scroll was introduced, and the practice of carving instead of painting the ornament initiated.

**Alexandrinum Opus.** The name given to a style of mosaic church pavement introduced from Alexandria at about the time of Constantine the Great, and which continued in use in Italy and elsewhere up to the thirteenth century. It was executed with tesseræ of porphyry, coloured marble, and other valuable materials in geometrical patterns, formed sometimes by cutting grooves in white marble pavement slabs.

**Alexis, St.** This saint is sometimes represented lying upon a mat, holding a letter, and dying. At other times he appears garbed as a pilgrim with a staff.

**Al Fresco.** In the open air.

**Algebra.** A word of Arabic origin, signifying the science which reasons about and operates upon quantities, by means of letters, signs, and symbols.

**Alhambra.** A Moorish citadel of Granada, Spain, containing the remains of a once beautiful palace built and decorated in the 13th and 14th centuries in the Spanish Saracenic style, comprising columns and characteristic arches, pavements and decorated fragments of surprising and unexcelled richness. The remains indicate that great attention was paid to the ventilation of this superb edifice.



*Fig.12.*

**Alhambraic; Alhambresque.** Other names for the Moresque style according to some; but more correctly these terms should be confined to embellishments analogous to those of the Alhambra. Fig. 12 represents part of a wall border from a plaster cast taken from the walls of that building. It gives a good idea of the special kind of ornament—stripped, however, of the usual gorgeous polychromatic mantle—which the fertile genius of its clever decorators so abundantly diversified.* See MORESQUE.

**Alien Priory.** A cell or dependency to a foreign monastery.

**Alignment.** A laying out or regulating by a line, or the line according to which a row of buildings must be laid out.

**Alipterion.** The place in the Palæstra where the Roman athletes were anointed with unguents, by which vigour and suppleness were imparted to the limbs.

**Aliquot Parts.** Those parts of a number that will divide it without remainder. For instance, 10, 5, 4, and 2 are aliquot parts of 20.

**Alive.** A state of motion or action. In colouring, cleaning paint, &c., a workman keeps alive his washes when he manipulates them so as to prevent their becoming prematurely dry.

**Alkalies.** A class of substances distinguished by combining readily with acids, and by changing vegetable blues and yellows into greens and browns respectively. Soda is called the mineral alkali, potash the vegetable alkali, and ammonia the volatile alkali. Lithia, the remaining one, is not particularised. Alkalies are useful in testing stone. See BED. They are present in brick clays, and potash and soda, combining readily with silicic acid, always produce a good hard vitreous brick when in proper proportion. Alkalies also have the property of destroying and decomposing woody fibre.

**Alkanet.** The name under which is sold the root of the *anchusa tinctoria*, which flourishes in the Levant and south of France. It gives a beautiful crimson colour to pure alcohol, wax, and oils, and is used for staining woods.

**Alkoranes.** See ALCORAN.

**Allegorical Figures.** Representations of persons and things to represent an allegory. They are common on sarcophagi and amongst the works of the great masters. Subjects, however, that are of themselves rich in significance rarely require allegorical treatment.

**Allegory.** In art, a fanciful explanation of one thing by the representation of another. It produces the intended effect upon the beholder by exciting admiration through beauty of form. Allegory is allegorically pourtrayed by a feminine beauty involving herself in a veil.

**Alley.** A thoroughfare for foot passengers only, leading directly to the doors or gates of tenements. It is generally narrow. See AILE.

**Allotment.** A part, portion, or place assigned or appropriated. When an estate is divided into building allotments, great care and judgment are necessary so to arrange them, that after portions have been built upon, the remainder may still present the attractiveness which proceeds from eligibility and good situation.

**Allowances.** In measuring, certain additions to materials made in consideration of labour. When work is measured "full," it is supposed to include allowances for omissions in the case of small and difficult particulars, but these ought properly to be dissected and as accurately described as the more simple kinds of

* The engraving is a fragment from one of the many excellent plates in Cundall's *Examples of Ornament*.

work. Charges for cutting and waste are preferable to allowances included in an extra quantity of material. Sometimes in painter's work the superficial area to be painted is taken from the joiner's bill, and one-seventh added as an allowance for the edges. In the gasfitter's bill an allowance is sometimes necessary, for making good after his work, in all trades. When plates are bedded in walls, and no brickwork is laid over them, two inches are allowed in the height, but no allowance in materials should be made for difficult or laborious portions of a job. In plumber's work everything must be minutely particularised, no allowances whatever being admitted. There are, however, various recognised allowances in tiling, slating, and other trades, that do not come under the same category as those which directly result from measuring laxly.

**Alloy.** A mixture by fusion of different metals. It is supposed that most metals can combine with each other in definite proportions; but as they dissolve in all proportions, it is far from easy to determine what they actually are. Unless chemical combination occurs during the time the metallic mixture is melted, most likely the metals remain uncombined, though intimately associated after solidification. See BRASS; BRONZE; SOLDER.

**Alloyed.** Reduced in purity and quality by the addition of inferior or cheaper metals.

**Allusion.** In works of art, a hint at something not expressed, but which is intended to be made clear to the mind by the allusion.

**Alluvial.** Added to land by the motion of rivers and the action of floods, &c. Alluvial deposit is the matter thus transported, consisting usually of sand and gravel and mud. At some parts of the coast the cliffs are composed of alluvial drift, and, opposing only a weak bulwark to the furious waves, are year by year battered and broken, and finally powdered and carried away in particles by the ever restless tides, to form elsewhere new and shelving banks and shoals. On the other hand, the alluvial formations of bygone days are now yielding, in rich abundance, the necessary ingredients for the manufacture of Portland cement.

**Allye.** An old term for aisle or aile.

**Almariol.** The same as almery, which see.

**Almarium.** See ARMARIUM.

**Almehrab.** A niche in a Mahometan mosque pointing in the direction of Mecca, and intended for praying in.

**Almery; Ambry; Ambre; Aumbry.** Old English terms for a locker in a niche in the wall of a church near the altar, or for a small cabinet of wood, used for the purpose of holding the sacred vessels, relics, deeds, vestments, and such like things. In monasteries the same term was applied to a locked-up cupboard, containing various simple articles required by the monks.

**Almond.** Pieces of rock crystal cut more or less in shape like an almond, and attached to glass ornaments, and especially those which adorn branch candlesticks, are called almonds. See EGG AND TONGUE.

**Almond Black.** A black pigment prepared from charred almond shells.

**Almond Tree.** In Christian art, the symbol of the Annunciation of the Blessed Virgin Mary.

**Almonds, Oil of.** An aromatic substance obtained by digesting bitter almonds in water. A mixture of one part of camphor and two parts of this oil applied to steel goods will prevent rust.

**Almonry.** The house or building in which alms used to be distributed, and where the almoner lived. In abbeys and monastic establishments it was usually situated near the church, and on the north side of the quadrangle. At other times it would be near the gate-house. More correctly the word signifies a repository, which contained collected fragments of victuals intended to be given to the poor.

**Alms-bags.** Bags of different forms used for hand to hand collection in religious edifices, and made of cloth or velvet, with or without embroidery, and sometimes having highly ornamented turned or carved handles.

**Alms-basins.** Basins of metal or wood variously carved or chased for collecting offertories.

**Alms-basket.** A vessel appropriated to receive alms.

**Alms-box.** A box, often of fanciful shape, and with a small slot in the lid, hung on the walls of churches and other buildings of public resort, to serve as a ready receptacle for alms.

**Alms-chest.** The proper name for an alms-box in a church. It is kept locked, and is either suspended from a nail or supported by a pedestal. It is usually made of oak, with occasional inscriptions and wrought iron embellishments, and, like other ecclesiastical work, is sometimes to be met with exquisitely carved. It is often called poor-box or alms-box.

**Alms-dish.** An alms-basin of large size. It is sometimes magnificent in design and workmanship, and as much as two feet in diameter.

**Almshouse.** A building intended for poor and aged folks. In its design thoughtfulness is needed, lest the particular wants of the infirm should be overlooked. No stairs, easy and accessible means for opening and closing windows, and rustic porches to hold seats in fine weather and to protect the doors in wet, may be named as likely to conduce to the home comforts of aged people.

**Alnus.** See ALDER.

**Aloes.** A hardened juice derived from aloe plants, and of some use in the arts. Employed as a varnish, it protects wood from the attacks of insects, and, mixed with turmeric and lac-varnish, it makes a good lacquer for brass. The leaves of the Socotrine aloe yield a beautiful violet colour applicable to dyeing, and requiring no mordant, and from the same plant is obtained another colour useful in painting.

**Aloring; Alorynge.** The parapet wall of an alur or gutter.

**Alour.** An old form for alur.

**Alphabets.** A general term for letters in any style or shape arranged in their proper sequence. In signwriting many alphabets are in use, so that almost any form or style of letter can be selected which may be thought appropriate either to the nature of the inscription or to the space at the writer's command.

**Alphege, St.** This saint, in Christian art, is represented with his chasuble full of stones.

**Altar.** A high place, pedestal, or stand on which in ancient times sacrifices were offered. Apart from those built unto the true and only

God and dear to believers, which are mentioned in Holy Writ where all that is necessary to be known concerning them may be found, others existed which the promptings of man's heart caused to be built to propitiate the Unknown, or to win the favour of false and imaginary gods whom they vainly acknowledged, "for all the gods of the nations are idols; but the LORD made the heavens."* These altars, as might be expected, widely differed, according to times and various degrees of civilisation, some being square and others round, whilst the materials of which they were built included stone, brick, wood, and metal. As regards their decoration, it has been asserted that they afford some of the best specimens of sculpture extant. In the Christian Church the term is sometimes given to the communion table, which during the first 500 years was generally of wood, being originally the ordinary table found in upper chambers or in other places where Christians assembled. At the expiration of this period, or thereabouts, it was decreed that all altars should be of stone, and up to the time of the Reformation, those of the English church consisted of a slab supported by pillars, or brackets, or by masonry either solid or made hollow like a tomb, or otherwise, so as to receive relics or the remains of saints. The idea of combining a tomb with an altar appears to have originated either from the Eucharist having been celebrated at the tombs of the martyrs, or from the desire of representing by the tomb faith in the human nature of our Lord and Saviour. The Latin church has always considered, from the period already indicated, a stone slab to be essential to an altar, and this slab is usually marked with five crosses in allusion to the five wounds of our adorable Saviour. The high or principal altar is always isolated or detached from the wall, and often raised on a platform and approached by steps. Its decoration consists of sculptured and painted ornament. On the other hand, the altars of the Greek church, whose edifices are often very splendidly decorated, are devoid of ornament. In the year 1550 movable tables of wood were ordered to be set up in English churches instead of the universal stone altars, which were all directed to be removed. Some churches at this time possessed several altars. These or others were re-erected in the reign of Queen Mary, but they were again swept away and nearly all destroyed in the subsequent reign, or by the Puritans. The communion tables which replaced them were usually made of oak and but little ornamented. See ALTAR SLAB; ALTAR TABLE.

**Altar Candlesticks.** Instruments for holding lights, and reckoned by some to be part of the furniture of the Christian altar.

**Altar Cloth.** A cloth of silk or velvet, or other decent stuff, depending in value upon the wealth of the congregation, which covers the altar in a church.

**Altar Desk.** A sloping rest for a book upon an altar. It is usually portable, and made either of metal or oak.

**Altar Piece.** A painted or sculptured decoration, when not expanded into a reredos, above and behind an altar.

* Psalm xcvi, 5.

**Altar Rail.** A fence between two and three feet in height, probably introduced by Archbishop Laud to protect the communion table from rude approach. This prelate, finding on one occasion the altar screen broken down, and a table set up in the nave, ordered a rail to be fixed round an altar table placed in the chancel. The custom became general, and though the rails were in almost every case destroyed by the Puritans, there is now scarcely any church without them. They are not, however, often found in private chapels. In specifications it is usual to direct them to be executed simply in accordance with the drawings. It is called also COMMUNION RAIL.

**Altar Rail Standards.** The upright pieces, which, together with the handrail or capping, form the altar rail. They are to be obtained in almost any design, with caulkings, or drilled bases, &c., complete, and ready for fixing to stone or wood floors.

**Altar Screen.** The partition, or screen, dividing the choir from the Presbytery and Lady Chapel. It naturally forms the back of the altar. Some examples are rich in exquisite carvings, statues, and tabernacle work, and exhibit throughout profuse ornamentation. A door used to be almost invariably placed on each side.

**Altar Slab.** A thin and whole piece of stone called mensa, which formed the top of an altar for several centuries in English Christian churches before the Reformation, and also during Queen Mary's reign. Returns were made by the churchwardens of the different parishes by order of Queen Elizabeth in 1566, stating what had been done with the altar slabs, which had been replaced by wooden tables. It appeared that many were broken and paved in in the churches. Some were used unbroken for paving, others were used for repairing bridges, to mend roads, to make sinks and hearths, and some were buried out of sight. A curious and rare description of altar slab had within it a little cavity called "the sepulchre." Usually this cavity—containing relics, particles of the Eucharist, or grains of incense—was situated in the body of the altar, and covered by a seal, or by the slab acting as one, in which case the slab at the consecration was raised and lowered into its place, the bishop having to ascertain that the seal closed the cavity. Occasionally, however, the sepulchre was situated in the front edge of the slab itself, and then the bishop had only to place the seal, which consisted of a thin piece of stone, about a foot square, in position. The condition of the sealed cavity was always a point of importance, and if it happened to be broken or the cement disturbed the altar was reconsecrated. Slabs holding the cavity have been called sealed altar slabs.*

**Altar Table.** A name sometimes given to the communion table, of which Fig. 13 affords an illustration.† It is commonly made of oak, pitch pine, or stained deal, and when of the former is occasionally to be met with beautifully carved.

**Altar Tomb.** A modern name for high tomb. It is a raised monument, in shape like an

* See a Paper by the Rev. W. H. Sewell, in vol. viii. of the Norfolk and Norwich Archæological Society.

† The engraving is taken from Messrs. Cox and Sons' Illustrated Catalogue of Church Furniture.

altar, and frequently with recumbent effigies on the top. Some erected in the Early English Period have low pointed arches over them constructed in the thickness of the wall. Others are ornamented with armorial bearings and small statues in canopied recesses, the whole having canopied coverings, with plain soffit, surmounted by gables. Others again have plain pedimental shaped canopies sculptured over the heads of the effigies, with seated guardian angels. In the Decorated Period the altar tombs have their sides covered with sunk recesses with foliated arched heads often containing figures. Sometimes the arched canopies have pyramidal pediments variously enriched and the recumbent effigies elaborately painted. The soffit of the arch is either plain or groined, and often richly so. In the Perpendicular Period the altar tombs still have panelled sides, and some are in arched recesses with most elaborate canopies, having their soffits covered with tracery. Flat testoons are placed over some tombs, so as to appear occasionally quite distinct. They are usually of wood, with moulded edges and embattled top. At the latter part of the period the canopy is obtusely pointed and surmounted by a horizontal cornice with armorial shield, the cornice being completed at the top with a row of Tudor flowers. The spandrils of the arch are filled in with panelled

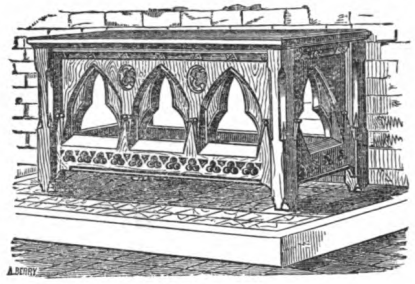


*Fig.13.*

tracery, and the mouldings richly cusped. The effigies are of alabaster or marble, and often richly painted, but subsequently the tombs become plain and the effigies emaciated. From about the middle of the sixteenth century the sides of the altar tombs are often covered with scroll work, arabesques, and shallow panellings. They are sometimes placed beneath circular arcades, with richly panelled soffits, supported at the angles by columns of the orders, having cumbrous and highly ornamented entablatures, or else the tombs are surmounted by ponderous flat and square canopies, whose entablatures, weighted with obelisks, &c., complete the immense load patiently borne by the supporting columns.

**Altar Window.** A name sometimes given to the window in a church immediately behind the altar.

**Alterations.** The term which comprehends in new work all deviations from any design which do not necessitate clear additions or omissions, but which merely comprise a change in the mode of executing details and finishing off work. At least such appears to be a not very improper definition of an elastic term, and, as an illustration, the substitution of a bay for an ordinary window might be said to entail an addition, whilst a change from a sash window to a casement is more correctly an alteration. When, however, the term is taken to mean addition to, or diminution of work contracted for, a clause in the agreement should provide a way by which the proper allowance or charge for them may be computed. In old work the term has a more extended signification, for it includes rearrangement which may involve either additions or pulling down, or both.

**Alternate Angles.** When a straight line cuts parallel straight lines, the angles on opposite sides of the cutting line, but which are not adjacent, are called alternate angles, and they are always equal to each other.

**Alternate Tint.** A double tint used by draughtsmen, and formed by applying alternately two colours in such a way that the edges blend. A brush for each tint is necessary, and before one colour is allowed to dry, the brush charged with the other must be run along its edge, the process being repeated as often as necessary.

**Alternation.** The reciprocal succession of the features of a design, and of ornamental details. It is the simplest property of all abstract beauty of form, and consequently is very easily effected by unequal or equal spaced repetition, and is almost universally practised.

**Altitude.** The height of any point of a terrestrial object above the plane of the horizon is the altitude of that point. An altitude is said to be accessible when a perpendicular let fall from the point to the horizontal plane can be reached, and inaccessible when it cannot. The theodolite is occasionally used to measure altitudes and depressions, and also for finding the altitudes of stars for determining the angle which the meridian makes with a principal station line of a survey. At sea the sextant is employed for taking altitudes. When the altitude of clock-dials, statues, and other ornaments is considerable means must be taken to conform their dimensions to it.

**Alto-relievo.** See BASSO-RELIEVO.

**Alum.** A double salt formed by the combination of sulphate of aluminium with a sulphate of one of the alkalies. The common alum of commerce is the double sulphate of aluminium and potassium. Alum and white of egg form an insoluble substance known to the ancients, and used by them in works of art. Alum and plaster of Paris mixed with water and allowed to dry becomes very hard. A small piece of alum keeps flour paste sweet. It is also used by the Japanese to bronze brass, which is effected by boiling it in a solution of verdigris, sulphate of copper, and alum. See ALUM WATER.

**Alumen.** The mediæval term for alum, and the Roman name for vitriol as well as alum. The Romans were acquainted with alum, for they used it to secure wooden buildings against fire.

**Alumina.** Sesquioxide of aluminium, and, when pure and amorphous, a white and tasteless substance. When exposed to heat uncombined with a flux it is one of the most infusible things known, but it is readily melted by fuel containing substances which combine with it chemically. Emery, the sapphire, and the ruby are nearly pure crystallized alumina. See ALUMINIUM.

**Aluminate.** Trihydrate of aluminium, with its hydrogen, replaced by a metal.

**Aluminate of Potass.** A small proportion of this substance, added to silicate of potass, and to avoid gelatinisation, quickly mixed, and applied to timber in danger of ignition, will considerably retard the progress of flame.

**Alumine.** The same as alumina.

**Aluminium.** A metal nearly as white as silver, but of a bluish tinge, and of remarkably low specific gravity (2·6), occurring plentifully in nature in feldspar, &c., in the form of silicate. Clay, which is essentially a silicate of alumina, has its origin in the decomposition of feldspar, which, under certain circumstances, and by the action of the atmosphere, becomes changed into soft earthy matter, rocks being sometimes disintegrated to a great depth by such means. The exact conditions of the conversion of feldspar into clay are not known, but it is clear that silica and alkali are abstracted from it during the metamorphosis.

**Aluminium Bronze.** An alloy of copper and aluminium, possessing a strength double that of bronze, greater than that of wrought iron, and with a resistance to compression excelling that of ordinary cast iron. It is expensive, but its freedom from rust, its lightness, and its strength and stiffness, adapt it for large chandeliers suspended from a great height, as well as for surveying instruments, &c., in tropical climates. Average tenacity 73,185lbs. per square inch.

**Aluminum.** The same as aluminium.

**Alum Water.** A solution of alum in water. Keene's cement is prepared by soaking plaster in it, and then re-burning and grinding. Alum water made by dissolving about 3lbs. of alum in ten gallons of tolerably hot water is sometimes used for washing over the rubbed down face of white brickwork to insure a uniform appearance before pointing, should any discoloured sand-made bricks have been worked in.

**Alur; Alure.** A gutter, passage, or gallery anywhere behind a parapet, for persons to walk on. The term has been applied also to a roofed-in part of a street.

**Alvearium.** A range of beehives, or an apiary, in ancient Rome.

**Alveolar.** Containing sockets or cavities.

**Alveus.** A stone cistern used by the Romans for bathing in.

**Amaasa.** Pieces of glass used in enamelling and in some descriptions of mosaic work.

**Amalgam.** An alloy of mercury with another metal. In silvering mirrors an amalgam of tin is used.

**Amalgamated Zinc.** Zinc washed in diluted oil of vitriol and then rubbed over with mercury is so termed.

**Amandola.** A green marble having a honeycomb appearance.

**Amasette.** A French term for a horn instrument used in grinding colours.

**Amateur.** One who cultivates a knowledge of the fine arts, or an acquaintance with any trade or calling, from predilection, or for pastime, and not through professional compulsion, or with the object of pecuniary profit.

**Amateur Architect.** A term more or less applicable, as a distinctive cognomen, to one who never having been placed with an architect at the head of an established practice in order to acquire his professional education in the usual manner, and in the way recognised by the profession, has simply added to some other calling, such as that of an auctioneer or builder the pursuit of an architect, trusting often to the services of draughtsmen, &c., for designs and the elaboration of plans. The much talked of architectural diploma would doubtless have the advantage of indicating that its holder was beyond yielding to the allurements of other branches of business, whilst it might offer significant impediments to tradesmen who were anxious to perform an architect's functions without due qualifications. The irregular assumption of the affix of architect is, from many points of view, a serious matter, and though, probably, there are instances where natural genius and considerable theoretical attainments have vindicated the act, it is a proceeding little calculated to raise improper parties in public estimation. There is this to be said, however, that what may be true of a man as to ability and qualification when, in a sort of borrowed plumage, he thus starts a practice, may be utterly unfounded ten years afterwards, for so much can be accomplished by hard work and pertinacious application during that period, that he who at the commencement was untutored and incompetent, may be at its close, not only quick and clever, but sufficiently devoted to, and master of his profession, as to complacently defy any one of his subordinates to defeat him with pen or pencil. It may be further observed that notwithstanding that most men pleasurably associate increase of years with a corresponding augmentation of grasp over the more difficult branches of their work, and are ready to admit that practice and experience impart to their disciples annual increments of golden knowledge, it requires no slight effort for any practitioner to forego patronage, and to refer a client to an older professional brother, on the ground that an additional ten years' experience will conduce to a better digested design, and to a more precise and discriminating interpretation of the client's wants for any proposed outlay than his own more limited experience could afford. Not only do the exigencies of life plainly prohibit such a procedure, but it is fallacious to suppose that men can, as a rule, rise beyond a certain personal limit of proficiency, no matter to what age they may live after it has been once reached. But, more correctly, the term amateur architect is applied to one of a class of men who do not practice as architects, but who simply meddle in matters architectural, holding sometimes extraordinary views of their prolific endowment by nature of all necessary ability to devise plans, and to put ideas sufficiently into shape to run all kinds of buildings up as well as to re-cast the drawings of ancient structures. This presumption often arises either through the ill-advised flattery of acquaintances, or it is the fruit of much conversation with operatives and builders who, through a desire, perhaps, to humour a crotchet, and knowing that almost anything can be achieved now-a-days in the building line by a free use of iron and cement, do not fail to declare that such and such plans and ideas are excellent, and require only trifling, if any alteration for safe and economical execution. The consequence probably is that the completed structure is not what the amateur in-

tended it to be, nor what the tenant approves of —that internally, the kitchen and parlour, the front and back stairs, &c., would have been better reversed, and so on, and that externally, notwithstanding that the importunity of a few friends with better taste, who privately saw the drawings, induced the amateur to change the chimney pots, balconies, barge-boards, and cornices, it yet simply remains a sorry spectacle, inviting no vestige of admiration from passers by. As a rule indeed, and of course excepting some gifted and accomplished amateurs, who are naturally modest and diffident as to their powers, the amateur architect, besides being thoroughly ignorant of the three great constructive principles, Simple Repose, Equipoise, and Tie, is exceedingly troublesome to the professional man when he condescends to consult him, often giving more or less imperative instructions, and approaching him with suspicion rather than with the manly feeling engendered by proper confidence in another's ability and intentions. Young architects require to be particularly on their guard against being swayed by the conceited notions of such clients, for if error or abortion result from yielding correct principles to plausible argument, the brand of disgrace will always attach itself to the professional and not to the amateur.

**Amateur Criticism.** Judging with independence and propriety of the excellencies and imperfections of a structure of any pretensions, or of any work of art, by a connoisseur of refined and cultured taste. It is supposed, and with reason too, that, apart from technical points, the amateur is better able than the professional critic to judge of abstract art in matters pertaining essentially to imagination and feeling, since there are no arbitrary rules of distinction, dependent upon dexterity of manipulation, as to the means by which taste and perception can be cultivated, nor is there a different medium through which impressions reach the imagination of the artist and amateur. The latter is perhaps less liable to the insidious innovations of individual style and handling, which too frequently beget a more passionate regard for the master-pieces and composition of certain schools than an absolutely impartial and competent judgment is disposed to yield. See CRITICISM.

**Amatito.** An old word for red ochre, or red hæmatite.

**Amazons.** The representation, in Art, of the male sex in female configuration.

**Amber.** A fossil resin, found on the shores of the Baltic and other Russian waters, in Japan, &c., soluble in hot linseed or nut oil, and in the vapour of spirits of turpentine. It is much used in the manufacture of varnish that is required to resist boiling water and to be, in other respects, tolerably invulnerable. Some consider that amber is produced by the decay of wax, and others that it is an indurated vegetable juice. In colour it ranges from pale straw to a rich orange, and besides its use in varnish, some beautiful art carvings are produced in it by amber workers. Amber has been styled the "gem of the sea."

**Amber, Yellow.** A continental ochreous pigment, which is of an amber colour when raw, but brown red when burnt.

**Ambit.** Perimeter or periphery.

**Ambitus.** A space surrounding a tomb, but in subterranean tombs a niche or recess, sometimes highly decorated, in which the urn or body was placed in the wall.

**Amblygon.** An obtuse angled triangle.

**Ambo.** A pulpit or reading desk ascended by two steps, and apparently arbitrarily placed in primitive churches, so far as exact position went, for the best convenience of those hearing, reading, and expounding the holy scriptures. It is still met with in Roman and some Oriental churches Ambones had two entrances, and were two in number in the Roman churches, each being of marble, but of somewhat different form.

**Ambrose, St.** One of the four doctors of the church, and represented in the costume of a bishop, and holding a beehive or a scourge.

**Ambry.** See ALMERY.

**Ambulacrum.** A place for exercise sheltered by trees.

**Ambulatio.** See PTEROMA.

**Ambulator.** The same as Perambulator. An instrument for measuring distances, and used in surveying. See ODOMETER.

**Ambulatory.** A place to walk in. A cloister or gallery.

**Amel.** An old word for enamel.

**Amelioration, Social.** An expression frequently used to signify improvement in the abodes of the humbler classes. The erection of refuges, homes, workmen's dwellings in large and commodious blocks, improved cottages, public libraries, workmen's institutes and clubs, &c., all tend to its evolution.

**Amenities.** The pleasantnesses and delights arising from an appointment or situation. The word is usually employed in an ironical sense to express the gratuitous, though innocuous abuse often heaped upon architects of important works by ignorant or interested parties.

**American Architecture.** Owing to the comparative neglect of Art in the United States through the absorbing pursuit of science, politics, literature, and legislation, no distinct national style has, up to the present time, been organised, nor is there sufficient positive newness in the artistic expression of most designs to stamp them with individuality. There are some signs, however, of the eventual bursting forth into grand luxuriance of a genuine American domestic style, having for its archetype a fusion of the features usually present in the best works of the leading English and French architects, modified by climatic conditions and social influences. Churches and public buildings are as a rule similar to those met with elsewhere, but remarkable indeed is that ready constructional power, which the Americans evince in rearing cities as if by magic, or what is almost tantamount to the same thing, in erecting vast and sumptuous buildings, and lavishly embellishing them within the space of a few weeks. Large cornices and entrance doorways, with fine flights of steps, are usually striking objects in private dwellings. Interiorly, attention is paid to legitimate comfort, and exteriorly, ornamentation, though promiscuously crowded, is kept within bounds, and is quaint rather than displeasing. On the whole it may be safely said that from a growing propensity and ability to adopt, by way of decoration, natural forms with uncrippled and artistic

handling, in conjunction with extraordinary aptitude in building majestic edifices, there is every promise that as years roll on, a definite and highly characteristic national style will be ultimately evolved of fitting dignity to illustrate in imperishable records the proud history of a mighty nation.*

**American Bricks.** These are only eight inches long, and but little more than one-third the bulk of English bricks. Their quality is generally good.

**American Leather.** Enamelled cloth, resembling leather in appearance.

**American Moving.** The mode of moving chimneys and houses as practised in the United States. It is generally accomplished by means of wedges, screw-jacks, and *ways* similar to those used in launching ships.

**American Pearlash.** The crude potash of commerce. It is used when added to about three times the quantity of lime freshly slaked, and mixed with water, to remove paint and soften putty. The mixture will spoil a good brush, and must not be allowed to touch the hand.

**American Plane.** *Platanus occidentalis.* A noble tree called also Western Plane, Button Wood, Water Beech, and Cotton Wood. The timber is not much prized, owing to its disposition to warp, but being easily cut in all directions, and taking well a fine polish, it is suitable for cabinet work.

**American Potash.** The same as American pearlash, which see.

**American Spruce.** There are two kinds, viz., the White Spruce, *Pinus alba*, which is imported in deals and planks, and the Black Spruce, *Pinus nigra*. The colour of the bark gives rise to the names, it being difficult to distinguish the woods when cut. The white description is fit only for temporary purposes, as it warps and twists and soon decays.

**American Turpentine.** A variety of turpentine sometimes called white turpentine. See TURPENTINE.

**American Wainscot.** Wainscot imported from America. The best is equal to that from the Baltic, and considerably cheaper, and though somewhat harder can be readily worked by machinery.

**Amethyst.** A bluish-violet variety of quartz crystal.

**Amice.** Part of a priest's raiment, enclosing the neck, and capable of being drawn over the head like a hood. It is supposed to be typical of the "helmet of salvation," and is frequently to be found on sepulchral brasses.

**Ammite or Hammite.** A pale-brown sandstone.

**Ammonia.** A colourless alkaline gas whose principal source is putrefaction. It is composed of 14 parts by weight of nitrogen and 3 of hydrogen. When disseminated in a room it injures leather, and is absorbed by rust. Ammonia is also the name sometimes given to ammoniac or ammoniacum, a gum resin obtained from the plant *Dorema ammoniacum*, and which is met with in commerce in the form of tears of whitish colour, having an unpleasant smell. It is soluble in spirit and, in water, and being avoided by insects, is very useful in water-painting.

**Ammoniacal Salts.** Sulphate and muriate of ammonia, &c. Rain water usually contains a minute quantity.

**Ammoniacal Vapours.** Vapours of ammonia, which are often given off by manufactories, and exert a deleterious influence on certain limestones.

**Ammonium.** An imaginary metal supposed to consist of one volume of nitrogen and four of hydrogen.

**Amorphous.** Without shape or determinate form, such as mamillary, filiform, stalactitic, &c. In chemistry, it is opposed to crystallized. Carbon and silicon are capable of existing either in the amorphous or crystallized modification, the former either as the diamond or lamp black, and the latter as will be found described under SILICIUM.

**Ampelites.** A black pigment known to the ancients.

**Amphibolite.** Another name for trap or greenstone.

**Amphibalus, St.** This saint is found represented bound to a tree by his bowels and scourged.

**Amphiprostyle.** A description of ancient heathen temple, which had a portico or porch at both ends but no columns at the sides. It never had more than four columns at either end, or, in other words, it was always tetrastyle, and unlike the temple *in antis*, it had no antæ but columns at the angles of the portico. See TEMPLE.

**Amphitheatre.** A building of large dimensions of oval form, used for gladiatorial displays, wild beast encounters, and other games. They were introduced by the Etruscans, and adopted throughout the Roman empire. First built only temporarily, they were soon erected of stone, embodying stories of different orders of architecture, and attaining proportions vast enough to accommodate tens of thousands of spectators. The Flavian Amphitheatre at Rome, otherwise the Colosseum, covered five acres of ground, and could hold 87,000 persons. One of the most notable features of their construction was the system of drainage so admirably carried out as to defy modern skill to excel it, and to shame the constructors of the present day for not properly providing for the comfort of sightseers who are detained for a long time in places of amusement.*

**Amphithura.** A curtain opening so as to form an entrance at both sides, and hanging between the nave and chancel.

**Amphora.** A variously sized vessel, made of clay or glass or even of onyx, pointed generally to insert in the ground, in a base, stand, or pedestal, and having a double handle attached to a rather narrow neck. It was used by the Greeks and Romans for many purposes, but chiefly for keeping wine and other liquids.

**Ampul.** A small vessel, sometimes of glass or of enamelled ware, used for holding oil or wine for sacred purposes in the Latin church.

**Ampulla.** A bottle composed of earthenware, glass, or metal, and sometimes covered with leather, used by the Romans for the preservation of liquids. Ampullæ were generally bellied,

* See a paper on this subject read before the Royal Institute of British Architects, February 3rd, 1863, by Mr. Gervase Wheeler.

*See Cresy's *Encyclopædia of Civil Engineering*, Stuart's *Dictionary of Architecture*, Godwin's *History in Ruins*, &c., &c.

with long necks, or with short ones having handles on opposite sides.

**Amussis ; Amussium.** A carpenter's and mason's instrument used by ancient workmen for getting a true plane surface.

**Amygdaloid.** A trap rock containing disseminated quartz nodules or other crystals of a somewhat almond-shaped form.

**Anabathra.** A Greek word, signifying steps or a ladder.

**Anabathrum.** A pulpit, desk, or elevated seat reached by the anabathra.

**Anacamptics.** The doctrine of reflected light now called catoptrics.

**Anachronism.** A chronological error. In pictures, the introduction of things or events which could not have existed or happened at the time of the subject depicted. It may justly be called, however, an artist's license when properly taken advantage of. That distinguished architect, the late Mr. Edmund Sharpe, in the course of an address delivered at the opening meeting of the excursion of the Architectural Association, August 19th, 1872, forcibly observed that "It is as much a barbarism to commit an anachronism in architecture as it is to write bad grammar, or to commit any other similar solecism. It is utterly impossible for any one to produce a pleasing and harmonious design in any given style of architecture unless he is fully imbued with the spirit and feeling which pervade all the details of that particular style. To unite, for example, in the same design, the mouldings of one period with the carved work of another is not only an offence against good taste and to those who know better, but it is also a breach of the most ordinary rules of art, for nothing is more certain than that the same sentiment and feeling which makes itself apparent in one detail of a building pervades the rest."

**Anaclastics.** The doctrine of refracted light now called dioptrics.

**Anadem.** The ancient name for a broad band of cloth worn round the head.

**Anaglyph.** A sculptured ornament.

**Anaglypha ; Anaglypta.** A chased or embossed vessel made of bronze or some precious metal with the design hammered out in relief. The name was also given to cameos and sculptured gems.

**Anaglyphic ; Anaglyptic.** In ancient sculpture, embossed work, or the art of executing it.

**Anaglyptography.** The art of engraving an object so as to make it appear to stand out in relief.

**Analemma.** In its original meaning anything raised or supported, but it sometimes may be understood to apply to walls built on strong foundations.

**Analogia.** Similarity or agreement. The same ratio or proportion, or a rule or law depending on it. Analogy.

**Analogium.** A tomb. 2. An old term for a desk or pulpit used for reading the new testament.

**Analogy.** In the fine arts, analogia. Conformity of parts to the whole subject.

**Analysis.** Separation of a compound body into its constituent parts. By its means bricks, clay, stone, water and all building materials are constrained to divulge the secrets of their constitution. Old Roman mortar has been proved by analysis to contain in some instances one fourth part of its weight of carbonate of lime, which goes far to corroborate the re-carbonization theory. As a rule the qualities of limestones, limes, and cements can only be satisfactorily determined by some kind of analysis prior to using.

**Analytical Geometry.** That branch of mathematics which treats of the application of algebra to the investigation of the properties of geometrical lines and surfaces. It is sometimes though rarely called algebraical geometry.

**Anamorphosis.** In perspective, a drawing which appears distorted, or different to what it really is when looked at in the customary way, but which resumes its correct figure when viewed in a certain manner, or from a particular point dependent upon the way in which it was projected.

**Anastatic Printing.** A process by which a fac-simile of any printed matter can be taken on a plate of zinc. Its advantages consist in the means which it supplies of producing almost any number of new plates from an old impression.

**Anatomy.** With artists not only a study to discover how far bones, sinews, bloodvessels, and muscles must be depicted in the representation of rest and action, but a physiological and psychological research into the visible limits of the effects of the occult working of the passions upon these parts of the body. Some feel inclined to affirm that the Greek sculptors did not study anatomy because of the control of muscular action exhibited in their works, but no such allegation can be advanced against the great painters of the sixteenth century.

**Anatron.** The salt which collects on the subterraneous walls of vaults and other places.

**Ancaster Stone.** A cream coloured oolite with compact and often crystalline carbonate of lime for the cementing medium. It is one of the best of the soft building stones, and weighs about 140 lbs. per foot cube, with a resistance to crushing of about 2,300 lbs. per square inch. It is worked with the same tools as Bath stone and hardens very rapidly.

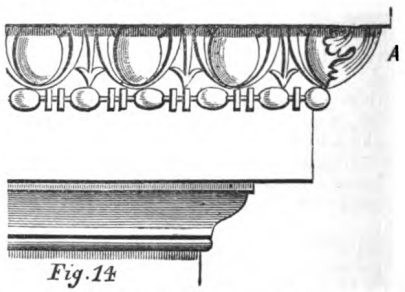


*Fig. 14*

**Anchor.** An ornament resembling a forked tongue, or barbed arrow-head, or dart, used to enrich the echinus or ovolo, and invariably alternating with the egg ornament as shown at A in figure 14. 2. The emblem, in Christian art, of Hope. 3. The symbol of the martyrs, St. Clement of Rome, and St. Nicolas of Bari. 4. An old name for the round iron plate, or piece of wood, forming the head of an iron tie fixed to resist thrust, or to prevent bulging. It often takes the form of S or X. See EGG AND TONGUE.

**Anchor and Collar.** The name given to a device which usually forms the top hinge of a lock or dock gate, or other similarly heavy gate. The piece called the anchor is let into the stone work, and the collar of wrought iron is fixed to it, constituting a socket for the top of the heel post of the gate to work in.

**Anchor Bolt.** A bolt with an expanded shank to prevent its being drawn out.

**Anchoring Plate.** A vertical plate of iron embedded in a firm stratum of undisturbed earth, and connected by means of tie rods with a retaining wall to increase its stability, when the firmness of its foundation is mistrusted.

**Anchor, Suspension Chain.** A massive iron plate seated on rock or masonry, and fixed at right angles to the chains, which at their ends are bolted to it.

**Ancient.** In architectural language any work existing before the period of the Renaissance. The term mediæval, however, embraces whatever was executed during this long epoch subsequently to the declension of Classic art. See ANTIQUE.

**Ancient Irish Style.** See IRISH ARCHITECTURE.

**Ancient Lights.** A legal term applied to windows that have uninterruptedly enjoyed a certain amount of light for a period of twenty years at the least. See LIGHT.

**Ancient Mortar.** The ancient Romans were most careful by means of beating to perfectly diffuse or disperse the rich limes which they used throughout the sand, or, in other words, to thoroughly mix and blend the ingredients of their mortar, knowing that such treatment increased its energy, though perhaps they were unaware that it was owing to the enlarged surface which it rendered available for the action of adhesive force between the lime and the sand. The separation of the particles used also to be perfectly effected by putting lime into a pit, covering it with water and leaving it for some months or even years, according to Pliny, before using, which practice has been continued in Italy up to the present day. A sample of Phœnician mortar taken from the ruins of a temple near Larnaca, Cyprus, and 2000 years older than the mortar of the ancient Romans, has been analysed by Dr. William Wallace, and found to contain 26·4 per cent by weight of lime, 20·23 per cent of carbonic acid, 48·2 per cent of sand and stones, and a small proportion of magnesia, alumina, &c. Carbonate of lime consists of lime and carbonic acid in the proportion of 14 parts by weight of the former to 11 of the latter, and therefore the quantity of carbonic acid required to completely saturate the 26·4 parts of lime in the above analysis would be 20·74, whereas the quantity observed was sufficiently near it to show that the hydrate of lime used in the mortar had become after the lapse of thousands of years a veritable carbonate. See BEATING MORTAR; MORTAR.

