THE ARCHITECTS' JOURNAL

Wednesday, July 25, 1928

PERSIUS

To those who do not know Potsdam and its vicinity, the name and work of Ludwig Persius, on which we publish the second article in this number, may be unfamiliar. Yet he and Karl Friederich Schinkel would be remarkable for having had a reigning monarch as partner, even if they had no other claims on our attention. This, however, they undoubtedly have. Schinkel is to Germany what Cockerell would have been to England had he had Nash's opportunities. Persius, on the other hand, is the most engaging exponent of picturesque eclecticism—a phase of architectural history to which attention is being drawn just now by the approaching dissolution of Dorchester House, the finest product of the phase in England. Vulliamy's adaptation of Peruzzi's Farnesina Palace, and Barry's versions of similar palaces in Pall Mall and at Bridgewater House, if taken with the host of lesser villas in what were then the suburbs of London, constitute an important and, hitherto, unwarrantably neglected contribution of nineteenth-century eclecticism to English architecture. How much the phase owed to the cult of the picturesque has been indicated by Mr. Christopher Hussey in his recent study of the cult as it affected the arts generally. The revival of astylar and asymmetrical Italian architecture after the close of Palladio's long reign is certainly owing in no small degree to the teaching of Sir Joshua Reynolds and such men as Richard Payne Knight, who advocated the application of pictorial methods to architectural design.

The activities of Persius coincide with the end of what may be called the picturesque phase of architecture in England. As this country took the lead in applying pictorial canons to eclectic design, and since King Frederick William IV was a close student of contemporary English publications on the theory of architecture, it is not illegitimate to see a connection between the Italianesque churches and villas of his architect and the English cult of the picturesque. Certain it is that the king and Schinkel were also accomplished landscape painters, and, as Reynolds said of Vanbrugh, Persius composed like a painter, choosing his forms and details solely with an eye to their effect in composition. In a phrase no less reminiscent of Reynolds's discourse on architecture, Persius wrote that symmetry, by which his predecessors felt themselves to be bound, should, in his opinion, be subordinated to convenience of plan and the requirements of landscape. He not infrequently used the English Tudor style, and several details that he commonly employed, notably windows of three-pane width, derive from English usage. After all, the eighteenth-century *jardin anglais* had long been familiar in Germany, and Repton laid out the gardens at Glienicke; so that to follow its development into the picturesque cult was only natural in a nation experiencing the throes of Romanticism. The influence of England on early nineteenth-century Prussia must not, however, be pressed too far. In Persius, Prussia possessed an artist who surpassed any English architect in his subtle skill of grouping and selection. We have no adequate parallel to him, as we have for Schinkel. We can adduce men who exhibited an equally wide eclecticism, and some who equalled him in one style or another. Thomas Hope's villa at Deepdene antedates his similar work by a generation; H. E. Goodridge's Lansdown Tower at Bath by twenty years; and Frances Goodwin's villas by ten. Barry used a more monumental medium than Persius ever attempted, and Decimus Burton, particularly in his subtly varied work at Tunbridge Wells, approaches him most nearly in his capacity for nicety of design and for impressing his personality upon it. We can point to T. H. Wyatt's basilica at Wilton (1844), and the similar church at Kingston-on-Thames, as English counterparts to the Heilands Kirche. But Persius, alone in Europe, possessed that binding quality which gives his eclectically expressed conceptions a unique personality. As early as 1805, Payne Knight had advocated eclectic design: "A house may be adorned with towers and battlements, or pinnacles and flying buttresses, but it should still maintain the character of a house of the age and country in which it was erected." Persius was able to show how a house so adorned could, in addition, be a vital creation in spite of features borrowed promiscuously from two thousand years of development. His aptitude for using whatever historical form best fitted his design can be most closely compared to the modern practice of Prof. Ostberg in Sweden. Both men impose their own personality and style, so that we forget the origin of individual features in our admiration for the delicacy and spontaneity of the whole. On the other hand, though, like other pirates, Persius has our admiration so long as he "gets away with it," he cannot be justified by any serious canons of taste. As his apologist admits: "A method of design so completely unfettered by rules and so dependent upon the individual skill of the artist, could hardly be expected to survive its creator many years. In the hands of lesser men it soon became lost in the general confusion which had established itself at the middle of the nineteenth century." Though he himself had the sureness of eye to make confusion his servant, Persius directly encouraged its growth by his light-hearted use of it. Yet had he remained faithful to a single style, or continued Schinkel's attempt to create a character in the Prussian style, he would not have been Persius, the arch-eclectic, and one of the most interesting characters in nineteenth-century architecture.

C

NEWS AND TOPICS

THE last has not yet been heard of the balustrade of the new University library at Louvain. The United States architect Mr. Whitney Warren, it will be recalled, had designed a balustrade bearing the Latin inscription "Furore Teutonico deruta, dono Americano restituta" (destroyed by German fury, restored by American gift). The rector of the University, Mgr. Ladeuze, objected to the inscription and had a plain balustrade constructed. This was partly destroyed by the students on June 27, but was patched up in time to be placed in position at the official opening of the library on July 4. Since then all has been quiet. Last week, however, a foreman of the men employed in completing the interior of the building arrived on the scene, and a few minutes later he was high up demolishing the balustrade with a sledge-hammer. The inscription has caused rioting, divided the Belgian people, embarrassed the Government, and caused the Royal Family to intimate that it would take no part in the dedication ceremonies. The attitude of Louvain students and that part of the Belgian public which upholds the stand of the American architect is thus stated by a Brussels newspaper: "If an inscriptionless balustrade goes up, we might as well take down our war monuments."

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Mr. Warren, who has instituted court proceedings against Monsignor Ladeuze, is quoted as saying: "As the architect and artist of the library building, I possess the right to insist that the building shall be constructed as planned, and even after the completion of the building I have the right to insist that the structure shall be maintained as I built it. If the rector intervenes and carries out his intention of completing the building without the inscription, I shall feel it my duty to fulfil my promise to the late Cardinal Mercier, to whom the rebuilding of the library is due, that the inscription shall be placed as he approved it. I shall file suit against Monsignor Ladeuze, and carry the fight to the highest court in Belgium. I shall do this with the full conviction that if the Belgian people yield this question they will be yielding to the Germans."

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Mr. H. J. Deane, who is president of the Institution of Structural Engineers, is due to relinquish his office very soon, and the luncheon given by the Institution at the Connaught Rooms on Friday was by way of being his last appearance in public as head of that body. Another particularly interesting feature of the luncheon was the presentation by the Lord Mayor of London of the Dorman Long prize to Mr. George Caddell. The problem set by the examiners was that of rebuilding the Royal Exchange as a steel-framed building, while still preserving the present æsthetic design. Commenting upon the use of steelwork at the present time, Sir Charles Batho remarked on the enormous growth of its use, more particularly in the City, and said that, although he himself was not an engineer and had no connection with engineers, he knew the name of Dorman Long because he continually saw it written on girders which barred his way whenever he had five minutes in which to get to some appointment a quarter of an hour away. I can quite sympathize with his relief (living, as he does, at the Mansion House) that the competitors for this prize were limited to traditional design; and a catch came into his voice when he contemplated the possible misfortune of his successors in looking out from the fiftieth floor of the Mansion House to the skyscraping Royal Exchange across the street.

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Later on in the proceedings the Lord Mayor referred to the Chair of Highway Engineering which has recently been endowed at the University of London. It is the only chair of its sort in this country, and Sir Charles Batho was regretting that this should be so in view of the fact that in practically every country in the world, however small, there is generally more than one, and France apparently has two or three. I quite appreciate the Lord Mayor's point; but I cannot help feeling myself that there is every reason for there being no chairs of this nature in England, because England is *par excellence* the country with the most perfect roads, and this to some extent removes the immediate necessity. At the same time, with developments and improvements coming along as they are doing today, it certainly looks as though we shall want quite a number of chairs of this sort in order to keep up our own national standard of excellence.

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I congratulate the Brighton, Hove and District Joint Town-Planning Committee on the celerity with which they have published a preliminary report so soon after the inauguration of their work two years ago. This report indicates in broad outline the various problems to be solved in securing the proper town planning of a region that occupies a central position on the Sussex coast. Mr. David Edwards, the chairman of the Technical Sub-Committee, is especially to be congratulated on his work. Of special interest to architects are the sections relating to zoning and the preservation of amenities. It is estimated that as the region occupies some 78,000 acres, given an average density of ten houses per acre, by the year 2,328 there may be a permanently residential population of 3,000,000. The report makes it clear that it is not to be expected that a scheme made today is going to exist for 400 years without alteration or amendment; but it is suggested that in the town-planning scheme sufficient land should be left available for normal requirements for a long period.

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"Ribbon" development is unhesitatingly condemned as being uneconomic. Peacehaven, that has several times been dealt with in THE ARCHITECTS' JOURNAL, is more mildly criticized in the following words: "Had the development of Peacehaven been restricted to a smaller specified area, an allowance made for expansion, a compact township of definite composition would have resulted, to the greater benefit of the community living there, to the increased financial advantage of the estate developers, and to less destruction of regional amenities." Various methods for preserving the South Downs are put forward, including zoning regulations and scheduling as private or public open spaces, with agreements with owners as to the time elapsing before purchase.

If old immortal words could sing in the poet's heart like birds, equally can beautiful and picturesque names add charm and character to our streets. In these days we have become careful selectors of such nomenclature in so far as it is concerned with historical and topographical fact. Thus we have our John Carpenter Street, perpetuating a once famous Town Clerk of London; our Mallord Street (in Chelsea) in which the ordinary person will at once detect the compliment paid to the greatest of our landscape painters; our Dean Bradley Street, enshrining the name of that famous theologian. But we never seem to trouble ourselves about giving names to streets, as one feels horticulturists do to roses, simply because they are euphonious and decorative. In earlier and less sophisticated days they did, and if they by chance omitted to, then popular acumen came to the authorities' aid and, as it were, insisted on a place being appropriately christened, as was the case with Quality Court, Chancery Lane, at first termed, with a hopeless lack of originality, New Court, but as old topographers tell us, commonly known as Quality Court, because of the goodness of its houses and the character of their occupants—a name which has properly adhered to it for two centuries.

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Sometimes, of course, these charming old names were but descriptive in a day when rusticity had not been banished from our streets, and Pine Apple Place, in Maida Vale, and Apple Tree Yard, near St. James's Square, and the Hop Garden, off St. Martin's Lane, seem to bring a whiff of country air into these now urban quarters. As a rule, equally of course, ground landlords have been responsible for street names, and when in certain cases they have exhausted their own surnames and titles (if any) have had recourse to their country possessions, as evidenced, for example, in Wimpole Street and Orchard Street (from Orchard Portman), and the rest. There is a character in names which somehow reflects itself on the streets that bear them. What a full-sounding aristocratic air has Great Stanhope Street, for instance! When Berkeley Square is all shops and flats, surely it will not retain that sonorous title. When Brummell was at the height of his glory he lived in Chesterfield Street; could one imagine him residing in The Polygon, even had it been known to him, which we may be pretty sure it was not? Some street names are a disgrace to London. Fancy living in Liquorpond Street or Watergruel Row; imagine awaking every morning in Goswell Street, like Mr. Pickwick; what an unsavoury sound has Garlick Hill; and can one visualize anyone with a nice mind residing in Blowbladder Street!

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Those of us who have learnt to swing a scythe are naturally inclined to boast of our prowess at this time of year, and it may be claimed for mowing that it is a useful and wholesome exercise calculated to take an architect at least as far from the cares of his office as any game of golf. Mowing demands too much concentrated attention from the novice to allow him much time for thought, but in the course of cutting his swathes he probably learns more of the relationship of house to grounds than he would have discovered in years of office work. The man who has appreciated the difference between mowing on the level and on the slope will be cautious and restrained in his plans for trim grass banks and grass borders, and will not burden his client with devices which tend to exhaust both purse and patience in their proper upkeep. When a grass plot must be made level by excavating and embanking on a hillside, the drawing-board and the textbook with its list of "angles of repose of materials" enter into a diabolical conspiracy to entrap the architect into designing rigid inclined planes about the edges of the lawn. With a forty-five set square he imparts a specious appearance of smartness to the mitres of the geometrical plan, and then suggests that the slopes should be turfed. Actually, he might profitably consider such alternatives as the formation of gentle slopes which can be mown without excessive difficulty, or the use of dwarf walls or rock banks to overcome the differences of level. Or if his knowledge of gardening is sufficiently discriminating, he may suggest the planting of the slopes with those particular flowers and shrubs which luxuriate in such situations.

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Architects who take up such delicate crafts as modelling and etching, or the making of violins or clipper ships, come into the public eye from time to time; but something may also be said for the architect who tries his hand at the more prosaic labours of excavating and depositing earth. As a corrective to the highly theoretical science of our textbooks, nothing can be more valuable than the handling of the actual basic materials of construction. It is all too easy to believe that hard rock will bear x tons, and clay y tons per square foot because we have read it in the book, and it is only as an afterthought that we realize that nothing short of experience will enable us to differentiate and identify various grades of subsoil when called upon to determine the economic area of a foundation in practice. Recent disasters to buildings near excavations, and to dams and retaining walls in various parts of the world, show how this vitally important but humble and homely aspect of constructional science is apt to be neglected by architects and engineers.

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Chinese architecture is a glorification of the roof. All the great buildings had lots of roofs. The pagoda had a roof, if only a pent-roof, to all its thirteen storeys. The characteristic of the temples is the roof also, supported on columns which are the survivals of the tent-pole. I have been looking at some astonishing models of Chinese temples in the famous Hilditch collection at Manchester. They are models of earthenware covered with glazes of the most beautiful colours, and they are miracles of construction. But then, the Chinese potter was the greatest in the world. How he managed to get these models to stick upright until they were baked hard, however, I cannot imagine. Tier after tier of isolated columns, slim ones, support heavy overhanging roof-structures which, in turn, carry great masses of heavy ornament. Like the architecture, he disdains the aid of walls. The Great Wall of China is one of the wonders of the world; another is the wall-less buildings which exist within its circumference. There are walls in China, but they are enclosed structures rather than structural accessories to buildings. They are very ornate and share with the roofs the burden of the gorgeous ornament imposed on them. For three hundred years during the Ming Dynasty, Chinese potters were busy producing great dogs and dragons, flying horses, demons and divinities in magnificent and sometimes grotesque forms, but always with fine colour, for the decoration of the tops of walls and ridges of roofs. There are hundreds of these in the Hilditch collection.