**Ancients.** See ANTIQUE.

**Ancon; Ancone.** An elbow or angle, or the adjacent sides of a right angle. 2. A console, or truss, cut and employed in the flanks of dressings and antepagmenta to apertures to act as a bracket or shouldering piece to give apparent support to the cornice or mouldings over. 3. The corner or quoin of walls, cross beams, or rafters. 4. A corbel or bracket cut on a keystone to support a bust or other figure, and sometimes the name is given to the keystone itself when so ornamented. Crosettes are also called ancones. Perithyrides, Prothyrides, and Parotides have the same signification as ancones. See CROSETTES.

**Andirons.** Iron bars supported by legs or standards of the same metal used in braziers in the middle of halls, and in old fashioned fireplaces, to support the burning logs and brands. They are called also Fire-dogs and Handirons.

**Andrew, St.** The symbol of this holy apostle is, in Christian art, a cross saltire, the instrument of his martyrdom having been two beams obliquely crossed.

**Androides.** Figures of men moved by machinery.

**Andron; Andronitis.** In an ancient Greek house the suite of apartments exclusively occupied by the men. That similarly occupied by the women was termed Gynaeconitis.

**Androsphinx.** In Egyptian art, a lion with a human head.

**Anelace.** A weapon intermediate in length between a sword and a dagger, terminating in a sharp point, and worn by civilians in mediæval times. It is often found on brasses.

**Anelectrics.** Substances which do not, under ordinary circumstances, acquire electricity by friction. Those which do so are termed idioelectrics. The former are usually good conductors whilst the latter are not.

**Anemone.** A genus of plants, containing some very beautiful species, including the red anemone of the Levant, which is considered to be one of the types of the ball-flower and dog-tooth ornaments.

**Aneroid Barometer.** A portable instrument, showing barometric changes by means of the expansion and contraction of an exhausted elastic metallic case or chamber, arising from variations in the pressure of the atmosphere. It is useful in surveying, and, with a good aneroid, a difference of ten feet in altitude may be detected.

**Anemograph.** An instrument for measuring the force of the wind and recording it, together with its course or direction. It combines the anemometer, which measures the force, with the anemoscope, which shows the direction.

**Anemology.** The doctrine of winds.

**Anemometer.** See ANEMOGRAPH.

**Anemoscope.** See ANEMOGRAPH.

**Angel Bracket.** An ornamental bracket, representing the head and part of the figure of an angel, and which constitutes one of the leading features of the ornamentation of the Perpendicular Style. See ANGELS.

**Angels.** In mediæval architecture, sculpture, and painting, winged imitations of the human form, represented as playing on musical instruments, holding shields, scrolls, pateræ, candlèsticks, the heads of monumental effigies, or as performing various good offices in consonance with their functions as messengers between heaven and earth. The angel choir of Lincoln cathedral is a good architectural example. Brackets or corbels, with the figures or heads of angels, are also occasionally simply termed angels.

**Angiportum.** A narrow lane or by-way.

**Angle.** If a straight line revolve in one plane round one of its extremities from a given

position into any other position, the inclination between the new and given positions constitutes a *plane angle*, and is generally called an angle. When these two positions are perpendicular to one another the included angle is a *right angle*, and it is divided by the English into 90 equal angles, called *degrees*, each of which is subdivided into 60 smaller and equal angles called *minutes*, and each of these again into 60 equal angles, smaller still, called *seconds*. If further subdivision is required, an angle less than a second is fractionally divided. The magnitude of any angle is expressed by stating how many degrees and subdivisions it contains. The inclination of a plane to a plane is the angle contained by two straight lines drawn from a point in the common section of the planes at right angles to it, one upon one plane and one upon the other. Such an inclination is of constant occurrence in buildings, building materials, and in the cutting edges of tools. A *solid angle* is formed by the meeting in one point of more than two plane angles not in the same plane. For other descriptions of angles see under their specific names. *Angle of a wall* is the angle of a building at the arris where two faces of the wall meet or unite, but it is not the arris itself. *Angle of elevation* is the angle formed by a raking piece, usually with a horizontal line, passing through its lowest extremity. *Angle of extrados* is, in a skew arch, the angle which the coursing joints in the development of the extrados make with a line drawn through them and parallel to the axis of the arch. *Angle of friction*, or *angle of repose*, is, in an arch, the greatest angle of elevation at which the voussoirs have no tendency to slide from their own weight. On roads it is the inclination at which carriages are on the point of moving by their own weight. It is also called the sliding angle, and the limiting angle of resistance. *Angle of groin* is a name given to the groin in centering. It must be measured as extra in "quantities," for fitting and waste. *Angle of incidence* is the acute angle contained between the direction of an impinging body and the plane on which it impinges. *Angle of inclination* is the angle included between a raking piece and a vertical line passing through its lowest extremity. *Angle of interval* is the angle included between two lines drawn from the eye to any two points. *Angle of intrados*, in a skew arch, is the angle which the coursing joints in the development of the soffit make with the springing line. *Angle of obliquity*, in a skew arch, is the acute angle at which a plane parallel to the face of the arch cuts a vertical plane perpendicular to the axis of the cylindrical surface forming the soffit of the arch. The complement, however, of this angle is sometimes erroneously called the obliquity. *Angle of pitch*, in a roof, is the inclination of its sides to the horizon, and it is usually merely called the *pitch*. In staircasing, it is the angle which the line of nosings makes with any step line. *Angle of reflection* is the acute angle which the direction of an impinging body, as it leaves the impinged plane, makes with such plane. It is always equal to the angle of incidence. *Angle of repose* is the same as angle of friction. *Angle of roof* is the angle of pitch. *Angle of skew* is the angle of obliquity. *Angle of the skewback of soffit* is the angle of intrados. *Angle of twist*, in a skew arch, is the difference between the angle of intrados and the angle of extrados. The *angle of the twisting rule* is slightly in excess of it. *Angle of vision* is the angle under which an object is viewed and upon which its apparent size depends. In perspective, sixty degrees should be its limit. *Angle of wind* is the same as angle of twist. See CIRCULAR MEASURE.

**Angle Bar.** The upright bar at the angle of a polygonal window or at the junction of two faces of a bay or cant window. Also the copper bar used in superior work in lieu of the common angle staff.

**Angle Bead.** A small round moulding nailed to plugs or wood bricks built into the walls, plumb and straight, at the returns of window jambs, piers, chimney breasts, or round arched recesses, either ornamented and to show, or to serve as a guide in floating the plaster. It may be run in cement if thought desirable. When square and of wood a more correct term is square staff. Sometimes a thin copper angle bar is used when it is wished to preserve a good arris. It is called also staff-bead, angle-staff, and angle staff-bead. In joinery, an angle bead is a double quirked bead formed upon an angle, and is called sometimes a return bead. See ANGLE-STAFF.

**Angle Bevel.** A tool, consisting of a stock or handle, with a blade moving round a pin at one end, which can be set at any angle with the stock.

**Angle Bond.** The union of walls at an angle. When two walls meet at right angles the bond is simple enough, but when the quoin is skew, or the walls form an acute or obtuse angle, much cutting is required to execute first class work, and, ordinarily, flushing conceals very irregular mortar joints and imperfect birdsmouths.

**Angle Brace.** In carpentry, a short piece of timber placed inside and across an angle to tie it. It is therefore often called an angle-tie, and when it is fastened to opposite corners of a rectangular piece of framing, it is called a diagonal tie or brace. An angle brace, besides being used to stiffen roofs, is employed in conjunction with the dragon (or dragging) beam to support the end of a long hip rafter, and whilst doing so it also ties the wall-plates together. It is frequently used in working angular framing into curvilinear. 2. The name of a boring tool for use in confined corners, and which is worked by means of a handle perpendicular to the direction of the hole it forms.

**Angle Bracket.** In bracketing, a bracket that projects from an angle of a wall, or from an internal angle, and which therefore is inclined to the faces of two walls instead of standing out at right angles to the face of one only. See BRACKETING.

**Angle Buttress.** A corner buttress placed at an angle of a wall, and equally inclined to the faces forming it. In the Decorated Period the practice became general to so place some of the buttresses, but it is not an invariable feature of the style.

**Angle Capital.** In ancient Greek architecture the capital of the flank columns of the Ionic portico, having a volute placed at equal angles with the front and flank. The modern Ionic capital, which has all its volutes angularly placed, is also frequently called by the same name.

**Angle Chimney.** A chimney situated in the corner of an apartment.

**Angle Column.** A column placed at an angle of a building. It is incorrectly called angular column.

**Angle Connections.** Pieces of plain and ornamental guttering, ridge-plates, &c., are so termed.

**Angle Doorway.** A doorway in the angle of a building. When one occurs between yawning shop fronts the bressummers should be carefully bolted or otherwise well secured to each other.

**Angle Float.** A float or plasterer's trowel made to suit the angles of a room.

**Angle Iron.** A bar of iron bent to a rectangular section to connect the edges of plates to form bridges, girders, ribs, &c. It is more readily used for riveting when of small scantling than iron of other sections.

**Angle Iron Laths.** In iron roofs lengths of angle iron filled in with wood on which slating is laid.

**Angle Joint.** When two pieces of material are joined at an angle the joint is called an angle joint, and has usually a distinct name, according to its nature and purpose. See BUTT-JOINT; LAP-JOINT; MITRE, &c.

**Angle Lavatory.** A fixed or movable washing apparatus placed in the corner of a room or passage.

**Angle Leaf.** A leaf placed at the angle of an object. The term is applied to a moulded ornament resembling a leaf, sometimes found in 12th century work, resting upon a circular base moulding and covering the exposed upper surface at the corner of a square plinth. It is a mode of pillar ornamentation somewhat rare in this country. See FLORIATED BASE.

**Angle Modillion.** A modillion placed at the angle of a cornice at its mitring. Its presence there can only be palliated when the projecture of the cornice is excessive.

**Angle Piece.** In running piping a piece connecting two pipes at an oblique angle.

**Angle Pipe.** A pipe fixed at an oblique angle with the horizon.

**Angle Plane.** A plane adapted to cut and smooth down internal angles.

**Angle Posts or Standards.** The posts required at the corners of some descriptions of concrete appliances.

**Angle Quoins.** Quoins of cornices, copings, &c., with head and tail, or front and return, containing a re-entering angle.

**Angle Rafter.** A hip rafter, which see.

**Angle Rib.** A curved piece of timber placed in the angle of a coved or arched ceiling and ranging with the ribs on either side; or a rib in a groined ceiling placed in a vertical plane, but not parallel to the planes in which the transverse ribs lie. In vaulting over a rectangular space the diagonal rib of the centering, reaching from opposite corners, is also called an angle rib.

**Angle Ridge.** A name occasionally given to the hip of a hipped roof.

**Angle Scrolls.** Scrolls placed at the angles of turrets, belfrys, or other parts of a building.

**Anglesea Marble.** See MONA MARBLE.

**Angles, Plumbing.** Establishing a vertical arris at the angles of buildings.

**Angle Staff.** A slip of wood, square or beaded, fixed to plugs at the corners of a chimney breast or wherever thought necessary. If the walls are to be painted the staves are beaded, or triple beaded, and the plaster is quirked against them, but if they are to be hung with paper, square staves or staffs are generally used, which serve as grounds for the plastering. See ANGLE BEAD.

**Angle Standards.** Stout iron bars plain or ornamented, placed at the angles of iron railing. See ANGLE POSTS.

**Angle Stone.** Another name for a quoin stone.

**Anglet.** The double bevel at the joints of chamfered rustic work.

**Angle Tie.** See ANGLE BRACE.

**Angle Tile.** A tile which is used or intended for an angle or a corner. Vitruvius (vii. i) employs the term in a sense, however, hardly reconcilable with this, which is the modern meaning.

**Anglo Gothic.** Gothic architecture in England after it had shuffled off the established features of the Anglo Norman style so long mixed with it during the Transition Period, and before it was contaminated with the Tudor arch. No age or country ever produced more perfect or more exquisite architecture.

**Anglo Italian Style.** A style of architecture that followed the English Renaissance, or its Elizabethan and Jacobean varieties. St. Paul's Cathedral, built by Sir Christopher Wren is, perhaps, the finest example of the style in its integrity, which was merely an adaptation of the architecture of the ancients, bereft of pedantry and sophistication, to the taste, sentiment, and requirements of the period. Inigo Jones, who introduced the style, had, besides other incentives for so doing, become inspired with love for classic architecture through Palladio's works, which had been designed after this accomplished architect had acquired a profound acquaintance with the productions of the ancients.

**Anglo Norman Architecture.** The style which prevailed in England after the Conquest through the amalgamation of the Norman Gothic with the ruder Anglo Saxon architecture. It was a round arched style, both grand and bold, and though uncouth at times, and wanting in proportion, and even inelegant in design, its structures were generally imposing and often characterised by extreme solidity, grandeur and mass, as well as by fertility or, indeed, fecundity of invention in matters of ornamental detail.

**Anglo Palladian Style.** A name sometimes given to the Anglo Italian style.

**Anglo Romanesque Style.** The round Gothic style, which arose in England through the rough and rude imitation of the Christian Romanesque by the tribes who helped to overthrow the Roman empire, and which subsequently developed into perfect Gothic. It comprehends the Anglo Saxon and the Anglo Norman styles.

**Anglo Saxon Architecture.** Buildings erected in England between the end of the sixth century and the introduction of the Norman Gothic. This style is sometimes termed the Saxon style.

**Angola Copal.** A fossil gum of inferior value sometimes used in varnish manufacture, and shipped from the West African coast.

**Angular.** Having angles or corners. Consisting of, or forming an angle.

**Angular Arch.** A head to an opening formed by two inclined stones meeting at their tops.

**Angular Brush.** A brush used in oil-painting, in which the hair slopes obliquely from one side of the point to the other.

**Angular Capital.** The modern Ionic capital, having its four sides alike, and all the volutes placed in diagonal directions.

**Angular Column.** The same as angle column, which is the proper term.

**Angular Course.** A course of herring-bone work.

**Angular File.** A file used by locksmiths for cutting the corners of the wards of keys.

**Angular Forms.** Those characterised by angular outline, contour, or prominences. They are generally suggestive of masculine qualities in the animal kingdom, and of durability and strength in the vegetable and mineral kingdoms.

**Angular Framing.** Timber framing, consisting of heads, sills, and quarters, angular on plan.

**Angular Groove and Tongue.** A joint in which the tongue terminates in an arris, instead of an edge. It occurs in ancient woodwork.

**Angularity.** The quality of being angular.

**Angularly.** With angles or corners ; in the direction of the angles.

**Angular Modillion.** The same as angle modillion, which is the correct term.

**Angular Niche.** A niche constructed in an internal or external corner of a building.

**Angular Perspective.** See OBLIQUE PERSPECTIVE.

**Angular Tie.** See ANGLE BRACE, which is the proper term.

**Angular Tongue.** See ANGULAR GROOVE AND TONGUE.

**Angular Wash Board.** A board fitted in a corner with a hole for a basin, and generally having a door and frame underneath to form a closet.

**Anhydrous.** Without water. Lime as it leaves the kiln is destitute of water and therefore anhydrous. Gypsum or sulphate of lime exposed in an oven to a heat of about 260° Fah. also becomes anhydrous, and when ground it is sold under the name of plaster of Paris, which see.

**Animal.** In ancient sculpture animal forms abound. The Assyrian and Greek animals are indicated in true expression and vigorous delineation as well as many kinds of hybrid and fanciful ones. In Rome, the art of sculpturing raised figures and equestrian statues culminated in the most exquisite workmanship, and in mediæval times all kinds of absurd incongruities and combinations of the human with animal forms unintentionally perhaps bear witness to the truism that animals oft safeguard their instinct with better care than men their reason. In those cases where no unnatural or grotesque representation occurs, animal forms are often used to typify virtues and vices with familiar significance.* See ARABESQUE.

**Animal Æthiops.** Another name for Sepia.

**Animal Charcoal.** Calcined bones or bone-black. It has powerful absorbent and deodorising properties. Amongst other uses it is employed in the manufacture of steel.

**Animal Power.** A term used to signify the quantity of different kinds of work that can be performed by man and certain animals, and which is usually expressed in lbs. For instance, it is estimated that a man can lift by hand to the height of his breast, during an ordinary working day, about 250 lbs. per minute, and that the force of traction of a horse during the same time on a horizontal road, proceeding at the uniform rate of 2½ miles per hour, is about 150 lbs. See HORSE POWER.

**Animated.** Figures are said to be animated when their posture is such that they seem disposed to move, or when they are so perfectly represented as nearly to approach the living object.

**Anime, Gum.** Gum Animi. The name of different resins, one of which exudes from a South American tree, and resembles copal, whilst another, which is called copal, in India, is yielded by a different tree. The gum is of amber colour, and used in varnishes. The best variety is a fossil gum dug from the earth and shipped from Zanzibar. It is found on the east coast of Africa, and possesses a high melting point.

**Animetta.** A name given to the cloth that covers the Chalice.

**Anlace or Anlas.** See ANELACE.

**Annatto.** A pale blood-red colouring matter, obtained from the seeds of the Arnotto tree. It is rarely found pure in the market. It is used for imparting richness of colour to varnishes applied to lacquered goods. Other names for it are Arnotto, Arnatto, Annotta, Orlean, and Roucou.

**Annealing.** Applying heat to glass, bricks, and metals, and abstracting it again in such a way that they are rendered more tenacious, harder and stronger. The exact change that takes place in the process is not known, but it is thought that through the absorption of heat a fibrous structure is evolved from a crystalline one. When iron is annealed its tensile strength is diminished, but its ductility and toughness are enhanced. The annual or periodical annealing of crane and other chains exposed to violent jars or shocks is recommended. Cutting tools are annealed after being hardened.

**Annealing Arch.** The name given to the oven in which glass is gradually cooled in the process of annealing. The oven is covered with a segmental arch.

**Anne, St.** This saint, the mother of the Blessed Virgin, is either represented in pictures of the Holy Family as an aged woman, or else with a book in her hand, and sometimes teaching a child to read whilst pointing to the words, "Radix Jesse floruit."

**Annexe.** An addition to a main building of the same character, and devoted to the same objects, but inferior in size and importance.

**Annicut.** The name applied in Hindoostanee to a weir composed of stakes, sticks, or young timber, built out into a river at right angles to one of its banks, and filled in with mud, &c., in order to turn aside part of the stream into suitable receptacles for agricultural uses.

**Annual Layers.** See ANNUAL RINGS.

* Vide Fairholt's *Dictionary of Terms in Art.*

**Annual Rings.** The concentric rings or layers formed year after year, and usually one per annum, in a timber tree. They are in most cases discernible when the tree is cut through. The more circular or elliptical they are the less likely is the timber to be defective, but it must be remembered that their lateral cohesion is often slight and must be assisted when necessary by iron straps.

**Annual Value.** In valuing property the fair rental likely to be received from letting it to parties having no beneficial interest in it beyond that accruing from labour and the outlay of capital, but how far the property may tempt the introduction of capital must be left to the wisdom of the valuer.

**Annual Variation of the Magnetic Needle.** See AGONIC LINES.

**Annuity.** A sum of money paid annually for a certain number of years, for life, or for ever. Conditions may be involved in its payment giving rise to almost endless variety, both as regards the nature of annuities and the calculations by which they are valued.

**Annular.** Having the form of a ring.

**Annular Bit.** A boring bit that merely cuts a circular path, but does not rout or turn up the part circumscribed.

**Annular Fillet.** A fillet encompassing a column.

**Annular Moulding.** A moulding with a circular horizontal section.

**Annular Saw.** A saw formed by serrating the edge of a steel cylinder.

**Annular Vault.** The vaulted roof of a rotunda and the continous vaulting formed by the stone steps of spiral stairs.

**Annulated.** Surrounded by circles, belts, or rings.

**Annulated Column.** A compound column formed by slender shafts clustered together around a central pier, or close to a jamb, and surrounded by rings or annular fillets worked on bond-stones, or they are joined by bands of brass or bronze. The shafts are often of Purbeck or other polished marble. See BUNDLE PILLAR.

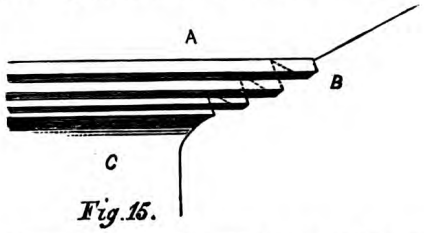



*Fig. 15.*

**Annulet.** A small annular moulding, consisting of a thin flat band, fillet, or listel detached from other mouldings. It is seen in the Doric capital, of which it is a characteristic and was used probably because strong horizontal lines were required to give a proper stop to the upright arrises of the flutes of the shaft. Three, four, or five were employed, according to their depth and the column's height. Fig. 15 shows at B the annulets of the columns of the Temple at Corinth. In this instance they are deeply undercut. A is part of the echinus. C do. of shaft. See BANDLET.

**Annunciator.** The name of a contrivance by which a multiplicity of bells are avoided in large establishments. Only one bell is required, and to this all the bell pulls are connected as well as to distinguishing pendulums, shields, &c., which only move when their own special cord is pulled, whilst the bell sounds with every pull. See BELL INDICATOR.

**Anode.** The name given by Professor Faraday to the positive pole of a galvanic battery. It is the pole by which the electricity reaches any substance undergoing decomposition.

**Anointing Room.** See ALIPTERION.

**Anotta.** The same as Annatto, which see.

**Ansa.** A Latin term for that by which anything is taken hold of; a handle, or haft. 2. A cramp-iron used for uniting masonry.

**Anse de Panier.** A term signifying basket handle, applied by French builders to an elliptical arch, or to a Mansard roof when its profile is formed in an ellipse.

**Anserarium.** The place where the ancient Romans kept and reared their geese.

**Anston Stone.** A dolomite, or magnesian limestone from Anston, Yorkshire, of a creamy colour and weighing about 144 lbs. per foot cube. When of a uniform and unexceptionable quality, free from loose vents, holes, and other defects, it has been found to stand well and harden by exposure.

**Ant.** See WHITE ANT.

**Anta; (plural) Antæ.** A kind of pilaster used in the architecture of the Greeks and Romans, and consisting of three sorts. One was employed to terminate the *pteromata* or longitudinal walls of temples to give them a finish when carried beyond the face of the end walls; another description was angular or showed two faces on the walls of temples; and the third was used in porches or to ornament jambs. Their projection was never less than that of the mouldings which ornamented them. In modern times the term often signifies a square pillar without base, capital, or moulding. See IN ANTIS; PILASTER.

**Ante.** A Latin preposition, meaning in regard to places or position *before* or *in front*, whereas *anti*, the Greek preposition, signifies substitution, equivalence, or opposition, so that to arrive at the correct meaning of compound words, with these prefixes, it is needful to ascertain which of the two enters into the composition.

**Ante.** The same as anta, which see.

**Antecabinet.** A large saloon placed before the chamber in which the council of a prince, or state, hold private consultations.

**Antecapitulum.** Part of the cloister immediately before the door of the chapter-house.

**Antechamber.** See ANTEROOM.

**Antechapel.** A term used in the Universities for a passage running north and south at the west end of a chapel.

**Antechoir.** A space between the choir and interstitium.

**Antecour.** The French name for a court before the vestibule which leads to the apartments of a house, or it may mean an approach to the principal or main court, which is not always the largest of the two. Its English equivalent is antecourt, a term of rare occurrence.

**Antecourt.** See ANTECOUR.

**Antedrawing Room.** A smaller drawing room attached to a larger one when the

character and size of the latter render it unsuitable for all but formal gatherings.

**Antefixum ; (plural) Antefixa.** In ancient architecture, lions' heads or those of other creatures carved on the upper mouldings of the cornice of a temple, either for ornament, or to cast off by means of perforations in them the water from the eaves. 2. Upright ornaments of marble or terra cotta often decorated with the honeysuckle, or other device, placed above the eaves to conceal the ends of the harmi or joint tiles. The term is sometimes incorrectly written antefixæ and antefixes.* See TILE.

**Antemural.** A barbacan, which see.

**Antepagmenta.** The jamb dressings or architrave jambs of ancient doors when of stone or stucco. The lintel with its returns of similar mouldings, and meeting the antepagmenta was called supercilium.

**Antependium.** The hangings in front of an altar in a Latin church, consisting of embossed and jewelled plates of precious metals, or of elaborately embellished wood carving, or of cloth of gold, of velvet, or of silk enriched with embroidery.

**Anteportico.** An outer court immediately before a portico, or an outer porch or vestibule. See PROPYLÆUM.

**Anterides.** The ancient name of buttresses and counterforts. See SPUR.

**Anteroom.** A room before or in front of another, contiguous to it, and usually the first entered, often of service in separating important apartments, and, in many instances, useful as a waiting room.

**Anteroom Furniture.** The furniture of an anteroom, which should be as far as possible confined to seats ranged round the walls so as to leave the centre of the room clear.

**Antesolarium.** A shading projecting roof to part of a house exposed to the sun.

**Antevenna.** An awning or projecting wooden shade before a house or shop.

**Anthemion.** The Greek name for the graceful honeysuckle ornament whose beautiful curvilinear forms adorn the necking of the Ionic order. It is also called *Palmette* and *Fleuron*. Though bearing a resemblance to the honeysuckle, it was never intended to be an imitation of it.

**Anthony, St.** Surnamed the Great, and The Hermit, and Antony of Thebes. This saint, the founder of monachism, is represented with a pig, having a bell round its neck, at his feet, and with a tau cross or a bell in his hand.

**Anthony St.** Antony of Padua. He is represented preaching whilst fishes are listening to him.

* There is a wide difference of opinion as to the correct meaning of this term, as the following extract shows :—"It is a common mistake to apply the term (antefixum, antefixa) not only to the check or stop of the covering or joint tiles on the roof, but also to the lions' heads in the cymatium of an antique temple ; it is clearly shown by Wilkins, *Prolusiones Archit.*, 4to., London, 1837, that antefixa meant the ornaments of the Zophorus or frieze, which in early times were formed in terra cotta ; and that the same word was sometimes employed for the statues upon the acroteria of the pediments, and even the sculpture in relief on the tympana. The name is evidently derived from the circumstance that the ornaments were fixed in front of the building which they decorated, and in many instances they have been found attached to a frieze, leaden nails being employed for the purpose of fastening them."—*The Dictionary of Architecture.*

**Anthracite.** A bright looking description of coal with a shining fracture. It does not emit when burnt opaque smoke. It often contains more than 90 per cent. of carbon, and besides being used for fuel is made into ornamental articles, which receive a high polish.

**Anthropomorphism.** Amongst the heathen nations of antiquity the representation of their deities by means of statues more or less resembling the human form.

**Anti.** See ANTE.

**Anti-Art.** Any practice opposed to the maxims of art. See ART.

**Anti-Attrition.** That which reduces wear caused by friction.

**Antic.** A fantastic composition or medley of men and women, curious birds, beasts, hybrids, &c.

**Anticaglia.** Antiquarian and archæological fragments.

**Anti-climax.** A falling off of importance in a composition, by completing or crowning it with something designed on a too insignificant or diminished scale.

**Anti-combustible.** Incapable of catching fire.

**Antico-moderno.** An Italian term for the transition style of art, characterising the fifteenth century, and continuing to the period in which the grand and perfect works of Raphael were produced. It is sometimes comprehended in the quattro-cento style by some writers.

**Anti-corrosion.** See CORROSION.

**Anti-corrosive Paint.** See PAINT.

**Anticum.** A porch to a front door, or the space between the front columns of a portico and the cella wall.

**Antifixœ.** An incorrect way of writing antefixæ, which see.

**Anti-friction.** A compound, such as plumbago and oil, or a mechanical device, such as balls or rollers, or knife edges, to lessen as far as possible the friction of surfaces in contact.

**Anti-frost.** That which prevents freezing. Exposed water pipes can be laid with falls, or fitted with stop-cocks, and caps and screws, so as to be emptied when not in use during frosty weather.

**Antilia.** An ancient description of pump.

**Antimensium.** In the Greek church a substitute for a proper altar.

**Antimony.** An extremely brittle bluish-white metal, easily reduced to powder. It is highly useful in the arts, forming amongst other valuable alloys in combination with lead type metal, which expands the moment of solidifying. The addition of copper to type metal forms an anti-friction metal. Some of the compounds of antimony are employed as pigments.

**Antimony Orange.** An orange pigment said to be very ineligible both in oil and water.

**Antimony Paint.** Any paint, into the composition of which either the oxide or a preparation of antimony enters, is so denominated. The oxides of lead and bismuth, together with that of antimony, yield different yellows used in enamel, porcelain painting, &c.

**Antipagmenta.** Properly antepagmenta, which see.

**Antiport.** An outward gate or door.

**Antiquarian.** The same as antiquary, which see. Also, the name of a drawing paper when cut or made into sheets about 52 inches by 31 inches.

**Antiquarianism.** Love of antiquities.

**Antiquarium.** An apartment or cabinet in which the ancients kept *their* ancient books, vases, statues, &c.

**Antiquary.** A person versed in antiquities, and who studies and searches after old models, statues, inscriptions, books, and ruins in order to complete as far as possible the history of the past. There were learned men in the days of ancient Greece and Rome who were antiquaries and who took a delight in dilating upon the meaning of inscriptions, and in explaining to inquirers the mysteries of antiquity; and there are in the present day not a few societies including as members scholars of the same type, most of which are consequently of high standing, contributing considerably to our knowledge of ancient habits, manners, customs, &c.

**Antique.** The art remnants of the ancient Greeks, Etruscans, and Romans are comprehended under this word. As these nations left behind them much that is worthy of being imitated, both in works of art and literature, it has been customary to take them as patterns to work up to, and to equal if we can. It is because of their universally admitted merit, pronounced to be artistic by the cultivated of all nations, that their remains of statues, busts, architecture, vases, paintings, &c., are by way of distinction termed antique, just as the people themselves are called by way of distinction *the* ancients because of their pre-eminence amongst the nations in all that constitutes national greatness. See CLASSICAL.

**Antique Appearance.** In brasswork, a semblance of age imparted by a coating of verdigris applied to the surface by means of dilute acids, and which is allowed to dry spontaneously. See ÆRUGO.

**Antique Furniture.** Furniture in imitation of that in vogue amongst the ancients. It is almost always highly suitable and appropriate for an entrance hall.

**Antique Letter.** In sign writing, the name of a bold and useful letter, well adapted for shading, and when on a large scale of impressive aspect. It is sometimes called the Egyptian letter.

**Antique Mouldings.** Those which were employed by the Greeks and Romans.

**Antiquities.** The old name of the study now usually called archæology, which see. The term also includes the written and monumental and other objects of research.

**Antiquo Modern.** A term sometimes applied to mediæval structures. It must not be confounded with antico-moderno.

**Antiseptic.** Opposing, resisting, or counteracting decomposition. Paint and other wood preservers may be said to be antiseptic.

**Antiseptic Varnish.** A varnish that protects the surface to which it is applied from deteriorating.

**Antistitium.** A monastery.

**Antithalamus.** A Vitruvian term, signifying an important bed chamber. Probably the same as amphithalamus.

**Antium.** A porch to a front door. The same as anticum.

**Antrellum.** A small temple, grave, or grotto.

**Antrum.** A cave or cavern. 2. A place where early Christians assembled.

**Antwerp Blue.** A blue pigment similar to Prussian blue, but lighter and brighter. Haarlem blue is a like pigment.

**Antwerp Brown.** A preparation of bitumen ground in strong drying oil.

**Anubis.** An Egyptian deity represented like a man but with a dog's face.

**Anvil.** An iron block upon which smiths place metal to be hammered and forged to shape. It consists of a core, body, or web B, Fig. 16, four feet F, a projecting end E, called a beak-iron, bickern, pike, or horn, for welding

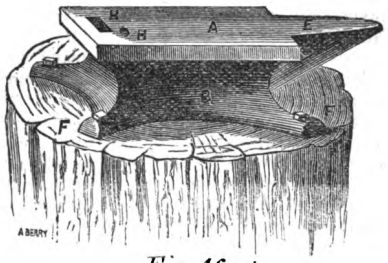



*Fig 16*

hoops, chains, and circular forgings, holes H, H, for the insertion of shapers, swages, set chisels, cutters, &c., for cutting, punching, shaping, and making the heads of bolts and nails, and a steel facing A shaped and laid on at a welding heat, the whole process of hardening it requiring great skill. When hardened, the face is ground to shape. The enormous anvils necessitated by modern steam hammers have little influenced the ordinary smith's anvil, which continues its career of usefulness with very little modification since the days of Tubal Cain. In smitheries the anvil is usually seated on the root end of an oak or beech, which must rest firmly on the ground, and be in close contact with it at every part, otherwise the blows of the hammer lose much of their effect. For the same reason the anvil and block must be closely connected. From representations on several works of art it is clear that the anvil of the ancients was similar in appearance to that now in use. During the "brazen age," the anvil, hammer, and tongs, as well as the things forged, were all of bronze. It is said that the sound of an anvil may be deadened by suspending a few large links of a chain from the small end. The links are supposed to absorb the vibrations. In Christian art, the anvil is the emblem of St. Adrian and also of St. Eloy. See HAZEL ROD; SMITH'S TONGS; SWAGE.

**Anvil Cutter.** A shears used by blacksmiths, the cutting jaws of which open by means of a spring and close with the hammer's impact.

**Apartment.** A room, or chamber, or division of a house enclosed by walls, or partitions, and which can be shut off from the rest of the building by means of its own door. A suite of apartments in former times comprised all necessary rooms for a family and domestics.

**Apatite.** Phosphate of lime. This mineral occurs in granular limestone, and occasionally in slate, and is supposed to have its origin in animal fossils.

**Ape.** In Christian art, the emblem of cunning, malice, and lust. See APING.

**Aperture.** An opening through a wall or other inclosing body, and made for air, entrance, inspection, heat, light, and ornament. It is, however, usually a door, window, or fire-place, and in the case of the two first, the materials forming the sides are called *jambs*, or under certain circumstances when external, *reveals*. The top if flat is called the *lintel*, and, if arched, the *head*, or by some the *arcade*, whilst the bottom is termed the *sill*, or sometimes *threshold*, if belonging to a doorway. The sides of a fire-place are its *jambs* or *covings*, and the top and bottom its *mantel* and *hearth*. Very often, however, all these terms are given to the surfaces of the respective parts. The jambs of Egyptian and Grecian apertures often incline inwards toward their top, and throughout all ages apertures for light have been either rectangular, oval, circular, or of other geometrical or fanciful shape. When designed for air only they are protected by air-bricks or air-gratings. Inspection apertures are usually made through doors, &c., in prisons and asylums, and through shutters and walls, &c., in shops. Rules for the dimensions of apertures are frequently misleading, but these important features need, however, especial attention in planning, for whilst the comfort of almost every room depends upon their relative position, the strength of the whole building often rests upon their absolute disposition. See COVING; JAMB; OX-EYE; THRESHOLD.

**Apex**; (plural) **Apexes, Apices.** The top or highest part of anything that is acuminated, gabled, &c. 2. In a groined roof or ceiling the apex or summit is the point in which the converging groins meet. 3. An ornamental terminal when not large enough to merit the name of finial.

**Apex-stone.** The saddle stone or ridge stone of gable coping. The top stone of a spire, spirelet, or pinnacle, which frequently receives a rod or staff to carry a vane or finial.

**Aphites.** Memphis marble, which see.

**Aphlogistic.** Flameless.

**Apiarium.** The Latin name for bee-hive.

**Apiary.** The modern term for the place where bee-hives are kept, corresponding to the alvearium of ancient Rome.

**Apices.** See APEX.

**Aping.** Imitating in a servile, affected manner. Thus structures may be said to ape any particular style when their exteriors show signs of it, whilst interiorly its peculiarities and attributes are wholly ignored.

**Apis.** The bull worshipped by the ancient Egyptians.

**Aplanatic.** A lens is said to be aplanatic when it eliminates spherical aberration. Such a lens is usually formed by a combination of two lenses of different shape and kinds of glass. There would be no spherical aberration if proper elliptic or hyperbolic surfaces could be given to lenses, but, hitherto, the difficulties to be overcome in their formation have not been surmounted.

**Aplastic.** Not plastic or easily moulded.

**Apodyterium.** In ancient baths, an undressing room, which was sometimes plain, but occasionally elegantly decorated, and of lofty and magnificent dimensions, as in the baths of Caracalla.

**Apogeum.** A subterranean cave or crypt.

**Apollo Belvedere.** A work of art discovered in 1503 and supposed to have been executed in the reign of Nero. The figure of Apollo, which is more than 7 feet high, is nude, with the exception of a cloak that hangs over an extended arm, and it is generally thought to embody the finest sculptured ideal extant of manly beauty. The statue was purchased by Pope Julius II., and placed in the Belvedere of the Vatican, which has given to it its distinguishing name.

**Apollonia, St.** This saint is represented with the martyr's palm in one hand whilst with the other he holds a tooth and pincers.

**Apomecometry.** An old word, signifying the art of measuring distant things.

**Apophyge** That part of a shaft of a column where it spreads out in the form of a hollow or cavetto to form a pleasing junction with the capital and base. It is otherwise named Apophysis, Apothesis, Congé, Scape, and Spring.

**Apophysis.** See APOPHYGE.

**Apostles, The.** In the early ages of Christian art the Apostles were represented as twelve sheep or lambs grouped around our blessed Saviour. Subsequently they were represented in human form, surrounding Him, each bearing a sheep, and still later all the Apostles were individualised by certain emblems, &c., which are mentioned in this work after their names. The feet of all are usually pourtrayed as naked, the nimbus surrounds their heads, and generally each bears a book.*

**Apotheca.** A store-room amongst the ancients for keeping valuable things in. The Romans kept their wine at the top of the house.

**Apotheosis.** The enrolment of a mortal amongst the gods. In decoration it is an ornament representing the necessary reception.

**Apothesis.** One of the synonyms of the apophyge. 2. A recess on the south side of the chancel of primitive churches for books and vestments. 3. An undressing closet in thermæ.

**Apparatus.** An appliance, or anything made or provided as means for the performance of some kind of work, and consequently the term includes a complete set of tools or instruments for any purpose or vocation or trade as, for instance, that of a quarryman, builder in concrete, mason, &c., &c. Besides this the term signifies also any combination of parts as means to an end, such, for example, as may be wanted for hoisting, warming, cooking, draining, &c.

**Apparells.** Embroidered work in silk or gold, with or without precious stones, attached to vestments and found figured on monumental brasses and effigies.

**Appearance.** It is of course advisable that the external appearance of dwellings should be reasonably attractive even where architecture can obtain no foothold. Picturesque verandahs, pretty conservatories no matter how small, artistic balconies, balconets, roof ornaments and vases, light and brightly painted jalousies, neatly stopped and painted brickwork, accurately laid slates, and tidy little gardens, often give perhaps a higher recommendation to a house or cottage than its internal arrangement, provision for ventilation, drainage, &c., deserve, yet they are to an extent beneficial. They should be more often met with than is customary, particularly at the backs of houses, which too frequently present

* See *Symbols of Early and Mediæval Christian Art*, by Louisa Twining.

only bare and ugly walls though often as much thrust before one's observation as the principal façades, and they might even prove profitable by causing the picturesqueness which they lend to disarm adverse reports as to the buildings being deficient in accommodation, and only slightly though showily built. As a rule, an ugly building is not a comfortable one, for the mind that could make it so would be almost sure to give it picturesqueness as well.

**Appendage.** Something added to a structure complete without it.

**Appian Green.** An ancient pigment prepared from a green earth having a calcareous base, and coloured by oxide of copper, and somewhat resembling verdigris. It is now called Verona and Cyprus green.

**Appian Way.** A Roman road remarkable for its foundations, bridges and paving. It ran from Rome to Brundusium, now Brindisi, through Capua, and was nearly 350 miles long. It was paved, and perhaps made, by Appius Claudius as far as Capua only.

**Appii Forum** See FORUM APPII.

**Apple.** In Christian art, the symbol of man's fall.

**Apple Room.** See FRUIT ROOM.

**Apple Tree.** *Malus.* This tree yields in its wild state a hard, fine grained wood of a brownish colour, but produces in the cultivated state a heavier timber, possessing a fine grain. It is more used for machines than for structures. Specific gravity of the wild variety when dry, =0.8, and that of the cultivated in a similar state =1.1.

**Appliance, Building.** Any contrivance by which building operations are performed, and materials prepared. The term likewise includes any material, or tool, or apparatus used or sold in the building trades, and is most comprehensive, whereas apparatus is restricted to an assemblage of parts which enable an operation to be performed, or which assists in its performance.

**Applicate Ordinate.** See ORDINATE.

**Application of Load.** The act and mode of applying the load upon which depends the relative strength of any piece subject to cross strain. The relative strength varies as 1, 2, 4, 8, according as the piece is loaded at one end and supported at the other; or loaded uniformly throughout and supported at one end; or supported at both ends and loaded at the centre; or supported at both ends and the load uniformly distributed, the total load being the same in all cases. There is considerable excess of strength if the ends be firmly fixed instead of supported only, but fixing both ends prevents expansion and contraction. The relative strength will, of course, vary for other dispositions of loads besides those just mentioned.*

**Application of the Orders.** The use of the Orders in a design when no Order is superimposed upon another. When such is the case their use is called assemblage.