ASTRAGAL

THE A.A. EXHIBITION

[BY E. MAXWELL FRY]

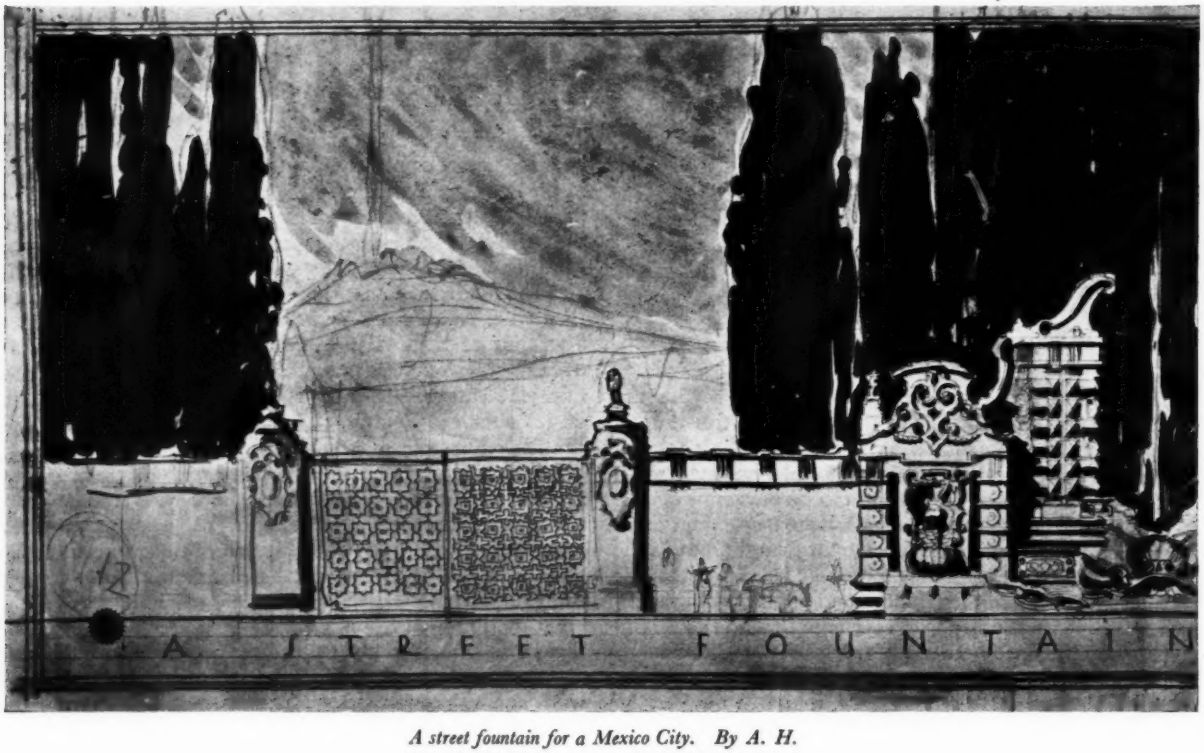
THE world in which we live today is not so much complicated as diffuse and diverse. We are aware in England, and we have about us photographic evidence, of the styles practised in many parts of the world. The influences of these styles and attitudes is constantly exerted, as is also the necessity for looking at new and interesting problems of design from a standpoint that is neither traditional nor particularly national. The architect who is sensitive to the conditions of his life is called upon to think as well as to create.

Rather than figure as an expert manipulator of one style, he should tend to be an artist moving freely in the abstract world of form and colour, ready to crystallize his ideas into shapes best fitting demands made upon them. As the American skyscraper has broken through the strait-jacket of classic convention in which earlier practice attempted to enslave it, so in other spheres there is the necessity for an outlook rather wider and more artistically logical than that which has served older generations with diminishing degrees of success.

It is with this in view that the five-year course at the A.A. Schools has been very carefully constructed to lay before the student not only the concrete facts of architectural design, construction, practice and history, but also that other world in which the actual forms of three-dimensional objects—their colour, their weight, and their multiple interaction in space—are made apparent. For instance, the natural liking for geometry and geometrical form, which is often one of the earlier signs of architectural leanings in the young, is made one of the first exercises of the first-year student. He starts with geometry and geometrical patterning before he touches form at all. Elementary shadows on simple geometrical forms are his first introduction to the solids of architecture, and these he renders very carefully so that the exercise advances him at the same time in the art of making an expressive drawing.

While this is going on, he is at work on a simple design—a very simple design of one unit, which can be shown in plan, elevation, section, and perspective without too great a demand on inexperience. In order to make this first little design a real piece of work, the drawings are also to be working drawings, and from these a paper model is made, so that a full realization of one design is gained at the outset. Lectures on history are going on, supplemented by measured work from objects in the well-filled London museums; and here again the student is asked to incorporate the dry-as-dust pieces of the museum in imaginative restoration drawings that help him to bring life to his knowledge of history.

Now also the elements of composition in several units are inculcated by means of diagrammatic drawings that show the relation of plan to solid building, so that the habit of three-dimensional thinking shall start early, and exercises in the design of abstract form and colour cheer him on his way toward his next design, which is just a



A street fountain for a Mexico City. By A. H. Girard (fourth year). Left-half of design.

little more advanced, and which he must turn into complete working drawings done on linen. Now comes a close study of plans, drawn carefully so as to make it also an exercise in competition drawing; and with it comes also the early study of Roman compositions, made on a small scale in preparation for more finished drawings in the second year.

The first year is thus both a grounding in elementary form and design, and a shadowing forth of the more advanced work of the next year. "Roman Composition," by J. G. Ledeboer, is a beautifully finished and very certain piece of work, unusually good for a second-year student, and going hand in hand with this are more interesting designs in abstract form and colour.

The second year, which is to introduce the student to designing in several units, includes a detailed study by means of isometric drawings and plans of the evolution of form from simple basilicas to complicated Gothic cathedrals, while diagrammatic representations of voids and solids in façades lead to more detailed drawings of famous buildings. From this the step to wider planning is easy, and the grip of the three-dimensional subject is never slackened. The second year closes with a fully developed planning *esquisse*. Through all this time the subjects set for weekly and fortnightly design have been gradually enlarged, and the Monday twelve-hour sketch, which is never relaxed throughout the course, calls for correspondingly greater powers of expression from the student.

I feel that this recitation of school curriculum may read a little dully, separated from the illustrations which I cannot scatter with any profusion through this article; but the work of the first two years is so much the basis of what follows after that some cataloguing is necessary.

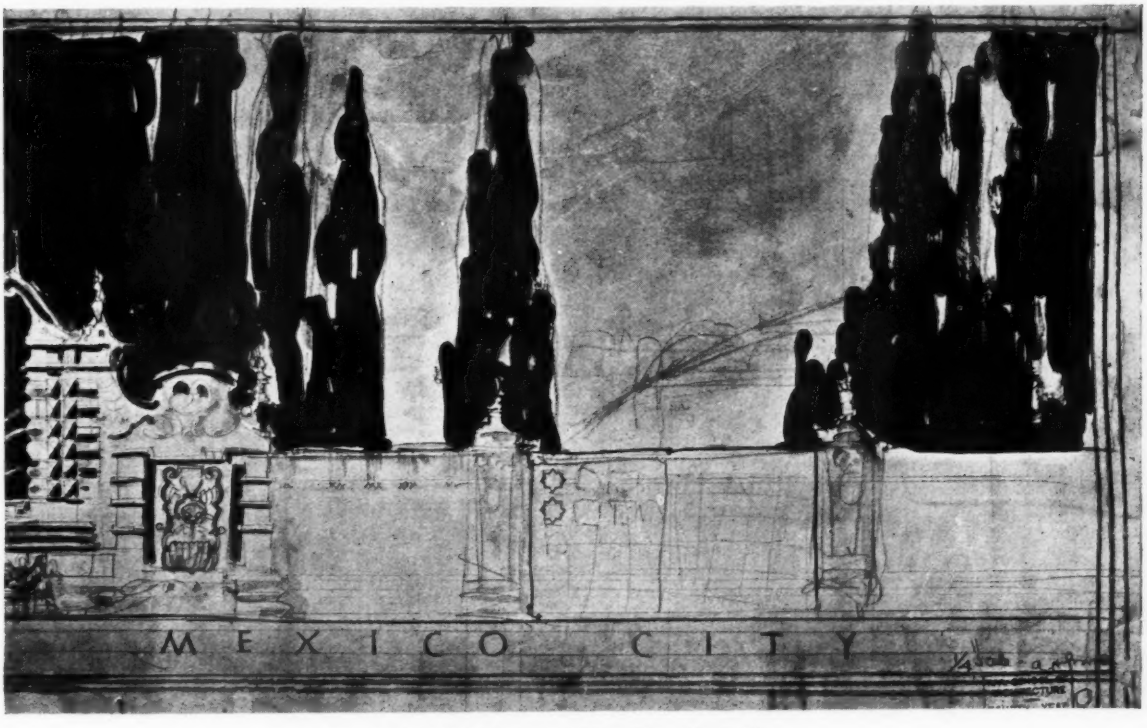
In the third year the bonework of the system is not so apparent, because the designs are bigger and are become the more important side of the work. Also, I suppose, a good deal of work which does not appear in an exhibition replaces the diagrammatic exercises of the first two years.

There are some very interesting designs for a church group among this year's work. What an interesting subject to tackle! And how completely these third-year students have assimilated the problem! Some of the designs might be the work of a very mature mind. I notice, too, many lively sketch designs interspersed among the rest, some of them very nobly imagined, and others just amusing—for students can see the fun in life even on Monday mornings.

The design for a seaside hotel, by J. A. Ritchie, is an extremely competent piece of work—a cool, spacious building that is absolutely right for its purpose. This is fourth-year work, and I wish there were room for illustrations. A farmhouse group, a kindergarten, and some witty designs for the cocktail-bar of a modern restaurant might be included with sketch designs punctuating the work of longer periods.

The fifth year, with large designs for an architect's headquarters by a riverside, an enormous film-producing studio, and a lake-side restaurant is strong diet for the visitor. He feels a little bit like the old gentleman in "Back to Methuselah" who found himself discouraged in an atmosphere of pure sense.

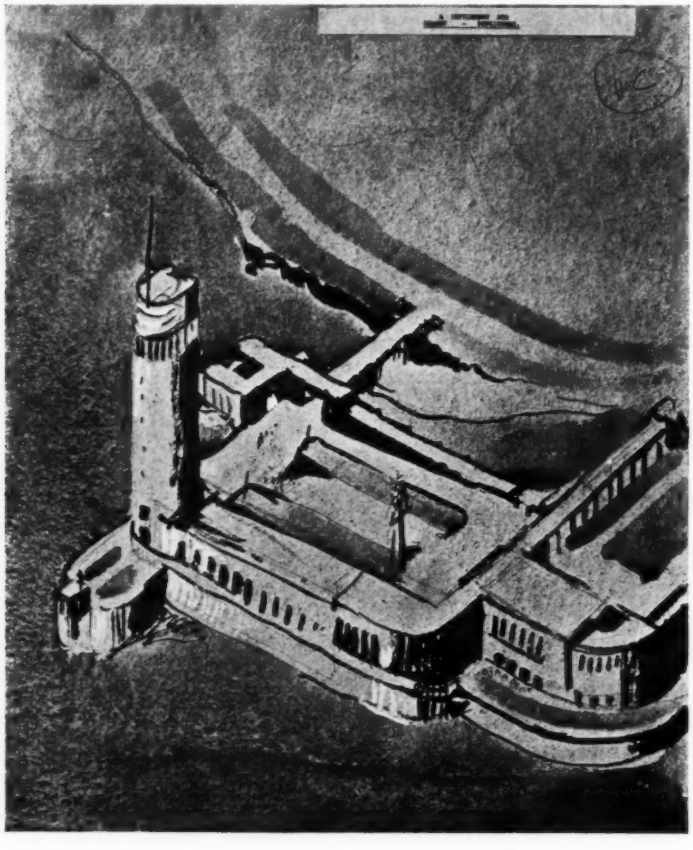
The subjects set are not such as to lend themselves to monumental planning, which is rather a pity, because however interesting may be the study of asymmetrical site planning, there is as much and more skill required in the ordering of complicated masses to achieve a monumental whole, and the restraint imposed is a salutary check on wayward excitements. That the looser programme can produce exceptionally good results, the



A street fountain for a Mexico City. By A. H. Girard (fourth year). Right-half of design.

design, illustrated below, for a seamen-pensioners' colony will testify. It shows an uncommonly complete grasp of the possibilities of the site and of the nature of such an establishment.

Visitors to the exhibition will find a great deal more than I have mentioned here to interest them, and they will be able to follow the sequence of study in the arrangements of the drawings round the walls. It must be left to them to judge how successfully the work of the later years fulfils the intentions of the system.



Above, a composition in abstract form. By Peter Rose Pulham (A.A. first year). Below, a settlement for seamen pensioners. By O'Rorke (A.A. fifth year). Sketch perspective in ink and wash.

LUDWIG PERSIUS OF POTSDAM: ii

[BY R. AND P. FLEETWOOD HESKETH]

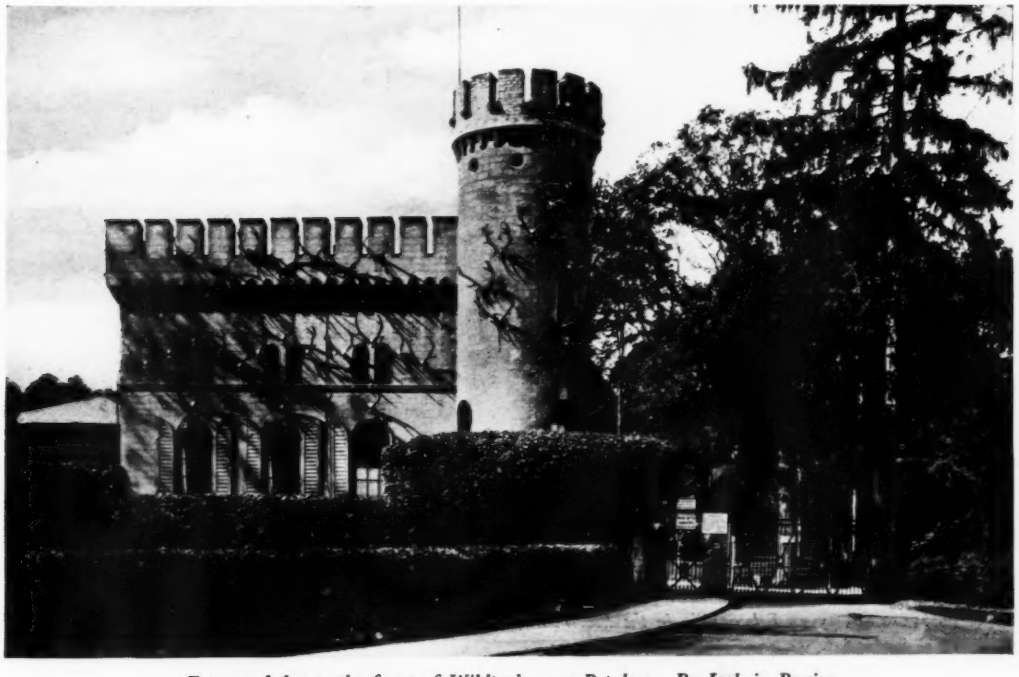
PERSIUS has been best remembered for his villas, which form the bulk of his work and embody all the characteristics of his manner. Under this head may be included the improvements he made at Glienicke, Babelsberg, Sans Souci, and Charlottenhof. The park at Glienicke has a remarkably English appearance. This may be accounted for by the fact that when Count Hardenberg owned the land in 1814 he invited the English landscape gardener, Repton, to lay out the grounds, whose designs were carried out by Wörlitz, of Berlin. Besides making additions to Schinkel's building, which was itself an enlargement of Hardenberg's villa, Persius also added stables, new entrance lodges, and various other buildings in the park. Of these the most striking is the water-tower which stands among trees at the eastern edge of the park overlooking the Havel. It is about 80 ft. high, and is connected by an arch to a gardener's cottage. This curious composition probably originated in the mind of the king, for it recurs in several of his drawings. Here, as in so many of Persius' buildings, windows of three-pane width have been used. This feature, though the usual arrangement in England, is very rarely to be met with in Germany, and forms a noticeable peculiarity of Persius' style. Both he and Frederick William, besides having travelled in Italy and France, are known to have visited this country. The king stayed for some time at Windsor in 1842, when he acted as sponsor at the christening of King Edward VII; also his library, which is still kept in the Altes Schloss at Berlin in its original form, contains several books of designs by contemporary English architects.

In his improvements at Babelsberg, Persius followed the example set by Schinkel, from whose designs the castle was built in 1835, and adopted a nineteenth-century version of the English Tudor style.

At the palace of Sans Souci he rebuilt and enlarged the wings to harmonize with the central block, which had been designed in the middle of the eighteenth century by Frederick the Great and his architect, Knobelsdorf. His hand is more easily discernible in the alterations which he made to the surrounding buildings. These consisted of the Kavalier Haus, a one-storied building mounted on a high rocky basement, which was evidently meant to be covered with creepers, but which, being bare, contrasts rather sharply with the highly-finished work above it; of the small buildings which surround the Historische Mühle; and of the enlargement of the picture gallery and of the Neue Kammern, a suite of visitors' bedrooms for which Persius designed some decorations in a rococo style of his own.

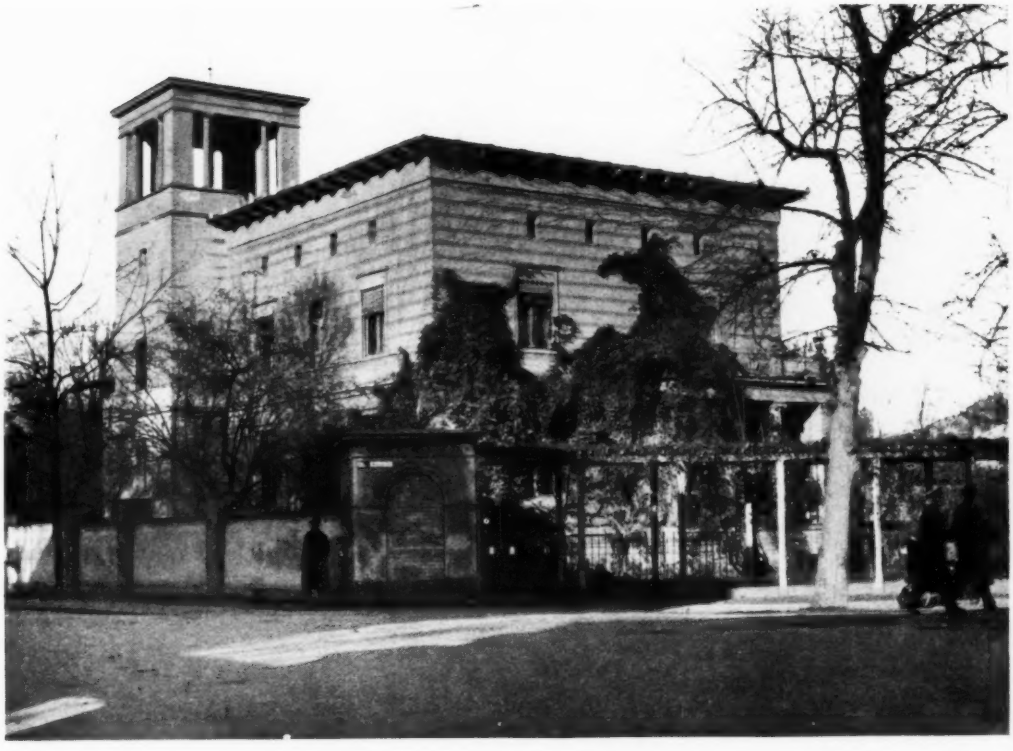
To the "Ruinenberg," a hill crowned by a pile of ruins, which closes the northern vista from Sans Souci, he added a tower and the fragment of a colosseum, whose arc he made so flat as to suggest a former building of great magnificence.

Many of the neighbouring gardens were laid out by him —the Paradies garten, the Nordischer garten, and the Sicilianischer garten; also the Marly garten by the Friedens Kirche. For them he designed a great number of marble fountains, terminal figures, seats, and other ornaments. He built the impluvium in the Paradies garten. Its outer wall has an unusual Greek Doric entablature whose cornice

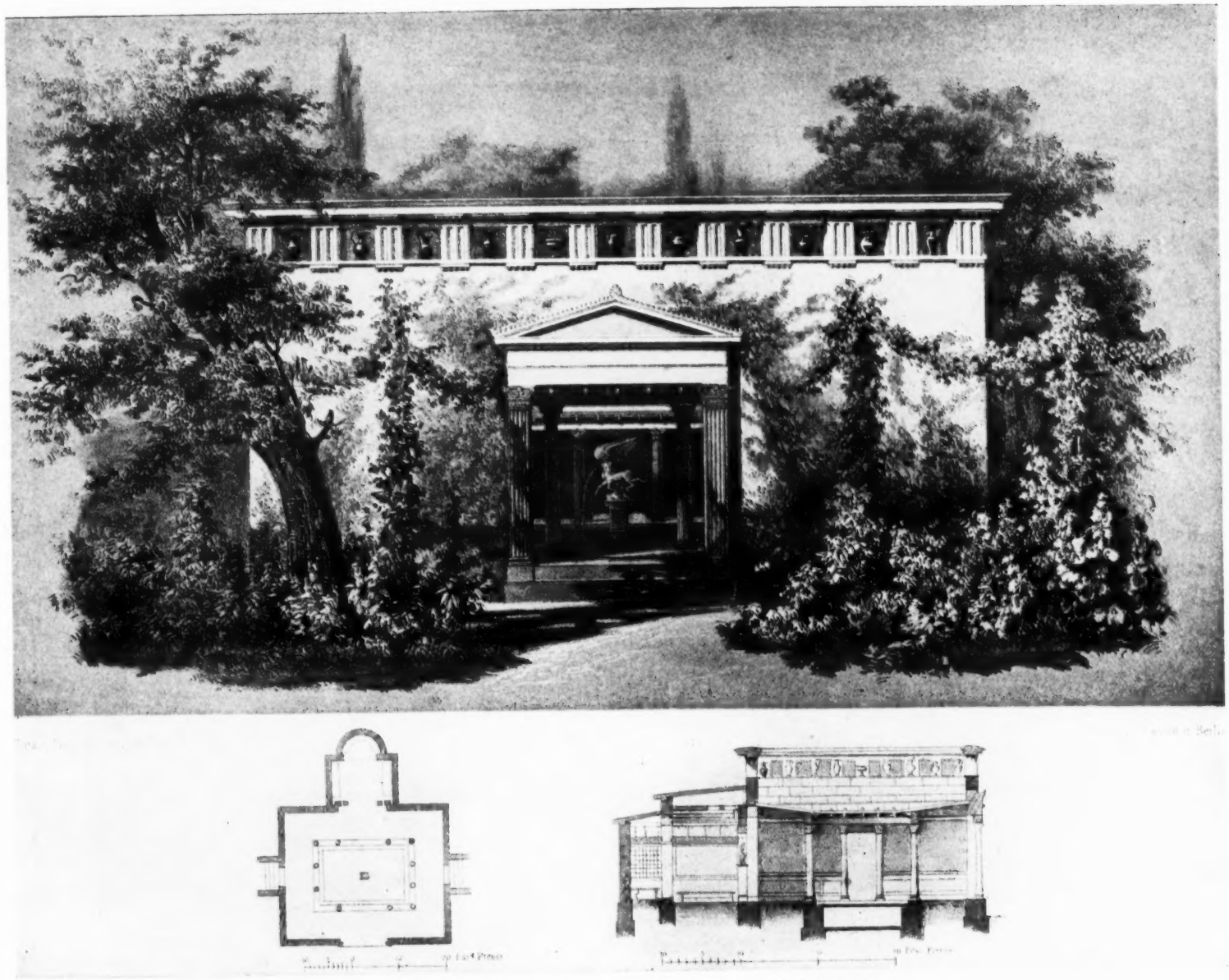


Entrance lodge to the forest of Wildpark, near Potsdam. By Ludwig Persius.

Above, villa in the Jäger Strasse, Potsdam. By Ludwig Persius.
Below, villa in the Marien Strasse, Potsdam. By Ludwig Persius.



Above, Villa Keller (Persius' own villa) at corner of Obelisk Strasse and Kaiser Wilhelm Strasse in Potsdam. By Ludwig Persius. Below, water-tower and head gardener's cottage at Klein Glienicke. By Ludwig Persius.



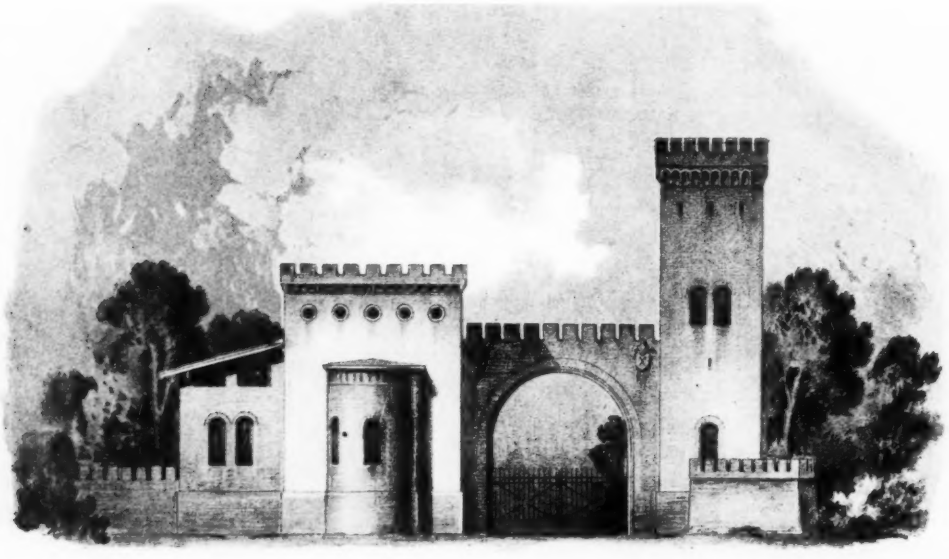
Impluvium in Paradise Garden near Sans Souci. By Ludwig Persius.

Impluvium in Paradise Garden near Sans Souci. By Ludwig Persius.

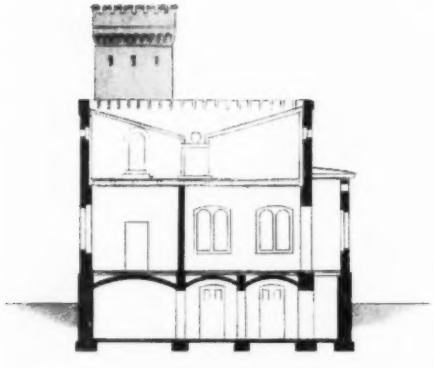
is supported on the triglyphs, while the metopes are left open; in these spaces are placed classical vases of brightly-coloured transparent glass. The Roman Bath near Charlottenhof, which has been attributed to Schinkel alone, owes its design, in fact, as much to Frederick William and Persius as to their master, and the drawings certainly give the impression that its original conception is due to the king. This is important, for it is one of the earliest buildings (1835) to adopt that irregular Italian style which Persius has made familiar in his villas. In a small group it combines a Greek temple, an Italian tower and loggia, and a Swiss chalet.

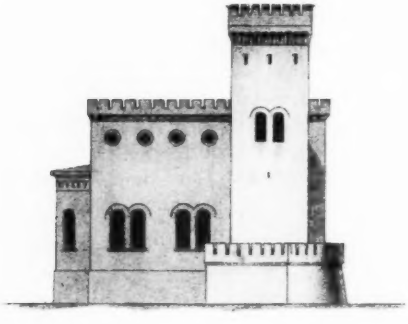
In the preface to a book of his villas dated 1843, Persius expressed the opinion that symmetry, by which his predecessors had felt themselves bound, should be subordinated to convenience of plan and the requirements of the landscape. Irregular treatment was sometimes forced upon him by the fact that many of his villas were alterations of old buildings. This was so in the case of the Villa Schöningen, which stands at the eastern end of the Glienicke

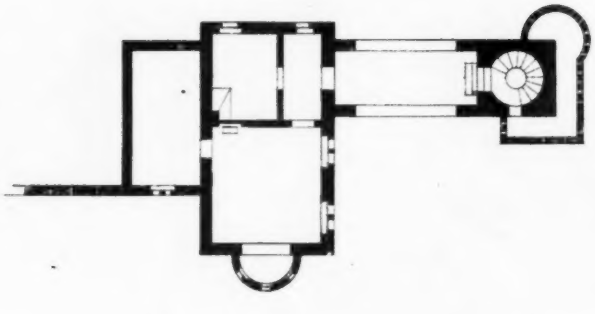
Above, hill with ruins. Below, one of a pair of lions on pedestals on the terrace in front of the Schloss at Glienicke.