**Applied Mechanics.** The science which treats of the laws of force in equilibrium or exerted in motion, applied to engineering, architecture, and other practical pursuits.

**Appliqué.** A French word signifying ornament laid or stuck on, and not in one piece with the work ornamented. The term is applicable to various articles of fancy or necessity as well as to the façades of structures or to house decoration.

**Apportionment of Ground Rent.** See GROUND RENT.

**Appraisement.** An authoritative valuation in writing of the estimated value of property, or of work to be performed, and it is necessary that surveyors should be armed with the proper license and stamps in all cases in which the obligatory character of the appraisement is not to be questioned. Where, however, the valuation is simply for information, and is not to come under the operation of law these formalities may be dispensed with.

**Appraiser.** A person who sets a value upon property or articles, which valuation is binding upon the party for whom it is made.

**Apprentice.** One who is bound by a properly executed indenture to serve a mechanic, or other master, for a certain period determined by the contracting parties, the master undertaking to teach or to cause the apprentice to be taught his own trade, business, or profession, or to give him facilities for learning it whilst he, in return, becomes entitled to the lad's services. Upon binding a youth who, by the way, to show his assent, must execute the indenture himself, it is of great importance so as to guard against any subsequent misunderstanding, in case the master's business consists of different branches or divisions, to clearly specify what he is to be taught. Either the bankruptcy or the death of the master terminates the engagement of the apprentice, who can demand a reasonable sum, according to the nature of his agreement; but the executor of the master is able to bind the apprentice to another master for the remainder of his term. Sometimes the master requires a premium and sometimes he consents to pay the apprentice small wages after he has served a certain time and has become sufficiently proficient to deserve them. The fundamental point to be observed by parents and guardians is to see that a youth is apprenticed to the calling he really likes, for only then will he love his daily work, render willing service to his master, and acquire that well grounded knowledge of his business, without which success in it would be quite hopeless.

**Approach.** A path or way leading from the road to a building. It must be sufficient in width and headway, and easy in sweep and gradient.

**Approximation.** An approach to exactness in any given particular when perfect accuracy is unobtainable. Thus, the strength of any building material to resist a crushing, tensile, or transverse strain is always an approximation, no matter how reliable the experimentalist may be, on account of the slightly varying circumstances and conditions under which pressure must be applied, and of certain minute differences of internal structure that are sure to exist in different specimens.

**Appurtenance.** Properly appertenence. Anything which belongs to another, as buildings to land, adjuncts and appendages to houses, and recesses and conservatories to rooms.

**Apron.** In engineering works a platform of masonry, brickwork, or timber, to protect the

* See Humber's valuable little treatise, *A Handy Book for the Calculation of Strains in Girders*, for concentrated information on this important subject.

base or lowest exposed parts from scour, abrasion, or rude shocks. In carpentry, it is a term occasionally used for apron-piece, which see. In joinery, it is the name of a hanging notched ornament under the cornice of a verandah. In plumbing, an apron is a description of flushing which hangs over and covers for 3 or 4 inches the edge of sheet metal when turned up against a wall, so as to protect the joint between the turned up edge and the wall, and to allow the upstanding metal freedom of motion. The upper edge of the apron is secured in a *raglet*, *groove*, or *joint*. See BEARD.

**Apron Lining.** The thin deal casing which covers the apron-piece.

**Apron Piece.** A horizontal piece of timber which takes and supports the carriages, carriage-pieces, or rough strings of a double or alternate flighted wooden stairs. It helps to support also the joists of the landing, and should be firmly wedged into the wall. It is also called pitching-piece.

**Apronwise.** Turned over like a metal apron in plumbing.

**Aps.** A name sometimes given to the wood of the abele.

**Apse; Apsis.** A semicircular or polygonal recess at the end or sides of choir, nave, transepts, or aisles of religious edifices. Its walls are lower than those of the building to which it belongs, and its roof is consequently lower than that of the latter. In England, the apse at the east end of the choir, which is a conspicuous feature in some buildings, gave way to a rectangular form in the early part of the Anglo Norman style.

**Apsidal.** Formed with an apse.

**Apsis Gradata.** The bishop's chair or throne in the apse, which was elevated above the seats of the clergy ranged on either side of it.

**Apteral.** A term applied to buildings, but especially to heathen temples, having no lateral colonnade, but columns only in front and rear.

**Apulian Romanesque Architecture.** An arcuated style followed by the denizens of South Eastern Italy, which branched off from the Italian Romanesque. It was distinguished by its richness in animal sculpture, the human form not being included in its decorations, owing to peculiar iconoclastic views. Its practitioners belonged to the Latin church, and the style became extinct in the 15th century.

**Aquafortis.** Nitric acid, which see.

**Aquaminarium.** A stoup, or holy water basin.

**Aqua Regia.** A mixture of nitric and hydrochloric acids, which dissolves gold through the agency of the chlorine.

**Aquarium.** An artificial receptacle for water maintained by steam pipes, &c., at a tepid heat placed in greenhouses and elsewhere and devoted to the growth and preservation of exotic aquatic plants. Latterly the term has been given to large and airy structures, containing tanks, reservoirs, and cisterns for holding specimens of fish, mollusca, crustacea, &c., in combination with saloons, refreshment rooms, and proper accommodation for concerts, lectures, and exhibitions, together with the occasional adjunct of a winter garden.

**Aquatint.** A method of etching on copper and powdered resin, which produces beautiful effects, resembling drawings executed in sepia, bistre, and other dark pigments. It has now fallen into comparative disuse.

**Aqueduct.** A conduit for water, constructed of stone, brick, timber, lead or iron either upon, above, or below the ground. The Romans excelled in building them, evidently considering a supply of good, pure, and sparkling water to be the first sanitary necessity, and they also avoided laying their mains under crowded streets, but preferred raised aqueducts. Some were built of squared stone, some of brick and marble, and others of a union of different stones, but all bore an impressive air of grandeur and indicate that their constructors were masters of the laws of running water, and experts at levelling. Timber aqueducts and hundred of miles of wooden pipes were in use in England during the last century, but they are now generally replaced by cast iron water pipes.

**Aqueous.** Watery.

**Aquila.** The face of a gable, or the triangular face contained within the horizontal and raking cornices of a pediment. 2. A lectern, having the form of an eagle with outspread wings, supported by a pedestal. See EAGLE-LECTERN.

**Arab or Arabian Architecture.** A style of architecture that arose in the seventh century simultaneously with Mahommedanism and which, springing out of the Byzantine style, retained it for a basis to be afterwards modified by the features of the styles followed in conquered provinces. It is supposed that, previous to the rise of Mohammedanism, the Arabians had no national style, but that being naturally luxurious and fond of elaborately coloured decorations, they soon managed by throwing their feelings and propensities, intensely inflamed by religion, into their architecture, to create a style which soon developed into a rich and beauteous one. See ARABIAN ARCH and SARACENIC ARCHITECTURE.

**Arabesque.** A building or ornament after the Arabian style, but generally the term is used for the latter, which is a description of fantastic embellishment largely employed by the ancients and found in some form or other amongst all peoples possessing the power to represent their fancies. The name has been significantly given to the intricate rectilinear and curvilinear decorations and devices which so plentifully occur on the ceilings, walls, and pavements of Arabian buildings, as well as to all corresponding ones. The arabesque of the Moors, however—the idea of which was borrowed from the Egyptians—contained no animal representations, but was confined to fruit, flowers, tendrils, and foliage, intertwined with consummate grace and skill with geometrical patterns, as their religion prohibited the imitation of living forms. This is not the case with modern arabesques nor with those of the Egyptians or other ancient nations, all of which often include animals and the human figure. The importance of this ornament in decorative art cannot well be overrated, arising as it does from the opportunity it affords of giving full scope to allegorical play so that where an artist has the power to infuse poetry into his composition, arabesque lends him willing aid. It is executed in colour or low relief, and a variety distinguished by much strap work and shield work was common in England during the Elizabethan Period.

**Arabesque Scroll.** A term, implying a combination of features of classic art, and sometimes applied to a beautiful variety of arabesque that was developed by Raphael, Michael Angelo, and others out of the excavated remains of antiquity that were brought to light towards the end of the 15th century. Everything possible in nature and art, either conventional or otherwise, which was likely to enhance the beauty of arabesque was pressed into service, and, as may be imagined, in the hands of such artists, it attained perfection, and became the characteristic feature of the Cinque-cento Period.

**Arabian or Arabesque Arch.** This distinctive feature of Arab architecture is not always, as is sometimes supposed, of horseshoe form, for the Arabs employed the semi-circular, the pointed, and the segmental arch, as well as the round horseshoe, giving to their pointed arch a slight return, or inward curvature at the springing, similar to that found in the round horseshoe arch. The arch-stones are sometimes notched together in very ingenious designs, giving to the archivolt a series of ornaments, which though appearing constructive are often really not so, but have their origin in a thin layer of veneer.

**Arabian Ornament.** The prevalent ornament of Moorish architecture, characterised by lines and foliage always flowing out of a continuous parent stem. The same as arabesque, which see.

**Arabo Moresco.** A name given to that phase of Saracenic architecture exhibited in the work at the Alhambra, Spain, dating about the middle of the 13th century.

**Arabo Persic.** The Persian style of Saracenic, now extant, and which, together with its Syrian and Egyptian congeners, originated about the year 650 of our era. The great mosque at Ispahan is an example of the style.

**Arabo Tedesco.** A term chiefly used by the Italians to denote a style compounded either of German Gothic or Byzantine and Saracenic.

**Aræostyle.** A species of intercolumniation so named when the columns are more than three diameters apart, but amongst the moderns the distance is usually fixed at four diameters. It should only be used with the Tuscan Order. The measurement is taken between the shafts at the lower part, just where the apophyge commences to curve downwards.

**Aræosystyle.** A term used to signify the method of interspacing a species of double intercolumniation formed by placing two columns side by side, with their capitals almost in contact in a portico or colonnade at a certain distance apart, in lieu of a single column. When the intercolumnar spaces are well-proportioned, a good effect is obtained, as instanced at St. Paul's cathedral and elsewhere.

**Araucaria.** The name of a genus of Coniferæ, natives of the tropics, which include some lofty evergreen trees such as the Chili pine, Norfolk Island pine, Brazil pine, &c., some of which attain the height of nearly 300 feet. Large fossil trees found yet standing on the earth's surface, and others buried in the coal measures, bear a striking resemblance to them.

**Arbalisteria.** One of the names given to the apertures for shooting through, commonly called loopholes, that were pretty general in mediæval fortifications. The name was derived from the formidable cross-bow (arbalest), carried by the soldiers, which had to be drawn to the proper tension for discharging its missile by means of a wheel attached to the weapon.

**Arbiter.** In Scotland, the name by which the person chosen to decide an arbitration is called.

**Arbitration.** A method adopted by parties to settle a difference or controversy without proceeding to an action at law. Generally it consists in submitting the cause in a formal and properly defined way to the hearing and determination of a third party denominated the arbitrator whose ruling the disputants pledge themselves to obey, and the step thus taken is called a reference or submission to arbitration. The law of arbitrations is exceedingly intricate, and it is inadvisable for any one to court its aid prior to consulting a legal friend, and it is proper to observe that those general clauses usually inserted in agreements to the effect that all or any differences are to be referred to an arbitrator are not considered in law to be binding. A wider application of arbitration than that just alluded to, owing to the frequent unhappy disputes between employés and contractors, has been directed towards reconciling divergency of opinion between master builders and the wire pullers of trade unions in order to avoid those dire afflictions called strikes and lock-outs, but hitherto, unfortunately, the attempt has met with but little success.

**Arbitrator.** A referee or party appointed to decide an arbitration. Any person of ordinary intelligence may be chosen for the duty, but it is preferable that he should be clearly a disinterested party and quite indifferent as to the result. In cases of dispute in building contracts, arising from an employer insisting upon administering the clauses of a specification, the architect should of course be the sole arbitrator, for he must be unfit for his post if he connives at unfairness on either side; but there is little fear of any occasion for the services of one occurring if the agreement and specification be carefully and fairly worded, and concise and to the point, neither too loose and vague, nor too severe and meddlesome concerning minutiæ, which the contractor perhaps understands better than an architect. If this be the case, and the general conditions and agreement well comprehended before signing, and the drawings sufficiently numerous and explanatory, the architect may well insist upon being the sole referee, for should an unforeseen difficulty arise between the client and builder, none so well as he can know what is the real meaning and intent of his carefully thought-out plans and documents nor, if he be a man of probity, could any other be found less likely to be swayed in judgment to the builder's prejudice by any fancied partiality towards the employer.

**Arbor.** A spindle or axle of a wheel or pinion. 2. A branch of a candelabrum, either suspended from the ceiling or supported by a trunk. 3. An arbour, which see.

**Arboreta; Arboretum.** A garden, containing a collection of trees and shrubs correctly labelled and arranged in some systematic order, either botanically or geographically.

**Arboriculture.** The art of cultivating trees and shrubs.

**Arborist.** A person skilled in the knowledge of trees.

**Arbor Vitæ.** A genus of evergreen plants *(Thuja)* of the natural order Conifereæ. Two or three species are common in Britain in ornamental pleasure grounds, &c. The name, which is Latin for tree of life, has been given on account of a resin yielded by the tree, to which remarkable medicinal virtues have been ascribed.

**Arbour.** A bower or shaded retreat, generally slightly constructed in a picturesque form by means of a timber framework filled in with lattice-work, wicker-work, wire-work, &c., and covered with climbers, vines, or in other appropriate ways. In landscape gardening an arbour can often be made a charming feature.

**Arbutus.** A genus of plants to which the strawberry tree *(Arbutus unedo)* belongs. This, which yields fruit somewhat similar in appearance to strawberries, is often grown in Britain for ornamental purposes. The *arbutus andrachne* is likewise occasionally cultivated with the same object, but frost places it in jeopardy.

**Arc.** Any portion of a circle or curve lying between two points, which joined by a right line forms its chord. The angles at the centre of a circle being equal to four right angles or 360 degrees, if the whole circumference be divided into 360 equal parts, and each of these subdivided, as explained under ANGLE, the magnitude of any angle may be expressed by the number of such parts which the arc that subtends it contains. The arc divided by the radius is the circular measure of the angle subtended at the centre by the arc. All lines drawn with compasses, such as foils in tracery, or pointed or curved door or window heads, are arcs. 2. In construction, any curved surface that is not an arch is so called.

**Arca.** A chest, coffer, coffin, trunk, or any kind of reservoir. 2. A prison. 3. A beam of wood with a groove or channel in it. See ARCÆ.

**Arcade.** A row or series of open arches alone or supported by piers. The series of arches which carried the canal in a Roman aqueduct gives a good idea of one. The arches may be plain or highly ornamented, of any width or shape, and they may be supported by columns or piers decorated to any degree, and either filled in or pierced with lights or openings. Very often behind an arcade there is a wall or covered space where even carriages may shelter. Cloisters, squares, and courts are often surrounded by arcades, and the nave and aisles of a church are commonly separated by them, or by arcaded colonnades. It is found, as a rule, that nave arcades, though to a certain extent interfering with direct sight, are beneficial for hearing, and consequently that Gothic churches built with nave, aisles, transepts, and broken roof, are in this as in other respects, of preferable construction to rectangular edifices covered by a wide roof of single span. The term arcade is also applied to a wall decoration, consisting of a series of closed or blank arches, which appear either outside or inside buildings of the Norman, Transition, and Early English Periods, sometimes interlacing and often beautifully ornamented. In the Decorated Period it was a rare feature, and in the Perpendicular it was superseded by panelling. 2. A covered street, but especially one roofed over by means of arches or arched ribs.

**Arcaded.** Furnished with arcades.

**Arcaded Colonnade.** A series of arches supported by columns, usually carrying a wall, which sustains a roof.

**Arcading.** That which consists of one or more arcades.

**Arcæ.** In ancient Roman architecture, the gutters of the cavædium, and probably others, were so called.

**Arc-Boutant.** A French term, signifying a flying buttress, which see.

**Arc-de-Cloitre.** A triangular part or half of a cross vault when its base is supported by a wall.

**Arc Doubleau.** A French term for an arch-band, or an arch placed below another, and concentric with it. Thus, in a vault, transverse ribs or shallow arches of stone thrown across and projecting below the soffit of the vault, are arcs-doubleaux. See ARCH-BAND.

**Arcella.** A small room, chest, coffer, or closet.

**Arch.** In general, any curved part of a structure intended to sustain weight, or resist pressure, and unsupported excepting at the ends; but strictly, an assemblage or series of hard, wedge-like, tapering stones or bricks, or of common bricks with wedge-shaped mortar joints, usually disposed in a bow-like symmetrical form, so that the forces arising from their weights are transmitted through them in a polygonal line (called the curve of equilibrium) to fixed supports or obstacles (called abutments or butments) at each extremity, by which means the blocks are mutually supported and enabled to carry in concert a superincumbent weight. In order, however, that the equilibrium of the arch and its surcharge and load may be stable, so that the arch may stand fast and not change its form, there are three conditions which must be satisfied, viz., the abutments must be immovable, the materials are to be proof against crushing, and there must be a sufficient thickness of arch stones to hold, within its central third part,* the curve of equilibrium, which fluctuates in position during the transit of a load. In mathematical investigations relating to the arch, radiating joints or joints perpendicular to the curve of the arch ring are usually considered, and, in practice, they are generally adopted and perhaps advisedly so, but there can be no doubt that if the joints are not weak and loose, that is, if the mortar is of proper quality and the bricks or arch stones skilfully bedded in it—the latter being also well dowelled—the joints have nothing whatever to do with the stability. When bricks are used in large works they are often made of special form, suitable for their position in the arch or pier, and it should be borne in mind that in ordinary house building the use of cement in many cases quite removes the necessity of providing against thrust when the space is not considerable. Hence arched brick beams cause no anxiety when flanked by attenuated piers, and the so-called French arch, when placed over a window and built with Portland cement, becomes a compact splayed heading without thrust, and no more liable to transverse fracture than a freestone one. In church work the arches generally are built in rims, with an occasional through stone, and all

* See Rankine's *Manual of Civil Engineering.*

the arch stones are dowelled together with slate or hard stone dowels secured with cement. In an ordinary arch intended for traffic, &c., the parts are named as follows. The concave under or inner surface A B C D, Fig. 17, is called the *intrados* or *soffit*,* the corresponding convex upper or outer surface through E F is the *extrados* or *back*. Sometimes the line of roadway G H is erroneously termed the extrados. The solid matter E G F H included between the extrados and the line of roadway is the *surcharge*, and that part of it which constitutes the filling in over the haunches is called the *backing*. The wedge-like blocks are termed *arch stones* or *voussoirs*,† and the middle or central part of the arch contained between the highest parts of the

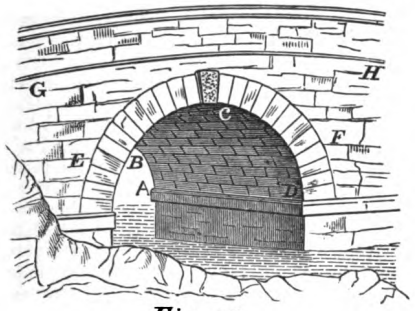



*Fig. 17.*

soffit and back is denominated the *crown*, but occasionally the crown is defined to be the topmost point or vertex of the arch. The *keystone* is the voussoir occupying the central position in the crown and consequently the highest in the arch, and when this block is not of stone it is simply termed the *key*. The summit of the crown is the *vertex* and the lowest arch stones, or those resting on the pier or abutment, are termed *springers*. The line A D, separating the intrados from the abutment, is called the *springing line* or *springing*, but some writers consider the springing to be merely a point in the springing line. The side of the arch between this line and the crown is the *rein*, *haunch*, or *flank*; the horizontal distance between the opposite springing lines is the *span* or *chord*, and the vertical distance between the soffit under the keystone and the level of the springing line is the *rise*, or *height*, or *versine*, but the latter term is only applicable in the case of segmental arches. The radiating seams, or planes, between the arch stones are *joints*, or *bed-joints*, or *summerings*, and the top stone of the abutment from which the arch rises is an *impost* when its upper bed is level, and a *skewback* when it radiates with the joints of the voussoirs. The *face* of an arch is the front or outside surface, usually vertical, displaying the arch stones and included between the intrados and extrados. The *length*, or *width*, is the length of the springing line, or the dimension measured perpendicularly to the face. The *depth* or *thickness* is the thickness of the arch-ring or face. The courses of stone or brick parallel to the face are called *ring courses*, and the joints between them *heading joints*. The courses perpendicular to the face, and parallel to A D in the figure, are *string courses* and the joints between them are termed *coursing joints*. An arch is said to *fail* when disruption ensues, either by the crown sinking through the haunches opening out, or by the crown rising through the haunches being overloaded, or by the voussoirs sliding on one another, which rarely ever happens. Excluding pointed arches, the most usual and almost the only mode of fracture in any finished work arises from the neglect of precautions to guard against the first of these contingencies, that is, from not employing the proper curvature, or a sufficient depth of voussoirs, or an appropriate surcharge or load to keep the curve of equilibrium from approaching too close to the intrados at the sides or haunches, for when it does, the effective bearing surfaces through cross sections of the arch-ring may become dangerously reduced.* Or the same kind of failure is induced by not making the vertical joints of the backing at the haunches close and perfect, but if the work is sound in this part it acts as a reservoir of strength, in case an unforeseen strain exacts more than ordinary resistances. In fact, too much attention cannot be paid in providing stability and rigidity by means of good masonry rather than to hope for them and pack in behind the abutments, or between the spandrils, with soil and rubbish, for if the line of pressure, which may be regarded as identical with the curve of equilibrium, be resolved into its vertical and horizontal components, the latter will be effective only in exerting a powerful *drift*, *thrust*, *push*, or *kick*, in an outward direction, which increases in intensity towards the springing until a certain point is reached, when it commences to decrease. In the case of a semicircular arch it is found that this point is distant 60 degrees from the vertex of the soffit, from which it follows that in all segmental arches subtending 120 degrees, or any less angle, the greatest thrust is at the springing. In pointed arches the position of the point of greatest thrust depends upon the pitch of the arch. In the equilateral arch it is distant 44 degrees from the apex, and in the lancet arch, 35 degrees. For considerations connected with the failure of an arch through a pier being too high or slender, see PIER. It may be useful to observe here, however, that the conditions of equilibrium of an arch cannot be better represented than by Dr. Hooke's principle which may be thus described. Suppose that from two fixed points A and B in the horizontal line A B, Fig. 18, a flexible chain of uniform weight and thickness be suspended and allowed freely to arrange itself, which it will do in some symmetrical position A C B, and then to become rigid and inverted so as to take up the opposite position A D B in the same vertical plane. The assumed rigidity is now to quietly and instantaneously disappear, and the chain will still support itself, because the forces with which the links mutually press upon one another, in the new position along the curve of equilibrium, are exactly equal and opposite to those with which they pulled at each other in the old. For the same reason the chain will collapse if a weight E be placed anywhere upon it, because the pressures it produces are exactly equal and

* Pronounced *suf-feet*.

† Pronounced *voos-warrs*.

* When centering is prematurely struck failure sometimes occurs through the pressure of the haunches heaving up the crown.

opposite to those required to continue the equilibrium. If, however, the links be supposed to be arch-stones of sufficient depth, having instead of pin-joints flat seams of contact, then the altered curve of equilibrium will pass through them, and the balance of parts be sustained. Hence, other things being equal, the deeper the arch stones, the stronger the arch, but it is manifestly unnecessary to exceed a certain thickness, which is more or less regulated by the span.* The curve which is assumed by any uniform chain, suspended as above, and hanging freely between two fixed extremities is called the common catenary, and if the chain be so weighted that the weight upon each link or element varies as its horizontal distance from the lowest point of the chain, the curve will become a parabola. As an ordinary arch, of moderate rise, with its surcharge up to the level of the roadway may be divided into a series of vertical slices, each increasing in weight from the crown to the springing, the line of pressure will often sufficiently approximate to an arc of a circle to render it quite safe, having regard to before mentioned precautions, to adopt a segmental or elliptical intrados, but in almost all cases, the span and rise being given, it will be found practicable, and sometimes advantageous,

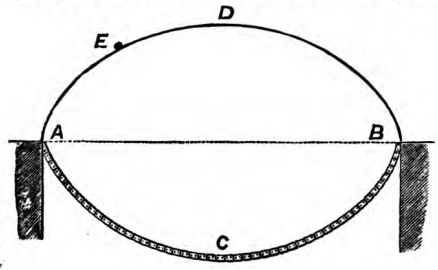



*Fig. 18.*

to suspend and weight a chain so as to find the variations of the curve of equilibrium due to the application of any load, as well as to the weights of the arch and surcharge. As all the parts of a properly designed arch should be in compression, the secret of its stability lies in correctly calculating the lines of pressure for the loads to be carried, and then designing the arch-ring so that its central third part may include them all. With good materials and workmanship the arch is then to be turned on a rigid centering between immovable abutments or piers, in such a way as to be virtually a cohering, indivisible mass, possessing everywhere a resistance to crushing equal to the minimum safe crushing resistance of good mortar, or 1 cwt. per square inch. Historically considered, the arch was known to the Egyptians and Assyrians, and doubtless also to the Greeks, who, however, did not employ it where it could be seen, as the idea of restlessness, which it conveys, would have been quite antagonistic to the sense of tranquillity engendered by the evident equipoise of their style. The Romans adopted it, and, as a consequence, materially changed the forms which they copied from the Greeks, animating them in the process, but at the same time losing some of the gracefulness which the latter could always impart to their architecture, through an unflinching adherence to the principles of repose. The truth contained in the Arab apothegm that "an arch never sleeps," very probably deterred many of the more ancient constructors from employing it except in situations where it was palpable that it could not fail by rupture at the sides, for though this characteristic propensity of the arch when put together at random must have been known to them they were doubtless unable to decide with certainty why it occurred or to take steps to prevent its occurrence. It is not conceivable that a structure could have been erected by men clever enough to cover an opening with horizontal or sloping blocks of stone, without the principle and difficulty of the arch being forced upon their observation, and it is more than probable that in after times when the arch was less feared and more used, architects were still prone to provide for the security of so much suspended matter by an excess of strength, involving waste of material, excepting when the presiding genius of the design happened to be of a bold self-reliant temperament quite incapable of feeling any concern about risks. Even now, with an accumulation of knowledge on the subject, there is no theory of the arch sufficiently clear, convincing, and exact, to induce practical constructors to renounce in its favour their own favourite and special views and formulæ, and this will not appear at all surprising to those who have endeavoured to penetrate the mysteries of the theory of the arch, for, besides the subtle discoveries which a mathematical investigation brings to the surface and which, perhaps, are not equally valued by all practitioners, there must ever be a diversity of opinion as to what constitutes an accurate allowance to meet the contingent imperfections in materials and workmanships which are almost sure to lie concealed in every structure. *Arch of Equilibration* or *Arch of Equilibrium* is one in which the line of pressure coincides with the line passing through the centres of gravity of the cross sections of the arch-ring. Or, it is a term sometimes given to an arch consisting of arch-stones of such a weight and with such inclination of surfaces of contact (joints), that the arch-stones mutually support one another without the intervention of friction. It is obvious that in this case the line of pressure must be perpendicular to all the joints. *Arch of Equipollence* is one in which there is no more tendency to yield in one part than in another. *Arch of the Abacus* is a name given to the curve which concavely indents the sides of the abacus as illustrated in the capitals of the Corinthian and Composite Orders. Arches are distinguished by specific names, according to their uses, properties, figure, and mode of application in construction, as well as from the particular style of architecture in which they are found, the form of their intradossal curves, and the materials of which they are built, &c. There are a great many varieties, as an inspection of the following list will show. Each will be described under its proper head, or elsewhere, and where necessary attention will be directed to special properties and peculiarities. *Abutment; Acute; Angular; Annealing; Arabian* or *Arabesque; Ashlar; Auxiliary; Axed; Back; Basket-handled; Belfry; Bell; Blind;*

* See Hurst's *Architectural Surveyor's Handbook* for an empirical formula to find depth at keystone.

*Brick; Camber; Catenarian; Cinque-foil; Circular; Clustered; Compass-headed; Composite; Compound; Concentric; Concrete; Contrasted; Corbel; Counter; Crocket; Cycloidal; Cylindro-cylindric; Dennett; Depressed; Diminished; Discharging; Drop; Dutch; Egyptian; Elliptic; Elliptic Gothic* or *Elliptic Pointed; Equilateral; Equilibrated; Equilibrial; Equipollent; Expansion; External; Extradossed; False; Fireproof; Flat; Fluing; Foiled; Four-centred; French; Furnace; Gauged; Geostatic; Gothic; Groined; Hand; Hanse* or *Haunch; Horizontal; Horse-shoe; Hydrostatic; Hyperbolic; Imperfect; Improper; Inflected; Inverted; Iron; Jack; Laminated; Lancet; Land; Linear; Lobed; Mixed; Moorish* or *Moresque; Multifoil; Mural; Norman; Oblique; Ogee; Parabolic; Perfect; Pier; Plain; Pointed; Polifoil; Powder Magazine; Raking; Rampant; Relieving; Ribbed; Ribbed Skew; Right; Romanesque; Rough; Rough Cut; Rough Relieving; Rubble; Saracenic; Saving; Scheme; Segment* or *Segmental; Segmental Gothic* or *Segmental Pointed; Semicircular; Semi-elliptic; Shouldered; Skeen; Skene; Skew; Sloping; Sphero-cylindric; Splayed; Square; Stilted; Stone; Straight; Strut; Sub; Surbased; Surmounted; Three-centered; Tied; Timber; Trefoil; Triangular; Trimmer; Triumphal; Tudor; Tuyere; Tween; Tymp; Ulnar; Wheel.*

**Archæology.** The modern name for the study that formerly was called "antiquities." It has been broadly divided into three main sections, termed respectively monumental, traditional, and written archæology. With the former of these the architect has most to do, and in its pursuit he will find much that is instructive in underground explorations, and much that is enjoyable in reflections as to the habits and customs of remote periods of society, which will pass through his mind when scrutinizing remnants of the handiwork of past ages. All who have spare time would do well to yield to any natural proclivities towards the cultivation of a pastime that becomes upon better acquaintance very fascinating, and which, besides possessing the above-named advantages, imparts to its devotees a profitable knowledge of armorial bearings, old buildings, catacombs, caves, coins, enamels, engravings, furniture, glass, inscriptions, medals, mummies, paintings, plate, porcelain, pottery, roads, sarcophagi, sculpture, seals, tapestry, tombs, tools, urns, &c., &c.

**Archaic.** Very ancient. Pertaining to remote antiquity, but not to pre-historic times.

**Archaism.** In works of art, a reproduction of the expression or feeling evinced by those that are *de facto* archaic.

**Archangel.** An angel of the highest order. No clear account is given in Scripture of the angel hierarchy, but in Christian art there are seven archangels, who are sometimes depicted with the following attributes:—St. Michael bears a sword and scales, St. Gabriel a lily, St. Raphael a pilgrim's staff and gourd, St. Uriel a roll and book, St. Chamuel a cup and staff, St. Jophiel a flaming sword, and St. Zadkiel a sacrificial knife.

**Archangel Tar.** Tar made in the north of Europe from the resinous wood of the *Pinus sylvestris*, and especially from the wood near its root. Archangel is the name of a department in Russia, as well as of the chief city in it, which is an important seaport, the oldest in the empire, and one of the leading timber ports. See TAR.

**Archangel Timber.** This is said to be one of the best goods in the market, and generally dear. It is Baltic timber shipped from the Russian port named in the preceding paragraph, and is pronounced to be all that can be desired for warehouse floors and staircases. Of course, it all depends upon the quality of the parcel, for Archangel and Onega timber have been described as "not fit for work exposed to damp. The knots are often surrounded by dead bark, and drop out when the timber is worked. Clean specimens are suitable for joiners' work."* It must be clearly understood, however, that the ports from which Baltic timber is now shipped are so numerous that it is sufficient to know that the goods are fit for the purpose, without paying heed to the name of the particular port whence they are dispatched.

**Arch Band.** That portion of an arc or rib which projects below the soffit of a vault.

**Arch Bar.** In a circular-headed window the curved bar into which the radial bars in the upper sash are mitred. It is also called cot-bar, and chord-bar.

**Arch Bevel.** See ARCH SQUARE.

**Arch Brace; Arched Brace.** In carpentry, any curved brace of smaller scantling than what is usually called an arched rib. Its ends may or may not be in a horizontal line, and it is almost invariably to be found in some form or other in hammer beam roofs. 2. In certain kinds of timber bridges, arch braces are the additional braces fixed at the ends of the structure, in lieu of making the ordinary braces successively of greater strength, or cross section, from the centre of span to the abutments.

**Arch Brick.** A wedge-like brick used in building arches. It is called also a compass brick. 2. A vitrified brick from the arches of a brick clamp.

**Arch Builder.** Chief builder.

**Arch Buttant.** A flying buttress, which see.

**Arch Centre.** The wooden frame constructed to support the voussoirs of an arch until the keystone is driven home, or till the whole arch is turned and the joints become consolidated. Pointed arches usually have a central joint and no keystone. In bridges, the centres frequently require more skill to design than the permanent work. See CENTRE.

**Arched.** Covered by an arch. Curved.

**Arched Beam.** A timber beam of curved form, and made so by bending, building up, or cutting. When not formed out of a single piece, it is more frequently termed a curved rib, which see. Sometimes an arched beam is erroneously called a timber arch. 2. Another name for a compound curved iron rib.

**Arched Beam Bridge.** A bridge supported by one or more arched beams, which require to be stiffened by some system of trussing before the load can be applied with safety.

**Arched Beam Roof.** A roof supported by arched beams or curved ribs.

**Arched Butment.** See FLYING BUTTRESS.

**Arched Buttress.** The same as flying buttress, which see.

* Newland's *Carpenter and Joiner's Assistant.*

**Arched Chamber.** The arched cavity or place built for the reception of a heating furnace, warming apparatus, &c.

**Arched Channel.** A channel of any section covered by a continuous arch or vault.

**Arched Floor.** A floor supported by one or more arches, usually with the object of being fire-proof. It has often the disadvantages, however, of depending for stability upon the steadfastness of other portions of the structure similarly exposed to the inherent weakness, springing from thin and lofty abutments, and therefore, wherever practicable, it is advisable to employ a less complicated arrangement, such, for instance, as concrete slabs. See FIREPROOF FLOOR.

**Arched Principal.** A curved rafter, or semi-rib, either trussed or not, ascending from the wall and extending towards the ridge of the roof, and forming with a similar and opposite one a chief support for the covering. The term is often given, however, to an arched rib, or the whole rib or roof-truss* when curved and reaching from wall to wall.

**Arched Rib.** The appellation, often contracted into rib, commonly given to each arched principal, or other curved independent member of a roof, bridge, centre, &c., spanning a void between abutments. It must be rendered self-maintaining, and well braced if of any magnitude, and kept from spreading by means of tension rods, or else there must be no question as to the immovability of the abutments. See CURVED RIB; LAMINATED ARCHED RIB; RIB.

**Arched Roof.** A roof formed by a series of arched ribs. In designing one care is especially needed that the horizontal thrust is either neutralised by tie-rods, or held in check by adequately firm abutments. As regards majesty and grandeur, the ordinary sloping iron cobweb roof cannot be compared with its more elegant arched rival, especially when the latter receives appropriate ornamentation. The roof of the Crystal Palace, incomplete as it is in this respect, indicates what can be done in the way of beauty by swelling out the sides of roofs into noble curves, instead of leaving huge flat surfaces to battle with storms and droop through defeat. 2. A roof whose external or internal surface is round or concave towards the ground.

**Arched Stay.** A stay of an arch-like form.

**Arched Vault.** A tautological expression, signifying a vault, and sometimes used to denote a groined vault.

**Archeion.** The Greek term for any public place belonging to the magistrates, and particularly applied to the archive office at Athens, where the state records were preserved.

**Archery Ground.** A portion of ground devoted to the exercise of archery. It forms an agreeable acquisition in ornamental grounds, and should not be omitted where space remains after land has been assigned for more important purposes. Archery constitutes a very interesting and healthy sport, and deserves encouragement, since it affords inducements for out-door exercise, and quickens the mind with the stimulus that emulation always evokes. The game was in abeyance, in this country, between the years 1685 and 1776, and from 1793 to 1844, when it was resuscitated, and at the present time it finds many admirers whose toxopholite proclivities are fostered through the auspices of various archery societies.

**Archetus.** A word that has been used to signify either a skeleton key, a saw for cutting stones, or a crane or pulley employed for raising stones to the upper part of a building.

**Archetype.** The first pattern or model, or the pattern or model after which work is executed.

**Archeus.** A word used by the old chemists to denote the internal efficient cause of all things.

**Arch Head.** The materials which form the upper part or the head of an aperture when arched. Head, by itself, signifies the same thing. See APERTURE.

**Archiepiscopal Palace.** The residence of an archbishop. See EPISCOPAL PALACE.

**Archil.** A colouring substance procured by exposing lichens, or the Orchella weed, to a process of fermentation and putrefaction. Its chief use amongst cabinet makers is to improve other reddish and purple dyes or stains for colouring wood. It is often called Orchil.

**Archimedean Brace or Drill.** A drill consisting of a handle and stem with a spiral groove, which is made to rotate by urging backwards and forwards a nut having an internal thread fitting into the groove. It is sometimes called a Persian drill.

**Archimedean Screw.** A flexible tube wound spirally like a corkscrew round a cylinder, having its ends pivoted on supports so as to revolve. Archimedes, the wonderful mechanician of Syracuse, who gave the initial push to the sciences, which are now applied with admiring gaze to the requirements of civilization, invented this instrument when he dwelt in Egypt for draining and irrigating land. A plate, twisted and bent round a cylinder in the same way forms a screw, and is now in most cases preferred to wheels for propelling ships through the water.

**Arching.** Turning or building an arch. Curving like an arch.

**Architect.** Strictly speaking, one who professes the art of designing buildings, and of directing and guiding their progress and growth to completion and excellence, so that they may not only be stable and perfectly adapted to their requirements, but capable also of creating refined sensations of satisfaction in the minds of those who inhabit them, or use them, as well as in the minds of all under whose observation they may chance to come. Or an architect may be defined to be one who is liberally educated, tolerably conversant with mercantile affairs, and specially versed in superintending the construction of all descriptions of buildings, and of designing and delineating any particular one in exact agreement with the characteristic features of any ordinary style of architecture, in accordance with hygienic laws, the maxims of skilful and economical construction, and in happy conformity with the precepts of art. Since, however, there is no legal standard of excellence amongst practitioners it is clear that some must fall short of the level of merit aimed at by these generally accepted definitions, but facts prove

* The term principal, by itself, though primarily signifying, through an ellipsis, a principal rafter, is now properly used for the whole roof-truss. (See Dobson and Tarn's *Student's Guide to the Practice of Measuring and Valuing Artificers' Works*, p. 155.) Truss, framed principal, and trussed principal, are other terms often used to express the same thing.

that in most instances practising architects possess the confidence of the public, and if there is at any time an apparent want of sagacity exhibited by some, it as often as not arises from the obtuseness, or misapprehension of those who too hastily pass judgment upon them. Considering the wide range of subjects which fall within the scope of professional study, no surprise ought to be felt at certain excellencies being conspicuous in some quarters on some points more than on others, and as business men of all denominations are often judged of according to conjectural surmises, it may equally well happen that where no very high order of ability is suspected, considerable qualifications may exist to abundantly compensate for more obvious deficiencies. Besides which, since all kinds of structures can be run up subject only to certain inconsiderable limitations and conditions, enforced by local boards with a view to general health and safety, this lax system not only encourages those about to build to be satisfied with an inferior class of residence or business premises to that which would be instinctively introduced were architects to be less fettered by limited outlays, or were it obligatory to employ them, but it has also the pernicious effect of confining a large portion of the profession to an inferior description of design and decoration, for which there is a craving because it is cheap. Bearing in mind, however, the advantages that are often educed by the trifling addition of an architect's fee to a contract sum, it is unquestionably odd that, through the conceit of not uniformly making a point of consulting such a practitioner previous to building or altering, numbers should tamely suffer life-long discomforts, arising from the arrangement or disposition of their habitations—the direct result of unskilful planning—or else, with enviable nonchalance, risk giving a neighbour chronic irritability, or dejection, through erecting an ugly abode, or a simply utilitarian structure—the direct result of bad design or of no architectural design at all.