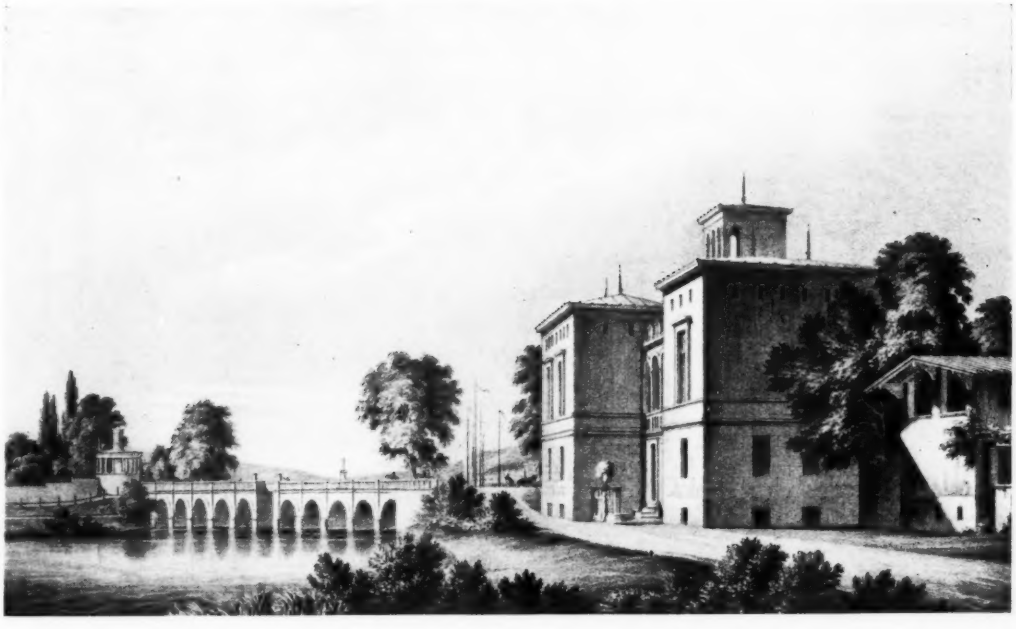
Eingangs-Thor zu Muskau in der Lausitz.



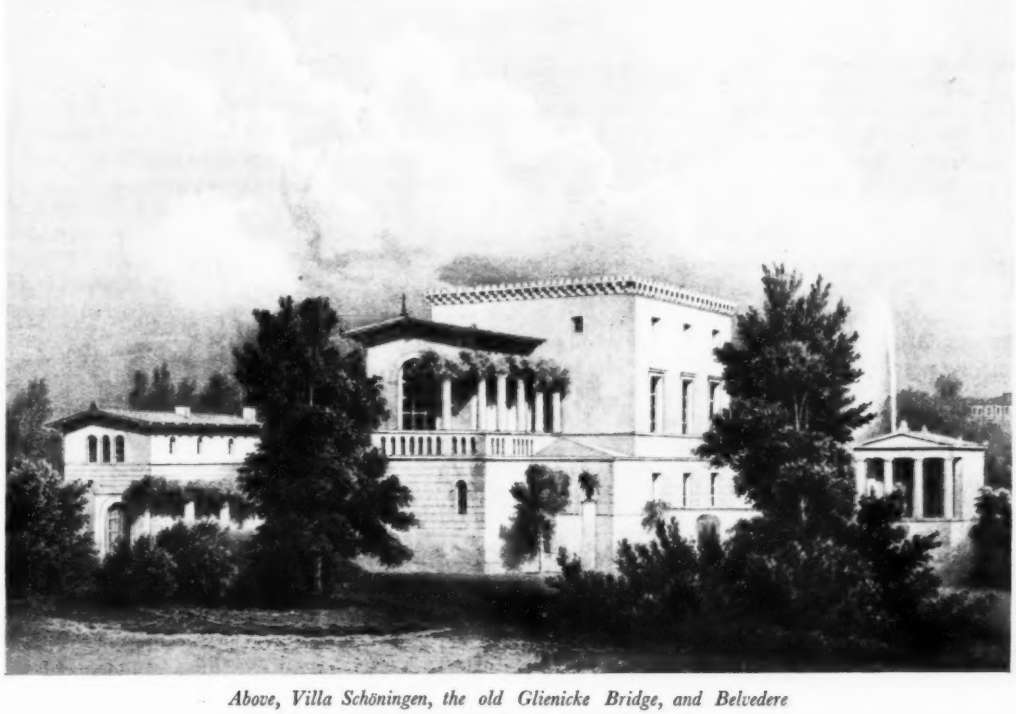




Park entrance at Muskau designed for Prince Pückler Muskau. By Ludwig Persius.



bridge. On this spot, in the year 1826, a shipbuilder had put up an unsightly two-storied dwelling. Soon afterwards, on the opposite bank of the Havel, were built the royal villas, Klein Glienicke and Babelsberg, and it was found that the shipbuilder's handiwork marred the view from both palaces. Persius was therefore commissioned, in 1843, to create out of the offending house an ornament to the landscape. The Villa Illaire, to the south of the Marly garten, is as good an example as may be found of Persius' villa style. It, too, is an old building remodelled. The roof of the main block is arranged to form an impluvium, and rainwater is collected in a tank in the centre of the house. Persius tells us that this device was one of his own invention, and that he first made use of it in the year 1836. His own house, which is now called the Villa Keller, and stands at the corner of Kaiser Wilhelm and



Above, Villa Schöningen, the old Glienicke Bridge, and Belvedere in the park of Klein Glienicke. By Ludwig Persius. Below, Villa Illaire in the Linden Allee, Potsdam. By Ludwig Persius.

Villa Königen Elizabeth in Obelisk Strasse, Potsdam. By Ludwig Persius.

Hohenzollern Strasse, was built from his designs in 1837. Its stuccoed walls are banded with broad and narrow stripes painted in alternate shades of stone colour. Frederick William contributed towards its cost in recognition of Persius' share in the erection of the Nicholai Kirche. It would be uninteresting to give detailed descriptions of all his villas; the greater number are in this irregular Italian style, and his hand can be recognized without difficulty. In the forest of Wildpark, where he was commissioned to build a number of rangers' lodges, he adopted a kind of Swiss-baronial style of no great beauty, but well suited to give the correct rustic appearance.

Persius made designs for such important buildings as the Orangery, near Sans Souci, and the Belvedere on the Pfingstberg, but neither of these were built until after his death. The Belvedere was finished by Hesse and Arnim in 1852, and the Orangery in 1856 by Hesse alone. The buildings, as they stand, bear a strong resemblance to Persius' drawings, but this is probably due to the fact that the designs of Persius, Arnim, and Hesse alike were no more than the interpretation of ideas which belonged in the first place to the king.

Beyond the neighbourhood of Potsdam very little of his work is to be found. He restored Stolzenfels, a ruined castle on the Rhine about half-way between Bingen and Coblenz. Stolzenfels had come to Frederick William on his marriage in 1823, and for many years he and Schinkel had planned to restore it, but it was not until after 1840 that the work was finally undertaken by Persius. Stolzenfels restored may be open to criticism as a piece of architecture, but for the intricacy of its defensive works it can have few equals on the Rhine. Persius also made improvements on the estates of Prince Frederick of the Netherlands, and of Prince Pückler Muskau, who laid out his park at Muskau, in the Lower Lausitz district between Cottbus and Görlitz, in the so-called English style.

For Berlin he designed a number of villas, and in conjunction with Edward Knoblauch, the Kroll'sches Etablissement, a large Italian building which appears originally to have been a large restaurant and concert hall. The old plans show a central hall called the Kaiser Saal, with smaller rooms ranged on either side—two winter gardens, a "Renaissance Saal," a "Rococo Saal," and a series of small rooms for private dinner parties. This building was burned down in 1852. It was rebuilt as a theatre, and has since been refaced, so that it now bears little resemblance to the original design.

In 1845 Persius set out on a last journey to Italy. Falling ill during the summer, he was obliged to return home, and on July 12 he died at the age of forty-two. The annual exhibition of designs by German architects, which opened on August 20 of the same year, was almost entirely given up to his drawings, and a contemporary number of the *Allgemeine Bauzeitung* contains an interesting review of his life's work. By the command of the king, all the buildings upon which he was engaged at the time of his death, and over which it was possible to exercise royal authority, were carefully finished from the designs which he left behind.

[The writers wish to record their thanks to Dr. Kania, of Potsdam, for much valuable information; to Dr. Krieger for permission to inspect the drawings of Frederick William IV in the library of the Altes Schloss at Berlin; to Dr. Jahn, of the Technische Hochschule at Berlin, and to Herr Gottschalk, Regierungs-Bau-Inspector at Potsdam, for access to the original drawings of Persius in their keeping.]

APPLIED ACOUSTICS

[BY A. G. HUNTLEY]

THE science of architectural acoustics has been lifted out of the mire of uncertainty and placed on so sure a basis that today exact results can be achieved in a completed building by legislating for them in advance of construction. The "hit or miss" principle has been relegated to obscurity. The subject of acoustics was appreciated even as far back as Grecian times. Although everyone is familiar in one form or another with the effects that are produced—instances being the child's love of shouting under the arch of a bridge, and the masculine proclivity for singing in the bathroom—yet it is not generally realized that every building has its own particular problem.

In speaking of acoustics, the average man will generally think of the best-known phenomenon, namely, echo, whilst he will have a mental picture of large buildings—cathedrals, theatres, and the like. The fact that the problem is equally important in places that could command a no more dignified name than that of room, such as court-rooms, class-rooms, board-rooms, committee-rooms, seems entirely to have escaped general notice, whilst the fact that offices and workshops should have any such problem at all is hardly credited. It is, however, a fact, and one that has been established by a series of tests carried out over a space of months, that typists working under noisy conditions require 19 per cent. more energy to do a given task than those working under quiet conditions, whilst the loss of valuable time by executive officers of all kinds, through intrusion of noise from traffic or other causes, can hardly be estimated in capital expenditure.

The subject falls naturally into two categories, namely: 1: As applied to auditoria of all kinds; 2: as applied to the general reduction of noise. The first category can be again subdivided into: *a*: Primary work in new buildings; *b*: corrective work in existing ones.

The late Professor W. C. Sabine, who, without doubt, has achieved outstanding fame in this question, discovered in the course of his researches certain requirements which can be characterized as the optimum conditions for good acoustics. He says that: "In order that hearing may be good in any auditorium, it is necessary that the sound should be sufficiently loud; that the simultaneous components of a complex sound should maintain their proper relative intensities, and that the successive sounds in rapidly-moving articulation, either of speech or of music, should be clear and distinct, free from each other and extraneous noises. These three are the necessary, as they are the entirely sufficient, conditions for good hearing. Scientifically, the problem involves three factors: reverberation, interference, and resonance. As an architectural problem it involves the shape of the auditorium, its dimensions, and the materials of which it is composed." To take this in detail. As sound-waves are reflected by the usual building finishes, such as plaster and wood, it follows that apart from the sound-wave which travels directly between the source and an observer, there must also be innumerable waves crossing and recrossing each other, due to the reflections of the initial wave by the bounding surfaces, and, as it takes time for these waves to travel round and about the building, they must augment and thus build up the initial sound until a saturation point is reached. Thus, the reflected sound helps the direct sound and enables a speaker, for example, to make himself heard in an enclosed space over greater distance than in the open air and, therefore, the provision of adequate loudness depends, to a large extent, on reflections from the bounding surfaces.

On the other hand, adequate loudness is only essential over that part of a building occupied by the audience, from which it can be readily realized that the best results are obtained where the reflected sound is evenly distributed over that area, and here it is that shape is so important. Sound is reflected in much the same way as light, that is, the angle of incidence equals the angle of reflection, defraction being ignored. Concave surfaces will, therefore, tend to concentrate the reflected sound, whilst convex surfaces will disperse it.

[The above is the substance of a lecture given before the Royal Society of Arts.]

It has already been pointed out that the bounding surfaces reflect sound-waves and, also, that some period of time must elapse during which these reflections are taking place. From this it is clear that this period must depend, not only on the distance the waves have to travel (or, in other words, the volume), but also on the effectiveness of the bounding surfaces in acting as reflectors. To express this idea of reflection another way round, it can be said that all materials absorb sound, so that if the incident energy of a sound-wave is taken as 100, then the energy of the reflected wave will be something less, say, 98, because part of the energy has been transformed into some other kind of energy or, in other words, has been absorbed.

The period during which the reflecting actions are operative is called the period of reverberation, and it is, therefore, dependent on the volume and on the capability of the building as a whole to absorb sound. Sabine has connected these three conditions and produced a formula showing their relation; it is:

$$t = \frac{KV}{r}$$

when t = the reverberation.
k = a constant = ·05.
v = the volume.
and r = the total absorbing power of the building.

It has already been shown that reverberation is an asset, owing to its assistance in securing adequate loudness, but a moment's consideration will show that, like everything else in life, it is possible to have too much of a good thing. In this case, if each individual unit of sound is going to be prolonged over a space of seconds, then, at any one moment, there are going to be a large number of unit sounds traversing the auditorium, and the orderly procession of the sound units will have to be heard through and above this conglomeration of noise.

Suppose the period of reverberation is 4 seconds and the normal rate of speech is four syllables a second, by the time the sixteenth syllable is being uttered there will be the previous fifteen syllables still contributing their quota of sound energy. Through the babel thus created, the sixteenth will have to make itself intelligibly audible, and this manifestly is impossible. In order, therefore, that "the successive sounds in rapidly-moving articulation, either of speech or music, shall be clear and distinct and free from each other," it is necessary for the reverberation to be controlled, so that reinforcement is obtained without detrimental blurring. In actual practice, a period of from 1 to 2½ seconds, depending on the volume of the building and the uses to which it is to be put, has proved very satisfactory. Music requires a longish period, otherwise it sounds "dead." On the other hand, speech is best with a shorter period. In a building required for both purposes, an average figure must be chosen, and generally, 1½–1¾ will be found about the optimum.

There are two other reasons why reverberation is required. These are: 1: Through long necessity our ears have become used to a certain amount of overlapping of sound, so that now this overlapping has become a requirement which is always looked for; 2: the ear, although a very delicate organism, cannot distinguish intervals of time less than $\frac{1}{15}$-second. This means that the reflected sound can arrive $\frac{1}{15}$-second after the direct sound and yet, to the ear, they will appear as one simultaneous sound.

This point is of importance, for if the speed of sound is taken as 1,200 ft. per second in round figures, it will be seen that there can be a difference in the path of the direct and reflected sound of from 75 ft. to 80 ft. before the sound will begin to separate, or, in other words, before an echo will begin to be audible.

Coming back again to the way sound-waves are reflected, it has been pointed out that the usual building-finishes, such as

plaster and wood, are good reflectors, so that they are of little value in Sabine's formula when it becomes a question of reducing the reverberation. When this is necessary, materials having high absorptive coefficients must be employed. In this connection, the audience will absorb sound very rapidly; the difficulty is, that the audience is generally a variable quantity. When possible, therefore, it is advisable to try and arrange that other material is there to take the place of the audience, should part of it happen to be absent. This can best be done by providing seats with as heavy upholstery as possible. In this way the seats are screened and, consequently, not absorbing when they are occupied.