**Architect and Surveyor.** The ordinary title with few exceptions—at all events during the earlier years of business—of a practising architect. The term surveyor, as thus used, does not signify a land surveyor, but an architectural, or quantity, or measuring surveyor, although the affinity which exists between an architect's more special work and the laying out of estates, and between this again and the capacity for forming a sound opinion as to the value and eligibility of building sites, is one of the reasons which induce many practitioners to become familiar with that part of land surveying which includes chaining and measuring, whilst others prefer making themselves proficient in levelling and traversing. Unfortunately, however, owing to its being felt that there is a way to acquire independence, if not fame, through confining attention exclusively to design and its concomitant superintendence, it is urged that the profession generally should refuse to amalgamate the functions of the quantity surveyor with those of the architect, and in fact reject work in other branches of professional industry that are thought to jar with the study of art, or which are not in harmony with a vocation specially requiring the practised help of a fertile and obedient pencil. The fallacy of this advice is, however, at once perceived by recollecting that an architect's skilled assistance is not only requisite to the refined and opulent, but to all who build in order to insure correctness in execution as well as appropriateness in design and plan with respect to every sort of fabric, no matter how humble or unpretending it may be, and it is evident that it would be equally impossible for special art architects to take kindly to much of such simple work as for the surveyors whom they now employ to be really required for comparatively trivial work. Considering, moreover, that where an architect does not take out his own quantities the specification must be vague if original, and the drawings general only, or showing what may be built in more ways than one, it almost follows as a matter of course that the practical execution of the works will altogether depend upon the rendering of the documents as exhibited by the quantities, which may or may not accord with the designer's preconceived wishes or ideas, the dimensions not being accessible to him. Much could be adduced to show that it is equally to the benefit of the public as to architects that the latter should act as quantity surveyors as often as possible when time allows, in order that they may evince expertness in whatever pertains to the anatomy of structure. It may, however, suffice to say that the healthy union of architect and surveyor answers many purposes. It encourages rather than checks on the part of the architect, a disposition towards economy, both in work and materials. It assists him in gaining a thorough insight into the intricacies of valuations, dilapidations, and compensations, and besides helping to dissipate the idea that in ordinary builder's work an architect's services are superfluous and economically useless, it enables practitioners to hold their rightful ground against the fair rivalry of others who are mastering these essential subjects during the unremunerative efforts of the young and hopeful who are anxious to secure patronage solely on the ground of being building artists.

**Architective.** Used in building. Proper for building. Architectural.

**Architectonic.** A term formerly used to signify something displaying the power and skill of an architect. Now it is more usually applied to any portion of the theory of architecture, and used in opposition to architectural, which see.

**Architectonics.** The theory or science of architecture.

**Architectress.** A female architect. It has been wondered at by many that women have not shown the same partiality to architecture as a pursuit that they have to other branches of art, especially since their instinctive good taste might lead to a general improvement in interior decoration, and stimulate architects to higher efforts to perfect thoroughly national domestic styles. No doubt the explanation is that the pathway to architectural fame is so rugged, and the action of professional and collateral elements as exhibited in the practical working out of plans occasionally so tumultuous, that none but the sterner sex can manifest the requisite obduracy to conduct important buildings from their apprehension to completion, and thereby enjoy a brilliant career. If the power to design could be acquired and practically applied

without losing the quiet serenity of the studio, there would doubtless occasionally appear in the grand domain of architecture an aspirant, both formidable and fair, prepared to dispute with chivalrous men its honours and rewards. But since it is next to impossible to attain eminence without being able to build in truth, and as this cannot be done without a good deal of practical acquaintance with building construction, it is scarcely to be expected that women will ever sedulously cultivate any architectural talent with which they may be gifted, excepting in so far as it may concern decorative art.

**Architect's Arbitration.** After what has been written under "arbitration" and "arbitrator" this phrase will be pretty clearly understood, but it may be well to observe "how improper it is for an architect who is to act in some matters as arbitrator between his client and the builder, and whose certificate is to be a condition precedent to payment to the builder, to allow himself to be bound by any express or implied contract as to the ultimate cost of the works. Although the object of any such arrangement between architect and client is presumably for the protection of the latter, and is most frequently insisted upon by unwise boards and committees, oftentimes the result is a most expensive and unpleasant litigation, and the overturning of the contract, between the owner and the builder, to the client's ultimate great loss." *

**Architect's Assistant.** One who aids an architect in the practice of his profession in return for a stipend, and generally after having passed the usual probationary period, as pupil, in an office and obtained satisfactory certificates. Practically such assistants—after seven years' joint service as pupil and assistant—are young architects, and principals do well in encouraging their attendance at art, university, and architectural classes or réunions, and such like intellectual gatherings, besides inculcating attention to constructional devices, and to point and refinement in design. There are other assistants, however, often splendid draughtsmen, with little ambition to bear the incubus of independent practice, who remain for years in the same office, discharging the daily round of routine work with fidelity and attachment to its head, and contributing much to the credit and success of the business.

**Architect's Certificate.** A document signed by the architect certifying the amount due to the builder or contractor, in conformity with the proviso relating to the payment of the instalments in the agreement. The certificate naturally implies that the architect has taken all usual steps to insure the work having been executed as intended by the contract, but to provide against the contingency of any oversight in this respect a clause should be inserted in agreements plainly stating that no certificate of completion shall exonerate the builder from doing what the specification enjoins to be done. It is proper to add, however, that some think such a clause wholly unnecessary, it having been decided by Lord Ellenborough in a trial for disputed balance of contract, that no certificate would exonerate a builder in such a case. The following is one of many forms of certificate, some being more verbose than others. "I hereby certify that * * * (the builder) is, in my opinion, entitled to the sum of £ * on account of contract for building * * * Signed * * (architect). First (or, as the case may be) Instalment. To * * (building owner). On completion, the wording of the certificate will depend upon that of the agreement, relating to the payment of the last two instalments, for the final certificate is usually not granted until the expiration of a certain time after completion, which is named in the contract, and during which the contractor remains liable for defects that become apparent.

**Architect's Charges.** The money equivalent for services rendered. The following is taken from the schedule of rules for the professional charges of architects, published under the sanction of the Royal Institute of British Architects, and confirmed at a general conference of architects of the United Kingdom, 1872. Five per cent on the total cost of the work executed from his designs, valued as if executed by a builder, and of new materials, is the usual remuneration, exclusive of travelling and other incidental expenses, which are paid by the employer, who also may be charged for time occupied in travelling to and from considerable or inconvenient distances, or if more than ordinary personal attendance is required. Exceptions to this general rule are (1) when the architect's services consist mainly in designs for skilled labour, and not for materials, when special conditions as to payment must rule; (2) when similar but distinct buildings are erected at the same time, from the same documents, &c., under the same contract, when five per cent should be charged on one, and less for the rest; and (3) in cases when the total cost of works executed is £500 or less, when the charge is to be by time, or by an ascending scale until ten per cent for works under £100 is reached. Two and a half per cent, exclusive of the charge for measuring extras and omissions, is charged upon works originally included in the contract, but not executed, and where material alterations are made after the employer has agreed to a design, and caused the contract drawings to be prepared, and whether the contract has been prepared or not, an extra charge can be made unless such alterations are rendered necessary by the architect having given an unreasonably low approximate estimate, causing the builder's tender to be much in excess. If the approved design should have been drawn out complete, with plans, elevations, sections, and specification, the charge is half the commission upon the estimated cost, and one half per cent. extra if, in addition, tenders have been procured at the employer's desire. A special charge is to be made in altering premises, according to the trouble involved. Approximate estimates are not to be charged for. An additional percentage may be claimed from the employer for a detailed one. The minimum charge per day for an architect's services is three guineas, but this sum is to be augmented in proportion to the professional standing of the practitioner. The usual 5 per cent. commission is to include the requisite preliminary sketches, drawings and specifications sufficient for an estimate and contract, detailed drawings and instructions for execution, one set of tracings and duplicate specification, general

* *Building News*, Vol. xxviii, p. 589.





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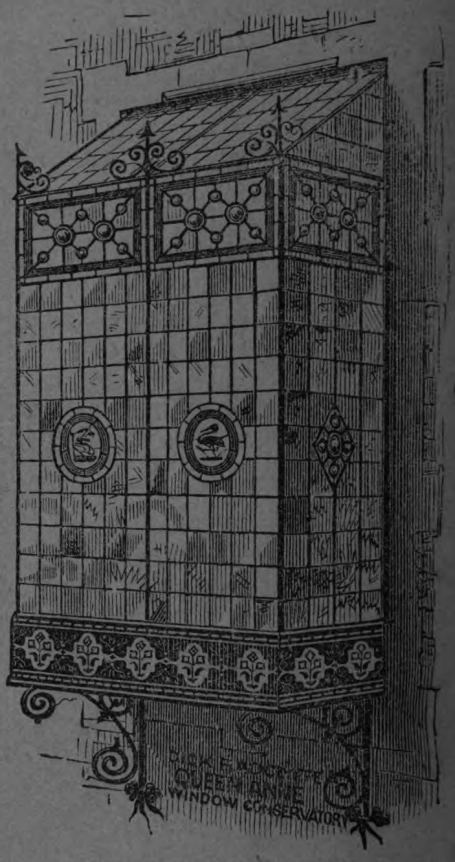
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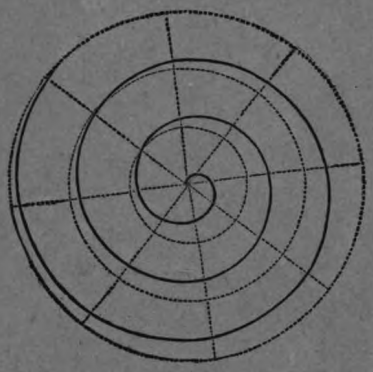
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superintendence of works (exclusive of clerk of the works), and examining and passing the accounts, exclusive of measuring and making out extras and omissions. It does not cover professional services in connection with negociations for site, in surveying it and taking levels, in making surveys and plans of buildings to be altered, in arrangements respecting party walls, or right of lights, nor services incidental to the failure of contractors whilst carrying out work, or in cases of subsequent litigation. In every case the payments which have been alluded to are to be made to the architect by the employer, and the former is not to receive commission, or payment of any kind from the builder or any tradesman in respect of works executed under the architect's direction. In the matter of estates, the following charges are exclusive of travelling expenses and time, of commission for preparing specification, directing, superintending and certifying the proper formation of roads, fences, and other works, executed at the cost of the employer, nor for putting the plans on the leases. For taking the plan of an estate, laying it out, and arranging for building upon it varies with circumstances; and, generally, a sum not exceeding a whole year's ground rent may be charged for actually letting the plots. For inspecting the buildings sufficiently often to see that the conditions are being fulfilled, and finally certifying for lease, the charge is to be a percentage, not exceeding one-half per cent. up to £5000, and above that by special arrangement. For valuation of property, the charge exclusive of travelling expenses, attendance before juries, arbitrators, &c., is one per cent. on the first £1000, and half per cent. on the remainder up to £10,000. Below £1000 and beyond £10,000, by special arrangement. For estimating dilapidations the charge is 5 per cent. on the estimate, and not less than two guineas in any case. See ARCHITECT'S PRACTICE.

**Architect's Commission.** The customary percentages described in the previous article. The five per cent. charged on the total cost of the works, valued as already explained, is sometimes conveniently divided into four equal parts, so that an imaginary equitable proportion of the commission may be calculated for work accomplished when stopped at any stage, but the schedule of the Institute does not recognise the practice. The charge for superintendence would, of course, only be omitted, or reduced in cases where the building is not commenced, or is left unfinished; for it is, to say the least, questionable policy to supply designs without insisting upon full superintendence. According to this plan, 1¼ per cent. is charged for preliminary designs and survey of site (which latter not being covered by the 5 per cent., and being thus charged for, exposes the imperfection of the arrangement); 1¼ per cent. is charged for general drawings, including plans, elevations, sections, specification and approximate estimate; 1¼ per cent. for working and detail drawings; and 1¼ per cent. for superintendence, exclusive of clerk of works. See ARCHITECT'S CHARGES; ARCHITECT'S PRACTICE.

**Architect's Duties.** The services rendered by an architect in return for his charges. They include the devising and carrying out of all necessary measures to insure a wise and judicious expenditure of his client's intended outlay to the end that the completed building may be scientifically and economically constructed, dry, free from smoke, thoroughly drained, well lighted, efficiently warmed and ventilated, provided with all reasonable modern improvements and inventions, finished externally and internally in good taste, convenient, a source of satisfaction to the owner, and a comfort to its inmates, occupants, or users. Many paragraphs in this dictionary elucidate the subject, but it may be interesting to rapidly review the particular round of duties ordinarily performed in the common case of house construction. First, the architect visits the site and marks its peculiarities with attention, taking notes as to the aspect, prospect, drainage and water supply, dryness or dampness, levels, nature of building materials within easy reach, peculiarities of style of adjacent or surrounding buildings, scenery, &c., and forms a good general idea of the kind of house it would just do for. The employer must then give instructions as to what the number and sizes of the principal rooms are to be, how many persons will live in the house, what accommodation is to be provided for guests, and in fact enumerate as far as he can all his wishes on the subject, referring for explanation, if possible, as to desired style and convenience, to some building already executed. The architect then, in a manner that can only be understood by those who have received skilled instruction on the point, applies himself to make a plan of the ground floor, and whilst doing so, and retaining in mind the rooms that are wanted overhead, and the requirements of roofing, all the difficulties which the site and other considerations seemed to oppose to a realisation of the employer's wishes, gradually, or sometimes instantly, disappear. A good disposition of rooms and thoroughfares being devised and established, the entire building rises in vision before the designer, who now rapidly prepares sketches which present a tolerably lucid idea of what the edifice will be like, and if the question of cost has not hitherto been introduced the time has now arrived when it must be faced. A great deal of trouble often occurs at this period from the impossibility of estimating the exact differences in the cost made by omitting certain portions, substituting, reducing, &c., but at last everything is satisfactorily arranged, and the working or contract drawings are proceeded with. These consist of plans of each floor, sections, and elevations drawn usually to an eighth scale, and detail drawings of certain parts drawn to a much larger scale, and to get them all ready and complete in time usually taxes the strength of an office to the utmost, as there is generally other important work on hand. Then follows the composition of the specification (the nature of which will be described in its proper place), having the conditions of contract attached, and a second approximate estimate should be framed if the preparation of these exact and precise documents has rendered another advisable. All this, which is so easily described, involves much anxious deliberation and reflection, careful research and calculation, as well it may when hygiene, sound and economical construction, and Art have each to be liberally catered for. It also entails a vast amount of monotonous ruling and inking in. It now remains to take steps about commencing

the building, and to this end, if the work is to be executed for a certain round sum, a bill of quantities is prepared, and either a contractor chosen after a consultation between the employer and architect, or tenders are invited by advertisement. Very often after deciding upon the builder a good deal of modification is suggested in the plans in order to lower the cost, and where this kind of thing is pushed too far the point and effect of a design are seriously endangered. The contract signed, a clerk of works is next required to control the quality of labour and materials, and a proper salary will almost invariably secure the services of one both competent and willing to discharge the arduous duties of the appointment. The architect has nothing to do with setting out the building, but he takes care to see, by applying a few tests, that it has been done correctly, and that measures are taken to insure the true height or position of the ground floor. He visits the building during the whole period of its execution as often as he considers necessary, whilst he is continually watching over the owner's interests by detecting oversights, remedying mistakes, reconciling incongruities, and devising improvements, as well as copiously designing and supplying artistic and constructive details for the use of the masons, joiners, plasterers, and decorators. Besides this he has to see that his certificates are only granted where they are rightly deserved, and upon the completion of the work he sifts and investigates claims for extras, which latter are measured and valued, and set against the omissions, which most probably occurred during the progress of the building. Thus the last debt to the contractor is ascertained, and at the proper time, named in the agreement, the final certificate for the balance is handed to him.*

**Architect's Estimate.** An approximate sum reached by various means to form an idea as to what any contemplated work may cost, but on no account to be understood to represent the actual outlay for which it could be executed (See ARCHITECT'S ARBITRATION). It can be arrived at by cubing the contents, which will be explained on another page, by averaging the cost of similar works, and accommodating the average to meet the altered circumstances of time and place, or by finding the superficial values of walls, floors, &c., pricing them at so much per square, and adding to the aggregate all the runs and articles that can be numbered which readily occur to the mind. A comparison of the three results will afford a tolerably fair indication of the cost to the architect, whose experience will enable him at once to check any serious error.

**Architect's Fee.** The same as architect's commission, which see.

**Architect's Liability.** Responsibility in law for neglect, unskilfulness, want of due care, &c. Damage, in some sense, must be proved to have been caused to create liability, and of course the failure of any building to meet important requirements would be a loss or damage, but it need not be necessarily brought about by remissness on the part of the architect. The discretionary powers, however, that are vested in an architect enlarge his responsibility to an extent that should prompt him to restrain the building owner from interfering to the disadvantage of the building, and to take measures to let the owner explicitly understand that he will not be answerable for any direct or side consequences that might ensue from his interposition. But there can be no doubt that the best way to avoid so unpleasant a nightmare, as the dread weight of responsibility often foreshadows, is to exercise discrimination in not misleading the employer as to the standard of work he is to expect, and the exact money that he will, in all probability, have to pay before the building and its adjuncts reach that state of perfection which he has so often contemplated. In addition to this the architect should permit nothing to be done on the works that he cannot sanction, no matter how forcibly or plausibly arguments may be plied to lead to a change of views, but he must remain constant to his opinions whilst he continues accountable for success or failure. Moreover, although materials and labour usually come up to the spirit of specifications, it is essential that the architect should have no doubt on the point. See AGREEMENT; ARCHITECT'S CERTIFICATE; ARCHITECT'S POWER.

**Architect's Plans.** The comprehensive term for drawings prepared by architects for the proper execution of builders' work. The usage of the profession was, until recently, that they together with the specifications remain the property of the architect, who is only paid for their use. The validity of this custom, however, having been called in question, and the Courts of Law not having as yet given an authoritative decision on the subject, the Institute advise that a distinct understanding should in every instance be had with the employer on the subject. See ARCHITECT'S PRACTICE; DETAILS; ELEVATION; PLAN; SECTION.

**Architect's Power.** A term that may be given to the authority with which an employer invests his architect to alter the plans that have been made the subject of an agreement with a contractor. It is particularly necessary that a full understanding should exist between the former two before the architect ventures to make alterations, for unless he is backed by the most incontrovertible authorisation of the building owner, he incurs a grievous form of responsibility. All trust in the protective nature of his discretionary powers may be rudely dissipated, if the cost of the deviations from the original plans happens to be greater than was anticipated.

**Architect's Practice.** The exercise of the profession of an architect, which consists in applying civil architecture to the wants of the day, or what is the same thing, in the erection of churches, chapels, public and domestic edifices, farm-buildings, monumental erections, and dwellings of every description and size, whilst that part of civil engineering which relates to construction, comprises the formation of railways, canals, harbours, docks, the building of light-houses, piers, bridges, and such like works of skill and magnitude, more or less associated with the transport of merchandize and systems of intercommunication. To qualify for practice it is essential and indispensable

* This article is partly compiled from a Paper read at the Society of Arts, April 28, 1869, by T. Roger Smith, Esq.

that three years should be passed *in statu pupillari* in the office of a qualified practitioner, and it is customary to supplement this term by continuing for another period as an assistant, or improver, dependent for its duration upon individual capacity and attainments. Acquiring also during this interval a sound scientific education, and having, it may be supposed, naturally a taste for the Fine Arts, and through good fortune a fair introduction and connexion, but of more consequence than this latter consideration, animated with the hope that integrity and perseverance will reward a young practitioner with the experience requisite to be trusted with the execution of grand and important works, a small but definite practice soon concentrates and expands around him without any need arising to descend to the risky temptation of soliciting business, which not unfrequently is granted in the shape of patchwork to ricketty and tumble down tenements. During the progress of buildings carried out from his designs and under his superintendence, the architect is entitled to payment on account, at the rate of 5 per cent. on the instalments paid to the builder, or otherwise to half the commission on the signing of the contract, or the commencement of the works, and the remainder as above, or the plan adopted by Her Majesty's Office of Works and Public Buildings may be followed, which is to arrange the payments so that the architect may receive one-third of his commission immediately after the signing of the contract, one-third as soon as one-half of the contract sum has been paid to the builder, and the remainder after the builder has received his final payment. The Institute recommend that when an architect supplies builders with quantities to form tenders for executing his designs, it should be done with the sanction of the employer, and it is desirable that where practicable he should pay him for the extra labour, as it is not included in the general commission of 5 per cent.*

**Architect's Pupil.** A youth, placed under the care of, and in frequent cases apprenticed to an architect for the purpose of receiving instruction in office routine, and gaining other initiatory qualifications towards eventual competency as an architect. A premium, arbitrary as to amount, is usually required, and three years is the general period of pupilage. During this time the young aspirant is not a free agent, and he has to recollect that upon his industry will to a great extent depend the progress that is made towards the acquirement of a well grounded knowledge of the rudiments of his prospective profession. Early rising, visits to workshops, constant sketching, membership in the Architectural Association, and a wise disposal of time after office hours will greatly assist in laying a good foundation of elementary technical information, without which in after years it may be found difficult to accumulate substantial professional skill. Too frequently, however, the master is blamed because the pupil has not taken kindly to what is necessary for his success in life. The business of an office often demands that the pupil should be left very much to himself, and within proper limits this is advantageous, for the subjects that he will have eventually to master are so various—descending, for instance, at one time to the consideration of a dry wine cellar and at another rising to the correct fixation of spire ashlar—and the necessity for indefatigable application to that end so obvious to principals, that it would be impolitic and misleading to train on any system that is not based upon a principle of self reliance.

**Architects, Royal Institute of British.** An institution incorporated in the year 1836 for the general advancement of civil architecture, and for promoting and facilitating the acquirement of the knowledge of the various arts and sciences connected therewith. At present no examination need be passed before election to membership, but measures are taken to insure, as far as possible, the admission into its chartered ranks of none but men of good education and sound professional accomplishments. It includes some of the most distinguished practitioners but not one-sixth* of the practising architects in the kingdom, and it would be unfair to those who are indisposed to offer themselves for election to membership not to add that the average merit and ability of the bulk of the architects not enjoying the privileges of the Institute, is generally understood to be by no means inferior to that of those who do. It is to be hoped that before long there will be a general influx of all qualified architects to its portals, and that instead of aiming at the enforcement of too stringent particulars in respect to admission, beyond those required by the charter, the council will be satisfied with a standard of attainments no higher than that ever possessed by any of its members, a proper allowance only being made for the technical progress and spread of education characteristic of the present day. By some such means the Institute, which has the welfare of the profession at heart, will be sufficiently braced and strengthened to endure the violent strain upon its framework, which may be expected to occur when it seeks to obtain a legal prohibition of the assumption of the style and title of architect, by any one who chooses to take it. According to the charter, no one can be received as a Fellow but an architect who has been engaged as principal for at least seven successive years in the practice of civil architecture, and no one as an Associate who has not been engaged in the study and practice of the same pursuit and for a term less than seven years, and who is not less than 21 years of age. After May, 1882, associates will have to qualify by passing an examination, according to a standard to be fixed from time to time by the council.

**Architect's Scale.** A graduated instrument used by architects and their draughtsmen for laying down measurements on their drawings. It is twelve inches long and marked and figured, so as to admit of certain fractions of a foot as well as various portions of an inch conventionally representing one foot.

* Bearing on the subject of this paragraph, there are some interesting letters in *The Builder*, Vols. ix., x., by Professor Kerr, under the heading, "Architecturus to his Son."

* In 1878, excluding honorary members, the total number of Fellows and Associates amounted to 643, whereof 326 belonged to the former grade. On the other hand, the third edition of Messrs. Kelly and Co.'s *Building Trades' Directory*, published the same year, reminds the public that there are 5,672 architects

**Architectural.** Pertaining to the practice of architecture, or of building when in accordance with the laws of architecture.

**Architectural Association.** An energetic society, consisting of several hundred members, engaged professionally in the study or practice of architecture, and of others interested in the various arts and sciences connected therewith. The association, which deserves the encouragement and good wishes of all practitioners, aims at the promotion of friendly intercourse among the younger members of the architectural profession, and of efficient study in fellowship of matters affecting their common pursuits. Meetings are periodically held, at which papers are read and discussed. Classes of design, construction, architectural science, and colour decoration, assemble at stated periods, and participation in other advantages accrues from membership, which is not restricted to denizens of the metropolis, but is open to residents in the provinces as well.

**Architectural Brickwork.** As there is such a huge quantity of brickwork annually piled up that is not architectural, it may be useful to devote space to cursorily denote what architectural brickwork is. It is rarely to be had by using dry bricks and sloppy mortar. Perfection in brickwork may be attained with wet bricks, thin joints, proper bond, and filled in cross joints, though thick joints, when slightly recessed to give light and shade are recommended, and sometimes look well when the work is, in other respects, excellent. Good, equally burnt, sound, hard, ringing bricks, plain and moulded, set in mortar composed of one-third part of fresh burnt grey-stone lime, and two-thirds of clean sharp grit sand, free from all foreign matter, are the materials required. Polychromatic aid, through the medium of coloured bricks, is by no means essential, though often pleasing if tastefully introduced; but bricks of a uniform tint laid as described, and arranged in cornices, arch mouldings, strings, plinths, jambs, &c., with the wall surface agreeably broken by projections and recesses, and with the glass kept well back in the reveals, are all that is necessary to produce architectural brickwork of no mean order of merit, if built with constructive truth.

**Architectural Casts.** Impressions in plaster of fragments of Grecian, and Roman, and other buildings, &c., &c.

**Architectural Diploma.** See DIPLOMA.

**Architectural Examination.** An examination, at present voluntary, established by the Royal Institute of British Architects to secure the professional student an eligible opportunity for testing his progress, and recording his proficiency, capacity, and talent. Rules and questions relating to the examination can be obtained on application to the Secretary to the Institute, 9, Conduit-street, Hanover-square.

**Architectural Garden.** A garden which is laid out with paths and avenues arranged in a formal, regular, and symmetrical manner, and often reached from balustrated terraces by means of balustrated steps. It comprises within its boundary sculpture, fountains, seats, and, perhaps, a conservatory, and affords scope, when on a large scale, for a display of the united talents of the landscape gardener and architect. Sometimes it is called Italian garden.

**Architectural Grammar.** A system of priciples whereby all varieties of architectural ornaments and features may be correctly explained, and their relationship understood, so far as the knowledge of the origin, growth, and decadence of the different styles will admit of its accomplishment.

**Architecturalism.** The effort and inclination to build architecturally.

**Architectural Jurisprudence.** That part of the science of law which treats of architectural matters or the liabilities of building owners, architects, contractors, builders and workmen.

**Architectural Modelling.** The art of making a model of any architectural work. It should be acquired if possible by pupils, so that in after years they may be able to know as much as may be necessary to direct the preparation of one if required, or even to make it on an emergency. Modelling was often practised formerly, as the different museums in the country testify; and so far as the education of the eye is concerned much can be learnt from models if symmetrical and correct, and finished off with sharply defined angles and carefully executed details.

**Architectural Nomenclature.** A correct list or collection of the terms used in connection with the history, theory, and practice of architecture. The object of this work is that it may act, in some measure, as a sort of contribution towards so important an acquisition. It has been suggested that a nomenclature should be adopted at once accurate and unalterable; but where are the builders and foremen who would ever forget their earlier lessons, and adopt novel terms in lieu of old and familiar names? Where, also, is the memory that could stow away in its pigeon holes the formidable array of terms now in requisition, and instantaneously oust them without mutilation or modification when demanded by volition? The richness of all vocabularies measures their value, and none is so rich as one which is full of synonyms. Besides which the familiar "metonymy"—the boiling kettle—affords sufficient excuse for an occasional figure of speech to vary builders' parlance and break the monotony of immutable terms.

**Architectural Painting.** An important branch of art restricted to the perspective representation of architectural objects, either with or without the portraiture of natural ones.

**Architectural Style.** See STYLE.

**Architectural Surveyor.** The same as quantity or measuring surveyor, or one who is understood to use ordinary skill and care in accurately dissecting or analysing a contemplated or existing building into its details and constituent parts, in order to exactly calculate the labour and materials required or expended. In the case of existing work these operations are termed "measuring up," and the dimensions are taken directly from the building, but where the work has not been commenced but is merely intended to be executed according to certain drawings and specifications, the process is termed "taking out quantities" or "taking off quantities." The resulting document is styled a "bill of quantities," and unless cause can be shown to the contrary, the builder is bound to pay the surveyor (whether he be the architect or not) for the quantities should he make use of

them in carrying out the work, and the surveyor is liable if the quantities happen to be incorrect and cause loss to the builder. If the building has not been erected the architect is either not paid, or is liable for the cost of the quantities, unless expressly authorised to personally take them out or to employ someone else to do so.* The distinct profession of quantity surveyor has, in all probability, arisen from some architects being either unable or unwilling from a plethora of more genial work to take such labour in hand, but it is nevertheless a vexed question if an architect ought, even if he so wishes, to take out his own quantities, the weight of argument for and against the practice being tolerably well balanced. Though an architect may be disposed when acting as a surveyor to understate his own quantities, and therefore the cost of his design, through the bias fostered by a natural desire not to exceed a stated sum of money, he will, unless strangely deluded, soon determine in the course of the operation whether the cost will accord sufficiently well with what he knows the building owner intends to spend, so as to refrain in time from proceeding with a design, the carrying out of which would be totally out of the question. Besides which the possession of the dimensions, or particulars of each item, enables the architect to more equitably adjust allowances for extras and deductions through observing how the cost of any specific detail may be affected by the contract prices. As to any supposed loss by the architect of a status of independence through being the quantity surveyor it could only arise in the face of misgivings as to his fitness for acting as arbitrator in all disputed points, and finally if the money payment by the builder to the architect for the quantities is to be discountenanced for fear of being misconstrued, then it is high time to devise arrangements by which the building owner is made to see that, as a matter of fact, it is immaterial whom he pays for them. See ARCHITECT AND SURVEYOR; BILL OF QUANTITIES; QUANTITIES.

**Architectural Symbolism.** The expression by means of architectural forms, or features, of religious impressions. Some think that the character of mediæval ecclesiastical edifices depends upon a system of symbolism; but though emblematic figures were oftentimes much used in decoration, in various features, and in leading lines of design, it is contested that no satisfactory system whatever can be deduced from a comparison of all known examples. Whilst it is conceded that much affectionate ingenuity has been displayed in attempting to show that ecclesiastical architecture is a language, it is agreed, with almost convincing force, that with equal plausibility it may be proved to have been specially addressed to those who could have had but a faint idea of its meaning.

**Architectural Student.** One who studies the tectonic and artistic branches of architecture.

**Architecturally.** According to the practice and principles of architecture.

**Architecture.** In its relation to civil life on land, civil architecture, or, as it is more generally termed, architecture, comprehends the art and science involved in the proper construction of every description of building required by the entire human family for shelter and the fulfilment of the condition assigned to it on earth. From the primitive dwellings to the most cunningly devised, ornate, and stately fane that man's proud destiny has ever instigated him to build, the world's history may be said to present a set of more or less continuous threads of constructional progress, having a common origin, each of which if unravelled would exhibit two distinct components intimately interwoven, and both showing at certain stages about equal development. These are architecture and building, the latter of which will be further noticed under its own heading. It is obvious that in the simple matter of two primitive huts, taste might be absent from one, whilst throwing an unspeakable charm over the other. So far as gross comfort or general purposes may be affected by the difference, or so far as the difference in appearance affects the choice between the two, there may probably be no inferiority in the tasteless one in the eyes of its constructor, because he, like his work, is innocent of the thrill which the touch of beauty imparts to many constitutions. Nevertheless, it is radically secondary in comparison, just as paste is to the true gem. The dissimilarity between the two embraces all the distinction between architecture and building. There may be the same utilitarian object served by both, and one may answer all the purposes of the other to the complete satisfaction of persons benumbed by the chilly influences of a temperament unable to determine between feeble common-place works and the productions of genius; but by the many who have within their bosom the germ even of the very estimable faculty of responding to impulses which excite various comforting emotions—such, for instance, as admiration, veneration, and approbation—the nature and essential qualities of that which is architecturally designed will be at once perceived and understood by a certain charm due to composition and harmony, beauty of proportion and expression, which cannot be displayed by vulgar edifices, reared no matter how skilfully, in accordance with shrewd commercial calculations, to serve a purely selfish end.

**Architecture, Orders of.** Certain systems of columniation customarily erected by the Greeks and Romans. The term Order signifies the columns together with the entablature supported by them. Correctly, there are only three distinct or leading divisions into which all the Orders may be separated. They are known as the Doric, Ionic, and Corinthian. It is usual, however, to speak of the Five Orders of architecture, which prevailed amongst the Romans, and had their origin in the modifications that were infused into the treatment of the three already named. As practised by the Romans, the Orders are styled the Tuscan, Doric, Ionic, Corinthian, and Composite, each of which will be briefly noticed in its place.

**Architecture Proper.** A term given by some writers to denote the perfections which a building may possess apart from its convenience and stability. It was introduced by Mr. Ruskin in his well-known work "The Seven Lamps of Architecture."

* Vide *The Builder*, Vol. xxxvi., p. 1294.

**Architecturesque.** A word invented by Professor Kerr to denote the picturesque in architecture, or those architectural works which possess merits, entitling them to occupy a position in pictures that would be classed as picturesque by landscape painters.

**Architecture, Styles of.** See STYLE.

**Architholus.** See SUDATORIUM.

**Architrave.** In the Orders, the lowest of the three chief members of the entablature, resting upon the caps of the columns, and whose stones are often tied in with rods and bars, besides being joggled. It may be formed like a flat arch, with wedged-shaped stones, or of one piece if needful. It is scarcely ever decorated, but is sometimes divided into two, or even three horizontal facias, or fasciæ, of different projections, the upper being denominated the first, or upper fascia, and the next the second or lower fascia, or as the case may be. The whole member is otherwise called *Epistylium*. Architrave is also the name of an external dressing, forming a cut and moulded margin round apertures in ashlar façades, and in stuccoed ones a similar plastered decoration. In joinery, it is the name of a border of similar character round apertures, but applied internally to the faces of walls for finish, and to hide the plaster joints. It consists of a fascia and mouldings of various degrees of richness, and when the fascia is stepped back in its centre so as to form two fasciæ, or faces, it is termed a *double faced* door (or window) *architrave*. Sometimes the mouldings are mitred to those of the skirting. At other times it is stopped by blocks projecting a trifle beyond the skirting, or the whole of the jambs are formed like pilasters. The horizontal member covering the lintel is called the *traverse*, or transverse architrave, and when double-faced its upper member is termed the *heading architrave*, and its lower the *jack architrave*. The sides or vertical members are called *jambs*, or *architrave jambs*. A good effect can be produced by extending and crossing the extremities of the jambs and traverse.

**Architrave Cornice.** An entablature without a frieze. It is advisable to employ it only where height is limited, or when the columns are to support arches. Specimens in joinery may be often seen over shops. See BLOCK CORNICE.

**Architrave Door.** A door dressed as above explained, with an architrave consisting of jambs, and traverse, and in outside work often of a cornice as well. It is properly architraved of door.

**Architrave Jambs.** The jambs, or upright portions of an architrave, that are fixed to the sides of an aperture.

**Architrave Mouldings.** Another name for the entire door or window architrave.

**Architrave Window.** A window decorated with an architrave. See ARCHITRAVE DOOR.

**Archivault.** The same as archivolt, which see.

**Archives.** A repository or closet for the preservation of writings or records. A secret closet. This word, borrowed from the late or low Latin word archivum, now also means the records and papers, &c., themselves, as well as the repository in which they are kept. Archarissimum, archarium, arceps, archibus, arcibus, arcibum, arcivus, arcivum were, in mediæval times, synonymous with arcivum.

**Archivolt.** The under surface of an arch when moulded, or when its edges between the imposts are chamfered or moulded. It is also the name of the band of mouldings, running round the face of the arch, and stopped by the imposts, springers, or plat-bands. In this case it is usually ornamented like the architrave if there happens to be one.

**Archivoltum.** In mediæval times a cesspool, or sewer, when arched over.

**Arch Joint.** A joint in an arch. Joints at the sides of archstones, and usually radiating, are termed bed-joints, or coursing joints ; those parallel to the face, end or heading joints ; and the remainder back joints. The surface, which forms part of the soffit would form a back joint with another order of archstones below it.

**Arch-like.** Built like an arch.

**Arch Mould; Arch Moulding.** A moulding running round an arch, generally following its curve, and stopped by the capitals of the columns. In Gothic architecture it lies either in the wall-plane, soffit-plane, or chamfer-plane, as distinguished by Mr. Paley.*

**Arch Rib.** A rib in Gothic vaulting.

**Arch Ring.** The voussoirs of an arch collectively. 2. A single layer of the voussoirs, or of bricks in a brick arch.

**Arch Springer.** A block bevelled off skew to support an arch. Sometimes the term is used in contradistinction to a springer in a groined roof.

**Arch Square.** A mason's tool like a bevel, but having either the stock or blade, or sometimes both parts, curved. It is used for working the soffit of an arch stone from its bed. Bricklayers use a similar tool.

**Archstone.** A voussoir or wedge-shaped stone forming part of an arch ring.

**Arch Tracery.** A variety of window tracery, belonging to the later or late Geometrical Style, which is produced when the external side of the arch of each of the outside lights coincides with part of the arch of the window.

**Archway.** A way or passage under an arch. It is a term usually applied to one wide enough to admit vehicles.

**Archwayed.** Having an archway.

**Archwise.** In the form of an arch.

**Arch Work.** Constructing an arch. 2. Work containing an arch or arches.

**Arcograph.** A convenient instrument for describing an arc of a circle without knowing its centre. A pliable strip of metal with its ends attached to sliding rods forms a simple one. It is also called cyclograph

**Arcuate.** Bent or curved.

**Arcuation.** The employment of arches. 2. Incurvation.

**Arcula.** A small coffer or box.

**Arcus.** The Latin word for an arch, vault, or anything bowed. 2. A chief arch. 3. A triumphal arch.

**Arcus Ecclesiæ.** A mediæval term for the

* See *A Manual of Gothic Moldings*, by F. A. Paley, M.A. Although the terms mould and moulding are spelt by some authors without the u, in accordance with their ancient orthography, this letter is still not improperly retained in the present day by the majority of writers.

chancel arch, or the arch dividing the choir or chancel from the nave.

**Arcus Terreus.** A name employed by Vitruvius, and which designates curved iron bearers, on which tiles that were plastered over were laid.

**Arcus Presbyterii.** In Mediæval architecture, an arch over the Tribune, marking the boundaries of the recess which enclosed it.

**Arcus Toralis.** Supposed by some authors to be a misprint for arcus choralis. The lattice separating the choir from the nave in a basilica.

**Are.** The unit of French superficial measure, containing 100 square metres, equivalent to 119·6 English square yards. The hectare contains 10,000 square metres, or about 2 acres 1¾ rood, in English measure.

**Area.** A small open space sunk below the level of the ground before basement windows and continued often some distance on either side, and sometimes admitting of being very prettily decorated by means of flower boxes. 2. A small court level with the ground. 3. The space which a building covers. 4. In geometry, the quantity of surface contained within any boundary. Amongst the Romans the word meant a burying-ground, church-yard, fowling-floor, bed or plat in a garden, the flat part in a circus in which exercises were performed, an open playground for children, a threshing floor (which with the ancients was in a field or other open space), or any open space or flat in or near a house, or one on which a house stood or could stand. See SECTIONAL AREA.

**Area Drain.** A narrow area usually paved, drained, and uncovered, and not more than three feet wide, constructed round the basement of a house to keep it dry ; and to carry this object out care must be taken that dampness does not travel along the pavement or the perforated cross walls that may have to be built to support the retaining or area wall. It is important that the difference between this and other descriptions of drains should be borne in mind. A *Dry Area*, or so-called air drain, has been already described under the latter term, and consists of a very narrow space not more than 8 inches wide, extending round the building, and reaching to the footings, and it often becomes foul and dirty. A *Blind Area*, again, is much inferior to an area drain, because there are cross walls without apertures built at intervals to keep the area wall from falling in, and which prevent drainage, and render it subject to stagnant air and dampness. But though there is a liability to mistake what is meant by either name, through a confusion of terms, there need be no difficulty in deciding upon the best manner to keep a house dry. A damp proof course ought to be inserted underneath the lowest timbers of all walls, and the pavement of the open space or dry area between the outside walls and an area wall all round the building, if a detached one, should be laid below this damp proof course, with a fall where necessary, and drained with a properly trapped vitrified stoneware pipe drain. But the most perfect and reliable system to insure dryness throughout a house, is to cover the whole of the ground on which it stands, including the area, with a thin layer of bitumen, or a few inches of cement concrete, taking care of course in the first instance, to efficiently provide for its drainage.*

**Area Grating.** Usually a collection of wrought iron parallel bars, about 1¼ inch apart, ½ inch wide, and from 1 to 1½ inch thick, strongly riveted to a corresponding frame for covering over areas. It is either movable or leaded into stone curbs.

**Areal.** Pertaining to an area.

**Area Railings.** Railings round an area usually let into a stone curb, and run with load. They are generally of cast iron, often ornamental, and sometimes insufficiently secured. Where there is a chance of people leaning against them, standards should be employed, or a stay fixed to the wall of the house, and bolted or riveted to the rail to steady it.