The following are the coefficients for a number of the more common materials:

	Open window units.
Audience (per person)	4·7
Wood	·05
Plaster	·025
Linoleum	·03
Acoustic plaster	·30
Acoustic artificial stone	·40
Hair felt (depending on thickness)	·50-·70
Cabot's quilt (two layers triple ply)	·70

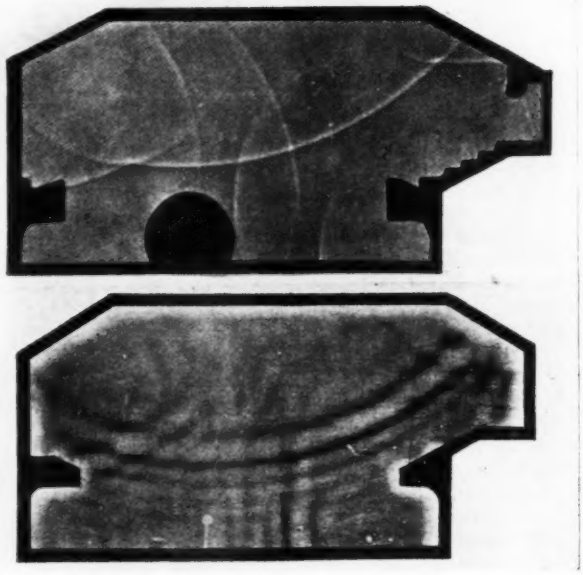
In new buildings shape, volume, and absorbing power can receive due consideration, and these should be investigated as soon as the sketch-plan stage of the design is complete.

To ensure that the shape shall produce an even distribution of the reflected sound and shall not cause echo or blind spots, one or more of the following three methods can be employed for the investigation: 1: The geometrical method; 2: the ripple tank; 3: the spark and pulse method.

In 1 a ray of sound is considered and its path, with its various reflections, is drawn out to scale. This method is not too accurate, but it is useful for preliminary investigations when, should the problem appear to be at all complicated, one or other of the remaining methods should be adopted.

In 2 a section of the proposed building is placed in a shallow tank of water, and a train of waves is set up by means of an electrical plunger at the spot where the sound in the finished building would originate. These waves travel over the water until they hit the side of the model where they are reflected. As the bottom of the tank is of glass, a light placed underneath will throw up the shadows of these ripples on to a ground-glass placed above, thus enabling either visual observation to be made or photographic results to be recorded.

No. 3 is the most complicated, but, at the same time, gives the clearest results. It depends for its action on the fact that light is refracted by sound-waves in much the same way as the convection currents rising from a radiator produce shadows if the sun shines through them. In the spark-pulse apparatus a sound-pulse is produced by means of an electric spark in a long rectangular light-tight box at one end of which is a ground-glass screen or photographic plate, and, at the other, another electric spark apparatus to create the light. When the current is passed through the apparatus, the light from the light spark automatically appears a fraction of a second after the sound spark. In this way a shadow is thrown on the screen or plate.

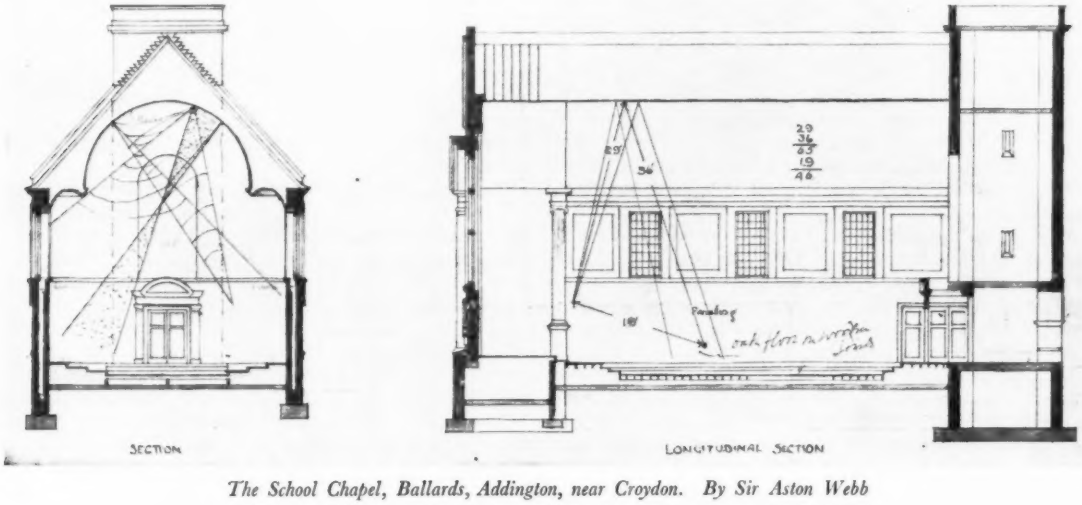


Comparative studies showing resemblance between sound-pulse and ripple photographs for similar model sections.—[*From* The Acoustics of Buildings.]

The above illustration, reproduced by permission of Drs. A. H. Davis and G. W. Kaye from *Aeoustics of Buildings*, shows the results:

a: The ripple tank. b: The sound-pulse.

When the shape has been investigated by one of these methods, those areas that are causing either non-useful or definitely harmful reflections are marked to indicate the positions to be occupied by the absorbent material, the amount of which will be given by Sabine's formula. If no absorbing material is required then the shape of the harmful area must be altered or treated in such



The School Chapel, Ballards, Addington, near Croydon. By Sir Aston Webb and Sons. Preliminary investigations. [*From* The Acoustics of Buildings.]

a way as to scatter the reflected sound in all directions; coffering has this effect.

The application of the principles to a new building may be illustrated by the School Chapel, Ballards, Addington, near Croydon, the architects for which were Sir Aston Webb and Sons, A.R.A. The building was required both for speech and music, but the latter was considered to be the main consideration. The organ was in a gallery on the west wall, whilst the pulpit was, of course, at the east end. The easting was arranged to run parallel to the longitudinal axis of the building.

The drawings on page 122 show the preliminary investigations with regard to the shape. From these it will be seen that useful reflections are being obtained from the centre portion of the barrel ceilings, whilst the sides are non-useful. These non-useful areas were used for the absorbing material, namely, acoustic plaster, whilst the balance of the area required was accommodated in panels between the windows. One set is taken for the organ and one for the speaker in the pulpit. From the longitudinal section it will be seen that the reflected ray is not greater than the direct by more than 75 ft., so that there is no danger of echo.

The illustration of the finished building (reproduced below) shows the admirable way in which the ceiling design has been made to fall in with the acoustic requirements.

With regard to the reverberation, the following are the figures in full:

RUSSELL SCHOOL, BALLARDS. *The Chapel.*

Volume.

57,994 cu. ft. $\cdot 05v = 2{,}900$.

Absorption by Congregation.

Value per person		4·75
Deduct for wood, screened by boys, 4 sq. ft.	·2	
Deduct for boys ..	·55	·75
Net value per boy ..		4·00

Absorbing Power (r).

	Sq. ft.
Wood floor and panelling	4,130
Plaster	6,172
Glass	317
Organ opening	123

4,130 × ·05	206	O.W.U.
6,172 × ·02	123	,,
317 × ·01	3	,,
123 × ·1	13	,,
	345	

Reverberation formula $t = \frac{\cdot 05v}{r}$ 160 boys × 4·00 640 O.W.U.

Empty $t = \frac{2{,}900}{345} = 8{\cdot}1$ secs.

Full $t = \frac{2{,}900}{985} = 2{\cdot}9$ secs. (640 + 345).

If t is to equal 2 secs. then r must = 1,450 units. There are already 985 units so 465 more are wanted. Acoustic plaster has a co-efficient of ·3 units, so that $\frac{465 \times 10}{3}$ sq. ft. of acoustic plaster will provide the absorption. This = 1,550 sq. ft.

Side ceiling panels =	756 sq. ft.
Side wall panels =	844 sq. ft.
Total	= 1,500 sq. ft.

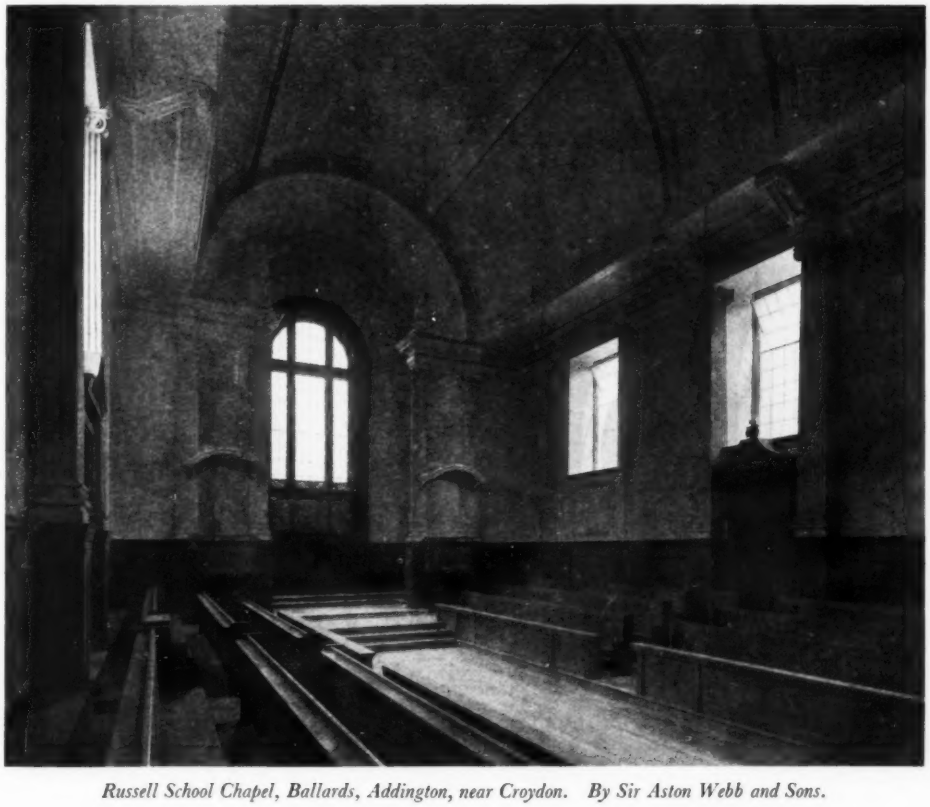
Theoretical value for "t" empty chapel.

$$t = \frac{2{,}900}{810} = 3{\cdot}6 \text{ secs.}$$

Actual value for "t" as measured after completion 3·45 secs.

In existing buildings the shape is definitely fixed, and it is not usually practicable to alter this; the volume also, for the same reason, is fixed, too. The only variation, therefore, is the absorbing power. Fortunately, most cases of defective acoustics are caused by excessive reverberation, so that an increase in the absorbing power is a certain remedy.

In very large buildings definite echo sometimes exists, and when this happens the cure lies in finding the surface responsible for the primary reflection and then making it absorbent. To do this a sound projector is used. This projects a beam of sound in any required direction, so that, if it is gradually turned about, up and down, the surface can generally be located. The diagrammatical illustration, published on page 124 by permission of Professor F. R. Watsons, Illinois University, will make this point clearer. When this surface has been located it must be made absorbent in order to stop the reflection.



Russell School Chapel, Ballards, Addington, near Croydon. By Sir Aston Webb and Sons.

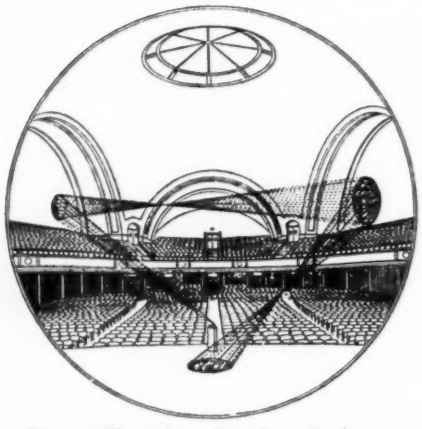


Diagram illustrating a three-dimensional survey (ignoring diffraction effects) of an echo in an actual auditorium. By Professor F. R. Watson. [*From* The Acoustics of Buildings.]

In considering the second part of the subject, namely, the general reduction of noise, more particularly in the office and workshop, the main principle to be borne in mind is that the more absorbent the room can be made the better will be the results obtained. Also, in this direction, it should not be forgotten that equally good results can be obtained, whether the noise is produced within the room or whether it penetrates into the room from outside (traffic noise comes under this heading and can be greatly minimized).

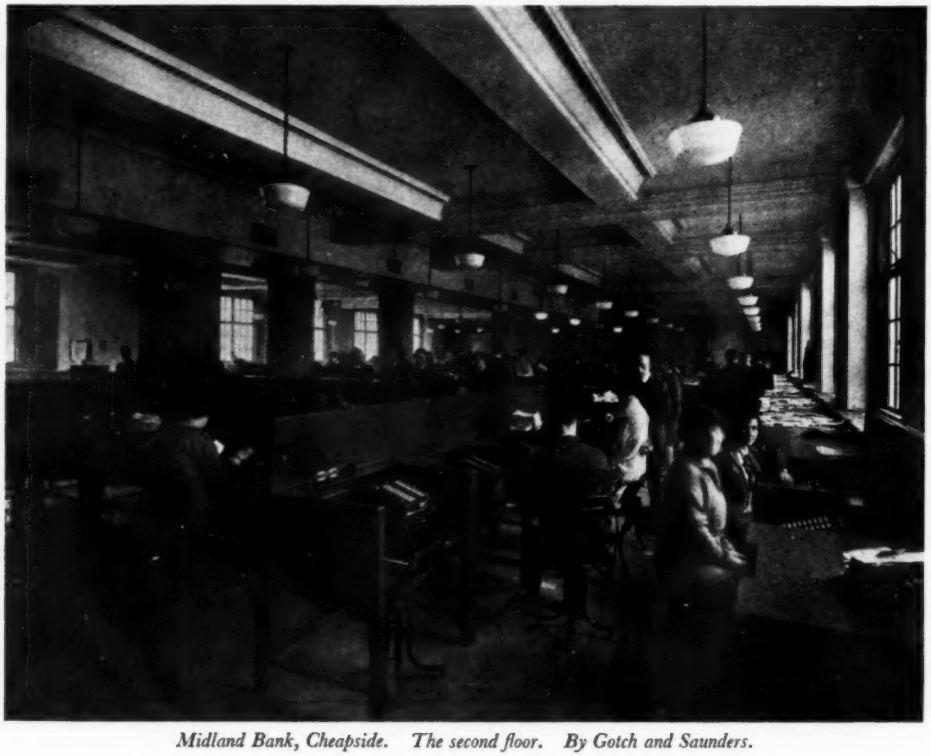
In the second-floor office of the Midland Bank headquarters, Cheapside (Messrs. Gotch and Saunders, F.R.I.B.A., architects, The May Construction Co., Ltd., acoustical engineers), the entire ceiling between the beams has been made highly absorptive by the use of Cabot's quilt covered with canvas. This treatment has produced highly satisfactory results.