**Area Wall.** The wall round an area backing up the ground. If exposed to the jar arising from heavy street traffic, it will require strengthening by counterforts or struts in those places where it receives no support from cross walls or cellar arches.

**Areiopagus.** A rocky eminence at Athens, renowned as the spot where the most venerable court of justice amongst the Greeks held its sittings in ancient times.

**Arena.** That part of an amphitheatre in which combats took place. It was covered with sand, whence its name, and it was surrounded by a stout wall called the podium. The term was sometimes given to the whole amphitheatre, and subsequently to the body of a church.

**Arenaceous.** Sandy. More or less easily crumbled.

**Arenaceous Rocks.** Sandstone rocks.

**Arenarious.** Sandy, or abounding in sand.

**Arenarium.** A sandpit. 2. An amphitheatre, a cemetery, sepulchre, grave, or crypt.

**Arenatio.** A word used by Vitruvius, and meaning stucco resembling mortar, or consisting of lime and sand.

**Arènes.** A species of sand found in abundance in some parts of France, consisting of comminuted chalk in unequal sized grains mixed with white or variously coloured clays. It is extensively used with rich limes to confer hydraulic properties upon them.

**Arenilitic.** Pertaining to, or consisting of sandstones.

**Arenose.** Sandy or full of sand.

**Areometer.** An instrument for determining the specific gravity of liquids. It is also called hydrometer.

**Areopagus.** See AREIOPAGUS.

**Areostyle.** See ARÆOSTYLE.

**Areosystyle.** Aræosistyle. See ARÆOSYSTYLE.

**Arerde.** Reared, erected, or built.

**Argand Burner.** In an oil lamp, a wick in the shape of a ring so arranged as to be supplied when lighted with two currents of air, one within and one without. The arrangement was discovered by Aimé Argand, who was born at Geneva about 1750, and the principle has been applied to a gas burner, which is formed by means of a flat cylindrical ring, having one end perforated with holes through which gas

* Rendering the outside walls with Portland cement from the damp proof course upwards will keep them dry where there is no area.

escapes. Upon being ignited the numerous fine jets unite, and, when encompassed by a glass chimney, form a very bright, clear, and strong hollow flame, owing to the rapid draught passing through and around it as well. It is always used in shop lamps for lighting up windows from the outside, for foot-lights on a stage, or, in fact, for any purpose requiring a strong, bright, and steady light.

**Argent.** In English heraldry, silver. It is left white or represented by a white pigment in coats of arms.

**Argentaria Taberna.** A term used by Vitruvius for the shop of a private banker.

**Argentum Musivum.** An amalgam of mercury, bismuth, and tin employed in colouring plaster casts. It is otherwise called argentum mosaicum.

**Argil.** Brick earth, potter's clay, white clay. When quite pure it is identical with alumina.

**Argillaceous.** Clayey. Consisting of argil.

**Argillaceous Earth.** Clayey earth. Three kinds are suitable for brickmaking termed respectively pure clays, marls, and loams.

**Argillaceous Rocks.** Rocks consisting of silica and alumina with small proportions of lime and magnesia. They emit a peculiar odour if breathed upon or chafed.

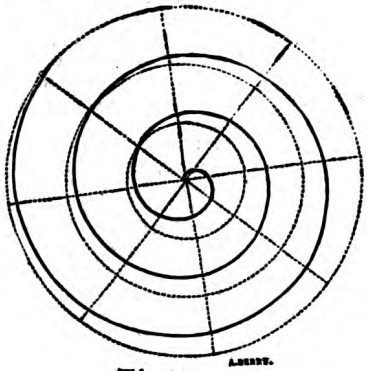


*Fig. 19.*

**Argillaceous Sand.** Sand containing clay. Pit sand is often argillaceous and unfit for mortar until made clean by washing.

**Argilliferous.** Containing clay.

**Argillo-arenaceous.** A term applied to soil when consisting of clay and sand.

**Argillo-calcareous.** Consisting of clay and a calcareous soil.

**Aris.** The same as arris, which see.

**Arithmetic.** That part of mathematics which considers the powers and properties of numbers, and teaches how to express them, how to calculate by them, and how to apply them to the business of life.

**Arithmetical Mean.** The average of different numbers. It is ascertained by dividing their sum by their number.

**Arithmetical Progression.** A series of numbers proceeding by a common difference are said to be in arithmetical progression. Thus, 2, 5, 8, 11, &c., are such a series, whereof the common difference is 3.

**Arithmetical Proportion.** If four quantities be taken so that one bears the same ratio to another as one of the remaining two does to the last, they are said to be in arithmetical proportion.

**Arithmetical Spiral.** A spiral formed by the motion of a point along the radius of a circle, or the radius produced, in a direction away from its centre whilst the radius is uniformly revolving round the centre, in such a manner that it completes one revolution in exactly the same time that the point takes to travel a distance equal to the length of the radius. The consequence is that if radii be drawn to equidistant points in the circumference of the whole circle, as shown in Fig. 19, the lengths of those portions intercepted between the centre and the spiral will be in arithmetical progression. This interesting curve has also been named the spiral of Archimedes, but writers on design are not all of one mind as to the soundness of its claims to be considered one of very graceful convolution.

**Ark.** Among the Jews, the sacred repository of the tables of the covenant. 2. A small close vessel, chest or coffer. 3. In Early English and Scottish writers, a chest or coffer used for meal, and usually made of oak.

**Arm.** A part of an object projecting boldly from it like the human arm when outstretched projects from the body. The arms of an arm-chair supply a familiar example. *Arm of a bracket* is usually either half, whichever way it is fixed. *Arm of a gasalier* is the limb or branch that juts out to carry the burner. Water lodges in it sometimes through corrosion of the inner tube and stops the light until the leak is repaired. *Arm of a couple*, in mechanics, is the perpendicular distance between the lines of direction of the two equal and parallel pressures, constituting the couple. *Arm of a gas bracket* is the horizontal or other pipe between the bracket-back and burner. *Arm of angle iron* is either wing or flange. *Arm of a tree* is a chief branch. *Arms of a lever* are the two parts into which the fulcrum divides it. *Arms of a pug-mill* are the knives or bars that stand out from the revolving upright spindle into which they are keyed to knead clay, mix mortar, &c.

**Armarium.** Originally a place amongst the ancient Romans for keeping arms. Subsequently a cupboard, or niche. It is sometimes written almarium.

**Armature.** The piece of soft iron placed between the poles of a magnet to keep its magnetic power from deteriorating.

**Arm Band.** An iron double hook, curved like the letter C, fixed in barrack rooms in rows along the walls, to sustain the muzzle ends of rifles whilst their butt ends rest upon the floor.

**Arm Chair.** A chair having resting places for the arms. It is sometimes called elbow chair.

**Armenian Architecture.** An eastern branch of Byzantine architecture whose character is involved in much obscurity up to the end of the 10th century. It is a direct offshoot of the Sassanian style, and the immediate parent of the Russian. Many rock cut churches and dwellings or tombs are to be found in various parts of the roots of the great range of the Caucasus, but it is impossible to assign correct dates to many of them. About the commencement of the 11th century the style begins to stand out with tolerable clearness, and examples point to the circumstance "that pointed arches

were used by Christians in the East almost as early as the time of Constantine, and were abandoned for the round arch, as in France, at a period when the Mahometans were carrying its application to the greatest degree of perfection."* A characteristic of Armenian churches is a dome or cupola, crowning the intersection of the cross vaults, having externally a conical surface deeply indented with rectangular flutes, and supported by a tall drum. A series of long elegant pilasters is also another noticeable feature of the style. These pilasters extend the entire height of the building, and are joined above by small round arches, giving the idea of a stilted arcade. As a whole, Armenian architecture presents an interesting field of study, not so much on account of its elegance and originality as a style, but because it forms an important link in the chain of Christian architecture.

**Armenian Blue.** A pigment of the ancients called also Cyanus, which is supposed to be the same as Azure or Ultramarine.

**Armenian Byzantine Style.** Another name for Armenian architecture, which see.

**Armenian Stone.** A soft blue stone, consisting of calcareous earth and oxide of copper. 2. The commercial name of Lapis Lazuli.

**Armenium.** A light blue metallic pigment employed by the ancients, and obtained by grinding a blue carbonate of copper found in Armenia. A counterfeit description went also by the same name.

**Arm File.** A hand file.

**Armilla.** Among the ancients, a bracelet or armlet worn both by men and women. The same term is used by Vitruvius to denote an iron ring fixed round the head of a pile to prevent it from splitting.

**Armorial Bearings.** The coat of arms or escutcheon of a family, including crest, helmet, supporters, &c.

**Armory.** A Government storehouse, or suite of apartments, for the safe custody of arms and military habiliments until required for use. 2. A room or series of rooms in mansions of the nobility, containing a collection of ancient warlike relics and armour, and sometimes an assortment of modern weapons also, for the defence of the peace in case of civil commotion or riot.

**Arm Rest.** The elbow of a stall or bench-end.

**Arm Saw.** A hand saw.

**Arnatto.** See ANNATTO.

**Arnott's Stove.** A stove invented by Dr. Arnott, which by its arrangement maintains a uniform and congenial temperature at a small expense and with but little attention. Through characteristic disinterestedness he did not patent his invention, and many stoves are called by his name that act on false principles. Hence, it is not surprising that some consider there are objections to the Arnott stove when inferior imitations cause the collection of deleterious gases through not properly carrying them off. The most scientific form of the genuine stove is a close one with an external case, having amongst other contrivances a self regulating valve that admits air in proportion to the draught, so that when its force is greatest the passage for the air becomes narrowest. The following description is very nearly in the inventor's own words. In Fig. 20, A B C D shows the external case which prevents the intense heat of the inner stove E G H from damaging the air of the room. V is the regulating valve for admitting the air to feed the fire. It may be placed near the ashpit door or wherever more convenient. L L indicate the fire-brick lining of the fire-box or grate, which prevents such cooling of the ignited mass as might interfere with the steady combustion. M is a hopper or receptacle with open mouth below, suspended above the fire like a bell, to hold a sufficient charge of coal for 24 hours or more, which coal always falls down of itself as that below it in the fire-box is consumed. The hopper may at any time be refilled with coal from above, through the lid N of the hopper, and the other lid O of the outer case. These lids are rendered nearly air-tight by sand-joints; that is by their outer edges or circumference being turned down, and made to dip into grooves filled with sand, as at P. The burned air or smoke from the fire R rises up in the space between the hopper and the inner stove case, to pass away by the internal flue S, into the other flue T of the outer case. W is the ashpit under the fire-bars, and the ashpit door must be carefully fitted to shut in an air-tight manner by grinding its face or otherwise. R is the coal intensely ignited at the bottom, where the fresh air maintains combustion, but colder gradually further up. Only the coal in the fire-grate below, where the fresh air has access to it through the fire-bars, can be in a state of active combustion. Between the inner and outer cases of the stove the air and smoke circulate with considerable rapidity, and maintain an even temperature analogous to that of hot water. See SLOW COMBUSTION STOVE.

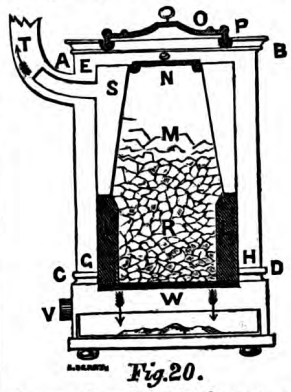


*Fig.20.*

**Arnott's Ventilator.** A contrivance for ventilating apartments, invented by and named after the talented physician and philosopher Neil Arnott, M.D., born in 1788, the inventor of the Arnott stove. The ventilator consists of a valve seated in a sort of box, which is placed in an aperture made for it close to the ceiling of a room communicating with the flue of a chimney. The valve is so fixed and balanced that it only opens inwards to the chimney; and when there is no draught it settles in a closed position. Sometimes a string is attached to the valve and fastened to a nail below it to regulate the extent to which it may open. The effect is that whenever there is an upward draught in the chimney the vitiated air accumulated near the ceiling passes into the flue and is carried away, and should a back or down draught occur

* Fergusson's *Illustrated Handbook of Architecture.*

the valve instantly closes and prevents smoke from entering through it into the room. There being sometimes, however, a risk of smoke returning into the room it is desirable in new houses to build for ventilation a separate flue contiguous and parallel to the smoke flue, which latter will heat the air in the former and make it ascend. From reasons of philanthropy Dr. Arnott did not patent this invention.

**Aronaded.** Battlements are said to be aronaded when the central parts of the crests of the merlons present a semicircular or curved form instead of being straight throughout.

**Arragonite.** A species of carbonate of lime occurring in various forms and resembling calc spar in composition, but differing from it in superior hardness, crystalline form, and in falling to powder when intensely heated. A peculiar coralloidal variety like tangled white cord, found in beds of iron ore is denominated flos ferri, or flowers of iron.

**Arrangement.** Vitruvius says "arrangement is the disposition in their just and proper places of all the parts of the building, and the pleasing effect of the same; keeping in view its appropriate character." In a more restricted sense and confined to fittings, &c., it may be said to consist in the disposition of their parts and details in a suitable place, way, or form. Planning ought to include it, though it does not always control it, for there are plenty of instances where bad arrangement has followed good planning and designing. In seating churches, and in fitting up public rooms, and other places that are liable to be crowded, or where people congregate, circumspection and thoughtfulness are always greatly needed, so that a due amount of comfort may not be sacrificed to indifferent arrangements in respect to ingress and egress, seeing, hearing, locomotion, change of posture, warmth, ventilation, and so forth. In many particulars cognate to this subject the ancients showed much more commonsense than is to be discerned in the present day. See AMPHITHEATRE. In the fine arts, arrangement entirely comprehends the whole course any work is to take from its inception or invention to its completion, and determines altogether through the placing of parts, grouping, colouring, or other means, how the subject is to be worked out.

**Arran Quarry.** A Scotch granite quarry, situated in the county of Bute, yielding a serviceable grey quartzose stone.

**Arras.** A description of tapestry used for the richly figured hangings that were much in vogue during mediæval times for lining the walls of baronial halls. It was manufactured at Arras, in France, whence the name.

**Arrectarium.** A term used by Vitruvius for an upright post or pillar in buildings so placed as to take a weight.

**Arricciate; Arriciare.** In fresco painting, the middle coat of the *intonachi*, according to Alberti, but according to Pozzo the first coat of mortar laid on the wall to be painted. The prepared surface of the wall is called by the Italians *intonaco*, and as soon as it bears touching the artist traces his work and applies his tints.

**Arrière Voussure.** A back coving or rear vault, or an arch placed behind an aperture in the thickness of the wall in order to increase the size of the opening and let in more light, or else to act as a discharging arch. It is otherwise named a Back Arch.

**Arris.** A workman's term always signifying the line of meeting or concourse of two surfaces, or the dimension of length only, but never a surface having appreciable width. Edge, on the other hand, is used for the narrowest surfaces of bodies, as, for instance, the thinnest side of a board is called its edge. Occasionally, but very rarely, edge is applied to the junction of surfaces as in the case of bevel-edge, but even here edge may be taken to mean the sloped off surface. Arris, however, means more than a line, for it comprehends the angle formed by the meeting of surfaces, and which is made as true and sharp as possible in all good work, requiring often extra care and better material to withstand wear in exposed situations, but in some instances, especially in stable fittings, it is necessary to avoid it, or reduce it by rounding off or chamfering to prevent accident. Pressed bricks generally have sharp arrises. In the measurement of stone quoins an extra dimension is sometimes allowed for the arris, and in plasterers' work whilst the arrises are described as such and measured per foot run, those cemented for additional strength and measured in the same way are often entered by way of distinction as "extra to cement angle." Arris is occasionally written *aris*, and it is termed *piend* in the north. Also, the ridge or hip of a roof is called in some localities the *arris of a roof*.

**Arris Fillet.** A fillet of wood of triangular section, or a wedge-shaped board used for raising slates on the roof of a building at the eaves, in the angles of valleys, and where chimneys, walls, windows, or skylights cut into the roof. It is indiscriminately termed eaves' board, eaves' lath, eaves' catch, tilting fillet, and tilting batten if consisting of a half batten or worked stouter than usual. At the eaves the object of an arris fillet is to prevent the slates rattling and to keep them level, whilst elsewhere it is to throw off the wet. See BELL CAST.

**Arris Gutter.** A gutter of V form usually of wood and fixed to the dripping eaves of a building. Sometimes it is called a fillet gutter.

**Arris Rail.** A rail cut to a triangular section. It is often employed in park and garden fences.

**Arris-wise.** A term given to bricks, tiles, and slates when laid diagonally. A balk of timber is also said to be cut arris-wise when sawn diagonally.

**Arrow.** In mediæval symbolism, the emblem of death and destruction. It is also occasionally a symbol of martyrdom. St. Sebastian and St. Edmund are represented pierced with arrows.

**Arrow-head.** A name given to the anchor or tongue placed between the principal ornament of the ovolo, ogee, and other mouldings. See ANCHOR; EGG AND TONGUE.

**Arrow-headed.** Shaped like the head of an arrow. Certain cuneiform characters formed by a combination of triangular or wedge-like figures, and found in the ruins of Babylon, Nineveh, Persepolis, and other places of the East are called arrow-headed characters. See CUNEIFORM INSCRIPTIONS.

**Arrow-let.** A narrow aperture, or crossed loop, in walls for light or ornament.

**Arrow, Surveying.** A piece of stout iron wire about fifteen inches long, pointed at one end and formed into a ring at the other, used for sticking into the ground to mark distances when surveying with a chain. Ten form a set. The rings round which a piece of red stuff is usually tied to make the arrows more conspicuous are convenient for hanging them on the finger. The arrows are very frequently called *pins*, and were formerly made of wood shod with iron ferrules.

**Arrow, Tamping.** An instrument sometimes used in blasting operations to act as a wedge in tamping. It consists of a pin of ½-inch round iron, about 2½ feet long, turned to a handle at one end and worked to a fine point at the other.

**Arsenal.** A national repository and manufactory for arms and warlike ammunition, and occasionally comprising workshops replete with splendid engineering triumphs, including sheers and cranes of great lifting power.

**Arsenate or Arseniate.** Arsenic acid in combination with a base.

**Arsenic.** A metal which when pure is of a steel-grey colour, having a high metallic lustre and a specific gravity = 5·7. It tarnishes in the air, but may be preserved unchanged in pure water. It is very brittle, and can be easily reduced to powder by pounding. One of the uses to which metallic arsenic is put in the arts is to mix it with lead in the manufacture of shot to render it more brittle, and in this combination the arsenic is harmless. All metals are made more fusible by the addition of arsenic, but the operation has to be conducted with extreme caution. Sometimes arsenic forms an impurity in iron, and produces red shortness. When present in copper to a limited extent it adds to its toughness, but much of it proves detrimental. The presence of arsenic in a mineral may often be detected by the strong odour of garlic which it emits before the blow-pipe. See ARSENIC, WHITE.

**Arsenic Acid.** An acid consisting of 2 equivalents of arsenic and 5 of oxygen.

**Arsenical Colour.** A pigment manufactured with some preparation of arsenic. It is usually poisonous and destructive of tints mixed with white lead.

**Arsenical Greens.** Greens prepared with the poisonous arsenite of copper, which is a bright green insoluble powder obtained by mixing the solution of a salt of copper with an alkaline arsenite. It is probable that manufacturers of wall paper conscious of arsenic being present in its colouring matter are liable at law for damages resulting from its use.

**Arsenicon.** See ARSICON.

**Arsenic, White.** This, or simply arsenic, is the common name of the virulently poisonous oxide of arsenic or arsenious acid. It is a heavy gritty white crystalline powder, and is used sometimes as a dryer by painters, and also in the manufacture of glass. In tropical climates arsenic is mixed with plaster, mortar, and paint to protect buildings from the ravages of the white ant. It is also used as a sort of mordant in the manufacture of some kinds of wall paper.

**Arsenic Yellow.** A poisonous yellow pigment prepared from arsenic, and much like yellow orpiment in colour, but not being affected by lead it dries better and is likewise more to be depended upon for retaining its tint. Some artists consider this pigment to be identical with King's Yellow.

**Arsenious Acid.** An acid consisting of 2 equivalents of arsenic and 3 of oxygen. See ARSENIC, WHITE.

**Arsenite.** A compound formed by arsenious acid in combination with an alkali.

**Arsenite of Copper.** See ARSENICAL GREENS; SCHEELE'S GREEN.

**Arsicon.** The Greek name for orpiment. It is otherwise spelt Arsenicon and Arzicon.

**Art.** The power of doing something not taught by nature, or nature subdued and fashioned by human means and made subservient to mankind. Or it is a word more frequently used to signify a course of procedure which properly followed and observed leads to success or facilitates performance. Art is thus opposed both to nature when free, and to merely speculative science. From the above definition it is clear that there may be many kinds of arts, and it is usual to class them in two important groups, called respectively useful arts and fine arts. The former are again comprehended under the term science no longer speculative, but built up on systematised principles and buttressed by facts. The fine arts also easily admit of being generalised under one term Art, which in its rehabilitation may be explained to mean the representation of something whose appreciation depends upon the imaginative faculties both of the artist or performer and of the critic or beholder. See FINE ARTS.

**Art-Clique.** A small circle of persons who adhere with pertinacity to any particular phase, mode of expression, style or practice, not considered by good critics to be normal in art.

**Arter.** In brickmaking, a name sometimes given to an incomplete neck when the bricks are placed in the clamp.

**Artesian Fountain.** The same as Artesian Well, which see.

**Artesian Well.** A shaft bored or sunk through impermeable strata in a vertical direction in the ground until a water bearing stratum is reached. The water then rises upwards in the boring through the pressure of the water which lies at a higher level and is in communication with what is tapped. The well at Grenelle near Paris is a good example of one. It was commenced in 1832, and after boring with unremitting labour for more than eight years through clays, calcareous nodules, white and grey chalk, flints, marl, and the upper and lower greensand, and reaching a depth of 1798 feet, water rose in abundance, yielding 512 gallons per minute. The diameter of the boring is only 3¾ inches, but in the present day large shafts, admitting the use of heavy trepans and tools of large diameter are preferred. Wells of this description are common in Artois, France, whose Latin name Artesium has furnished the appellation by which they are distinguished.

**Articled Pupil.** A pupil bound by articles or indenture.

**Articles of Antiquity.** Objects belonging to by-gone ages, and consequently valuable on that account. In excavating, coins, weapons, pottery, and other articles of antiquity are occasionally found, and where they are likely to occur it is advisable for the architect to let it be

understood that they are to be placed in his custody.

**Articulation.** Among anatomists, painters and sculptors, the junction, or joining of the bones.

**Artificer.** An artist, mechanic, or manufacturer, but amongst building operatives the term is usually restricted to one whose craft requires in its execution not only manual dexterity but intellectual application as well. Masons, carpenters, plasterers, and all workmen employed upon buildings, with few exceptions, are, or ought to be, artificers.

**Artificers' Works.** In the different building trades, the various works performed by artificers.

**Artificial.** Not natural. Made by art.

**Artificial Cement.** A cement produced by adding to pure calcareous rock a certain amount of clay, and sometimes of soluble silica also. These ingredients are then ground with plenty of water, formed into a pasty mud, allowed to settle, then dried, and burnt at a great heat, by which means silicates of lime and alumina are formed so as to be analogous to their condition after the calcination of natural cement-stones. Portland cement is the principal artificial hydraulic or water lime that is manufactured, the term cement having no other than a generic signification applicable to all mortars, whilst the name Portland was simply given to it because when trowelled to a smooth surface it much resembles in appearance rubbed Portland stone. See ARTIFICIAL HYDRAULIC LIME; NATURAL CEMENT; PORTLAND CEMENT.

**Artificial Crystal.** A portion of matter that has spontaneously assumed a definite geometrical form not by the agency of natural causes which produce natural crystals, but through artificial instrumentality induced by fusion, solution, or chemical action.

**Artificial Foundation.** A foundation necessitated by the ground not being fit to bear the weight that is going to be put upon it. The general principle involved in its preparation is the due enlargement of the bearing surfaces of the walls. From this point of view, nearly all foundations are artificial, but a difficulty here arises because foundation has a two-fold meaning, since it includes the proper preparation of the ground and the correct form, dimensions, and construction of the lowest courses of the walls termed footings. In practice, it is found more convenient to cover the area of the foundations with concrete or inverted arches instead of extending the bearing surfaces of the walls to an inordinate degree, and on this account an artificial foundation may be said to consist altogether in adapting the ground to support the building. When there is a prospect of the ground yielding uniformly recourse must sometimes be had to sheet piling to prevent lateral escape of the soil, a practice which might be followed with advantage when a house is built on the confines of a plot contiguous to another, which at a future day might be used as a sand-pit. The paramount object to be constantly kept in view, in preparing foundations, is to prevent unequal settlement, which always causes fracture. An artificial foundation can, of course, be made too unyielding, in which case it might be productive of as much harm as a yielding artificial one, placed in juxtaposition with a firm natural foundation, such as chalk or granite. Piling and planking have almost wholly given way to concrete as an artificial foundation, the width and thickness of which must depend upon the height and massiveness of the superstructure. See FOUNDATION; GRILLAGE; SAND FOUNDATION.

**Artificial Fountain.** A jet of water spouting upwards through a nozzle, or ajutage by means of the hydrostatic pressure of water in a reservoir placed at a superior level. Owing to friction produced by passing through pipes, round bends, along projections, &c., a considerable head of water must be available when a grand effect is desired.

**Artificial Granite.** A stone that can be prepared for building purposes, where great strength and cohesion are indispensable by mixing disintegrated natural granite with clay, pounded glass, lava, iron slag, and water, kneading the mixture to a pasty mass, moulding it into blocks, and submitting them to a heat sufficiently intense to produce vitrification. The process is the invention of Mr. P. M. Parsons, C.E.

**Artificial Horizon.** An instrument used occasionally by surveyors to ascertain the altitude of an object. The best kind consists of an oblong trough, filled with mercury, and protected from the wind by a cover, formed with two pieces of sloping glass like a span roof, each piece having surfaces ground truly parallel. The angle between the object and its image made visible by the artificial horizon is exactly double the angle of elevation of the object.

**Artificial Hydraulic Lime.** Lime manufactured by blending from 8 to 30 per cent. of clay, silica, &c., with rich or fat lime so that when calcined the compound may possess a similar degree of hydraulicity to that characterising the natural lime it is wished to imitate. In this country artificial cement and artificial hydraulic lime are often considered to be one and the same thing.

**Artificial Ivory.** A substance not unlike ivory may be formed by dissolving in alcohol, some amber and a quarter of its weight of Kowrie gum and then adding half the total weight of porcelain clay. These ingredients must be carefully blended with the assistance of heat, and then moulded as required.

**Artificial Light.** Light obtained through the agency of candles, lamps, gas, electricity, or from any source save only the sun. Light from the moon is reflected sun-light.

**Artificial Magnet.** A piece of iron or steel placed in contact with a lump of magnetic iron ore, or else magnetized by some mechanical process so as to produce the phenomena of magnetism. The magnetic ores are called natural magnets, the earth itself being the greatest one of all, acting upon the magnetic needle exactly as a huge compound artificial magnet would. At a red heat iron loses all traces of magnetism. See ATTRACTION, MAGNETIC.

**Artificial Marble.** A cement or plaster, with or without other materials or colouring substances variously worked in and admitting of being brought to a sufficiently hard face and smooth surface to receive a high polish. Keene's, Martin's, and Parian cement, and scagliola are well known compositions possessing these qualities, to which others might be added.

Recently a process has been patented by which ordinary limestone may be converted into artificial marble by being made to receive all the rich and varied colouring, and to assume the beautiful appearance of the natural mineral.

**Artificial Marl.** A mixture of chalk and clay such, for instance, as malm.

**Artificial Seasoning.** Timber for carpenters' use may be said to be sufficiently fit or seasoned when it has lost one-fifth of the weight it had when felled, but joiners require that it should be dry, which implies the loss of one-third of such weight, and if time cannot be spared for the gradual evaporation of this moisture in a dry and proper locality, recourse must be had to some artificial process, that is to some method of artificial seasoning, by which it may be extracted. It is said that a 3-inch deal used whole requires three years to season naturally, but that when cut down into inch stuff six months will suffice if proper care be taken in the stacking. A free space should be left round each piece, which should be placed upright if possible, for wood dries more quickly on end than when laid horizontally. The situation should be dry and airy, not exposed to the sun, or to high winds, and the goods should be under cover if practicable. There are various means by which wood may be artificially seasoned, such as by the extraction of sap, by charring, by soaking in water, by scorching, smoke drying, or even by steaming and boiling, but perhaps one of the best methods is that known as the Desiccating Process introduced by Mr. Davison, and which consists in exposing timber in a suitable oven to a current of hot air moving with a velocity of 100 feet per second. The heat varies from 90° to 200° Fahr., according as the wood is in logs or thin boards, and the time required may be roughly stated to be one week per inch of thickness on the supposition that the exposure to the hot air lasts only twelve hours per day. A comparison of the respective times required by the natural and this artificial process shows how unlikely it is that the latter can be nearly so reliable, especially when it is remembered that the operations of nature are perfect both in rule and action. The three years necessary for the 3-inch deal, when seasoned naturally, dwindles down to three weeks through the application of great heat for a short time instead of a continuous airing for a long one, and the consequence is that unequal contraction takes place, and the pores of the wood, not having undergone a permanent change of form, re-open and increase the tendency to split. Notwithstanding this, however, it is found in practice that Desiccation carefully applied turns out timber fit for use which would otherwise, through insufficient stock, be often used in a more or less unseasoned or green condition.

**Artificial Sines, &c.** In tables of logarithms, the logarithms of the natural sines, &c., which latter are usually given without the decimal point prefixed.

**Artificial Site.** A site formed by lowering an eminence, or by raising the surface of the ground to a higher level than the natural one, or by a combination of both measures. In all cases of building on made ground it is advisable to carry the foundations to a natural bottom, though such a precaution is often overlooked. When a site cannot be raised an effect almost tantamount to a real elevation may be produced by lowering the ground in its proximity. The impression of wonder and sublimity produced on the mind when the ascent to a building consists of terraces and great flights of steps was not lost upon the Assyrians, who raised artificial sites of remarkable dimensions in order to effect the desired sensation. As an instance, the palace of Sennacherib was erected on an artificial mound no less than half a mile in diameter and thirty feet in height.

**Artificial Slate.** A substitute for slate made by mixing together paper-pulp, resin, and glue and forming the composition into tablets by means of pressure. It is called also *carton-pierre*.

**Artificial Stone.** A description of stone made by artificially combining similar constituents to those which exist in natural stone. Blocks can be produced which rival those from the quarry in all valuable qualities, and which greatly surpass them in virtue of being proof against the ravages of atmospheric action. Density and homogeneousness, absence of cleavage, a good average resistance to crushing, and to the action of frost and intense heat are all characteristics of a soundly made artificial block. The ease also with which it can be moulded to any fanciful shape adds to its value, and doubtless its more general popularity and use, at all events in superior buildings, is but a question of time. See CHANCE'S ARTIFICIAL STONE; FERRUMITE; RANSOME'S ARTIFICAL STONE; RUST'S VITRIFIED MARBLE; VICTORIA STONE.

**Artificial Wood.** A compound consisting of equal parts of saw-dust, phosphate of lime, and glue or resin, has been so named.

**Artisan.** A mechanic whose knowledge is limited to manual dexterity in his particular trade. Despite any difference that may exist in the primary meaning of the words artificer and artisan, it is usual to speak of all workmen—with the exception of labourers—belonging to the building trades as artificers. See ARTIST WORKMAN.

**Artisans' Dwellings Act.** A statute passed in 1875 to remedy the ills accruing from densely inhabited badly built courts and alleys, and other portions of cities and boroughs, and compelling owners in certain cases, which might arise through the action of local authorities, to pull down and reconstruct them. An official representation must be first made by a medical officer, acting in pursuance of the Act, whenever he sees cause to do so, and if two or more justices of the peace in the district, or twelve or more persons liable to be rated, complain to him of the unhealthiness of any area, it will be the duty of the medical officer to inspect and make an official representation, and if it satisfies the local authority that the area is unhealthy it is to make a scheme for its improvement, power being given by the Act to form an improvement fund and to borrow money for the purposes of the Act, with general powers to carry it into execution.

**Artist.** A person skilled in the practice of some art, but especially in that of any of the fine or liberal arts, requiring for its correct enunciation science and taste. The term is particularly applied to actors, sculptors, painters, engravers, and architects.

**Artiste.** A French term signifying one who is particularly skilled in the performance of

almost any of the useful arts. Its meaning is altogether dissimilar from that of artist.

**Artistic.** Conformed to art.

**Artistically.** In an artistic manner. In a manner indicative of an artist's skill. With artistic effect.

**Artistic Effect.** See EFFECT.

**Artistic Feeling.** The display in a work of art of the subtle impressions in the artist's mind which called it forth, and animated its progress and consummation. The fact of detecting artistic feeling in a work betokens that symphonious emotional chords have been excited in the spectator, and that he possesses, though perhaps unconsciously, the elevated taste, and perception of an artist.

**Artistic Treatment.** In architectural matters, the form, dimensions, disposition and arrangement, mode of employing and the means adopted to enrich features and materials, having regard both to the precepts of art and to structural necessities. Upon it hinge the differences and peculiarities of all styles, for though most have a sort of representative or typical form or material for each subordinate part of a structure, these differ among themselves often very little and always far less than the treatment does of the same model or exemplar by each different race, or by the same race at different periods.

**Artist Workman.** A workman who does not mechanically follow the rules of his trade, but from possessing individual art-power, is enabled to infuse something original and artistic into his work whilst he manipulates it.

**Art, Mural.** Wall decoration, which see.

**Artophorium.** The ancient name for the ciborium, which see.

**Art Power.** The faculty or ability to work or design artistically.

**Art Tiles.** Ceramic, majolica, or other tiles encaustic or enamelled, dull or glazed, with coloured geometrical, floral, figure, or conventional patterns executed either by rapid sketching, stamping, or by carefully accomplished hand drawing.

**Art Union.** A society having for its object the promotion of a general and popular interest in the fine arts, and which to further their encouragement purchases sculptures, paintings, and various works of art out of a common fund contributed in small shares by any of the public who choose to become subscribers, amongst whom the purchased works are distributed by lot.

**Arum.** A genus of plants of which there is only one British species, namely *Arum maculatum*, commonly called Cuckoo-Pint, Lords-and-Ladies, and Wake Robin. It is tolerably abundant in England and in most parts of Europe, and is of interest to the sculptor of art-foliage, owing to the bold and graceful form of its large arrow-shaped leaf, which, elegantly curling backwards, offers by its simplicity of line and contrast of light and shade an appropriate subject for the adornment of a capital. Its merits were appreciated by the Egyptians, who adapted it to the beautiful singularities of their ornamentation. *

**Arundel Marbles.** Part of a collection of inscribed ancient marbles purchased at Smyrna by Mr. Petty, a man of taste and letters, about the beginning of the 17th century, for Thomas Howard, Earl of Arundel, who is worthy of remembrance, not only for general merits, but for a noble patronage and encouragement of the fine arts. These marbles, now at the Oxford University, contained when entire the Grecian chronology from B.C. 1582 to B.C. 264 called the Parian Chronicle, but before they were presented to the University they suffered defacement and loss during the time of the great rebellion. They are sometimes termed Arundelian Marbles.

**Arundel Society.** A society formed in London in 1848 with the object of promoting the knowledge of art and assisting in its study by the publication of line engravings, chromo-lithographs, &c., of frescoes, pictures, and choice examples of painting, sculpture, and architectural and ornamental design. Another of its objects is the worthy one of preserving the most important monuments of painting and sculpture remaining from past times. The society derives its name from the title of the illustrious nobleman mentioned in the preceding paragraph.

**Arx.** A castle, fort, or citadel.

**Aryballos.** A vase of globular form used by ancient nations for perfumes and ointments. It was so called because of its similitude to a purse.

**Arysteres.** Small vessels in which wine in ancient times was distributed to the guests. See CRATER.

**Arzica.** A yellow pigment made from the herb *Reseda luteola*. The same name belongs to a yellow earth, which yields an ochreous pigment of a light yellow colour, darkening to orange when burnt.

**Arzicon.** See ARSICON.

**Asaph St.** This saint is found represented as a bishop, with pastoral staff.

**Asarotum.** A sort of painted pavement used by the Romans before the invention of Mosaic work. It is said that one at Pergamus purposely represented a floor left unswept after a meal.

**Asbestine.** Partaking of the qualities of asbestos or formed of it. Incombustible.

**Asbestos; Asbestus.** A green or white mineral found resembling flax, or in easily separable fibres, consisting principally of lime, magnesia, oxide of iron, and silica. It is a variety of hornblende, and derives its name from a Greek word, signifying "indestructible," since it was a constituent of a partially unconsumable cloth used by the ancients to wrap round their dead on the funeral pile. In the present day asbestos is used for the wicks of oil lamps, for lining safes, and in laboratories for stoppers, &c., exposed to intense heat. It is also employed for so-called gas fires which are made by fitting under the fire-grate gas piping having five atmospheric burners, three on one supply and two on the other, so that one set may be kept full on whilst the other is turned low to reduce the heat if necessary. The grate is filled in with pieces of asbestos, and about a quarter of an hour after the burners have been lighted a good representation of a coal fire is produced with equal heat, and without smoke or dust.

**Asbestos Stove.** A stove prepared similarly to the firegrate in the preceding article.

**Ascella.** See ASSELLA.

**Ascendant.** The old term for the sides or

* See Colling's *Art Foliage*.

upright parts of the ornamental bordering, or dressing called chambranle, corresponding to the modern architrave round chimneys, doorways, and windows. The top part of the chambranle, or the part over the opening, is called the traverse or transverse. Window openings often had the sill ornamented, that is, they were surrounded by a four-sided chambranle.

**Ascendit ad cælos.** In Christian art, the holy apostles are sometimes represented holding scrolls containing those portions of the creed which tradition assigns to each. In such cases, St. James the Less bears the words "Ascendit ad cælos, sedet ad dexteram Dei Patris Omnipotentis," which is the Latin for "He ascended into heaven, and sitteth on the right hand of God the Father Almighty."

**Ascent.** The angle which an inclined surface makes with a horizontal line. Also the act of rising. Capillary action and evaporation are respectively the ascent of liquid and vapour. In a building staircases are the usual internal means of ascent, whilst, externally, flights of steps employed for the same purpose often have a fine effect if used on a sufficiently vast scale.

**Asceticism.** See MONASTICISM.

**Ascos.** An antique vase or pot for holding perfumes, &c., and somewhat resembling a wine-skin.

**Ash.** *Fraxinus excelsior.* A tree not much used in carpentry, owing to its being hard and heavy, insufficiently rigid, and not durable, for it often rapidly decays when exposed to dampness or wet. It possesses, however, a combination of strength with toughness and flexibility when young, making it valuable for many purposes connected with the manufacture of implements and machines, especially where sudden shocks have to be resisted. When old it becomes brittle.

**Ash-bin.** Properly a box or chest in which to place refuse ashes, but generally a stone or brick erection, often of some size, used as a receptacle for all kinds of kitchen offal. Messrs. Walter Macfarlane & Co., the eminent founders, have introduced very excellent cast iron ash-bins, both loose and for building into walls, and have fitted up in Glasgow alone, under sanction of the local authorities, this kind of accommodation for many thousands of the population with the most marked success. It is observed by them with much force that "cast iron is obviously the best material for ash-bins, on account of its non-absorbent nature, its strength, and the obstruction it offers to vermin of every sort." An ash-bin is often termed ash-hole, ash-pit, dust-bin, &c., and sometimes ash-bucket when portable.

**Ash-bucket.** A bucket used for throwing ashes and other house refuse into in readiness for the scavenger. When of wood it harbours vermin, and is dangerous owing to the chance of its causing conflagrations through ignition from burning cinders.

**Ash colour.** A colour between brown and grey.

**Ashes.** The pulverulent remains of animal, mineral, and vegetable matter after burning, though it is not strictly correct to term the unconsumed remains of a mineral ash, because ash itself is mineral matter. It is also a common term for house refuse. Domestic ashes collected by the scavenger when divested of the multifarious items, fragments, and scraps that find their way to the ash-bin are much employed in brickmaking, being usually separated by sifting into two lots called respectively *breeze* and *soil*. The breeze, which consists mostly of cinders, is used as fuel in clamp burning, and the soil, or finer particles, which often include a considerable quantity of coal-dust, is thoroughly mixed with the brick earth during the processes of soiling and tempering to serve as a flux in burning. Hence, bricks made in this manner are burnt as well as baked, and in some instances where the burning has not been carried sufficiently far in the clamps, houses are built with them when in a condition to fairly contribute to the combustible character of the tenements. Smiths' ashes are those gathered from the forge, and are preferred for darkening mortar for pointing and for mixing with lime concrete, as they contain fragments of scaly black oxide of iron. When well ground they are also often mixed with mortar in lieu of sand, and impart to it an agreeable hue. Mortar thus made is sometimes called *blue* mortar, and about London it is used for covering parts of buildings much exposed to the weather.

**Ashes Mortar.** A variety of mortar composed of two parts by measure of freshly slaked lime and three parts of wood ashes. When cold it should be well beaten, and it improves by keeping if beaten two or three times previous to using. It is efficacious in resisting the alternate effects of dryness and moisture, but is not suitable as a hydraulic or water mortar.

**Ashes, Wood.** The remains of burned wood or plants.

**Ashford Marble.** See BLACK MARBLE.

**Ashford Slates.** A variety of roofing slates obtained from county Wicklow, Ireland, resembling Welsh slates, but of a coarser texture.

**Ash Hole.** A repository for ashes or an ash bin. 2. The lower part of a furnace underneath the fire-bars. A deduction is made for it in measuring ovens and coppers, which with this exception are taken as solid brickwork.

**Ashlar.** A term derived perhaps from the Italian word *Asciare*, to chip, or it may be a corruption of the low Latin words *Assella* or *Assula*. Up to the beginning of this century masons gave the name of ashlar to a large squared stone, but they now often apply the term ashlar masonry, ashlar work, or ashlar (1) to solid cut stone masonry built throughout with ashlars as above, squared and dressed to given dimensions, or (2) to the closely jointed facing averaging perhaps six inches thick, common about London in imitation of the foregoing, and (3) to all walling not absolutely rubble. The term is given to any or all of these, but there is no fixed custom throughout the kingdom. Ashlar is unquestionably a term whose use gives rise to much vagueness of idea, unless qualified by some other accompanying word explanatory of its meaning, and considerable divergence of opinion exists as to how much of masonry rightly comes under its denomination. Some constructors confine the term to all work that requires the chisel to each stone, and class other descriptions of masonry containing hammer-dressed blocks under the separate and distinctive term of stone *walling*, with the exception only of ashlar facing, which is exempted owing to the identical appearance of the two kinds of work, and to the

fact that ashlar is an abbreviation for it. As now employed in masonry, however, the term ashlar, according to the best authorities, means all hewn or squared stone used for face work, and is not confined to that which is executed throughout the entire thickness with cut stones, dressed true and square, set in horizontal courses of uniform depth, and properly bonded with all cross joints vertical. Work of this kind can be built of any reasonable height and thickness, circular or square on plan, and plumb, or battering, or curved in section, but it involves great labour both in preparing the stone, and in setting it on its bed. This may give grounds for the adoption of ashlar facing, otherwise ashlar, or bastard ashlar, in lieu thereof, which materially reduces the amount of such labour, but it offers no excuse for the practice of only dressing the joints accurately a few inches from the face, working slack, or chipping away the stone towards the tail-end, propping it up by means of wedges, or bits of wood, stone, brick, or slate—which unskilful process is termed pinning up or underpinning—or for inaccurately dressing and setting the backing and filling or hearting, just as if the uniform thickness and parallelism of the beds and joints were of no consequence in those parts. An equally bad artifice to get a close joint is to work the bed hollow. In almost every case the effect of such work is known beforehand, and it can only be done where there is an absence of a proper desire to carry out the wishes and intentions of the director. The dimensions of the blocks usually range from one to two feet in breadth, and thickness or height, it being preferable to have the breadth a trifle greater than the thickness. The length may be double the breadth for convenience of bond, but its limit will be determined by the specific resistance to cross strain of the stone that is used. To guard against fracture from unequal weight or settlement three times the depth is the limit of length recommended by Professor Rankine for the weaker sandstones and granular limestones, but a length of from four to five times the depth may be adopted in the case of harder stones.* Besides bond and thin and uniform workmanlike mortar joints to secure the complete combination of parts, it is sometimes necessary to have recourse to cramps and bolts of iron and copper as well as dovetailing, joggling, and plugging to beds and joints. Ashlar is called by different names, depending upon the way in which it is worked and how backed. In ancient contracts "clene hewen" was often specified and probably meant rubbed or cleansed or polished ashlar. At the present day stones for ashlar facing or bastard ashlar are often roughly shaped at the quarry to lessen cost of carriage, and hence ashlar has been defined to be common stones as brought from the quarry of different lengths and thicknesses. Such stones are either "random" or "dimension." If the former are wanted they are forwarded regardless of size, but if the latter then the exact dimensions of the required stones are sent to the quarry, and blocks are forwarded having a measurement each way slightly in excess of those given so as to allow the finished stone to be got out with clear faces. Quarrymen call squared stones ashlar previous to their being hewn. The following are some of the varieties or names of ashlar, which will be further noticed under their respective heads :—*Axed ; Bastard ; Boasted ; Brick ; Chiselled ; Cleansed ; Common ; Coursed ; Diamonded ; Drafted* and *Picked ; Dressed ; Fair Broached ; Frosted ; Hammer-dressed ; Herring-bone ; Herring-bone Random ; Tooled ; Nigged ; Perpend ; Picked ; Plain* or *Plane ; Pointed ; Polished ; Prison ; Punched ; Random ; Ramdom-tooled ; Reticulated ; Rock* or *Rock-faced ; Rough* or *Rough-faced ; Rowed ; Rubbed ; Rubble ; Rusticated ; Scutched ; Smooth ; Snecked* or *Snicked ; Sparrow-pecked ; Tooled ; Vermiculated Rusticated.* See ASHLAR FACING.

**Ashlar.** *In Carpentry*, the name given to the vertical strut placed on the inner side of the wall at its top to steady the rafter. In some kinds of mediæval roofs the rafters pitched on plates at the outside of thick walls which were not carried up higher than the plates, and accordingly a row of posts called ashlars, ashlar-posts, studs, or ashlaring, were required to continue the face of the wall and to cut off the acute angles. In domestic work the ashlars formed the sides of the garrets and furnished places for closets. See ASHLARING IN CARPENTRY.

**Ashlar Arch.** An arch constructed with cut stone voussoirs of a wedge-like shape. In preparing the templates it is necessary to allow for the thickness of the joints.

**Ashlared.** A term given to brick quoins when the bricks are blocked together to form headers and stretchers, each block rising about three or four courses high. Ashlared quoins sometimes look well when made to project an inch or so beyond the face of the wall.

**Ashlar Facing.** Ashlaring, or Bastard Ashlar. A thin stone facing with close fitting joints not exceeding from one-eighth to one-tenth of an inch in thickness, set in very fine mortar free from grit, or putty, which latter is almost always used at that part of the joint near the face. The stones usually rise from 28 to 30 inches in length, 12 inches in height, and are sometimes from 8 to 9 inches in thickness, but often average no more than 6 inches. The upper and lower beds and vertical joints are always perpendicular to the face, but the back may be with advantage inclined to the face, so that a small amount of lap may occur in the setting through the lower bed of one course being slightly wider than the upper bed of the course below. All the blocks must be laid on their natural beds, for if not they flush at the joints, and the weather more speedily disintegrates them. When projecting mouldings occur as in strings and cornices, this rule, however, does not apply, for unless the stones are set bed-face portions would fall if unable to resist atmospheric action. Ashlar facing is broadly divided into two kinds of work called brick ashlar and rubble ashlar. In the former it is advantageous to employ cement or quick-setting mortar so as to eliminate the difference in the settlement occasioned by the far greater number of joints in the backing, but the depth of the ashlar should exactly accord with a certain number of courses of brickwork, and the bond stones should show a collective area on the face of the wall on no account less than one-eighth of its total surface, but preferably

* Rankine's *Manual of Civil Engineering*, 12th Ed., p. 384.

considerably more than such limit. Sometimes iron ties or cramps are employed to fix the edges of the ashlar to the back of the wall. Rubble ashlar is formed by supporting an ashlar facing by means of a rubble backing. It has the same defect of inequality of settlement through the excess of joints in the backing, aggravated by their occasional great thickness, which must be met, however, by the same measures as just described for brick ashlar. Through stones have also to be provided at proper intervals. (See THROUGH BONDS). In all cases the stones should either be joined together by properly protected iron or copper cramps or stone dowels, or slate dowels about one inch square and two inches long, and the backs of the ashlars should be left irregular for the backing to more securely tail against. When granite is used in ashlar facing, the face is usually close picked or finely worked with the pick, the beds and arrises being worked fair. When single axed, or double or fine axed, granite is brought to a higher finish than when only close picked. Ordinarily, ashlar-facing is measured by the foot super, and described as (say) Bath stone ashlar, averaging seven inches thick, including bonders, joints, and faces, or the ashlar may be taken by the cubic foot and the labour as plain work to the face and one bed and joint, not omitting the bond-stones.

**Ashlaring.** Ashlar facing or ashlar work. The stonework in front of a building which, in the case of houses, is usually brought to a smooth surface by what is denominated plain work, which see.

**Ashlaring, Ashlering.** *In Carpentry*, the upright quartering formed by a series of ashlars or ashlar-posts between the rafters and floor of a garret, usually lath and plastered, and cutting off the acute angle formed by the sloping roof meeting the floor. They should not be less than 4 feet long with a scantling of about 4 inches by 2½ inches. There is a clause in the Metropolitan Buildings Act which affects their disposition by the restrictions imposed upon the form of garret ceilings. See ASHLAR, IN CARPENTRY.

**Ashlar Wall or Ashlar Walling.** A wall built or faced with ashlar.

**Ashlayering.** The same as ashlaring, which see.

**Ashler.** See ASHLAR, which is the most usual spelling.

**Ashlering.** Ashlaring.

**Ash Pan.** A shallow vessel under a grate or furnace for ashes to fall into. In kitchens, &c., when practicable, a hole under the fire-bars lined with masonry, and covered by a movable grating is often made to receive the ashes. See ASHPIT.

**Ash Pit.** A cavity underneath the bars of a grate, constituting a receptacle for ashes. 2. An outside place or cavity for ashes and other kitchen refuse, which in most cases should be provided with proper doors and covering. See ASH-BIN.

**Asilla.** A yoke over one shoulder or pole similarly placed, used by the ancients for carrying burdens. It is of frequent occurrence on Egyptian and other ancient sculptures and works of art.

**Asiminthos.** A large vessel used by the Greeks for bathing purposes.

**Askew.** A word formerly used for skew. A skew arch or bridge is said to be askew, skew, or oblique to the right or to the left, according as the acute quoin of the abutment is to the right or to the left of a person looking through the arch. Fig. 21 shows an arch on the skew and askew to the right, the quoin at A, to the right of the spectator, being an acute quoin.

**Askew Table.** A course of stone weathered on the top and covering a continuous set-off in a wall.

**Aslant.** Obliquely, or on one side.

**Aslope.** With inclination, leaning, or declivity. Obliquely.

**Aspasticum.** An apartment or place adjoining or attached to a basilica, or ancient church, in which the bishop and presbyters

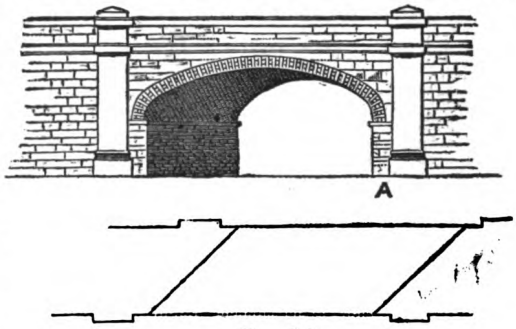



*Fig. 21.*

received devotional, business, and ceremonial visits.

**Aspect.** The position of sloping land, or of a face of a building with reference to the points of the compass. The succession of heat to cold, dryness to moisture, scorching heat to driving rains, is more or less destructive to certain materials, which should therefore be selected or protected as far as possible, according to the aspect of the part for which they are intended. Due south and east severely try some kinds of work and materials. There is a difference of opinion as to the best aspect for the various divisions of an edifice, but generally the choice of aspect should take precedence of that of prospect. The south-east is usually preferred for living rooms, and bay or supplementary windows often have to be resorted to so as to appropriate any available prospect without sacrificing the advantages of a good aspect. The dining room should face the north or north-east, unless used much as a sitting room, when south-east is best. The most genial aspect for a drawing room is south-east for the main windows with an end light at the south-west side. For the library due east is considered by some to afford the most satisfactory aspect, owing to the sun being off the windows at noon or thereabouts. A roomy bay-window, however, at the east end will not altogether preclude from the apartment the enlivening sunbeam. As a rule, houses that stand east and west are regarded as more comfortable than those whose backs and fronts face the north and south. With respect to public buildings the latter arrangement has been found to prove prejudicial to the health of the inmates.

**Aspen.** *Populus tremula.* A variety of the poplar, remarkable for the tendency which its

leaves exhibit to tremble or quiver at the slightest breeze on account of the great length and slenderness of the leaf-stalks. The wood of the tree is light, soft, and white, and quite capable of being used in the interior of houses, but when intended for such purpose it is advisable to bark the tree and allow it to dry previous to felling.

**Asperges.** The instrument used in the Roman Catholic Church for sprinkling holy water. In mediæval art it is sometimes adopted as the emblem of Sir Robert of Knaresbury.

**Aspersorium.** The same as aquaminarium, which see.

**Asphalte.** A mineral pitch or a compact bitumen, which occurs abundantly in many parts of the world, and very remarkably in a lake on the island of Trinidad, where it is solid near the margin, but boiling in the centre. When cold it is a solid black or dark brown substance without smell, breaking easily with a vitreous fracture. Like other hydro-carbons it is supposed to result from the decomposition of organic matter accumulated under water, and afterwards covered up with mineral matter so as almost to prevent any access of air. Asphalte was highly valued by the ancients as a cement, and the Tower of Babel and the walls of Babylon may be cited as instances of its use. The asphalte which is so largely used for pavements, damp-courses, waterproofing vaults and cellars, covering roofs, arches, &c., materially differs, however, from this variety of mineral pitch. It is a natural limestone evenly impregnated with bitumen, or the natural asphalte just described, and is found in the neighbourhood of the Jura Mountains, usually of a dark chocolate colour. Asphaltic mastic—the name under which blocks of asphalte prepared from the natural rock are often sold—contains about 87 per cent. of carbonate of lime and 13 per cent. of bitumen when of finest quality, and it is made by reducing the stone to powder, mixing it with mineral tar and exposing it to a strong heat. Grit or coarse grained sand is often added in various quantities, giving rise to different degrees of quality. Before using, the mastic, which is moulded into cakes, has to be re-melted with a small quantity of mineral tar as a flux, or the asphalte, if compressed, is reduced to powder, and after being distributed properly over the place prepared for it is consolidated by means of hot irons. Efforts have been made to produce artificial compounds rivalling the natural product in its excellent properties, but none have as yet been discovered that upon trial have proved equally strong or as indifferent to great changes of temperature. Asphalte is sometimes written asphalt and asphaltum. See BARNETT'S LIQUID ASPHALTE ; BRUNSWICK ROCK ASPHALTE ; CLARIDGE'S PATENT ASPHALTE ; LIMNER ASPHALTE ; MONTROTIER ASPHALTE ; VAL DE TRAVERS ASPHALTE.

**Asphalte Bed.** A layer of asphalte upon which something is bedded. An asphalte damp-proof course.

**Asphalted Road.** A road covered with asphalte as above described in lieu of being paved with sets or macadamised, &c. Concrete from 5 to 9 inches thick is in the first instance properly deposited on the roadway, over which is laid the asphalte, varying in thickness from 1½ inch to 2½ inches, according to the severity of the traffic. Foot-paths are usually formed with a half-inch layer of asphalte laid upon a 4-inch stratum of concrete. The advantages of an asphalted road consist mainly in its cleanliness, lightness, and noiselessness, but it has the great disadvantage of slipperiness, which outweighs everything else. It requires to be kept clean, in which condition some assert it to be no more slippery than stone in any weather when the gradient is not more than 1 in 50—an assertion very likely true in other atmospheres than our own. Asphalte is not combustible in roadways, and cannot well be repaired or laid in frosty weather.

**Asphalted Platform.** A platform laid with asphalte.

**Asphalted Felt.** A waterproof material and non-conductor of heat, composed of hair or wool and asphalte, or felt saturated with bitumen, much used for roofing purposes, either over corrugated iron, under slates when laid upon close boarding, or by itself over boarding. In the latter case it requires to be stretched tight, and nailed down with joints overlapping, after which it must be coated with a hot boiled mixture of tar and lime, and finally sanded. A bed of asphalted felt is also sometimes used to lay over templates upon which heavy timbers bear, between rafters and inside panelling, between floor-boards and joists, and in fact almost anywhere where sound has to be deadened, or freedom from draught in joiners' work secured. The same material is often termed Asphalte Felting. See FELT.

**Asphalte Felting.** See ASPHALTED FELT.

**Asphalte Floor.** A floor formed by providing a coarse concrete stratum three to six inches in thickness, carefully levelled, over which when set a thin layer of very fine concrete is floated and brought to a true and even surface. This must be allowed to well dry, and then a layer of liquid asphalte is poured over it and worked to a proper fall, with channels, &c., for conveying off water. The asphalte should be from ¾ inch to 1 inch thick worked smooth without leaving weak joints or seams and sprinkled over with coarse sand when soft, or if the traffic is expected to be heavy, coarse grit must be mixed up with the melted asphalte before it is poured over the floor. A skirting should always, where practicable, be formed round the floor. The main disadvantage of an asphalted floor may be considered to be its disposition to condense moisture, which causes dampness, though it is quite impervious to wet.

**Asphalte Pavement.** That part of a footway, road, or passage, that is paved with asphalte. See ASPHALTED ROAD.

**Asphalte Roof.** A flat roof covered with asphalte. The joists are usually laid about 12 inches from centre to centre, over which rows of plain tiles are arranged so as to cover over the interspaces. A thin layer of concrete is then carefully floated over them, and allowed to become perfectly dry before the asphalte is poured over, which is kept in place by means of strips of wood along the edges. This practice sometimes gives rise to fissures or cracks in the seams between two contiguous courses, so that it is a good plan to lay the asphalte in two thicknesses, keeping the seams of the upper layer between those of the lower. Sand should be sprinkled on the surface when soft to protect it from the sun.

**Asphaltic.** Pertaining to asphalte, or containing it.

**Asphaltic Mastic.** A name given to a mixture of mineral tar and bituminous limestone. See ASPHALTE.

**Asphaltic Mortar.** A mortar composed of powdered asphalte, resin, sand, and mineral tar.

**Asphalting.** Laying asphalte. Work executed in asphalte. In measuring, it is valued per foot super independently of the concrete, which is a separate item.

**Asphaltum.** The same as asphalte, which see. When pure, this mineral pitch is used in oil painting, being first dissolved in turpentine. It affords a fine brown colour or, more correctly speaking, varnish, which however needs great care in applying, owing to the atmosphere causing it to crack and contract. The addition of Vandyke and other browns is said to materially check this tendency whilst adding to it body, if not brilliancy. See BITUMEN.

**Aspic.** A species of lavender from which is prepared an essence used in wax painting called by the same name.

**Asquint.** Obliquely, or towards one side.

**Ass.** In mediæval symbolism, the emblem of sobriety.

**Assault.** An illegal attack in time of peace. In building prisons this contingency, as the result of a riot, must be considered; and in constructing strong rooms and cells, the cunning artifices sometimes elaborated to pierce through walls and floors apparently impenetrable ought not to escape the designer's memory.

**Assella.** A word signifying shingles or thin boards. It is the diminutive of the Latin word asser, which see.

**Assemblage.** An old term in carpentry and joinery for joining and uniting several pieces together by dovetailing, framing, mortising, &c. The work so united was similarly termed.

**Assemblage of the Orders.** The placing of two or more orders one above the other in a building. When no order is superimposed upon another, their employment is technically termed *application.*

**Assembling.** In mechanics, the act of putting in their respective places and fastening together the component parts of a structure, article, or machine.

**Assembling Bolt.** A bolt which secures together different parts of an article that admit of separation.

**Assembly Rooms.** A suite of rooms appropriated for the reception of large parties for the purpose of holding balls, public dinners, soirées, concerts, &c. It should contain a saloon and grand hall, or a smaller and larger ball room, with orchestra and gallery, tea room, supper room, card room, vestibule, balcony, cloak rooms, dressing rooms, crush rooms, kitchens, lifts, and service rooms, good and numerous entrances, and rooms and offices for those who have the care of the building or who attend upon or entertain the guests. As the saloon or large ball room may often be used for concerts and deliberative assemblies, it is expedient that there should be provided good acoustical properties as well as artistic effect.

**Asser.** A term employed by Vitruvius for a board or plank, or a common rafter supporting a roof tile, as well as for the woodwork forming the outline of a vault.

**Asseris.** An ancient name for the common rafters of a roof immediately underneath the tiles.

**Asses' Ears.** A term sometimes given by workmen to elevated extremities, such as those sometimes found on acroteria, &c., when their conformation or outline recalls to mind the appearance of donkeys' ears. They are otherwise called dogs' ears, cats' ears, or lions' ears, according to shape.

**Assis.** Amongst the ancient Romans a word that signified a strong plank or board, a cock or valve of a pipe. Also a late Latin term for battens or thin boards.

**Asshler.** An old way of spelling ashlar.

**Assist, To.** In specifications it is necessary to insert under most trades that each trade is to assist or attend other trades when and where required. The joiner especially is often wanted to assist the smith and plumber, and the services of the bricklayer are occasionally similarly requisitioned by nearly all the trades.

**Assize.** In masonry, a somewhat uncommon term for a course of stone or a cylindrical block or frustum in a column. If a column is not monolithic it is said to consist of assizes.

**Assize Court.** A building which ought to be of fit dignity and convenience for the business of the sittings of the judges of the superior law courts that are held from time to time in various counties for administering civil and criminal justice. The accommodation usually required may be summed up as follows:—Two courts of justice, judges' robing and retiring rooms, peers' room, judges' clerks' rooms, magistrates' room, attorneys' room, barristers' robing room, consultation rooms, rooms for the clerk of the peace and his clerks, public hall with galleries, &c., grand jury retiring room, petty jury retiring room, committee rooms, and rooms for attendants, opposite witnesses and police, proper cells and strong rooms, and a house for the keeper of the building. All these need careful planning, and have either to be brought into suitable communication by means of proper thoroughfares, or else kept comparatively isolated with their own entrances as the case may be.

**Association of Ideas.** A process of the mind brought about by seeing, remembering, anticipating, judging, and imagining, causing one idea to re-call or restore another. Garbett gives the following curious illustration of the effect of accidental association:—"A few years ago the very elegant and purely common-sense treatment formerly applied to domestic and palatial buildings by the Florentine school of architects was revived and introduced into this country by Mr. Barry, who employed it first in the Travellers' and Reform Club Houses. The hint was followed, as it deserved to be, in a variety of buildings to which it was well suited—perhaps better suited than any other manner. However, we are told in a criticism of one of these, that 'it has in its general aspect quite as much or even more of the club-house than of the ordinary villa character'; and of another—an assurance office—that 'it might pass for a club-house'. The critic does not appear to regard this in either case, indeed, as a fault: but what we have to observe here is the singular force of association, by which the use of this manner in *two* London club houses suffices to stamp it forthwith as a sort of *club-house style*—if not

absolutely unfit for other purposes, at least peculiarly appropriate to this."*

**Association of Orders.** See ASSEMBLAGE OF THE ORDERS.

**Assula; Astula.** Chippings or small slabs of marble or stone.

**Assumed.** Taken without proof. In measuring artificers' work it is sometimes sufficiently exact to resort to assumption where well known parts either lie concealed or admit of being estimated by inspection. As an instance, strings to stairs are usually assumed to be 12 inches in width.

**Assurance.** Insurance. A contract to pay a given sum in a certain event. See FIRE INSURANCE.

**Assurance Badge.** A plate or medallion formerly put up on the front of a building by a fire assurance company for the double purpose of advertising and of enabling their firemen to single out the houses in whose safety they were to be specially concerned. Fire brigades now, however, care little about the badges, and bestow their commendable efforts to the saving of all property alike, the consequence being that the practice of fixing them to assured buildings has become almost extinct.

**Assynt Marble.** A greyish white and white marble varied occasionally with blue, found in the mountainous and rugged district of Assynt, Sutherlandshire.

**Assyrian Architecture.** One of the first styles, if not the very first, which architecture assumed in the world. The great and genial region watered by the Tigris and Euphrates, the cradle of the human race, and the seat of the first almost universal empire was as likely as any to be the scene where kingly grandeur and ambition would excite artistic effort to rear becoming edifices for their display and gratification. Mr. Huggins, the well known author of "The Course and Current of Architecture," says of this style, that "as exhibited in Mr. Fergusson's restorations of the palaces of Nineveh, it bears something of the air of a style that would arise from the imitation of nature—of that kind of structure that instinct and climate would lead man in his early state, in such a country as Mesopotamia, to form for himself—a style into which the genius of the forest bower had breathed consistency and beauty." When the style approached its zenith, it was characterised by a brilliant display of colour and colossal representations of composite animals and winged bulls, images of kings, bas-reliefs, and other imposing sculptures well calculated to impress the beholder with lofty sentiments of awe and veneration. Important buildings gained much in effect by being erected on terraces composed of sun-burnt bricks, and faced with sculptured slabs of stones. Such an arrangement necessarily heightened the splendid and majestic spectacle afforded by lines of winged bulls of stupendous size, giants, and representations on a vast scale of other living forms. There is one circumstance connected with Assyrian architecture that will always invest it with peculiar interest in the opinion of many, namely, the relationship which it bore to the two sacred temples of the Jews who were often tributary to the Assyrians. It is now generally considered to be satisfactorily established that both the Temple built by Solomon, which was dedicated to the worship of the Almighty, and that built by Nehemiah after its destruction, were in the same general style as that prevailing throughout Assyria, but perhaps further enlightenment on the point will yet show that those were not in error who clung to the belief that the Tyrians acquired their knowledge of the rules of architecture directly from King Solomon. Many specimens of the Assyrian style, of which the ruins of Persepolis have been called the bones, and those of Nineveh the flesh,* are to be seen in the British Museum, and it may be added that it is, as might have been expected, the style in which the arch is first made a decorative feature.

**Astel.** A board or plank used for overhead protection when tunnelling. Also the name given to the arched or flat ceiling formed by the boards.

**Astragal.** In the Orders, a small moulding of semicircular profile separating the capital from the shaft of the column. There is some doubt as to whether it belongs to the shaft or capital, but it was considered by Vitruvius to be part of the former. It is frequently cut and ornamented with representations of beads and berries, and sometimes gives the idea of being used to conceal a joint. A similar moulding separating the fasciæ of architraves is called by the same name. It is also termed a bead, and in cabled or rudented columns the so-called cables are sometimes styled astragals. In Gothic architecture the astragal is the lowest member of the capital, and is often called the neck. In joinery, the term is given to a convex moulding having a profile of about three-fourths of a circle (see Fig. 22), which is used in conjunction with a fillet, ogee, cavetto, ovolo, &c., for sash bars, framing, &c. A rebated sash-bar is also termed an astragal, and formerly a hip-roll was so called. See BAGUETTE.

**Astragal and Hollow.** A moulding consisting of an astragal and a sunk member having a contour somewhat of the form of a quarter of an ellipse or circle. An astragal and hollow sash bar is shown in section at A, Fig. 22, and a

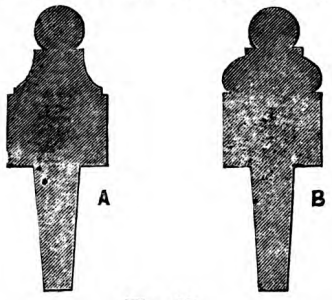



Fig. 22.

frame and sash so moulded might be described as a deal case frame, oak double sunk and weathered sill, 1½ inch deal astragal and hollow sashes double hung, patent lines, brass axle pulleys, lead weights and Meakin's patent sash fastenings. Mouldings such as these are not confined to sashes, but are often displayed on

* *The Principles of Design in Architecture*, by E. L. Garbett. Weale's Series.

* Fergusson's *Handbook of Architecture.*

other productions of the cabinet maker, joiner, &c.

**Astragal and Ovolo.** A moulding similar to the above, excepting that the sunk portion is replaced by a convex moulding of almost similar profile. The sash bar represented in section at B. Fig. 22, shows this form of moulding.

**Astragal Plane.** A bench plane used by joiners for striking astragals.

**Astragal Tool.** In turnery, a chisel with a semicircular concave face, adapted for turning beads and astragals.

**Astragalum Lesbium.** See BEAD AND REEL.

**Astragalus.** The ancient name for the game of hucklebones.

**Astral Lamp.** An argand lamp with the oil reservoir so disposed in the form of a flattened ring that the downward rays of light are not intercepted in the immediate vicinity of the lamp.

**Astronomical Column.** A column with internal winding stairs reaching to the top, upon which, in former times, astronomical instruments were placed for taking observations.

**Astula.** See ASSULA.

**Astylar.** Without columns or pilasters. The term is a modern one, and is intended to be applicable where a cornice or entablature is employed and the remaining part of the Order absent. In many instances it proves an effective means of embellishment, and can be adopted where the complete Order would be totally out of place.

**Asulæ.** The same as assula, which see.

**Asylum.** Formerly a place of refuge or a sanctuary, but now the term is generally understood to mean a public institution where the bereaved or afflicted are watched over and cared for.

**Asymmetral or Asymmetrical.** Not having symmetry.

**Asymptote.** A straight line which, being extended, constantly approaches a curve, but though produced to an infinite extent never touches it. See TANGENT.

**Atacamite.** A copper ore, consisting of a combination of oxide of copper with chloride of copper. A similar compound becomes deposited on the surface of antique bronze articles as a greenish incrustation. See ÆRUGO. Sometimes the ore is ground up and used as a green pigment.

**Atchevement.** Another way of spelling achievement, which see.

**Atelier.** A French term applied to the studio or workroom of painters and sculptors.

**Aternshill Slates.** A variety of slates used for roofing purposes obtained from Perthshire, Scotland.

**Athensæum.** A name derived from Athene, otherwise Minerva, the goddess of wisdom, and in former times given to buildings wherein the professors of the fine arts or of literature held their assemblies. The three most celebrated were those at Athens, Rome, and Lyons. In modern use the term is applied to literary institutions, or to buildings devoted to the requirements of societies having literary predilections.

**Athenian Architecture.** See GRECIAN ARCHITECTURE.

**Athens.** The capital of the ancient state of Attica and the most famous city of Greece was, according to tradition, founded in the time of Moses by Cecrops, its first king, and named Cecropia, which was afterwards changed to Athens in honour of Minerva, who went by the name of Athene among the Greeks, and who was considered by them to be the protectress of the city. It was, in the course of its eventful history famous for learning and eloquence, and gradually became enriched with the finest structures that were ever raised by the hand of man, and which have afforded a continuous theme of admiration for all who find delight in studying well-nigh faultless masterpieces of architectural art and decorated construction. They were almost entirely built of white Pentelic marble, upon which the atmosphere has had but little effect, and the general character and condition of the ruins in many instances have been quite sufficient to afford a good idea of the correct form and size of the original buildings, and to enable skilful artists to truthfully pourtray them.

**Athletæ.** Persons who contended for prizes in the public games of the Greeks and Romans in contests of agility and strength. They were generally trained in the palaestrae, which among the Greeks differed from the gymnasia. Athletæ in various postures formed a favourite subject for representation both in paintings and upon marble sculptures amongst the artists of these nations.

**Atkinson's Cement.** A variety of Roman cement of the colour of dark Bath stone, containing about 70 per cent. of lime and 30 per cent. of clay in which the amount of silica is nearly equalled by the iron and alumina. It is made by burning nodules or septaria found on the coast near Whitby, Yorkshire, and is a good material for outside work, but is said to require gauging with about three parts of sand to prevent cracking. In using, no fissures must be left to admit water which might freeze. Brickwork in mortar intended to be covered with it must be quite dry and merely wetted just previous to applying the cement, otherwise the wall will absorb too much of its moisture and prevent it from hardening. If the sand used is not clean it causes the cement to crumble, and as it sets almost as quickly as Roman cement all work when once begun should be completed, care being taken that no partially or fully set cement is worked up a second time. This cement, in conjunction with sand and shingle, was used by its patentee as ashlar in the forms of blocks, which continue to stand well. It is also called Mulgrave cement and Whitby cement.

**Atlantes.** Otherwise Atlantides, Atlases, Gigantes, Perces, Persians or Telamones. Male figures employed instead of columns, pillars, or pilasters, to support entablatures, &c., and called Atlantes by the Greeks in allusion to the mythical Atlas, who was condemned by Jupiter to bear the vault of heaven on his head and hands. The Romans gave them the name of Telamones.

**Atlantides.** See Atlantes.

**Atlas.** The name of a drawing paper whose size is 33 or 34 inches by 26 inches. 2. The singular of Atlantes, which see.

**Atmosphere.** The air, or aeriform fluid envelope, inclosing the earth. 100 cubic inches of dry air weigh 31 grains. Transmission of sound, disintegration of rocks, we owe to it amongst

many things. All its particles repel one another, and are kept together by force external to it. Its height is supposed to be 45 miles. The pressure of the atmosphere is one of its most important qualities. A column of mercury 30 inches in height and one square inch in section protected from atmospheric pressure at one extremity balances a column of the atmosphere of equal section, which must equal in weight that of the mercury or 14·73lbs. called 15lbs. for simplicity. Air is composed of about 4 volumes of nitrogen to 1 volume of oxygen, not chemically but mechanically combined, with minute quantities of carbonic acid which is produced by combustion, respiration, fermentation and putrefaction. The action of plants keeps the quantity, however, pretty uniform. Ammonia, and (especially during the night in towns) acetate and hydro-sulphate of ammonia, nitric acid, sulphuretted hydrogen, ozone, and sulphurous and sulphuric acids are found in traces. Many minute particles of solid matter also float about in the atmosphere. Lastly, watery vapour has to be named as being always present in it, and though of high importance to organic life moisture is the chief agent by which the decay of building materials is effected.

**Atmosphere, Action of.** To give a concise explanation as to how building materials are chemically affected by the atmosphere it may be stated that in England it is supposed to contain in every 10,000 volumes on an average 150 volumes of watery vapour and 4 volumes of carbonic acid. Rain water holds in solution, in the neighbourhood of large towns especially, carbonic acid, nitric acid, nitrate, carbonate, and sulphate of ammonia, organic and carbonaceous matters, traces of fixed inorganic salts, and occasionally sulphurous, sulphuric, hydrochloric, and hydro-sulphuric acids. Hence, with respect to stone, considering that it is often composed of an agglomeration of particles or crystals united together by a cementing material which contains carbonate of lime or magnesia, the sulphurous and sulphuric acids contained in the watery vapour have the power of converting the carbonates into sulphates, which are twenty-two times more soluble in water, and in doing so expose the stone to still further chances of disintegration by causing a looser re-arrangement of its particles. Carbonic acid also can be absorbed by rain-water to the extent of cent. per cent. of volume at the ordinary pressure and temperature of the air, and water so charged is potent to dissolve the carbonates of lime, baryta, strontia, and magnesia under certain favourable circumstances with considerable ease. Nitrates of lime or magnesia, which are extremely soluble salts, are also occasionally formed, to the injury of stone, through the medium of watery vapour or moisture. The important investigation as to the decay of building stones, held by the Parliamentary Committee appointed to inquire into the subject with especial reference to the new Palace at Westminster, brought to the surface much that elucidates the complex action of the atmosphere upon stone. Some varieties of magnesian limestone, though quite appropriate for building purposes where the air is uncontaminated by manufactories, are quite unfitted to withstand the impure atmosphere of large towns. Portland stone, unless well selected, likewise suffers from it. Granites are not easily affected by acids, but dolomites, or magnesian carbonates of lime, limestones, and sandstones having a calcareous cementing substance, are in great danger of being ruined by them unless care is taken in their selection. The only safeguard, in the case of important buildings, is to subject samples to experiment, and then to employ at the selected quarry someone who is a really good judge of stone. The effects of the atmosphere upon other building materials is perhaps owing more to the action of its oxygen and to its hygrometric condition than to other causes. Without moisture iron will not oxidise at common temperatures. Mortar made from rich limes imbibe moisture, and its exposed surface crumbles from frost. In damp situations hydraulic limes or cements should be used. Moisture facilitates the decomposition of wood. Paints owe much of their preserving powers to the absorption of oxygen. The sulphuretted hydrogen of the air, however, turns white lead grey. Metals, on the contrary, become corroded chiefly through the action of oxygen, and should therefore be painted for protection. Glass suffers from atmospheric moisture impregnated either with ammonia or with hydro-sulphuric acid, otherwise called sulphuretted hydrogen.

**Atmospheres.** When the pressure of a fluid is expressed in "atmospheres," an atmosphere means the pressure of a column of mercury 29·9218 inches in height at 32° Fahr., at the mean level of the sea in latitude 45°. In round numbers this is taken to be 15lbs. on each square inch of surface.

**Atmospheric Air.** The same as atmosphere, which see.

**Atmospheric; Atmospherical.** Pertaining to or dependent on the atmosphere.

**Atmospheric Current.** Wind, which is caused by a disturbance of the equilibrium of the atmosphere brought about through the agency of solar heat, &c., which constantly changes the water-holding capacity or hygrometric or vaporous condition of different portions and prevents them remaining at rest. Besides which heat causes the atmosphere to expand or contract in various places, thereby throwing it into motion.

**Atmospheric Electricity.** The electricity which belongs to the air exactly similar to that diffused through every other portion of matter. That part of the atmosphere nearest the earth generally contains a potential of an opposite kind to that on the earth's surface, but different contiguous layers of the atmosphere are often found to be in different electrical states. The electricity, however, exists, when not in a neutral state, either as a negative or positive potential in a free or uncombined condition, and consequently clouds as they move through the air collect and retain it under favourable circumstances, becoming in due time electrified bodies, heavily charged with one kind or the other.

**Atmospheric Gas Burner.** A burner which consumes a mixture of air and gas. The union is effected before burning by means of an air-chamber.

**Atmospheric Hammer.** A ponderous hammer worked by means of compressed air.

**Atmospheric Vapour.** The vapour of water held by the atmosphere. Slow evaporation constantly takes place from the surface of

water at any temperature, however low, and consequently the air is never completely dry, for such vapour is absorbed or dissolved by it. The warmer the air the greater the quantity of vapour it can dissolve.

**Atom.** A word derived from the Greek, signifying that which it is impossible to cut. In physics, it is a term applied to a portion of matter so small that it cannot be further reduced. There can of course be no means by which the size of the ultimate physical atom can be determined, and the only idea that can be readily formed of it is to suppose it to be of the size of a minute particle of matter, gradually dwindling away into non-existence, at the instant immediately preceding total extinction. It is necessary, however, to consider matter to be made up of an aggregation of particles called molecules placed at specific distances apart, and held in equilibrium by attraction and repulsion, which molecules, according to circumstances, may or may not admit of further subdivision into atoms by the action of other forces. Moreover, it is probable that whilst all physical atoms are the same size, and spherical in shape, a chemical molecule may contain several physical atoms and be crystalform.

**Atomic Theory.** The hypothesis of Dr. Dalton, proved to be generally correct, according to which atoms of different substances unite together by the force of chemical affinity to form new compounds. The atomic theory may be said to consist of four laws, which regulate the combination of unlike bodies by *weight*, viz. : (1). Law of Constancy of Composition. Elements of a chemical compound always unite to form it in the same proportions. (2). Law of Equivalents, or of Reciprocal Proportion. If two substances A and B unite in definite proportions by weight with a third C, then A and B will unite together in the same proportion. (3). Law of Multiple Proportion. If A and B are capable of uniting by weight in several proportions, then the different quantities in each compound will bear a simple relation to each other which may be represented by A + B, A. + 3B, A + 5B, or by 2A + 3B, 2A + 5B, 2A + 7B, &c., &c. (4). The Law of Compound Proportion, which may be explained by saying that the combining proportion of a compound substance is the sum of the combining proportions of each member of the compound.

**Atomic Weights.** The proportions by weight in which the different elements chemically combine together referred to one of them taken at an arbitrary value as a starting point. In Great Britain it is usual to select hydrogen for the purpose, and to assume its value to be unity. The following are the atomic weights of the elements that principally compose the materials used in construction. Aluminium 27·4, Calcium 40, Carbon 12, Copper 63·4, Hydrogen 1, Iron 56, Lead 207, Magnesium 24, Nitrogen 14. Oxygen 16, Potassium 39·1, Silicon 28, Sodium 23, Sulphur 32, Tin 118, Zinc 65·2.

**Atracium Marble.** A variegated marble displaying black, blue, green, and white colours obtained from Mount Atrax in Thessaly, and used by the ancients.

**Atramentum.** A Latin word, signifying sepia, writing ink, black paint or any black colouring substance whatever for walls or any other purpose.

**Atrium.** A word having both a distinctive and collective meaning. It was used to designate the entrance hall or court of a Roman house—either covered by an awning or exposed to the sky—into which the chambers that were arranged around it opened, and it was also the name given to an independent building somewhat resembling the open basilica, but having three sides. Subsequently an atrium, consisting of an inclosed court or surrounding area and portico, was built before the principal doors of large primitive churches, which practice, together with the use of the name, was not discontinued until after the eleventh century, when the term was for a time applied to the churchyard and cemetery. See CAVÆDIUM.