LITERATURE

ARCHITECTURE IN THE AMERICA OF YESTERDAY

It may be assumed, probably, that almost everyone who takes a serious interest in architecture has read the vivid and enlightening article in the *Encyclopædia Britannica* (Supplement, 1926) in which Mr. H. W. Corbett, of Helmle and Corbett, the designers of Bush House, has summarized for us the architectural developments of the past fifteen years. To read that article, and to study the accompanying illustrations, is to think of the United States as architecturally the boldest and most individual country in the whole world—the country least trammelled by tradition. The full-page pictures devoted to "sky-scrapers" take one's breath away, while some of the other enormous American edifices represented are, at first sight, almost equally startling to Old-World eyes. At first sight, I say. On closer examination, of course, one may discover some kinship in them to European or Asiatic models. Not in many cases is one set thinking of Rome or Greece. More often, I think, does there seem justification for an effective phrase in which a friend of mine expresses his distaste for the modern American movement generally, above all, as illustrated in post-war London. Bush House, Adelaide House, and all the others, my friend condemns wholesale as "importations from ancient Egypt via Chicago."

To turn from Mr. Corbett to Mr. Howard Major, the author of this lavishly-produced book on *The Domestic Architecture of the Early American Republic*, is to see the United States in an entirely different light. Mr. Major does not write very elegantly, but he has studied his subject and he expresses himself boldly. "Not only the architect," he begins by saying, "but the general reader should find the one style of architecture that America has developed to be of absorbing interest." This "one style of architecture," he proceeds to explain, is that developed under "the sway of the Greek revival." Nor will he admit it to be a style outworn and to be abandoned. "The Greek Revival," he maintains, "is a style which readily adapts itself to present-day use; and it has unmistakable advantages. It is the only thoroughly



Midland Bank, Cheapside. The second floor. By Gotch and Saunders.

American architecture. The traditional American belongs in a house of this national style, our independent creation in architecture. With its wide geographic field, from Florida to Maine, evidencing the skill of the early designers in adapting the style to highly-varied climatic conditions, we have not only a national expression in architecture, but one that is suited to the rigour of the Maine winters, as well as to the tropical heat of Georgia and the Gulf States."

Mr. Major is fully aware, of course, that he is on what is regarded as the losing side. His volume, indeed, is meant to serve as an antidote to those textbooks which decry the nineteenth century as "devoid of artistic expression" and as "a period to be shunned." He cites in full, scornfully and only that he may refute it, the following passage from the work of "a well-known author":

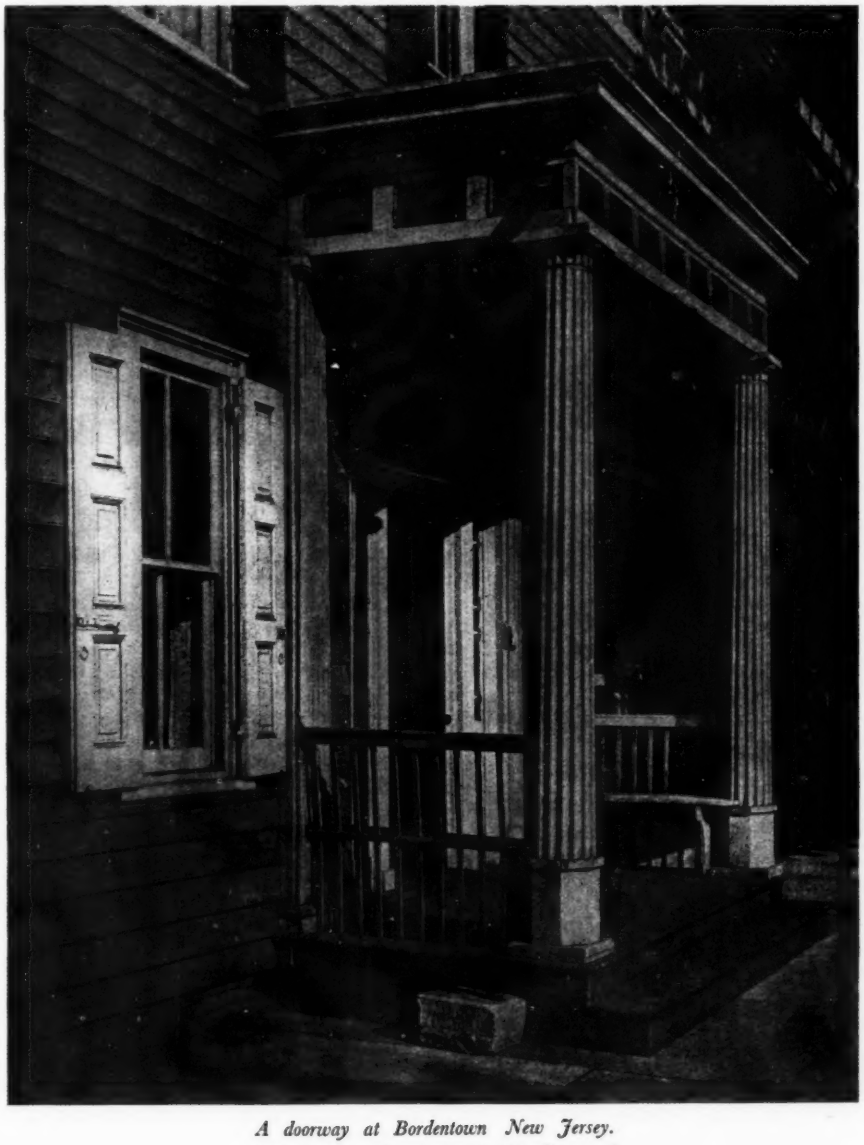
"The classicism of the Classical Revival, on the other hand, was essentially and unalterably rigid in its adherence to the forms of antiquity and the archæological manner of applying those forms. It was not an adaptation; it was, in very truth, a revival of the modes of two thousand years ago, a gigantic exhibition of architectural archæology.

"The weakness of the architecture of the Classic Revival was in its rigidity and inflexible resistance to efforts to adapt it to varied modern requirements.

"Tiny temple-fronted houses were not domestic, and were as unreal and architecturally unsatisfactory as stage settings viewed from the rear."

To demonstrate the utter untenability of their view is the purpose of Mr. Major's big book, with its wealth of photographic illustrations. They are arranged in four groups, covering respectively the North Atlantic seaboard, the South Atlantic seaboard, the old North-west, and the old South-west. The buildings which are included all date from between 1820 and 1850. One more brief extract from the text will suffice to show the spirit in which Mr. Major has undertaken his task:

"Within our time many of these dignified Greek buildings have been torn down, so this is a propitious moment in which to gather together all of the extant examples possible. An historical society has secured one of these buildings for preservation, and other such purchasers will doubtless follow. . . . The Greek Revival is emerging from its days of calumny and neglect, and now,



A doorway at Bordentown New Jersey.
[*From* The Domestic Architecture of the Early American Republic.]

House, near Wellington, Ohio. [*From* The Domestic Architecture of the Early American Republic.]

a hundred years after its ascendancy, its appreciation is manifest."

The photographic illustrations, it should be added, are excellently reproduced. The frontispiece to the volume is from a painting by Edward Stratton Holloway of a typical home in the Greek Revival style in Nantucket, Massachusetts.

FREDERIC WHYTE

The Domestic Architecture of the Early American Republic: The Greek Revival. By Howard Major, A.I.A. Lippincott. 3 guineas.

GERMAN RENAISSANCE

It is only six months ago since an authoritative book on the German Building Art of the Renaissance, published in Munich, was reviewed here. Now there comes along from Berlin a no less authoritative, and even more extensive work on the same subject. The two books cover the same ground but not in the same way. Each one is admirably copious both as to text and illustration; each one provides a generous survey of its subject; taken together, that subject is now most adequately, if not absolutely exhaustively treated.

The architecture of the German Renaissance is a subject which lends itself to romantic treatment as in other Renaissance work, but it conveys the sense of a more serious form of romance than either Italian or French. It is German romance in which the elements are less sprightly. It is a burgher form of romanticism rather than aristocratic, in spite of the large part which German nobles took in it. The *Schloss* was a potent factor, but no less potent were those of the churches and public buildings, and no less were the houses of the burgher population. It is on these lines that Carl Horst treats his subject, picturesquely but systematically. He succeeds in making living pictures of the conditions of the times, and generally imparts a practical turn by including plans of buildings among his other illustrations. In German architecture there is an indigenous character which proceeds from the Gothic. Gothic suited the German character and clung to it for as long as possible. German Renaissance is less of a break-away than is usual; classical elements were longer in taking hold, and retained earlier characteristics for longer periods, taking advantage of baroque as soon as possible. Changed as was the aspect of many a German town by the Renaissance, there still held a medieval feeling which, in the smaller and less known towns, is retained at the present day.

A sober love of beauty persisted uninterruptedly through the centuries. The Gothic cathedral, so spontaneous in its exposition, centred the burgher interest and incited it to emulation. The classical factor was alien, and not particularly welcome. The classical work of the period, however, has a special beauty of its own, not wholly underivative, but thoroughly acclimatized. In the Rathaus at Augsburg, by Elias Holl, is an example of the least typical German classical work, while between this and the thoroughly German Paderborn Rathaus is that at Emden. In the first two, as in many others, the love of beauty possessed by the burghers is seen in the provision of the fountain in front, that at Augsburg being one of the most celebrated in Europe. These fountains are typical and are to be found very widely. They vary in ambition, as they are widely various in design, architectural or sculptural, from the simple basin with group at Gera to the elaborately ornamented market fountain in Mainz, and the more artful creations of the garden architects at Munich.

The cathedrals and the fountains are rivalled in interest by the churches which the burghers built for themselves, lavishing their warm wealth on their inside and out. Catholic, Protestant, Jewish vied with each other, evolving a few types with many variations. The burghers raised high towers and belfries to mark their pride in their town halls. In the towns in which this wealth was being accumulated through commerce, trade guilds erected their halls, and even the members of the trades built dignified warehouses such as the Kornhaus at Bremen, which is a fine example of how to be plain without being ugly. The domestic architecture was no less rich than the public buildings, intimating the innate love of beauty of the burghers, while the great State buildings to be found in some of the capital cities dominated all in their grandeur.

The satisfying richness of the whole field of German Renaissance architecture may be summarily judged by a glance at the indexes of the text and the plates of this very generous book. Some of

the towns have twenty to thirty references—Brunswick, Dantzig, Frankfort-on-the-Main, Hildesheim, Nuremberg, Munster, showing that it is not only in their medieval architecture that these places are so rich. Good points of this book are its insistence on the burgher influence, its descriptions of the architecture of the less known towns, and its illustration of architectural, sculptural and carving details in belfries, fountains, fronts of houses, windows and doorways, pulpits and screens. There is a wealth of solid good taste, some flights of fancy and even fantasy, and a free use of native talent, which is derived from French or Italian sources and evolved from an artistic civic consciousness.

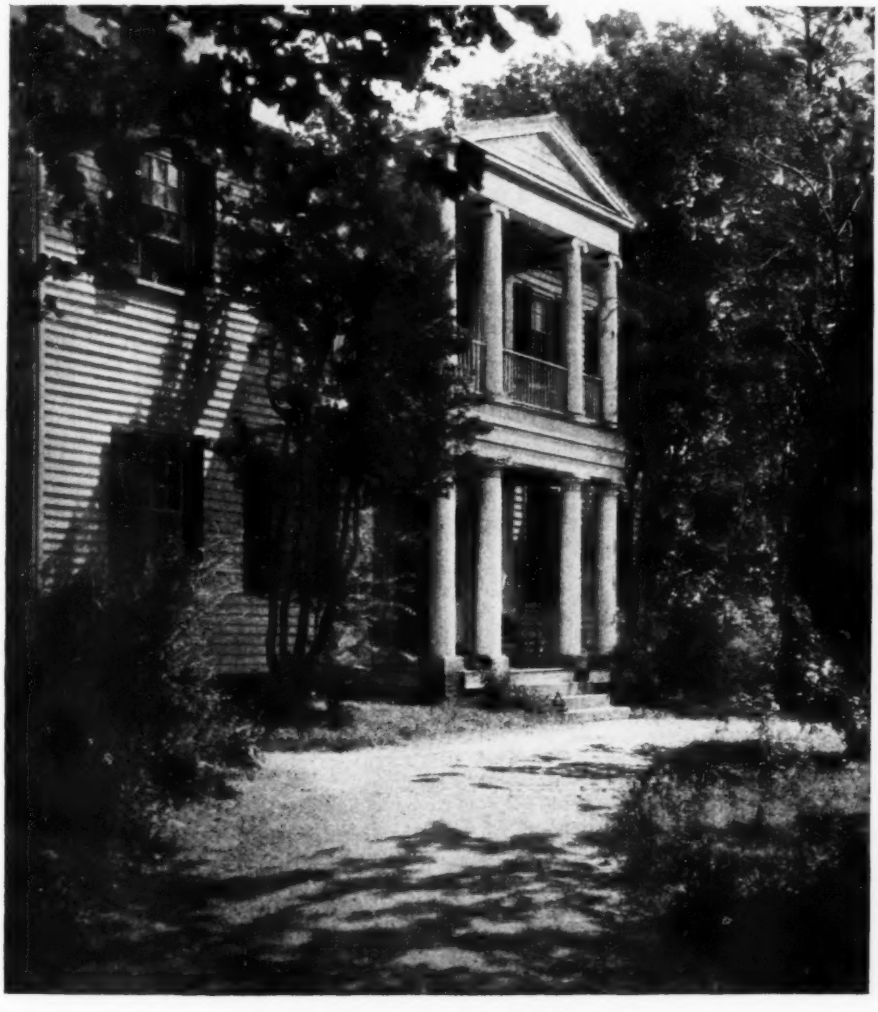
KINETON PARKES

☛ *Die Architektur der Deutschen Renaissance*, von Carl Horst. Berlin: Im Propylaen-Verlag. La. 8vo, pp. 327 (illus. 217) + plates xvi.

BUILDING SCIENCE ABSTRACTS

These building science abstracts are compiled by the Building Research Station, and are published in conjunction with the Institute of Builders. The abstracts may be taken as fair summaries of the original literature, though, of course, the Building Research Station cannot accept responsibility for the accuracy of the various authors' statements.