**Attacamite.** The same as Atacamite, which see.

**Attached Building.** A building belonging to another and not necessarily connected with it, though usually having one wall at least in common.

**Attached Column.** A column engaged, or one partially inserted in a wall. It is usually attached to the extent of one-fourth part of the diameter, but there is no fixed rule excepting that the part engaged must on no account exceed one-half the column.

**Attachment.** That by which one thing is attached to another, or the method adopted in attaching them together. The term is generally used in reference to the parts of iron structures.

**Attachment of Lightning Conductors.** Insulators are highly dangerous, and should

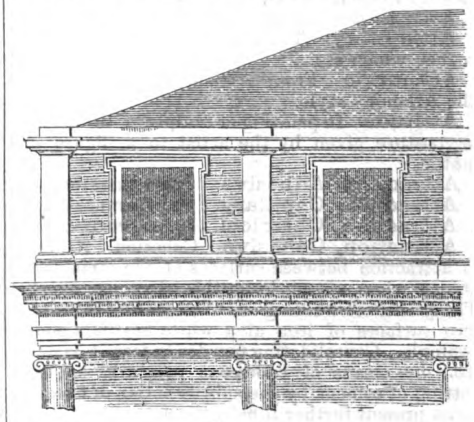


Fig. 23.

therefore be never used. They annihilate the most useful function of the conductor, which should be fixed as closely as possible to the building it protects. For connection with piping, guttering, &c., and with the earth, see LIGHTNING CONDUCTOR.

**Attendance.** See ASSIST.

**Attenuated.** Make thin, slender, or fine.

**Attic.** A kind of stunted order, represented in fig. 23, having antæ or small or dwarf pilasters, and frequently used over an entablature or a main cornice or a regular Order, chiefly in the Roman and Italian styles. It is intended to complete the decoration of the façade, and probably owes its name to some sort of similarity between its appearance and that of certain Greek

buildings. It is called also Attic Order. See ATTIC ROOM ; FALSE ATTIC.

**Attica.** A state of ancient Greece, of which Athens was the capital.

**Attic Base.** A form of base of extreme elegance and simplicity, and consequently of general applicability, consisting of an upper torus, fillet, scotia or trochilus, fillet, and lower torus, either with or without a plinth. It is supposed to have been originally an Athenian simplification of the Ionic base. Vitruvius applied the name of Atticurges to it. The Anglo-Norman base showed in the course of its development a remarkable resemblance to the Attic base.

**Attic Column.** According to Pliny, a square pillar or anta used in the Attic Order.

**Attic Door.** A door-way to which Vitruvius has applied the name of Atticurges, owing probably to some peculiarity not of form but of decoration. In ornamentation it was intermediate between the simplicity of the Doric and the comparative richness of the Ionic door-way.

**Attic Order.** See ATTIC.

**Attic Pillar.** The same as Attic column, which see.

**Attic Room.** A low room in the top story of a house when the ceiling is square with the walls. The whole story, which is often above the principal cornice, is called the attic story or the attics, a term obviously derived from the employment of the Attic Order. A garret is a room at the top of a house either entirely or partially enclosed by the roof, but the distinction is not uniformly observed, especially in the case of Mansard or curb roofs. See ATTIC.

**Attics.** See ATTIC ROOM.

**Attic Story.** The story containing the attic rooms, which see.

**Atticurgic.** From Atticurges, meaning in the Athenian style.

**Attitude.** In painting or sculpture, the action or posture given by the artist to a figure or statue.

**Attraction, Adhesive.** See ADHESION.

**Attraction, Capillary.** See CAPILLARITY.

**Attraction, Chemical.** See AFFINITY.

**Attraction, Cohesive.** Cohesion. A form of attraction between surfaces of the same substance when at an insensible distance apart. The process of welding or of hammering together two surfaces of iron at a white heat is a good example. Consolidating powder to form tesseræ, &c., by means of enormous pressure, or the setting of cement by the subtler action of unseen force present further illustrations.

**Attraction, Electric.** The force which draws oppositely electrified bodies together when at sensible distances apart. It has, however, been thought probable that chemical affinity is merely a modification of electric attraction. Bodies exhibiting potential electricity of one kind repel others similarly electrified, but attract those oppositely electrified. The two kinds of electricity are vitreous or positive, and resinous or negative, but neither can ever be developed without the other.

**Attraction, Magnetic.** The property possessed by a certain kind of ferruginous ore of attracting other bodies to particular points on its surface called poles. These poles are usually termed north and south poles, and it is invariably found that those of the same name repel, whilst those of opposite names attract one another. The north pole of a magnetic needle is another name for its negative point which, if left free to move, always turns to the magnetic north. See AGONIC LINES ; ARTIFICIAL MAGNET ; MAGNETIC NORTH.

**Attraction, Molecular.** The force which keeps the atoms of bodies together. Its potency is influenced by an opposing force called repulsion, and the physical properties of matter, such as hardness or softness, fluidity, porosity, tenacity, elasticity, plasticity, brittleness, &c., depend upon the extent of the superiority of one over the other.

**Attraction of Gravitation.** The force that holds the spheres in their orbits, and which on the surface of the earth gives to bodies the property of gravity, commonly called weight. The laws by which this form of attraction operates are concisely enunciated in Airy's "Gravitation" as follows :—"1. The attraction of one body upon another does not depend upon the mass of the body being attracted, but is the same whatever be the mass of the body attracted if the distances are the same. 2. Attractions are proportional to the mass of the body which attracts if the distances of different attracting bodies be the same. 3. If the same attracting body act upon several bodies at different distances the attractions are inversely proportional to the square of the distances from the attracting body."

**Attributes.** In painting and sculpture, symbols given to figures and statues to indicate their office and character : thus, a club is the attribute of Hercules ; a trident, of Neptune ; a palm, of Victory ; an eagle, of Jupiter ; a peacock, of Juno, &c. In architecture, marks, emblems, or symbols attached to figures for their more immediate identification, or as a matter of appropriateness when placed upon buildings for ornament or to show their destination. For instance, two females bearing respectively an olive branch and a wheat sheaf would have the attributes of peace and plenty, and would consequently answer for the decoration of a market house. In mediæval art, the emblems or symbols employed are otherwise termed attributes.

**Attrition.** The act of wearing by the rubbing together of surfaces.

**Aubigny Stone.** An oolite imported from a place in the neighbourhood of Falaise, in Normandy. It is supposed to be somewhat similar to Caen stone, but more crystalline, and therefore harder and more durable, though it is said to weather badly. Its weight is estimated to be nearly equal to that of granite.

**Auburn.** See ALBURN.

**Auchray.** The name of a quarry near Dundee, Forfarshire, yielding a good purplish grey sandstone, belonging to the old red sandstone formation, and weighing about 159 lbs. per cubic foot.

**Auchterhouse Stone.** A bluish grey sandstone having a weight per cubic foot of 159 lbs. or thereabouts. It is obtained from Lioch quarry near Dundee.

**Auction Room.** A commodious public room, lighted if possible from the ceiling, which should be entirely supported from above, having in close proximity proper accommodation and offices for the staff employed in the business, and strong rooms and store rooms for the safe

custody or inspection of property that may have to remain on the premises.

**Audience.** An assembly of hearers or an auditory.

**Audience Chamber.** Generally speaking, an apartment in a palace where the monarch or the head of a government receives envoys, ambassadors, or ministers. The term may also be applied to the room or hall where any dignitary, potentate, or high official is accustomed to admit others to a hearing.

**Audit-house.** A cathedral adjunct.

**Auditor.** A hearer. One who attends a public gathering for the purpose of hearing something discoursed. Every auditor, if possible, should have his direct ray of sound as well as his own line of vision, and this is obtainable by giving a constantly increasing rise to the seats in a direction away from the speaker, which will vary in amount according to the distance and height of the front auditor with respect to the speaker, who is invariably the highest of the two. When it is necessary, however, to keep the floor of the building occupied by the audience level, the platform on which the speaker or musician stands should not be raised more than between two and three feet, or what is essentially necessary for conspicuousness, as there is usually a tendency to throw the voice or sound upwards. A sounding board or very low ceiling might perhaps render it advisable to increase the distance between the levels of the two floors.

**Auditorium.** A Latin word signifying a place of assembly for hearing lectures, &c. A lecture room, court of justice, school, or auditory. That part of a theatre appropriated to the public. In ancient churches what is now called the nave used to be denominated the auditorium. The word still retains the meaning of being that part of a room or building occupied by the audience.

**Auditory.** An auditorium. Also, formerly, a seat or a bench where a magistrate or judge heard cases.

**Auger.** A two handed tool of the form of a gimlet, used by carpenters and joiners for boring holes required for bolts, rods, pins, &c. There are various kinds, but a good variety, called a screw auger, has a point with screw and cutting lips, and a twist or spiral at the end of the shank or spindle a few inches in length, to allow the chips to escape without withdrawing the tool. A pod auger has a straight channel or groove.

**Auger-bit.** A description of bit having the peculiarities of an auger, and used in a brace.

**Auger, Earth-boring.** See GROUND-AUGER.

**Auger-gauge.** A contrivance attached to the shank of an auger to stop its further penetration.

**Auger-hole.** The hole made by an auger. It need not necessarily be round, as might at first be imagined, for as early as the year 1826 augers were invented to cut square holes.

**Augite.** A variety of pyroxene, which consists of silica and magnesia in combination with the oxides of iron and manganese, and lime. Sometimes one or the other of these bases is absent. It hould be observed that the chemical composition of augite and hornblende are supposed to be almost identical, accidental impurities alone causing divergence in the analyses, and different degrees of cooling accounting for the slight variation in the angles of crystallisation

**Augustan Marble.** A green marble used by the ancients, and obtained from Egypt.

**Augustine, St.** There are at least two saints of this name, which is often spelt without the final *e*. One is sometimes represented as baptising Ethelbert, King of Kent, and another, who is one of the four doctors of the church, is pourtrayed holding a heart.

**Augustinian Canons.** A monastic order of canons regular that followed a mode of life very similar to that of the Benedictines. They had many establishments in England, having been brought to this country during the reign of Henry the First. They were clothed in white, with the exception of a black cope. See AUSTIN FRIARS.

**Augustus, House of.** A building erected in the time of Tiberius, the ruins of which are extant, and interesting as furnishing examples of the kind of bricks in use during that emperor's reign. Specimens show that some at least were thin and triangular in shape.

**Aul.** An obsolete way of spelling awl, which see.

**Aula.** A word used by old ecclesiastical writers for the nave of a church. Amongst the ancients it signified a court before a house, a courtyard, or an inner court of a house, hall, or entrance room.

**Auleolum.** A church or chapel of small dimensions.

**Aulter; Aultere.** The same as altar.

**Aumbry.** See ALMERY.

**Aumery.** Another way of spelling Almery.

**Aureola.** The luminous halo or mantle of light with which painters and sculptors sometimes surround the whole figure of our Saviour. It frequently receives the form of the vesica piscis. It is occasionally written aureole, and differs from nimbus and glory—nimbus applying to the halo when only encompassing the head, and glory signifying a fusion of both aureola and nimbus. See NIMBUS.

**Aureolin.** The name of a very pure and permanent yellow pigment used both in water and oil. It is a nitrate of cobalt.

**Auripentrum.** Varnished leaves of tin-foil covered with saffron, and used as a substitute for gold in wall decoration during the middle ages.

**Auripetrum.** The same as auripentrum, which see.

**Auripigmentum.** The name given by the ancient Romans to yellow orpiment.

**Aurum.** The Latin for gold. The atomic weight of gold is 197, and its specific gravity 19·3, that of water being 1.

**Aurum Musivum.** A bronzing powder, called also Mosaic gold. It is a sulphuret of tin, and is used for plaster casts.

**Austere.** In art, that which is depicted with harsh though truthful rendering, unsoftened by any extrinsic attractions.

**Austin Friars.** The popular name for the religious order of Augustins or Augustinians, who were originally hermits, but congregated into a body by Pope Alexander IV., and soon after introduced into England, where they had 32 houses at the time of their suppression. Their usual dress in public was black, and they were distinct from the Augustinian canons.

**Austin's Artificial Stone.** A material composed of sand, &c., cemented by lime invented between 60 and 70 years ago, and chiefly used in the manufacture of statues, garden ornaments, chimney shafts, &c.

**Australian Mahogany.** See JARRAH.

**Austrian Nails.** Nails manufactured in Austria, some of which are remarkable for a peculiar twist in the shank, which is considered an advantage by some who use them.

**Auter.** Altar.

**Autogeneous.** See AUTOGENIC.

**Autogenic.** Autogeneous, autogenous, or self-generating.

**Autogenous Soldering.** A method of soldering without the use of solder. The edges of the metal are cleaned and placed in contact, and then made to melt and run together by means of coal-gas or hydrogen gas and the blow-pipe. The process is, however, impracticable for repairing the metallic coverings of roofs, owing to the impossibility of getting the edges of cracks properly together, besides which, if it were possible, the tension upon the part mended, arising from contraction, would cause it to tear asunder again near the same place.

**Autographic Art.** That branch of art which treats of the configuration and delineation of ancient hieroglyphics and lettering.

**Autographic Printing.** Impressing copies of writings and drawings from a lithographic stone or zinc plate upon paper, cloth, &c.

**Automatic.** A term applied to machinery, signifying that when put in motion it has the power of regulating to a certain extent its own movements.

**Automatic Cowl, Landau's.** A cheap, durable, and easily fixed cowl for correcting smoky chimneys and ventilating buildings. It is described in the *Building News*, vol. xxx., p. 442.

**Automaton.** A machine which is apparently self-acting, though it actually continues in motion by means of invisible machinery, or concealed men or children. The astounding effects of such devices were known to the ancients, but it is doubtful if they ever perfected such remarkable contrivances as the modern drawing, writing, and speaking automatons.

**Autometer.** An instrument used for measuring amounts of moisture.

**Autotype.** A process of fine art printing by which fac-similes of an original work can be produced.

**Autotypography.** A method by which a drawing made with a certain composition is impressed into a metal plate by passing the two laid together between rollers, from which plate any quantity of copies may be taken. The method was discovered about 15 years since by Mr. George Wallis, after considering the problem —"If the down of a feather can be made to impress itself and print, why may not a drawing?"

**Auxiliary Arch.** A term applied to an arch formed by curved ribs built under lattice, Warren, or similar bridge trusses when they require to be strengthened either through settlement, or from the apprehension of the transit of heavier loads than those for which the structure was designed.

**Auxiliary Circle.** A circle having the axis major of an ellipse as its diameter is called the auxiliary circle. Perpendiculars drawn from the foci of the ellipse on the tangent intersect the tangent in the circumference of the circle.

**Auxiliary Girder.** One of a pair of girders added to a suspension bridge to resist the action of a heavy rolling load. It is held by the suspending rods, and fastened to the piers, with a certain amount of play, as well as hinged at the centre of the span so as to enable it to give when the chain changes figure.

**Auxiliary Rafter.** A rafter placed immediately under a principal rafter or parallel to it when a heavy strain from a wide span is anticipated. It is sometimes called cushion rafter and principal brace, and under special circumstances the term is applied to the raking piece of a queen-post truss.

**Avanturine.** A natural mineral, consisting of common quartz spangled throughout with scales of golden-yellow mica. The artificial imitation, which is considered more beautiful, is a kind of ornamental glass having a brownish colour and containing glittering spots, produced by fusing together glass and fragments of copper and iron. The Venetians are said to have been the first who imitated the natural mineral. It is also written aventurine.

**Avenue.** A straight alley, promenade, road, or walk, usually planted on either side with trees, statuary, or other objects, at regular distances or intervals. Besides being adopted in broad public thoroughfares, it is an embellishment often resorted to by the landscape gardener, and with fine effect when suitable trees, such as the elm, chestnut, poplar, lime, and beech, are appropriately arranged, either singly or in clumps or groups.

**Avenue Type.** Buildings having a longitudinal central axis running from end to end are said to be of an avenue type. The term is used in contradistinction to others built with a dome or central hall, round whose vertical axis all the parts are grouped.

**Average.** See ARITHMETICAL MEAN.

**Averdupois.** See AVOIRDUPOIS.

**Avery.** A place for keeping oats when used as food for horses.

**Aviarium; Aviary.** A bird-house or place for keeping and breeding poultry, peacocks, pigeons, &c. The arrangements will depend upon the habits of the particular birds whose wants have to be provided for, and in most zoological gardens good examples are to be seen.

**Avoirdupois.** The weight used in this country for all substances excepting gold, silver, medicines, and precious stones. The imperial pound avoirdupois is the standard unit for weighing all heavy goods of large masses, and is the weight of one-tenth part of an imperial gallon, or of 27·7274 cubic inches of distilled water when the barometer stands at 30 inches and the thermometer at 62° Fahr., so that if a cubic inch of pure water is defined to weigh about 252·458 grains, then the pound avoirdupois will contain exactly 7,000 grains. The pound is divided into 16 ounces, each containing 437½ grains, and the ounce is further subdivided into 16 drams, each of which weighs 27$\frac{11}{32}$ grains. 112lbs. constitute one hundred-weight (cwt.), and 20 cwts. equal one ton.

**Avolta.** A place covered by a vault.

**Award.** In a case of arbitration the judgment or ruling of the arbitrator, or the document signed and sealed containing it. The decision of an architect in respect to any dispute during the execution of a building carried out

under his superintendence is likewise termed an award.

**Awash.** When the water level of drains, &c., into which field drains discharge themselves is less than three feet below the surface of land, such land is said to be awash, provided the level of the water is not above the surface, in which case the land is said to be flooded. Awash land may also be artificially created by constructing large receptacles for water whose level may not exceed a distance of three feet below its surface.

**Awl.** A pointed tool used for piercing holes. See BRADAWL.

**Awning.** A screen serving as a protection against the glare of the sun as well as against rain. It is usually applied to shop windows, so as to cover the whole width of the pavement, and a common description consists of a roll of canvas, which, when furled, fits into a recess in the entablature, concealed by a bar fastened to the outer edge of the canvas and held in place by jointed extension rods. When the awning is unwound these rods are straightened and, projecting forward over the pavement, keep it securely outstretched. Permanent awnings can, of course, be made of glass, wood, metal, slates, and tiles, whilst cleverly contrived folding ones are of frequent occurrence, composed of thin boarding, canvas, or metallic plates.

**Awry.** Asquint. Twisted towards one side.

**Axal.** See AXIAL.

**Axal Section.** A section taken through the axis of a body. The axal section of a dome is a vertical section through its axis.

**Axe.** A hand tool of various forms, used for felling and chopping timber, breaking ground, cutting stone, dressing bricks, &c. It is made of iron, with a steel edge or point, and has an eye into which the handle is tightly driven and fixed. The edge, when there is one, is always in the same plane at the axis of the handle. In mediæval symbology the axe is the emblem of the holy apostles St. Matthew and St. Matthias. See BRICK-AXE; BROAD-AXE; CAVIL, CHIP-AXE; DOUBLE-BITTED-AXE; FELLING-AXE; HAND-AXE; HATCHET; JEDDING-AXE; KENT-AXE; PICK-AXE; SCOTCH-AXE; SIDE-AXE; SLATE-AXE; STONE-AXE.

**Axe, Battle.** A military weapon of remote antiquity, having one or two edges, and in the earliest instances supposed to have been made of stone. According to some authors it is the symbol of St. Matthias.

**Axed.** Stones are said to be axed when dressed with a stone axe or hammer. A fine-axed face, which is the highest finish possible with such a tool, is produced by an axe or hammer weighing 9lbs., and having two sharp edges. Similarly, bricks are axed when axed down with the brick-axe.

**Axed Arch.** A rough cut arch formed with bricks roughly cut or axed down to a given size by means of a brick-axe, and then set in cement. The soffits alone are rubbed if intended to appear, but the work is only fit to be plastered over or for relieving arches. It is said, however, to often cost as much as gauge-work. Axed work is usually set in Portland cement occasionally mixed with a small quantity of putty.

**Axed Ashlar.** Ashlar wrought by being first scappled or coarsely shaped with a heavy hammer, then boasted and squared with a pick, and finally axed with a broad sharp axe to obliterate the pick marks. See GRANITE.

**Axe-head.** The iron bit which is attached to a helve or handle to complete the tool termed an axe.

**Axe-helve.** The handle of an axe.

**Axella.** The same as assella.

**Axes.** A term used by the ancient Romans for boards or planks. It is said to be also the name for the principal rafters. Among moderns it is the plural of axis. See ASSIS.

**Axe-stone.** A stone or variety of hone used for sharpening axes.

**Axial.** Pertaining to an axis.

**Axial Length.** In a skew arch, the distance between the extremities of a soffit coursing joint after one half turn, measured in a line parallel to the axis of the arch, is called the axial length of a course.

**Axial Section.** See AXAL SECTION.

**Axila; Axilia.** The same as assella.

**Axiom.** A self-evident truth, or an established principle.

**Axis.** Plural axes. In *architecture*, a primary or secondary central line in a design either longitudinal or vertical. In *geometry*, a straight line in a plane figure, about which it revolves to generate a solid. In *mechanics*, a straight line, real or imaginary, passing through a body round which rotation might or does take place. Usually, if a cutting plane moves along it the body is halved. *Axis in peritrochio* is an old term for one of the mechanical powers commonly called the wheel and axle, which see. *Axis of a balance* is the line upon which it moves or turns. *Axis of a couple* is a line perpendicular to the plane of the couple. *Axis of a crystal* is a line passing through its central point, about which the atoms composing it may be conceived to be symmetrically built up. All crystals have three or four such axes, equal or unequal, rectangular or oblique. *Axis of a curve* is a line lying in the same plane and dividing it into two symmetrical parts. *Axis major* of an ellipse is the diameter drawn through the foci, and the *axis minor* or *conjugate axis* is the ordinate through the centre. *Axis major* of a hyperbola is likewise the diameter which, when produced, passes through the foci, and the *axis minor* is perpendicular to it and passes through the centre. *Axis of a geometrical solid* is a straight line which passes through the centre of all parallel corresponding sections. *Axis of a hinge* is that of the pin running through its knuckle. *Axis of a lens* is a right line passing through it and perpendicular to both surfaces. *Axis of a pencil of rays* is the axis of the cylinder or cone which is formed by the collection of rays or right lines constituting the pencil. *Axis of a pillar* is the same as that of a geometrical solid. A pillar should always be so fixed that the line of pressure may pass down the axis. *Axis of a rib* is a line passing through the centres of gravity of all its cross sections. *Axis of a road* is an imaginary line running longitudinally along the middle of it. *Axis of a telescope* is a right line passing through the centres of all the lenses in the tube. *Axis of a twisted column* is the spiral axis formed by the axis of the same supposed to be untwisted and then drawn spirally in order to trace its circumvolutions. *Axis of a vault* is that axis of the regular solid, with respect to which the vaulting surface has been described. In the Roman system of vaulting this surface is always kept level in a direction parallel to the axis of the

vault. *Axis of oscillation* is a line parallel to the horizon passing through the centre, about which a body vibrates, and perpendicular to the plane in which it oscillates. *Axis of rotation* is the line about which a body revolves. A principal axis of rotation is an axis upon which rotation produces no pressure, and every rigid body has three such axes perpendicular to each other. *Axis of stress* is the rectangular direction in which a direct tensile or compressive force acts upon a given point. *Axis of symmetry* is a right line formed by the intersection of two planes, each of which symmetrically divides any homogeneous body. *Axis of the earth* is its polar axis, round which it revolves from west to east, and which measures about five hundred and a half million inches, or a little more than 7,899 miles. The mean equatorial axis or diameter is about 26½ miles longer. *Axis of the eye* is a right line passing through the centres of the pupil and crystalline lens. It is sometimes called the optic or the visual axis. *Axis of the Ionic capital* is a line passing either horizontally or vertically through the centre of the eye of the volute.

**Axle.** A bar, or rod, or shaft, on which a drum, pulley, or wheel is placed either loosely or firmly to revolve either without or with it.

**Axle Pulley.** A description of pulley of several qualities and sizes for hanging sashes and shutters, having a brass or iron axle on which the wheel or sheave is mounted. One variety is shown at A, Fig. 24. The axle revolves with the wheel in iron or brass-bushed holes in the side plates. The axle pulley keeps in order for a longer period, runs more easily, and is altogether a better article than the commoner description of pulley called *frame pulley*, which is represented at B in the same figure. The engraving is derived from Messrs. F. W. Reynolds & Co's illustrated catalogue of builders' ironmongery and general hardware.

**Aycliff Stone.** A grey magnesian limestone, weighing about 166lbs. per foot cube, and drawn from Aycliff quarry, Durham.

**Aymellum.** A late Latin word, equivalent to the English term amel or enamel, and to the Italian word smalto.

**Ayr-stone.** A description of slaty stone used as a hone or whetstone, and for polishing marbles and metals. It is also called Scotch stone, snake stone, and "water of Ayr."

**Azimuth.** The angle measured along the horizon, and in a direction towards the right contained between the plane of the meridian and that of a great circle passing through the zenith and a point on the horizon, is called the azimuth of that point. By magnetic azimuth is meant a similar angle measured in the same way from the magnetic meridian. Also any great circle passing through the zenith, and therefore vertical, is sometimes called an azimuth. See GREAT CIRCLE.

**Azimuthal Arc.** An arc of the horizon. A weathercock moving round its vertical spindle in answer to the changing breeze describes an azimuthal arc.

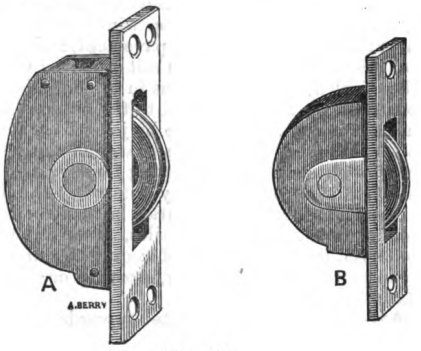



Fig. 24.

**Azimuth Compass.** A compass similar to the mariner's compass, excepting that it is divided into degrees instead of into *points*.

**Azoic.** Wholly without organic life.

**Azote.** The name given by French chemists to nitrogen.

**Azure.** A blue pigment, sometimes prepared from a carbonate of copper, but many blues of various composition having been called by this name little can be said about it, except that its tint is a celestial or cerulean blue. Ultramarine, the most exquisite and permanent blue obtainable, which is made from lapis lazuli, a combination of a silicate and sulphate of alumina, and cobalt—a pigment composed of alumina and phosphate of cobalt, or else prepared from metallic cobalt or its oxide—are both often called azure. In heraldry, the word signifies blue, and in engraved coats of arms it is indicated by horizontal lines. See ULTRAMARINE.

# B

**B.** A letter distinguishing a drawing pencil soft and black for shading. In the dimension book it is used as an abbreviation for "beaded." It is likewise a brand often met with on iron after the maker's mark or device signifying best quality. Superior sorts are branded B B and B B B, meaning best best and treble best. B iron is, however, considered sufficiently good for iron structures in general.

**Babel, Tower of.** In connection with the remarks on Babylonian architecture the following is of interest. The Birs Nimrud (Temple of Belus or Baal), a mass situated about six miles to the south-west of the modern town of Hillah in Babylonia, is considered by some explorers to be the site on which stood the tower of Babel. The ruins, which rise to more than 200 feet in height, stand on an immense mound, strewed with vitrified and blackened masses of dislocated and strongly cemented brickwork and of stonework from the wrecks of Babylonish temples, subsequently built on the same spot, and which were supposed to be the means of preserving the ruins of the tower. The bricks are inscribed and fireburnt, and are laid in layers with extremely thin joints of tenacious mortar, but though the appearance of the chaotic mass accords well with the consequences of an awful visitation, there is little else than conjecture to establish the identity of the ruins.

**Babicombe Marble.** A variety of Devonshire marble. See MADREPORE MARBLES.

**Babylonian Architecture.** This may be said to be the name for the style of architecture that prevailed in the city of Babylon during the height of its proud splendour and magnificence. Scarcely anything is known about it save the magnitude of the works recorded by ancient writers. There was much in common amongst the Assyrians, Babylonians, and Persians as regards sculpture, architecture, and ornamentation, so that an acquaintance with the Assyrian and Persian styles will go far to give a fair idea of what was the probable luxurious and gorgeous condition of the chief city of the old world. In sculptured or painted decoration the king was almost always the chief and most prominent figure, his acts forming the subjects which the artists delighted to exhibit. The walls of Babylon were 200 cubits high, 50 cubits thick, and in the form of a perfect square, each side of which was 15 English miles in length. Outside the walls was a trench from which the earth was obtained for making the bricks required for their erection, and the trench itself was lined with the same bricks, all of which were fire-burnt and cemented together with reeds and bitumen. The walls had watch towers, and were perforated with 100 gateways, fitted with gates of brass. The Euphrates flowed through the middle of the city, dividing it with its broad stream into two halves, and was spanned by a magnificent covered-in bridge. In the centre of the eastern half—according to some authorities—stood the temple of Belus (see Babel, Tower of), and in that of the other the royal palace, surrounded by circular walls decorated with figures of animals painted in their natural colours by means of pigments that were afterwards burnt in. Streets lined with houses of three or four stories crossed one another at right angles at regular intervals. Such is a brief description of the great city whose utter destruction proved man's best effort to build for perpetuity to be both vain and futile.

**Babylonian Cement.** Supposed to be either moistened clay, or common earth, or bitumen.

**Bacca; Baccha.** An old term for a watch tower, pharos, lighthouse, or beacon.

**Bacchante.** A priest, or priestess of Bacchus, or one who took part in a Bacchanalian festival. Half frenzied and half ecstatic Bacchantes are often represented in antiques sometimes with remarkably fine heads and usually with laughing faces.

**Bace.** The mediæval term for the pedestal of a statue situated in a niche.

**Bachelors' Bedrooms.** Those apartments in a mansion or palace appropriated to young gentlemen who are visitors, or to the sons of the head of the establishment. Where possible they should answer for sitting rooms as well as bedrooms, and be reached by other stairs than the principal ones.

**Bachelors' Stairs.** A staircase in a mansion leading to the bachelors' rooms.

**Bacillum; Bacillus.** A walking stick. The diminutive of baculus, which see.

**Back.** The part opposed to the front. In building it is a word very generally made use of to signify the rear and upper parts of objects, and also what gives support. Besides being opposed to front, it often means the surface or the side contrary and opposite to any edge, face, bed, or breast. In Lancashire, and some other parts of the country, a principal rafter is called a back. Back is likewise, in the manufacture of Portland cement, a name given to a large tank in which the clay and limestone are left to settle previous to drying. In brickmaking also, in the process of *washing*, the mixture of clay and water is collected in a large shallow vessel called a back. *Back of a chimney* is the wall bounding it opposite the chimney opening and chimney breast. *Back of a grate* is the part opposite the bars and between the cheeks. *Back of a handrail* is its upper side. *Back of a hip rafter* is its bevelled upper surfaces, ranging with the two adjacent sloping surfaces of the roof. See BACKING. *Back of an arch* is its extrados. *Back of a rafter* is its upper side in the sloping plane of the roof. *Back of a register stove* is the plate between the covings. *Back of a rib* is the surface against which the sheeting or covering is secured. *Back of a saw* is its unnotched upper edge. When stiffened with a strip of metal such strip is termed the back. *Back of a shop lamp* is the metal piece securely fixed to the architrave over a shop window to which the outside supply pipe is attached when in use. The pipe supports the lamp before the window and feeds it with gas. *Back of a slate* is its upper surface or

side. *Back of a square of glass* is the side opposite to that which receives the light. *Back of a stone* is the surface opposite to its face. It is usually left rough or as it comes from the sawyer, and either squared if it is used for facing purposes or inclined forwards toward the top bed to afford a lap. *Back of a timber* is its upper side or edge when fixed horizontally or in an inclined position. *Back of a wall* is its inner face or the surface opposed to its outer face or face proper. *Back of a window* is the window-back or breast lining, that is, the wooden framing between the lower extremity of the sash-frame and the floor, and usually uniting with a similar piece on either side called an elbow. In "measuring," its visible length must be increased by twice the thickness of the frame for the two passings.

**Back and Sides.** The same as back and elbows. Sometimes the skirting round the flap and frame or seat of a w.c. is so called. See BACK OF A WINDOW.

**Back Arch.** The English name for arrière voussure, which see.

**Back Basket.** A basket carried in olden times over the shoulder for transporting materials used in building. It was also called buck basket.

**Back Bone.** In a case spray bath, the main central tube into which are soldered the smaller tubes or ribs that branch out on either side.

**Back Boxing.** In a cased sash frame, the same as back lining, which see.

**Back, Bracket.** See BRACKET-BACK.

**Back Building.** An addition to a main building at its rear, often partly enclosed by returning the back wall.

**Back Check Lifter.** In bath fittings, a Scotch term for a sort of pull-out rod and knob connected with the valve of a supply pipe by means of a chain, for the purpose of lifting it when required. It is otherwise known as a *horizontal pull.*

**Back Choir.** A choir in rear of a high altar.

**Back Cutting.** Earth used for canal banks, &c., other than that obtained from the corresponding part of the cutting.

**Back Day.** The wages due to a workman when he quits his employment. When workmen are paid weekly, their wages are usually kept one day in arrear to admit of the time sheets being properly made up and signed by the foreman, and such day is called a back day.

**Back Door.** A door in the back part of a house. 2. A private or indirect entrance.

**Back Drain.** A drain behind a river embankment, serving to drain the land protected by it, and to receive the drainage during the flooding of the river.

**Back Drainage.** Draining a house through the back in opposition to allowing the house drain to pass under the house into the sewer in front of it. This latter and prevalent system has been repeatedly denounced by sanitarians, and is considered to be a great and reckless evil.

**Backed.** Provided with backings.

**Back Elvation.** A geometrical projection of the back of a building, drawn on a plane perpendicular to the horizon.

**Backer.** A narrow slate put on the back of a broad square-headed slate when the slates begin to get narrow. It is not required in ordinary slating as now generally practised with slates of equal thickness carefully squared to size.

**Back Fillet.** The return projection to a projecting quoin, door or window architrave, dressing, &c.

**Back Filling.** The hearting of a wall, or the stone which forms the interior of it, between the facing and backing.

**Back Flap.** A leaf of a window shutter hinged to it, and which folds back into the boxing, being unseen when the shutters are open, and consequently in inferior work it is not moulded and often not framed.

**Back Flaps.** Hinges used for uniting one back flap to another, or to the shutter. See HINGING.

**Back Fold.** The same as back flap, which see.

**Back Fold Hinges.** Another name for back flap hinges, or back flaps.

**Back Front.** The back of a building as opposed to its fore front.

**Background.** Ground in the rear of a building and belonging to it. 2. Amongst artists, the space behind the middle distance, and which is usually occupied in architectural pictures by objects represented as being situated to the rear of the fabric.

**Back Hearth.** The covering to the space under a fire-grate and between the jambs of the chimney breast.

**Back House.** A building behind the principal block or main part of a house. See BACK BUILDING.

**Backing.** The operation of making or preparing a back, or the materials constituting it. Teak forms a good backing to iron structures on account of the oil peculiar to it, which is a preservative against rust. *Backing of an arch or vault* is the filling in over the haunches. The strength and stability of an arch greatly depend upon the solidity and quality of the backing as well as upon the height to which it is carried. *Backing of a rafter* is the formation of its back, so as to make it range with others in the same slope. *Backing of a curved rib* is the same operation performed on a rib. *Backing of a rib, in cradling*, is the formation of its inner edge for lathing and plastering. *Backing of a wall* is the stone which forms its back, and very often it includes all the masonry of the wall excepting the facing. It is the cheap inside part of a wall adopted, because of the cost that would be entailed by having ashlar throughout, and it is executed either in brickwork or in coursed or uncoursed rubble masonry. When the facing, however, is understood to include the materials which form both the inner and outer faces, then the backing signifies the remaining materials, constituting the interior mass or hearting. *Backing of the hip* is the angle of inclination, at the back of the hip rafter, of two adjoining planes of the roof. Consequently, the two surfaces forming the back of a hip rafter are respectively in the same planes as the backs of the rafters in the adjoining side and end of the roof. This angle is also called the back of a hip rafter.

**Backing Line.** In some methods of handrailing a line drawn on the face-mould parallel to that on a diagram which represents the pitch of the plank. At the centre of the backing line a mark is placed, opposite to which on the edge

of the plank another line is drawn showing its bevel or pitch. Other lines, similar to the first, are also traced on both sides of the plank exactly opposite to each other, and keeping the backing line on the mould exactly over them, the mould is traced off first on one side and then on the other, with this differenee, viz., that the central mark is kept in a line with the top extremity of the bevel line on the upper side of the plank, but against the bottom extremity on its underside. This operation is called backing the mould, and is necessary for scribing the plank preparatory to wreathing.

**Backings.** Slips of wood fastened to rough walls for the purpose of fixing dados, linings, &c.

**Backing the Mould.** The operation described under backing line to make provision for the twisting round of the surface of the rail.

**Backing Up.** Placing materials against an object by building up masonry, or filling in earth, in order to impart more stability and solidity.

**Back Joint.** A mason's term for a close joint at the back edge of stonework, as, for instance, at the junction of stone steps either with or without a rebate, or at the inner surface of chimney-piece jambs when jointed to return pieces, or at the meeting seam of a stone step with a boarded floor, &c. The back joint of an archstone is that joint which is above and opposite its soffit. In measuring, a running dimension is usually taken for the back joint. See BACK REBATE.

**Back Knee.** In gasfitting, an elbow screwed to barrel to carry a gas bracket.

**Back Lash.** In machinery, a striking back or reaction of parts when motive power is withdrawn or a change of motion occurs, arising from defective fitting, &c.

**Back Lining.** Generally, a wooden covering to the outside or inside of the back or remotest verge of anything. *Back lining of a boxing* is the covering to the wall at the back of the recess or boxing for the back flaps. *Back lining of a cased sash frame* is the side of the case opposite to the pulley stile. *Back lining of a window* is another name for the window-back, or back of a window, which see.

**Back Nails.** A description of nails having flat shanks, so as to adhere firmly without forcing apart the fibres of the wood. They are used for wooden guttering and for vessels intended to hold water, &c.

**Back Nut.** A nut screwed on a pipe or rod to bear against a plate or washer so as to enable the pipe, when passed through a hole, to be screwed up from the opposite side with another nut. See BACK PLATE

**Back Painting.** Fixing a mezzotinto engraving on a sheet or other piece of glass and staining it with varnish colours.

**Back Parlour.** In small houses, a room at the back, usually occupied by the family, and answering for a dining-room.

**Back Pieces.** In an arch centre, the pieces of board or plank, which are nailed together in two or more thicknesses so as to break joint, and which are cut to the curve of the intrados of the arch to form the ribs of the centre. 2. The back-piece of a gas bracket is otherwise termed the bracket-back.

**Back Plate.** A large washer, often used in plumber's or gasfitter's work in conjunction with a back nut.

**Back Putty.** The putty first laid in on the rebate, and upon which a square of glass is bedded. The front putty completes the stopping, and is run along the edge of the rebate on the other side of the glass, and when the sash is in position, is usually outside and exposed to the weather, excepting in the case of shop windows, which are glazed from the inside for the sake of security.

**Back Rail.** In a church or school bench, &c., that rail which gives support to the back. It should be so arranged as to give a slightly sloping back to the seat, and must, on no account, project beyond the face of the bench back.

**Back Rebate.** That part of the joggle sunk in a stone step to receive the sally of the step next below. Also corresponding sinkings elsewhere, such as a rebate sunk round the outer edge of a stone door or window architrave to hide the perpendicular joint between it and the pier. See BACK JOINT.

**Back Room.** A room behind a front room, and having no other apartment between it and the back of the building.

**Backs.** In some parts of the country a term given to the principal rafters of a roof. It is supposed to be a corruption of balks. See BLADE.

**Back Saw.** A saw having a thick piece of metal called the back, fixed to its plate on the edge opposite the teeth to stiffen it and prevent it from buckling.

**Back Shutter.** The same as back flap, which see.

**Back Side.** The back part of anything or that part farthest from the spectator. 2. The yard behind a house.

**Back Sight.** In levelling, the reading of the staff at a station that has been passed or whose level is known. The back-sight is always taken before the fore-sight, and when the fore-sight or sum of the fore-sights exceeds the back-sight or sum of the back-sights, there is a fall from the first point to the last, and *vice versa*.

**Back Stair.** A staircase running from the basement to the top of a house, and intended, in large establishments, to relieve the principal stairs of as much traffic as possible, especially in regard to nursery requirements and the passage up and down of domestics. Back staircase and back stairs are synonymous terms.

**Back Station.** In levelling, the station at which the staff is first read off. When a series of simple levels is taken, the fore station at any operation becomes the back station at the next.

**Back String.** A name sometimes given to the wall string of a stair.

**Back Water.** Water which sets back in a stream owing to some obstruction, such as a weir, below.

**Back Yard.** The yard behind a building.

**Bacon Larder.** In a country house, an addition sometimes made to the salting room, consisting of a separate compartment fitted with strongly fixed hooks and shelves.