Such a catalogue should prove a most useful guide to students of building science when selecting records of former experiments. Many of the publications dealt with are only to be found in the particular journals of technical associations and societies, where they would be effectively hidden unless some kindly explorer had brought them to light and given some account of their nature. Works upon several different subjects have been examined and their contents classified in the present volume, whose contents include references to the materials of construction, and of decoration, the elements of structures, housing and domestic engineering, and specialized construction. In this last chapter, item 942, a brief account is given of "The failure of the St. Francis Dam, Los Angeles, California; F. A. Noetzli. *Engineering*, 1928, 125 (3247), 419-22. A description illustrated by photographs and diagrams is given of the St. Francis poured concrete dam, both prior to and after its collapse, shortly before midnight of March 12, 1928. The structure consisted of a main dam, about 700 ft. long and 206 ft. high, and of a low wing wall 550 ft. long. The concrete aggregate was obtained from a local gravel pit, and was used unwashed and unscreened. One barrel (360 lb.) of a standard brand of cement was used per cubic yard of concrete. After the collapse there remained of the dam only a centre portion, about 75 ft. long, and the wing wall. Although vertical cracks, from 30 ft. to 70 ft. apart, had developed in the dam prior to the failure, but little leakage occurred, and these cracks



Martichal Residence, Raleigh, North Carolina.
[*From* The Domestic Architecture of the Early American Republic.]

were not considered to have materially affected stability. The causes of the collapse are under investigation."

Several of the works examined and commented upon refer to practical field tests of materials, a subject of the utmost importance to constructors. In others, prices and durability of materials are dealt with, and the publication is certainly one which no person interested in building science can afford to ignore.

WILLIAM HARVEY

Building Science Abstracts, vol. i (new series), No. 5. May 1928. Abstracts Nos. 739, 951. London: Department of Scientific and Industrial Research. Published under the authority of His Majesty's Stationery Office. Price 9d. net; annual subscription 10s. net.

MR. POLEY'S ST. PAUL'S

This book is a fine monument to St. Paul's and its architect, and should be in every gentleman's library. The volume includes an introduction by Sir Reginald Blomfield, Mr. Poley's own preface and introduction, a short history of old St. Paul's, notes on Wren, his cathedral and craftsmen, thirty-two plates and four illustrations in the text, and two appendices on churchmen and music. The format is excellent; the title page is especially well designed; the whole is printed on thick handmade paper, a dead white colour. I think a thinner paper might have given tone and an even cleaner line. A stronger insistence on the purely architectural rather than the generally interesting side of the cathedral might have been obtained by placing the plans, sections, elevations, details, and perspectives in the order named, immediately after the introductions, which should have included a definite statement of Wren's "programme." After the drawings might have come a reasoned critique of the design, or a symposium of what the best authorities have said, rather than the notices on the later churchmen and organists. Certain of Mr. Poley's observations are open to question; for instance, that "every one of Wren's fifty spires was but some brilliant skirmish," etc.; it is apparent that Wren was defeated in some of these skirmishes. Again, Mr. Poley writes of the "sincerity . . . simplicity . . . directness" of the design of St. Paul's. Many writers on the subject have pointed out the cleverness, slickness, and expediency in it, and the falsity of certain parts. It is probably the most artificial of the great designs of the world. The flank walls which are merely screens in their upper parts; the division of these walls into two stages by two orders, as though nave and chancel were of two stories; the useless gallery over the west portico; the two domes (like the Restoration petticoats, one to rustle and one to show); the appearance of the lantern sitting on the dome when really it is supported on a brick cone; the concealed windows at the top of the external dome—these things do not mean sincerity, simplicity, and directness, but subtlety, artificiality, and allusiveness. The result is the most charming piece of architecture; but it has not the moral quality of either St. Peter's, with its sacrament-like correspondence between the outward and the inward, or of the Escorial, with its austerity, to name two buildings of comparable size and scale. On page 12 there might have been a mention of the bells, and they should have been indicated on plate XXI.

The plates on the whole are extraordinarily complete and, so far as I have ascertained, exact. There is only one important omission, namely, the internal pavement. A small patch of this is shown near the west portico, and the star jointing of the floor at the base of the geometrical stair; it is barely mentioned in the text. It should be stated if the pavement is entirely Wren's, including the very intricate paving under the dome, and of what the materials consist. The fact that the Latin plan was chosen for ritual purposes suggests that the planning of the pavement would have had considerable thought, that it would have marked processional routes and the path to the altar, as well as reflected the lines of the domes and indicated the construction of the floor. The smaller omissions are the altar itself (is the present one original?); the fine window buttress in the library (a most successful example of its kind); the detailed work in the vestries; the old pulpit (now in use again), and the organ casing.

Coming to the consideration of individual plates, the three perspectives and certain others are in line with wash shading and are good, but the pure line drawings are better, so that I cannot help wishing that all the drawings had been left in this state. Plate III, the west elevation, is the best of the shaded drawings, and gives adequately the superb pyramidal composition. The shading, however, glosses over the extraordinary effect of the actual building, i.e. the effect of the dome coming over and across the west front as though the latter were merely a row of footlights. This is partly due to the strength of the outline against the sky, partly to the bold modelling of the dome and partly to the quality of design in the dome excelling that of any other part. Plate V shows a section of the west portico, and I wonder if the Duke of York made Wren put that gallery of the upper order. Did he think what a platform was here, from which some future cardinal might give a benediction? Plate VI is of the lantern over the dome, a most interesting and well-drawn detail which should make a layman realize the risk as well as the drudgery and art of measuring the work. Plate VIII is the south elevation, and is the best of the series in spite of the carving having printed a little too dark. There is a subtle silvery effect in this drawing; it is convincing of the soft, sensuous beauty and seduction of the design. It reminds at once of Wren's *cri du cœur*, that the dome was a form of "wonderful grace." With him the dome never ceased to be the thing; and all else was sacrificed or subordinated to it. In his first or "model" design the dome was larger and, being on the Greek cross plan, the limbs of the church were gathered closer together, so that at the re-entrant quadrants the outer walls came nearly to the dome's feet. In effect there was little else but dome, as can be seen in the model itself. After the rejection of the model, Wren still obtained his effect. He was that mild type of man against whose obstinacy the strong people of the world are worn down. The result of the Latin cross plan was that Wren brought in the second (upper) order of the flanks, considerably less than the lower order and the peristyle order which are about equal; he gave the drum, peristyle, and dome a bolder modelling than the flanks, which are subdued and subordinated; not only the artificiality of the design was increased, but even more so its subtle charm. To some the "wonderful grace" of the dome makes the building incomparable; personally I acknowledge a beauty nearer divine in the direct severity of the Escorial, or even in the tragic depths and lines of Hawksmoor's steeples.

Plate IX, the longitudinal section, is again a fine drawing of similar effect. Plate XII shows a well-drawn section of the western tower, with its beautiful legerdemain of square, circle, and inverted quadrant on plan. Plate XXVI is the loveliest of the detail drawings: it is of the thrones and stalls; it gives not only the facts, but the suggestion of the grand, voluptuous modelling. Plate XXVII, of the screen behind the stalls, is almost as good. Plate XXXI gives details of Tijou's ironwork, and XXXII gives many of the stone full-size sections.

The plates of the interior, showing the sections through the screen walls and the artifices in the construction of the domes, impress on the mind that combination of artificiality and charm with which Wren has marked the building. Carlyle's salute to him as a "gentleman" nowhere comes with a truer appellation, and nowhere has arrived a more thorough exposition of that "gentlemanlike" species of mind which distinguished the age of the Stuarts and Hanoverians. Its very perfection in St. Paul's almost makes it a vehicle of religion. It is not the full, sensuous beauty which prevents the consummation of its effect in worship, but the combination of this sensuousness with artificiality to give the glamour of the historic gentleman. Elsewhere it is good for me to remember I am a gentleman, but in church it is better for me to confess myself a fool.

The extracts from the accounts are quite the most interesting part of the text, and altogether Mr. Poley is to be congratulated on this magnificent record of Wren's most nearly perfect and greatest work in which he enshrined the spirit of an epoch. Only patience, devotion, and courage could have brought Mr. Poley's endeavour to such a satisfactory issue.

P. M. STRATTON

St. Paul's. By A. F. Poley, Willowbank, Hampton Hill, Middlesex. Folio. £7 7s. net.

ENGLISH PRECEDENT

24 *Decimus Burton is probably most famous for his two triumphal entrances at Hyde Park Corner, and the Athenæum Club in Pall Mall. But, among many other works, he also designed the new town and port of Fleetwood-on-Wyre in Lancashire. The photograph shows the smaller of the two lighthouses belonging to the harbour. The columns are of Grecian Doric outline, but are not fluted. The brackets of the balcony are reminiscent of those which Burton used at the Athenæum, but differ in proportion.*

IN PARLIAMENT

[BY OUR SPECIAL REPRESENTATIVE]

MR. HURD asked the Minister of Health if he would publish in the official report, for the information of members, the notice which he was issuing to local authorities of the formation of advisory panels of architects and others to give free advice upon the reconditioning of cottages and other buildings under the Housing (Rural Workers) Act, 1926, so as not to destroy their picturesque appearance or their historical associations?

Mr. Chamberlain said that he was proposing to issue a circular to local authorities, drawing their attention to the formation of the advisory panels in question, and it would perhaps meet Mr. Hurd's object if, when the circular was sent out, copies were placed in the library of the House of Commons.

Mr. Briant asked the Minister of Health if he was intending to make further proposals to deal with the shortage of houses and the admitted prevalence of overcrowding in many industrial districts?

Mr. Chamberlain said that the legislation under which a very large contribution to the housing needs of the country had already been made, and which involved substantial contributions from the Exchequer, was still in force and it was not at present contemplated that there should be further legislation on that subject.

Sir Robert Thomas inquired whether the Minister of Health, in view of the fact that open spaces in central London, such as the site of the Foundling Hospital, came from time to time into the market and were purchased for the erection of buildings for private profit, and that there was at present no law to restrain this, would consider introducing legislation enacting that within certain congested areas in London no building should be permitted in future upon land not previously built upon?

Sir Kingsley Wood said that the member doubted whether the proposal in the question was the best way to deal with the matter, quite apart from questions as to its equity. He hoped, when a favourable opportunity occurred, to introduce legislation for the town planning of developed areas.

Mr. Chamberlain stated that he proposed to make an announcement on the Rent Restriction Acts before the House rose for the summer recess.

Mr. Chamberlain informed Mr. Drewe that, up to June 30, applications had been received under the Housing (Rural Workers) Act, 1926, for assistance in respect of 180 dwellings in the County of Devon. At the same date assistance had been promised in respect of seventy-five dwellings, and work had been finished on nine dwellings and was in progress on sixty-six dwellings.

Mr. Ammon asked the Minister of Transport whether he could make a statement as to the proposed new road to be made in the neighbourhood of Jordans?

Colonel Ashley replied that the local authority were studying town planning proposals for their area, and in examining any road schemes that might be submitted to him from that neighbourhood he would have the fullest regard to the special circumstances affecting the Jordans Meeting House.

Mr. Harris asked the President of the Board of Education if he would state what was the present constitution of the committee appointed by him to advise upon the planning of school buildings; what were the names of the members of the committee; what were the terms of reference; was it intended to publish a report; and, in view of the abrogation of the building regulations, was it proposed to issue a circular or memorandum indicating generally the views of the Board with regard to the planning of school buildings, as in the case of other matters of educational interest and policy?

Lord E. Percy said he hoped that the results of the Committee's inquiries would be published in the autumn. The Committee was at present constituted as follows: Sir Frank Baines, C.V.O., C.B.E., F.R.I.B.A. (Chairman); Sir G. F. N. Clay, F.R.I.B.A.; Mr. G. Topham Forrest, F.R.S.E., F.R.I.B.A., F.G.S.; with Mr. A. F. Birch-Jones, M.C. (Secretary). The late Sir Charles Ruthen,

The head offices of the Westminster Bank, Lothbury, E.C. By Mewes & Davis. [From a perspective by J. D. M. Harvey.] The building is in course of construction.

Director-General of Housing, Ministry of Health, was also a member of the Committee. The terms of reference were: "To inquire and report as to the construction of school buildings with special reference to—1: The use of new materials and methods of construction; and 2: The reduction of cost."

LAW REPORTS

ANCIENT LIGHT DISPUTE AT SOUTHSEA. COURT OF APPEAL JUDGMENT AWARDING DAMAGES

Maybury and Another v. *Spickernell. Court of Appeal. Before the Master of the Rolls and Lords Justices Lawrence and Russell*

This was an appeal by the plaintiffs, Dr. Amelius Victor Maybury and Mr. Benjamin Ware, the owner and tenant respectively of 69 Bradford Road, Southsea, from a judgment of Mr. Justice Clauson, sitting in the Chancery Division, dismissing the action which the plaintiffs brought against Mr. F. J. Spickernell, for a mandatory order upon the latter to pull down so much of the western wall of his cinema at the corner of Bradford Road and Victoria Road, Southsea, as obstructed the light to the ancient windows of the plaintiffs'. The plaintiffs also claimed damages.

The defendant, Mr. Spickernell, contended there was sufficient light for the requirements of ordinary mankind, and while denying liability, paid £50 into Court for Dr. Maybury, and £20 for Mr. Ware as sufficient compensation for any damage they had sustained.

The short facts were that, before the cinema was built last November, the site consisted of two small cottages 80 ft. away from the plaintiffs' house with a nicely-kept garden between. The western wall of the cinema was 34 ft. to 35 ft. high and was only 10 ft. away from plaintiffs' windows. The case for the plaintiffs was that, whereas before the cinema was erected the living-room, sitting-room and scullery of plaintiffs' house were bright and cheerful, they were now "dark, dismal, and depressing," and that the staircase was positively dangerous.

At the conclusion of a great amount of expert evidence, Mr. Justice Clauson came to the conclusion that the case fell on the side of partial inconvenience and not real injury, and that the plaintiffs had no cause of action. He accordingly dismissed the action with costs and made an order for the payment out to the defendant of the two sums he had paid into Court. From this result the plaintiffs now appealed.

Mr. Jenkins, K.C., for appellants, having read the evidence given at the trial, contended that the plaintiffs were entitled to the injunction claimed, but failing that, to substantial damages, having regard to the diminution in the value of the plaintiffs' house as a consequence of the defendant's building. He submitted that the value of the reversion of the house had diminished to the extent of £250 by reason of the defendant's building. In addition to that he submitted the tenant was entitled to damages amounting to £60 or £70.

After the conclusion of the case for the appellants, Mr. Manning, K.C., supported the judgment of Mr. Justice Clauson. He said the judge on the evidence found there was enough light left to the plaintiffs' house for ordinary purposes.

Lord Justice Lawrence said the test laid down by the decided cases was whether the privation of the access of light was so substantial as to render the occupation of the plaintiffs' house uncomfortable or less suitable for the purposes of occupation.