**Bacon Rack.** A kind of frame suspended from the ceiling of a meat larder for storing bacon on.

**Bacon Store.** In a superior country house, a separate office in which a stock of bacon is kept.

**Baculometry.** The art of measuring dis-

tances by means of rods, which were called by the ancient Romans baculi.

**Baculus.** The Latin term for a rod, staff, stick, or sceptre. In ancient works of art it is commonly borne by various descriptions of personages.

**Bad.** Faulty and defective. Bad building may be said to consist either of absurdity or confusion of style, bad materials, unsound construction, want of compactness and solidity in walls, and wet and unwholesome basements. These evils are brought about either by the influence of corrupt example, unskilful wording of building laws, or by false economy. As to bad materials, unburnt bricks, and inferior timber are sometimes worked in until their character is discovered, whilst bad mortar has been the cause of many accidents owing to road-scrapings, refuse or earth, mud and horse-dung, entering into its composition in lieu of clean sand. Bad lime is the same as fat lime, so far as regards mortar, which, when made with it, is always weak either wet or dry. It may be improved by the addition of cement, with proper precautions. (See BILLY). Bad cement has been found to consist of ground lime and slag dust. Bad iron, when fractured, is never fibrous, even when rupture takes place slowly. Turpentine, as used by painters, is often bad through being mixed with mineral oil, when it may be distinguished by a disagreeable smell. Skilfulness and faithfulness on the part of architect and contractor are the chief remedies against such abuses. See ADULTERATION; FRAUD; TEST.

**Badge.** A mark used in heraldry for the purposes of distinguishment. The varions badges used by the monarchs of England aud noble houses are, to a certain extent, indications of date when found on mediæval edifices. It is otherwise called *cognizance*.

**Badger.** A tool or brush, flat or round, used by painters and gilders, and bound or set in such a way that the hairs spread outward or away from its centre. Fig. 25 represents a gilder's round badger*. In painting and decoration, a



Fig. 25.

similar kind of brush is termed a "softener" or "sweetener," aud is used to sweep over freshly laid colours in order to blend them together. See BLENDING.

**Badger Plane.** A plane used for working up close to a corner in rebating or sinking.

**Badigeon.** A mixture to stop holes to hide flaws in wood or stone-work. Masons and statuaries use a mixture of mortar or plaster and freestone well mixed and ground together, and joiners a composition of sawdust, whiting, and glue, or putty and chalk coloured if necessary to match the defective work.

* The illustration is taken from a useful work entitled "*The Paper Hanger, Painter, Grainer, &c.*," published by Kent and Co.

**Bad Knot.** See DEAD KNOT.

**Bag.** A pipe is said to bag, or to be baggy, when it sinks down out of a straight run. Water sometimes lodges in a gas-pipe when baggy, thereby causing jumping lights.

**Bag.** A conventional measure of no fixed capacity. A bag of cement generally contains about 2 bushels of 100lbs. each, a bag of lime about 1 bushel, and a bag of plaster of Paris about one-eighth part of a bushel. See BUSHEL.

**Bag and Spoon.** A contrivance consisting of an iron ring attached to a leather bag perforated with holes, and which is sunk by means of a long pole or handle from a barge for the purpose of dredging for sand.

**Baggy.** See BAG.

**Bagnio.** An Italian term for a bath.

**Bag Pump.** A variety of pump having instead of the ordinary bucket an elastic bag distended by rings. One end of the bag is attached to a plate worked by the pump handle, and the other end is secured to the base of the pump barrel.

**Baguette.** A small astragal moulding, sometimes ornamented by carving. When enriched with ribands, laurels, &c., it is termed a chaplet, and when plain a bead. The term is derived from a French word primarily signifying a small stick, and has been adopted in this country.

**Bahama Mahogany.** A hard close-grained mahogany of a fine rich colour found in islands of the Bahama group. It is said to be equal in quality to Spanish mahogany, but less easy to work.

**Bailey.** A court or ward of a castle between its keep and the walls constituting the defences. In some instances the name has been retained when all trace of the castle has disappeared.

**Bainco Secco.** A composition used in fresco painting, consisting of slaked lime, powdered marble, and water.

**Bain-Marie.** A shallow vessel about 2½ feet by 2 feet, containing hot water, in which saucepans are placed to warm their contents. It is a kitchen fitting usually heated by steam or water from the kitchen boiler.

**Baize.** A coarse woollen stuff with a long nap.

**Baize Door.** An inner door covered with baize, and usually panelled, either on one or both sides, with burnished brass beading or gilt headed nails.

**Baked.** Dried and hardened by heat.

**Baked Bricks.** Bricks burnt in close kilns, and those made from refractory clay, or from pure clay without any flux to fuse and unite the particles. Burnt bricks are those burnt in clamps and made from fusible earth mixed with soil.

**Bakehouse.** A building for baking.

**Baker's Oven.** A chamber arched or domed over, situated in a bakehouse for baking in. A two-sacks oven requires an internal clear space of from 100 to 200 superficial feet, and should be from 2 to 2½ feet high to crown of arch. If it is to be heated with coals, a distinct flue, with proper damper and frame for the smoke, steam, and draught, respectively, is sometimes provided, but there are different ideas as to how ovens should be constructed and arranged.

**Bakery.** An apartment for baking purposes. It is an almost indispensable appendage to a country mansion, and should be fitted with a

dresser, kneading trough, flour chest, and brick or iron oven. The former is by far the best.

**Bakewell Quarry.** A quarry in Derbyshire from which brown or dark-coloured marble is obtained.

**Balahulish Slates.** A variety of slates drawn from quarries in the north of Scotland, but of no particular excellence.

**Balance.** Equipoise or equilibrium. See BALANCED. 2. An apparatus for weighing bodies consisting of a peculiar application of the lever.

**Balance Bar.** A long beam attached to the gate of a lock and bolted to the meeting or mitre post. It rests on the heel post, which is tenoned into it, and whilst affording a means of opening and closing the gate, its overhanging portion acts as a partial counterbalance to the downward strain.

**Balance Beam.** The same as balance bar, which see.

**Balance Bridge.** A bridge which turns on a horizontal axis, having a portion of roadway that acts as a counterpoise to the part projecting beyond the pier, so that when the bridge is lifted to allow objects to pass, the inner portion descends into a well or cavity. See BASCULE BRIDGE.

**Balance Crane.** A crane having a centre column and two opposite trussed arms so arranged as to admit of any weight that might be raised on one arm being counter-balanced by a constant and movable weight on the other arm.

**Balanced.** The external forces which act upon a structure or any part of it, and the internal forces or resistances which they bring into activity are balanced when no injury occurs to the structure through the action of the external or straining forces. Unless the straining forces are balanced the structure will be urged to rack. 2. A work of art is said to be balanced when no part obtrudes itself upon the eye beyond what its province or importance warrants.

**Balanced Sash.** A lifting or suspended sash provided with balance weights. It is that which in duplicate, together with the boxed or cased frame, forms the ordinary double hung sash window. In some rare instances the sashes are made to counterbalance each other.

**Balanced Steps.** Winders whose nosings do not converge on plan, but which have the shape of their treads modified to avoid too much narrowness at the handrail end, and to give the handrail above them a more graceful bend. They are sometimes called dancing steps. Both descriptions of winders will be readily recognised on opposite sides of the well-hole in Fig. 26. See DANCE.

**Balance Gates.** Flood gates which turn on vertical shafts situated about midway in their width as centres. They consequently open whichever way the water presses, and can be made self-closing or self-opening according to the position of the centres.

**Balance, Hydrostatic.** A balance arranged for weighing bodies in water to find their specific gravity. Archimedes discovered that when a body was immersed in water it lost a portion of its weight equal to that of the fluid displaced. It follows, therefore, that if bodies are weighed in air and then in water their absolute mass and volume become known, whence it is easy to calculate their relative density, which being referred to a common standard determines their specific gravity.

**Balance Level.** An instrument which balances itself when suspended by the hand so that a level may be taken by looking along sights fixed at its extremities.

**Balance of Account, Final.** This term explains itself. Too large a sum should not be retained, but it is advisable to keep in hand a small balance for a considerable period—both being dependent on the magnitude of the works—in accordance with a stipulation to that effect, for the purpose of making good defects which may ultimately appear; though where gross neglect in carrying out the works can be proved, it has been decided in a trial for disputed balance of contract that no certificate would exonerate in such a case. See AGREEMENT; ARCHITECT'S CERTIFICATE.

**Balance Pump.** A pair of pumps worked reciprocally by a man standing on a horizontal beam pivoted on its centre, who forces each end alternately downwards. The beam may also be oscillated from below by means of a long handle fixed near the pivot.

**Balance Weights.** Another name for sash weights, which see.

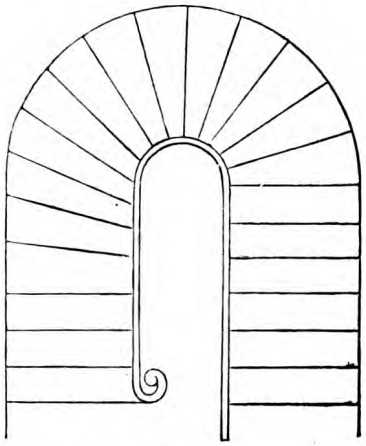


Fig. 26.

**Balancing.** In laying down gradients, the process by which embankments are apportioned to cuttings. A silk thread is stretched along the section from the spot where the road commences to such a point on the ground as will leave apparently equal amounts of space above and below the thread. The process has to be repeated from spot to spot until the gradients are found which give a minimum of cuttings throughout the whole length without preventing the observance of other indispensable conditions.

**Balaneion.** A Greek word signifying a bath, and equivalent to the Latin word balneum.

**Balcon.** A circular row of seats above the pit in a French theatre, and projecting beyond the tier of boxes next to it.

**Balconet.** An architectural decoration to a door or window sill, generally consisting of ornamental rails and fretwork. In painter's work it is measured at per yard super.

**Balconied.** Provided with balconies.

**Balcony.** A projection usually placed outside a building before windows and openings, and supported either by columns, consoles, brackets, or cantilevers and surrounded by a balustrade or an iron railing, which, if of tasteful design, may be rendered additionally imposing by being gilt. A balcony always forms a very agreeable addition to an upstairs boudoir when fixed sufficiently firmly to prevent accident. In all cases a balcony should be capable of supporting any number of people that could possibly crowd upon it, and its projection should not be such as to interfere with the light of any window below.

**Balcony Panel.** A name sometimes given to cast iron balustrades for balconies.

**Balcony Railing.** Iron railing surrounding balconies, often consisting of cast panels and angle standards and wrought rails and stays.

**Bald.** Unadorned, Inelegant. A sloping roof covered with lead has been well described as being not only unnecessary, but bald both in form and colour. See LEAD.

**Baldachin; Baldachino.** An Italian word applied to an open piece of work or building, either supported by columns or suspended from the roof, and very similar to a canopy, ciborium, dais, tabernacle, or tester. It was invented in the 17th century, and its usual place was over a tomb or altar, superseding in some cases the ciborium. The name was also given to a rich embroidered cloth used for copes and to a portable canopy employed for processional purposes. A shell over the front of a house was likewise occasionally designated by the same word. It is sometimes written Baldequin. See BAUDEKYN.

**Baldness.** In an architectural sense, meanness, inelegance.

**Balection Moulding.** See BOLECTION MOULDING.

**Baleine.** A movable stage or scaffold raised from the ground, consisting of trussed beams, supported by an embankment and trestles, along which wagons run and tip up their contents between the beams to continue the embankment. It is employed in France.

**Bale Tacks.** Strips of sheet lead hooked at short distances apart to the heads of slates or fastened to the boarding, and bent over to clip the edge of sheet lead when its position exposes it to the danger of being blown up by the wind getting underneath. Bale tacks also go by the name of latchets or tingles.

**Balineum.** The Latin for a bath, private bath, or place in which persons bathed.

**Baling Out.** Throwing out, and usually by means of buckets or shallow vessels. Water which finds its way into trenches, excavations, and cellars is usually baled out if it cannot be removed in other ways.

**Balise ; Balize.** A beacon, or sea-mark, or land-mark, consisting of a pole or timber frame.

**Balista.** An old term for the cross-staff, which see.

**Balistaria.** See LOOP-HOLE.

**Balk.** A Dutch word used to signify the trunk of a small fir tree, rarely exceeding 25 feet in length or 12 inches square, left rough squared and tapering. It is called also a Dram timber. Generally the term is understood to mean a log of timber roughly squared, which is the common form in which the northern pine is imported from the Baltic ports, but formerly it signified a large beam or rafter of a roof, especially one over a barn or out-house. 2. In engineering, a ridge or bank between two excavations. 3. A margin along arable land left untilled, as, for instance, a bier-balk. Baulk, bauk, and bawk, are other ways of spelling the same word.

**Balk Roofing.** Roofing constructed with balks.

**Balk Stone.** A term given in some districts to limestone.

**Balk Timber.** See BALK.

**Ball.** A spherical body or substance. It is used as an architectural ornament (See BALLOON; PEARL MOULDING), and also very generally in fittings connected with water supply (See BALL COCK ; BALL LEVER ; and BALL VALVE). It is also sometimes used to terminate a lightning rod attached to a building, in which case it helps to confine the free electricity of the building, which it also protects by causing the rod to form part of the line of discharge ; but, on the other hand, were the rod terminated by a fine point in lieu of a ball, it would probably allow the electricity to escape, and thereby prevent any discharge at all. Whiting is sometimes sold in balls.

**Ball and Socket Joint.** A joint formed by a ball inclosed inside and fitting a socket, consisting of about three-fourths of a hollow sphere, the absent portion of which affords space for the tube or rod, attached to the ball, to move freely about in any lateral direction. The socket is made in two pieces, which are screwed together, and have their plane of junction through the centres of the spheres, so that the ball is easily inserted or removed when requiring oiling. When the joint is made for gas or water, the ball is also hollow, and bereft of a portion of its perimeter exactly opposite to the corresponding hole in the socket. In this instance, however, a second hole is required, both in the ball and socket opposite those already described for the passage of the fluid past the joint. It is called also ball-joint, and, incorrectly, universal joint. See UNIVERSAL JOINT.

**Ballast.** A name given to broken stones or dry gravel used for the foundation of roads and for making concrete. The term originated in the use of gravel ballast emptied from ships in the Tyne for road-making in the neighbourhood of Newcastle. Thames ballast is gravel procured from the bed of the river of that name.

**Ballasting.** The broken stone or gravel forming road metal, or the firm and compact covering to the foundation of a road. It is also called metalling. See BOTTOMING.

**Ball Caster.** A caster for furniture provided with a ball of ivory, glass, &c., working freely in a socket, instead of the ordinary wheel or roller revolving round an axis.

**Ball Catch.** Hale's patent mortise catch.

**Ball Cock.** A cock which opens or closes in conformity with the movements of a hollow air-tight metal ball, which is connected with its plug by means of a light rod, and floats on the surface of water in cisterns, &c. The ball cock is adjusted in such a way as to be self-acting, and shuts off the supply without allowing the cistern to become quite full. It is otherwise called ball tap, ball valve, float ball cock, &c.

**Ball Crane.** Another term for ball cock, which see.

**Ball Flower.** An ornament characteristic of the Decorated style, resembling a ball inside a circular opening flower, whose three partially closed petals seemingly prevent its escape. It is generally found inserted at equal intervals apart in hollow mouldings. A similar flower with four petals occurs in late Norman work, but not with the same equal spaced repetition.

**Ball-headed Screw.** A wood screw furnished with an ornamental ball-shaped head.

**Ballingdon Bricks.** Good facing bricks manufactured near Sudbury, Suffolk.

**Ballister.** More correctly baluster, which see.

**Ballium.** An old name for Bailey.

**Ball Joint.** The same as ball and socket joint.

**Ball Lever.** A lever which turns on a fulcrum near its centre, and is weighted with a ball at one end so as to enable it to return to the proper position to close a valve when the other end is released after being pulled to open it. It is attached to certain kinds of closet cisterns, and the ball end of the lever is connected by means of a wire to the plug or valve, whilst a pull is simply attached to the other. The ball lever is quite distinct from the ball cock.

**Ballon.** See Balloon.

**Balloon; Ballon.** A round ball, or globe, or sphere, either plain or encircled with devices placed on the top of columns—piers, as at A, Fig. 27, gate-posts, &c., by way of ornament. The brass ball, eight feet in diameter, of St. Peter's, Rome, is of this nature, as are likewise other smaller ones occasionally fixed on the tops of lanterns, turrets, and cupolas.

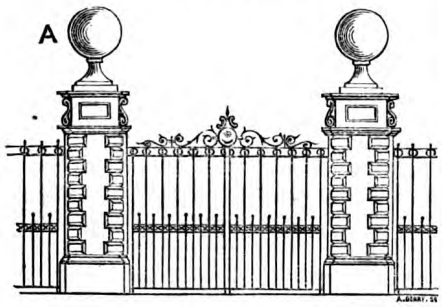



Fig. 27.

**Balloon Frame System.** An American method of constructing timber houses by which notching, halving, mortising, &c., are almost dispensed with, and the various strains to which their framework is exposed are as far as possible made to act in the direction of the length of the pieces, so as to call into play their tensile strength instead of resistance to cross strain. The system depends for its rigidity almost exclusively upon nails usually driven obliquely, and, taken as a whole, it is said to afford great strength with a very economical expenditure of material.

**Ball Room.** A spacious apartment for large assemblies of dancers, preferably surrounded by a banquette, raised a few steps above the general level of the floor, and furnished with seats and couches. The room, to be complete, also requires a balcony, orchestra, and dais, besides judicious arrangement with respect to doors, windows, warming, and ventilating. See Assembly Rooms.

**Ball's Green Quarry.** A quarry in Gloucestershire yielding the Painswick stone, which see.

**Balluster.** More correctly baluster, which see.

**Ball Valve.** A valve formed by a ball ground truly spherical, moving in a cylindrical chamber, and falling when closed upon a concave air-tight seat. It is raised from its seat by the passage of the fluid, and descends to it again by the force of gravity. Ball valve is also another name for ball cock, which see.

**Ballyknocken Quarry.** A quarry situated in county Wicklow, Ireland, from which is drawn a good greyish white granite that can be readily worked, and which is much used about Dublin.

**Ballymore Marble.** An Irish marble of a pale, whitish colour, and crystalline texture found in the neighbourhood of Dunfanaghy, Donegal. It admits of a good polish, and is worked into chimney-pieces.

**Balneæ.** Among the ancient Romans the bath or the public baths at a place were so called in the same way as a private bath was termed balineum. Sometimes, however, a bathing-room in a private house was called balneæ.

**Balnearia.** A Latin word signifying baths and bathing chambers. See Baths.

**Balneary.** A bathing-room.

**Balneum.** See Balineum.

**Balsam.** An oily resinous substance which exudes from certain trees. See Gum.

**Balsam, Canada.** A kind of turpentine yielded by the Balm of Gilead fir (*Abies balsamea*). It forms with turpentine a brilliant, colourless varnish called crystal varnish, and is held in much repute for varnishing maps, &c.

**Baltei.** An ancient term for the straps or mouldings encompassing, or apparently binding up the bolsters, coussinets, or cushions of the Ionic capital.

**Balteus.** A wide step, usually the eighth, in a stepped platform, &c., occurring in ancient amphitheatres and theatres to serve as a landing place. See also Baltei.

**Balthei.** See Baltei.

**Baltheus.** More correctly balteus, which see.

**Baltic Fir Laths.** The proper description of plasterers' laths for ordinary work when rent from sound and clean timber, and when oak laths are not specified. See Laths.

**Baltic Oak.** See Baltic Timber; Baltic Wainscot.

**Baltic Spruce.** *Abies excelsa.* Another name for the Norway spruce, white fir, spruce fir, or white deal, by which latter term it is generally known in this country. It is more resinous than American spruce, and generally superior to it. As a rule amongst builders most white wood goes by the name of spruce. The colour of white deal "is yellowish, or brownish white; the hard part of the annual rings is of a darker shade of the same colour. The wood has often a silky lustre, especially in the American and British grown kinds. Each annual ring consists of two parts, the one hard and the other

softer. The knots are generally very hard. The clean and straight-grained varieties are often tough, but not very difficult to work, and they stand extremely well when properly seasoned. The sap-wood of the white deal is not discernible from the heart-wood."* See ALBURNUM.

**Baltic Timber.** The name usually given to fir timber (which general term includes pine and fir, or spruce) imported from northern ports. There is a good deal of oak also imported, but English oak is generally preferred and specified, though Memel, Stettin, and other ports furnish a capital article, often straight in grain, less liable to cast, and easier to work than British, which it equals in durability. Fir which does not run over 13 inches, or at most 15, if free from knots, is usually to be depended upon. That from Sweden is recommended as being the toughest, but it is apt to run taper, and all sticks above 12 inches square are to be suspected of being shaky at the heart. Swede timber is not so strong, and a good deal cheaper than other descriptions, and when in scantlings and mixed with Memel it easily passes for it. Red pine is always strong and durable and fit for anything, but yellow pine is not always to be trusted. Christiana battens are the best for joiner's framing. See ARCHANGEL TIMBER; BALTIC SPRUCE; DANTZIC TIMBER; FIR; MEMEL TIMBER; NORTHERN PINE; RIGA TIMBER, &c.

**Baltic Wainscot.** Wainscot—oak for cutting into thicknesses—imported from the Baltic in logs squared on three sides, and with the top left rough and in lengths not exceeding 18 feet. Riga oak is very clean and free from knots, and is in much request for boarding and wainscotting. See WAINSCOT.

**Baltimore Oak.** A variety of American oak. See WHITE OAK.

**Baluster.** A small pillar or column placed vertically in a balustrade, and admitting of various forms, of which the double-bellied description is the lightest in appearance. Its height depends upon the purpose for which the balustrade is intended, but rarely exceeds three feet. 2. A term given to the lateral part of the Ionic capital. 3. An upright bar, ornamental pillar, or panel supporting the handrail of a stair between the newels, and often incorrectly called a banister. See COLONNETTE.

**Balustered.** Having balusters.

**Balustrade.** A series of balusters, often of elegant appearance, supporting a rail, coping, or cornice, or it may be defined to be a parapet, fence, or breast wall constituting a defence or ornament composed of balusters, pedestals, base, and cornice. It is sometimes intended for ornament only, whilst at others it is used to enclose terraces, balconies, alcoves, and even altars, as well as before openings, and in stairs, &c., when care must be taken to render it safe. If introduced for ornament, it should not be placed in situations impossible for use, as, for instance, over the raking cornices of a pediment.

**Balustrade Order.** An order of stunted columns occurring in Hindoo architecture.

**Balustrum.** A word applied in mediæval times to cancelli, which see.

**Bambino.** The infant figure of the Saviour, represented in accordance with the customs of the Italians, and often forming the subject of altar pictures enveloped in an aureola, and surrounded by a group of guardian angels.

**Bambocciade.** In painting, a sort of grotesque scene from common or low life, but ranking higher than the grotesque in so far as it represents nature in unaffected simplicity.

**Bamboo.** A genus of grasses having elastic, hollow, and light stems, employed in house building, bridge construction, &c., in Asiatic climes, where it grows to a large size. It is also used for chairs and tables, and in this country its external appearance is sometimes imitated in articles of furniture.

**Bancalia.** Cushions for seats or benches.

**Banco.** A bench.

**Bancour; Bancove.** A cushion or covering for a bench or seat. It is also written banker.

**Band.** A flat member or moulding of slight projection, such as a fascia or tænia, or a continuous tablet round a building or along a wall, such as a shallow string course, either plain or ornamental. A platband is a variety of band. Bands of panelling are often seen in rich Perpendicular work. The elegant mouldings encircling shafts and pillars in Gothic architecture, and the cinctures round Italian columns are also termed bands. See SHAFT-RINGS.

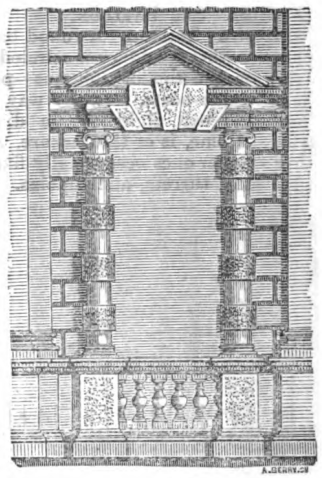


Fig. 28.

**Bandage.** An iron chain or belting bound round the outside of a building to counteract outward thrust. It is especially necessary in the case of domes where the lower parts are not much thicker than the upper ones and well provided with projections and buttresses. The proper position for a bandage will depend upon the form of the dome, and the graduation of its thickness.

**Banded.** Bound by a band. Streaked with coloured bands.

**Banded Architrave.** An architrave broken with equal spaced rusticated or projecting blocks.

**Banded Column.** A column encircled with rustic cinctures or annular rustics, or bands which may be either plain, ornamental, or variegated. It is represented in Fig. 28, and is

* *Tredgold's Carpentry*, by Hurst.

frequently found in the Renaissance style. Piers and pilasters are occasionally banded in the same way.

**Banded Doorway.** A doorway with a banded impost.

**Banded Impost.** An impost which, instead of stopping the arch mouldings, appears to allow them to run through it and to continue down the jambs, the mouldings of the arch and jambs being similar.

**Banded Pier.** } See BANDED COLUMN.
**Banded Pilaster.** }

**Bandelet; Bandlet.** A little band or flat moulding, larger than a fillet and smaller than a band. Also a similar moulding encircling a column. The term has also been applied to the Doric annulet.

**Banderole; Banderolle.** A flat inscribed band, of a sort of spiral form, in vogue during the period of the Renaissance in ornamental buildings, and corresponding to what is now used for mottoes to coats of arms.

**Banding.** A term given to a narrow strip of veneer, forming a border or part of one, either to solid wood or to a large veneer. If the wood is cut in the direction of the grain, the banding is called straight-banding, and if across it cross-banding. When the wood is cut in a direction oblique to that of the grain, it is called feather-banding.

**Banding Plane.** A plane designed for cutting grooves for inlaying or banding in straight and circular work. It resembles the plough in some respects, and can be adapted to work of different curvatures.

**Bandlet.** See BANDELET.

**Bandrol; Bandrole.** See BANDEROLE.

**Bands, Endless.** Wrapping connectors used in machinery to communicate motion. They are either round or flat, and are made of cat-gut, gutta-percha, or of woven wire. They are capable of transmitting considerable force, and communicate motion smoothly and noiselessly.

**Band Pulley.** A drum, or flat-faced cylindrical pulley.

**Bands and Gudgeons.** A Lancastrian name for hook and band hinges.

**Band Saw.** A saw consisting of an endless and pliable serrated steel belt or strip, which continuously revolves in one direction over two wheels which keep it strained. It is made in all sizes, and is applicable for cutting out wreathed handrails or for sawing large logs.

**Banerolle.** See BANDEROLE.

**Bangor Slates.** Slates famous for roofing purposes, and usually of a decided blue or purple colour, though gray and green are to be had. At the quarries the slates are split into leaves of the proper thickness by means of long iron wedges, and subsequently trimmed on a fixed steel edge with a cutting knife. See SLATES.

**Banister.** A corruption of baluster, but a word of too general use not to be eventually accepted as quite applicable to the bars sprigged on to the handrail and capping of the string, or even to the whole of the slight and open fence commonly used for protecting a stair.

**Banister Rail.** A handrail to a stair.

**Bank.** An elevation, or mound, or ridge of earth, stones, or other materials raised above the surrounding plain. 2. An old term for a piece of fir from four to ten inches square. 3. Banking premises, which see.

**Banked Earth.** Earth dug out of an excavation and reserved for filling in.

**Banker.** A bench usually of stone, on which masons place the work they cut and square, hew and shape. Scotch masons term it a siege. In measuring block stone, the full dimensions of the blocks are to be taken as they go to the banker. Amongst bricklayers, a banker consists of a bench or table formed of a piece of timber about two yards long, raised to a convenient height for dressing bricks for skew and gauged work. The term banker is likewise given to the board or platform on which mortar is mixed or shovelled to from the mill. Banker is also another form of bancour, which see.

**Banker-browded.** An old term for embroidered cushions.

**Banking Premises.** A house with one or more strong-rooms, and an open office or shop used as a bank. It should be obviously fire-proof and thief-proof. The Dennett arch, a plentiful use of plaster, Milner's or Chubb's fittings, Clarke's shutters, and Minton's tiles, aided by skilful planning, attain these ends with very satisfactory results. The communication between the bank proper and the manager's residence, as well as the disposition of the desks and counters in the shop with respect to the light, and the means necessary for warming and ventilating, are matters subject to no fixed rule of practice, but can be best devised by a comparison of these particulars in existing banks.

**Bankruptcy.** Inability to pay all debts. In some contracts a proviso is inserted having reference to the contingency of the contractor becoming bankrupt.

**Banner.** A piece of silk, satin, velvet, &c., bearing a device, sometimes fringed and tasselled, hanging from a pole or staff, and supported by cords attached to the ends of a cross-piece.

**Banneret.** A metal ornament, often resembling a square ensign or other knightly symbol, and supported on a spindle attached to the top of a railing standard or finial, so as to turn with the wind. The ancient order of bannerets were sometimes called knights of the square flag.

**Bannerol.** The same as banderole, which see.

**Banner's Patent Ventilating Cowl.** An ingenious device connected with Mr. Banner's sanitary appliances, consisting of a horizontal funnel shaped tube, into which the top of the ventilating pipe is inserted and bent round towards its smaller end, whilst the large or mouth end is made to constantly turn to the wind by the aid of a vane. The motion of the air produces a current through the funnel, which in its turn creates a vacuum round the end of the ventilating pipe, whereby it is assisted in discharging its contents, whilst down draught is rendered impossible unless the action of the cowl is overpowered by suction arising from large fires—a contingency which can be obviated by placing the cowl in a situation where it will be sensitive to the breeze, and by paying due heed to the ventilation of the whole of the building.

**Bannis Kirk.** The name of a quarry in Caithnessshire, yielding a superior brown sandstone.

**Banquet.** See BANQUETTE.

**Banquet House.** A building set apart for entertainments.

**Banqueting Hall.** In mediæval times, an apartment in royal abodes and lordly castles, distinguished from the common hall, and set apart for meals and feasts.

**Banqueting House.** The name of the only executed part of Inigo Jones's contemplated metropolitan royal palace. It is a well known example of an assemblage of the Orders, showing the Corinthian superimposed over the Ionic, which stands on a rusticated basement with small blank windows. It is now known as Whitehall Chapel.

**Banqueting Room.** Amongst the ancients, the room in which banquets were partaken of. The Romans had many elegant saloons of this description, but the Domus Aurea or golden house of Nero, eclipsed all previous ones. This remarkable apartment is said to have imitated the revolution of the heavens through the circular motion of its ceilings and partitions, besides representing the different seasons of the year which changed at every service, and showering down upon the guests perfumes, essences, and flowers. The present meaning of banqueting room is confined to a place prepared for refreshments on a scale suitable to the requirements of state magnificence.

**Banquette; Banquet.** A raised footway adjoining the parapet of a bridge. 2. A narrow platform slightly raised on the margin of a floor. 3. A ledge on the side of a cutting. 4. A seat extending along a window back. 5. A raised platform on the back of a sideboard.

**Bantam Work.** A showy description of carving and painting, somewhat similar to Japanese work.

**Baobab.** One of the names of the largest known tree in respect to the thickness of its trunk, which ranges from 20 to 30 feet in diameter. It is a native of the tropical parts of western Africa and Madagascar, and is otherwise called the monkey-bread tree (*Adansonia digitata*). The lower branches extend horizontally, and then droop to the ground, having stems equal in size to the trunks of ordinary trees.

**Bastismal Font.** See FONT.

**Baptist Chapel.** A building devoted to the public worship of the denomination of Christians called Baptists. Like other chapels dedicated to nonconformist worship, an arrangement is necessary distinct from that followed in churches belonging to the Establishment, with the important addition of a large tank or receptacle for water called a baptistery.

**Baptisterium; Baptistery.** A place in which the sacred rite of adult baptism by immersion is performed. In the ancient church a baptistery was not only a building or a portion of a building in which the ceremony of baptism took place, but it was also the spot where the catechumens were illuminated and trained up and instructed in the rudiments of the Christian faith, and it would appear to have consisted at times of a room separate from the church, and to have been in some instances of large size. After the sixth century the baptistery began to be taken into the church porch, and afterwards into the church itself.

**Bar.** A piece of wood, metal, or other solid matter, long in proportion to its width and thickness, and often constituting an impediment or obstruction. The term is applicable to the ties, struts, braces, posts, and beams in a frame. Its meaning is sometimes identical with rail, as in the case of a handrail to a stair, which may be correctly termed a bar. The meeting rails of sashes are also meeting bars. It is not always straight, as instanced by a chimney bar, and may be vertical as well as horizontal, as exemplified by the slender bars which often perform the functions of balusters. *Bar of a court of justice* is a term given to an enclosure fenced off with a stout partition breast high to prevent the crowd from interfering with the business before it. The same term denotes that part where the advocates may address the court, and it is also applied to the dock or enclosure from the bar in front of it, where the accused is placed during trial. *Bar of a door* is a bar of wood or iron placed across it to secure it when closed, and is the simplest mode of fastening it. *Bar of a field bar gate* is one of its horizontal pieces. The top bar, heel post, and brace form the frame, the other bars being thinner, and denominated common bars. *Bar of a girder or truss* is a strut or tie, and the strain along it when inclined equals the product of the straining force multiplied by the secant of the angle contained between its direction and that of the bar. When the bar is horizontal, the strain along it is equal to the product of the straining force and the cotangent of the angle which its direction makes with the bar. *Bar of a harbour or river* is a bank of sand, gravel, or earth, forming a shoal at its mouth. A pier or breakwater judiciously placed will sometimes reduce the obstruction. *Bar of a hotel* is a room used for an office or counting house, generally having a commanding view of the entrances and chief thoroughfares. *Bar of an inn* is a somewhat similar apartment, used as a sitting-room and store-room. *Bar of a public-house* is that part of the public room behind the counter. *Bar of a sash* is a light piece of wood or metal dividing the sash into compartments. *Bar of a window* is a shutter bar. *Bar of the house* is a partition three or four feet high in either house of Parliament, dividing off a space near the door from the body of the house. See ANGLE BAR; ARCH BAR; BAR IRON; BEARING BAR; CAT BAR; CHIMNEY BAR; COT BAR; CROW BAR; DOOR BAR; DROP BAR; FIRE BAR; GRATE BAR; GUARD BAR; IRON BAR; LATCH BAR; LIFTING BAR; LOCKING BAR; MAGNETIC BAR; MEETING BAR; SADDLE BAR; SASH BAR; SHUTTER BAR; SPLIT BAR; SWING BAR; WINDOW BAR.

**Barb.** The points that stand backward in an arrow or other instrument, such as a barbed bolt, to prevent extraction.

**Barbacan; Barbican.** A watch tower for espying an enemy, or an advanced work or outwork for the defence of the drawbridge of a castle. It was often built of timber. The name is also given to an aperture in the walls of old fortresses for firing through.

**Barbadoes Stone.** A light greyish brown sandstone, obtained at Barbadoes quarries, Tintern, Monmouthshire, which weighs about 147 lbs. per cubic foot. It was used at Tintern Abbey.

**Barbadoes Tar.** A variety of thick fluid bitumen, possessing a peculiar odour. See PITCH.

**Barbara, St.** The symbols of this saint are a cup, or crown, or sword, or tower.

**Barbaricum Opus.** An ancient Roman

floor, supposed to have suggested the adoption of mosaic pavement, of which it was the precursor. It consisted of a medley of pieces of marble of various shapes and of every procurable description.

**Barbed Bolt.** A bolt with its end split and turned backward to prevent retraction.

**Barberry Root.** The root of the common barberry (*Berberis vulgaris*), which, when boiled in water, produces a good yellow stain used to deepen the natural colour of woods.

**Barbican.** See BARBACAN.

**Bar Cock.** A cock of somewhat imposing appearance, used in the bar of an inn or public-house for drawing off liquor.

**Barden Hill.** The name of an important quarry in Leicestershire, yielding a trap rock, much used for paving and macadamising roads.

**Bardiglio Marble.** A marble imported from quarries near Carrara, used for chimney pieces, and having a dove-coloured ground marked with a faint blue streak or, in finer varieties, with rich purplish veinings, almost approaching black. It is sometimes termed Bardilla marble.

**Bardilla Marble.** An Italian marble possessing a very light grey or bluish ground, with or without dark grey mottled variations. This marble also goes by the name of Bardiglio.

**Bar Door; Barred Door.** A Scotch term for a ledged door.

**Bare.** A term sometimes used in slating to denominate the exposed surface of a slate in opposition to the *cover* or remaining part of the back which lies concealed. See GAUGE ; MARGIN.

**Barff's Process.** A mode of preserving iron by means of the artificial formation on its surface of a thin crust of black magnetic oxide of iron, which is not only extremely hard, but a defence against the action of the atmosphere.

**Bar Fittings.** The fixtures in a bar where liquor is retailed.

**Bar Frame.** The frame which holds the bars of a fire grate.

**Bargate Sandstone.** A dark, heavy stone quarried near Godalming, Surrey.

**Bargeboard.** An inclined board, frequently pierced and richly and boldly carved with foils, flowers, foliage, &c., placed at a gable end, when the roof covering extends beyond the face of the wall, either for ornament or to hide the termination of the horizontal timbers. It usually either covers the outer rafters, called barge couples, or else is fixed in lieu thereof. It did not make its appearance until the 14th century, when it soon became general on the gables of church porches and houses, but was not often applied to the principal roof of a church. It is otherwise called bergeboard, gableboard, pargeboard, and vergeboard.

**Barge Couples.** The pair of rafters outside the face of a gable.

**Barge Course.** The course of tiles which projects over the gable end of a building, and which is usually supported by barge couples, a bargeboard, or by both. Its soffit is sometimes plastered over. The term is likewise given to a course of bricks on edge, or stone coping laid on the raking sides of the gable end when the roof covering is stopped against it.

**Bar Handle.** An elegant form of mediæval door handle, having for its grip an ornamental bar of twisted, grooved, bellied, or banded pattern, fixed parallel to the door.

**Bar, Hip.** See HIP BAR.

**Bari.** A word found in some dictionaries, and explained to mean that portion of a slate which shows the gauge, and on which the water falls. It is obviously a misprint for bare, which see.

**Baric Oxide.** See BARYTA.

**Bariole.** A description of marble quarried near the estuary of the Rhone, France. It is marked with red and yellow on a white ground.

**Bar Iron.** Malleable or wrought iron in bar, produced from cast iron by re-melting, puddling, and forging. The action of the oxidising flame during the process of puddling removes the carbon, sulphur, silicon, phosphorus, &c., but it leaves some mechanical impurities, which have to be squeezed or rung out of it by means of a steam hammer or other powerful appliance, after which it is pulled out into bars with rolls. Bar iron is usually one-fifth stronger than plate iron of the same quality, and this remark applies to articles such as girders built up with iron plates. It is, nevertheless, inexpedient to load wrought iron beyond five tons per square inch of section, and when the load acts compressively the resistance to this weight will greatly depend upon the length of the bar, and the position of stays. See MALLEABLE IRON. The following are the chief ordinary commercial qualities and varieties of bar iron, each of which will be noticed under its respective head : *Best Bar; Best Scrap Bar ; Common Bar; Convex Bar ; Flat Bar ; Half Oval Bar ; Half Round Bar ; Hexagon Bar ; Merchant Bar ; Octagon Bar ; Oval Bar ; Puddled Bar ; Rough Bar ; Round Bar ; Square Bar.*

**Barium.** A metal occurring abundantly in nature in the form of sulphate and carbonate. It has only been obtained pure in small quantities, and then only in the form of powder. It decomposes water at ordinary temperatures and combines with its oxygen, which it also readily absorbs from the atmosphere. See BARYTA.

**Bark.** The integument of a tree, existing in two thicknesses called the outer and inner bark. Communication is kept up between the pith and bark by means of the medullary rays along which the sap travels to the interior of the tree. Trees which shed their bark can live in certain unhealthy atmospheres, which would be fatal to those which do not. See BARKING.

**Barkary; Barkery.** A tan house.

**Barker's Mill.** A form of reaction water wheel made to rotate by water issuing in opposite directions from the extremities of two equal horizontal arms supported by a vertical tube free to revolve.

**Bark Hut.** A sort of arbour constructed with unbarked wood, and frequently in a fanciful, ornamental, and picturesque style.

**Barking.** Stripping off bark. It is a good plan to take the bark off standing oaks early in the spring as soon as the bark is loosened by the circulating sap, and to fell them in the autumn after the fresh foliage has died away, for by such means the sap is expended, and the sapwood becomes hard.

**Barking Irons.** The tools used in taking off the bark of trees. They consist of an axe to cut the bark, and peeling irons to push underneath it.

**Bark Stove.** A kind of greenhouse for protecting tropical plants from the cold, having a