Mr. Manning said Mr. Justice Clauson had stated that if he had decided in favour of the plaintiffs the amount of damages would have been very small and not enough to give the plaintiffs a cause of action. The defendant did not deny that his building took away some light from the plaintiffs' house, but his case was that the damage to the house as a whole did not amount to an actionable nuisance.

In giving judgment allowing the appeal, the Master of the Rolls said the case presented many difficulties to the judge who had tried the case. The judge had said that the plaintiffs had failed to make out their cause of action and dismissed the action. It was undoubtedly true that the Court of Appeal very rarely disagreed with the decision of the judge of first instance on a question of fact, but there were some cases in which it was necessary to interfere with the decision of the Court below, and this was one of them. It appeared to him that the law which had been applied to the facts by the judge had not resulted in a right conclusion. It was more on a question of law than a question of fact that he disagreed with the decision of the learned judge. Having referred to the facts of the case and the evidence the Master of the Rolls said that although it was shown that there had been substantial interference with the light to the plaintiffs' house, the judge had held that did not amount to an actionable nuisance.

Having referred to the leading cases on the subject his lordship said that what they had to decide was whether there had been real injury to the plaintiffs by reason of the defendant's building. He thought there had. There had been no rushing up of the wall by the defendant who, it was right to say, had acted quite reasonably throughout. In the circumstances the Court would not grant the injunction asked for, but would give the plaintiffs damages which they would assess themselves.

To Dr. Maybury they assessed the damages at £200, and to the tenant at £50, for which amount they would have judgment with the costs of the action and of the appeal.

The Lords Justices concurred.

COMPETITION CALENDAR

The conditions of the following competitions have been received by the R.I.B.A.:

July 30. New Town Hall in West Marlands, for the County Borough Council of Southampton. Assessor: Mr. H. Austen Hall, F.R.I.B.A. Premiums: £500, £300, £150. Total cost not to exceed £385,000. Particulars from the Town Clerk, Municipal Offices, Southampton.

September 1. The Council of the R.I.B.A. have accepted an offer from the directors of the Gloster Aircraft Co., Ltd., and Messrs. H. H. Martyn & Co., Ltd., to give a prize for the best imaginative scheme for a London aircraft terminus suitable to the supposed requirements of air traffic fifteen years hence. The competition is open to Associates, elected Students, or registered Probationers of the R.I.B.A. below the age of thirty years on September 1. The competition will be in two stages. From the preliminary competition ten competitors will be selected for the final, and each will be paid £5 for his expenses. The closing date for the final is January 10. There will be two prizes in the final, a first prize of £125 and a second prize of £25. The following have consented to form the jury to award the prizes: Sir Sefton Brancker, K.C.B., Mr. C. Cowles-Voysey, Mr. E. Vincent Harris, Sir Edwin Lutyens, R.A., Major R. Mayo (consulting engineer, Imperial Airways, Ltd.), Mr. T. S. Tait, Mr. Maurice E. Webb, Mr. G. E. Woods-Humphery (general manager, Imperial Airways, Ltd.). Particulars may be obtained free on application at the R.I.B.A.

September 5. School at Rickmansworth to accommodate 400 senior girls, for the governors of Royal Masonic Institution for Girls. Assessor: Mr. H. V. Ashley, F.R.I.B.A. Premiums: £750, £500, £400, £300 and £200. Particulars from Mr. M. Beachcroft, 31 Great Queen Street, W.C.2. Deposit £2 2s.

September 29. The British Portland Cement Association, Ltd., is offering awards for the best concrete houses erected during the current year. These awards are offered for work that has been actually designed and constructed. The prize awards will be as follows: To architects, 1st prize, £100; 2nd prize, £50; to builders, to the builder of the house awarded the 1st prize, £50; 2nd prize, £25. Assessor: Mr. E. Guy Dawber, A.R.A. Any concrete house or bungalow, the contract price of which is from £500 to £2,000, designed and erected in Great Britain under the supervision of an architect, is eligible. Houses must conform to the following requirements: 1: Only cement of British manufacture shall have been specified and used, with the exception of white cement which only may be used for obtaining special effects; 2: Concrete must be used for the roof of houses where a flat roof is called for. The covering for other types of roof must be pre-cast concrete tiles except where extra expense is entailed by the employment of this latter form of covering. The actual construction must be completed by the end of 1928 in order that the prizes may be awarded early in 1929. Further particulars from The British Portland Cement Association, Ltd., 20 Dartmouth Street, London, S.W.1

SOCIETIES AND SCHOOLS

The Tite Prize

The Council of the R.I.B.A. have decided that in future the competition for the Tite Prize shall be confined to those who have passed the R.I.B.A. Intermediate or equivalent examination, or who produce certificates from responsible architects to the effect that they have reached the required standard. Students who, at the time of taking the final *en loge* competition, will have sat for the R.I.B.A. Final or equivalent examination will not be eligible to compete.

R.I.B.A. Maintenance Scholarships

The Council of the R.I.B.A. announce the following awards of R.I.B.A. Maintenance Scholarships in Architecture:

The A.G.B.I. Maintenance Scholarship. This scholarship, which was awarded to J. F. D. Wylson, of Whitstable, Kent, in 1927, has been renewed for a second year. It is of £100 in value and is tenable for a maximum period of three years from the date of award.

The R.I.B.A. Maintenance Scholarships. In 1926 scholarships tenable, subject to satisfactory progress, for three years, were awarded to: B. I. Day (School of Architecture, R.W.A., Bristol); E. L. W. Davies (Bartlett School of Architecture, University of London); E. J. White (Bartlett School of Architecture, University of London); H. Jackson (School of Architecture, Birmingham); A. K. Brown (School of Architecture, Armstrong College, Newcastle-upon-Tyne). These scholarships have been renewed in each case for the third year.

The R.I.B.A. Fourth and Fifth Year Maintenance Scholarship. This scholarship, which was awarded to C. J. Bartlett, of the Welsh School of Architecture, Cardiff, in 1927, has been renewed for another year. It is of the value of £100 and is tenable, subject to satisfactory progress, for two years in the fourth and fifth year courses at a School of Architecture recognized by the R.I.B.A. by a student who has already completed a three years' course in a recognized school.

Incorporated Association of Architects and Surveyors

Major R. I. Tasker, M.P. for East Islington and Chairman of the London County Council's Building Acts Committee, has been elected President of the Incorporated Association of Architects and Surveyors, in succession to the late Mr. V. A. Lawson, A.M.I.C.E., F.I.A.A.

Essex Society of Architects: West Essex Chapter

The second of the series of conferences with educationists, under the auspices of the West Essex Chapter of the Essex Society of Architects, was held at Romford, when the schoolmasters of the district were well represented, and engaged in a very warm debate on the subject of the teaching of architecture in the schools. The lecturer was Mr. Neil Martin-Kaye, A.R.I.B.A., the head of the Department of Architecture at the School of Arts and Crafts, Southend-on-Sea. With the help of the blackboard he gave a graphic description of his methods of teaching the appreciation of proportion, balance and scale, not only as it affected architecture, but as it affected the capacity for appreciation of art generally. It was this aspect of the case that was emphasized, as it was realized that an appreciation of good manners in architecture would of necessity follow. In the subsequent discussion the educationists stressed the need for an improved status for the subject of architecture at our universities generally; a much improved status regarding the emoluments of those engaged in its practice; a recognition in all our schools of the necessity for accommodation for teaching art in all its branches; a great reduction in the present size of classes where kindred subjects are taught, particularly in elementary schools; professional guidance in visits by scholars to buildings; and, above all, the necessity for suitable text-books and pictures.

Structural Engineers' Scholarship

The annual travelling scholarship, value £300 (this year named the "Dorman Long" scholarship), has been awarded by the jury of the Institution of Structural Engineers to Mr. George Caddell, of New Ferry, Cheshire, who also receives the gold medal which the Institution couples with the money award. The competition for the scholarship is one in design, and this year the candidates were required to re-design the Royal Exchange as a modern steel-frame building. Mr. George Caddell, who is forty-seven years of age, was admitted to membership of the Institution in 1922, and has for some years served as honorary secretary of the Institution's Lancashire and Cheshire Branch. He is now in private practice in Liverpool and Manchester.

The Bartlett School of Architecture

The following awards have been made at University College in the Bartlett School of Architecture:

Entrance Exhibition: N. Brandon-Jones of Berkhampsted School.

Donaldson Silver Medal (subject to confirmation by the Royal Institute of British Architects): W. G. D. Anderson.

Herbert Batsford Prize: F. E. Kerswill.

Ronald Jones Prizes: Renaissance Architecture, F. W. Holder; Mediæval Architecture, E. F. Starling.

THE ARCHITECTS' JOURNAL Prize (for best final design produced in the day school by a fourth year student): E. D. Steel.

The Builder Prizes (for the best sets of measured drawings of old work): Senior, R. N. Earle; Junior, E. J. White.

Prize for Design in Ferro-concrete (by a member of the atelier). Subject—A clock tower: S. G. Chaplin.

Walston Prize (for design by a member of the atelier). Subject—A petrol station: A. E. Barnard.

The following have obtained the Certificate in Architecture: J. Buch, Joan R. Drury, R. N. Earle, W. A. Phillips, A. Schneider, E. D. Steel.

The following have obtained the Certificate in Town Planning: H. G. Avery, L. G. Booen, T. C. Coote, Eleanor K. D. Hughes, C. L. Tatham.

Training in Decoration

"Decoration" has for many years formed part of the course of training in architecture provided at the Bartlett School in the University of London; it has also been effectively taught and practised at the "Slade," which also forms part of University College. The Incorporated Institute of British Decorators have founded, in the first instance for three years, a lectureship in decoration in the Bartlett School of Architecture for the purpose of improving and extending the training in decoration. Mr. H. Warren Wilson, A.R.C.A., has been appointed to it. He will assist in the teaching of decoration to architectural students; he will also, under the professor of architecture, be responsible for a new division of decoration. A full-time certificate course occupying three sessions has been instituted for those who wish to make the practice of decoration their calling in life. The course will include construction, historic ornament and the orders of architecture, design and principles of ornament, chemistry of painters' materials, drawing and anatomy, heraldry and lettering, history of architecture, sculpture and painting, figure composition and the various methods of mural painting. Associated in the work with Professor Richardson and Mr. Warren Wilson there will be Mr. Arthur Stratton, Mr. Corfiate, and the rest of the staff of the Bartlett School; the co-operation of the Slade School under Professor Tonks is secured and there are also available the resources of the departments of Archæology (Professor Ernest Gardner), and of Egyptology (Professor Sir Flinders Petrie). A pamphlet describing the whole scheme may be had from the Secretary of University College, London.

WESTMINSTER BANK

The directors of Westminster Bank Limited have declared an interim dividend of 10 per cent. for the half-year ended June 30 on the £20 shares, and the maximum dividend of 6¼ per cent. on the £1 shares for the same period. The dividends, 10s. per share and 1s. 3d. per share respectively (both less income-tax) will be payable on August 1.

TRADE NOTES

Messrs. Redpath Brown & Co., Ltd., have just published a new edition of their *Handbook of Structural Steelwork*. The work is an entirely new one applicable to the new British Standard Sections (1920 revision), and is not a reprint of the handbook, dealing with the sections standardized in 1904, and issued in 1913, which it supersedes. The author of the new handbook, and also of the previous one, is Mr. W. Basil Scott, M.I.STRUCT.E., chief engineer for the firm at Edinburgh. In the new edition the special features of the previous handbook are retained. These features include a very extensive range of compound girders and pillars of various types; dimensions, properties, and safe loads for all sections presented on two facing pages; safe loads on pillars, both by the Moncrieff and by the London County Council pillar formulæ; and copious explanatory notes. As most of our readers are aware, the handbook is not a trade catalogue. It is an engineering compilation facilitating the design and detailing of structural steelwork, and it is used as such by the architectural and engineering professions and the structural steel trade generally. The handbook is not for sale, but is distributed by Messrs. Redpath Brown & Co., Ltd., to architects, engineers, and approved applicants.

You can only obtain density of concrete and avoid interstices by subjecting the concrete to enormous pressure. This statement is made in a booklet issued by Messrs. Langley (London), Ltd., on Stelcon flags and kerbs, and supported by interesting illustrations. One illustration shows a slab of the firm's concrete which is manufactured under a pressure of 250 tons per square foot, and consequently is claimed to be free from interstices. Steel-clad porphyry (granite) flags in a size and weight convenient for a man to handle easily are made under such pressure. The firm claim that a Stelcon steel-clad floor is free from dust, is easy to clean, and wears evenly. The flags have been laid in works and warehouses of every description, railway platforms, corridors in hospitals and schools, pavements in big cities, terraces, promenades, etc.; in fact, wherever a floor is subject to heavy wear and tear. They can be delivered in red, black, yellow, blue, brown, and green.

Some interesting illustrations of St. Mary Abbott's Court, Warwick Gardens, Kensington—a block of high-class flats, erected from the designs of Messrs. Joseph and Mr. C. H. Roberts, A.R.I.B.A., joint architects, and in which about 4,250 Nautilus flue blocks have been used, are reproduced in *Doing Away with Chimney-Breasts*, a booklet, the sixth edition of which has just been issued by the Nautilus Fire Co., Ltd. It is stated that the Nautilus economy flue has many incidental advantages alike to architects, builders, owners, and tenants. Floor space is saved and cubic contents are increased in the absence of projecting chimney-breasts. A wider range of design is opened up to the architect, for the fireplace can be installed at the most convenient point in each room, irrespective of those in the rooms above and below. Nautilus flues can be used in buildings constructed of any material. Indeed, in houses in which the chimney would be the only part built of brick their particular utility is evident. They can be built against, or into, a partition wall, and have often furnished the most satisfactory solution of the problem of heating rooms created by partitioning-off, as in the conversion of a large house into a block of flats. With all their advantages, which apply equally to large and to small buildings, it is not surprising that Nautilus economy flues are being adopted in increasing numbers in different types of building throughout the country. They have received the unqualified approval of the Ministry of Health, the London County Council, and other authorities. The booklet undoubtedly represents the most complete literature on the subject of economy flues in existence.

The chairman and members of the B.E.D.A. Refrigeration Committee inspected the refrigerator works of Messrs. Electrolux, Ltd., at Luton. At the luncheon held prior to the inspection, Mr. J. G. A. Berg, executive manager of Messrs. Electrolux, said that refrigerators were more than food-cupboards. They gave cleanliness and hygiene in foodstuffs. They did not kill the bacteria in food, but retarded the growth. Bacteria thrived at a temperature of over 50 deg. F., but under 50 deg. no multiplication took place. This was the object and the purpose of refrigerators. Refrigerators now marketed by British manufacturers were entirely satisfactory, efficient, and cheap in running costs. Congratulations and thanks were due to the E.D.A. for the splendid work they had done and were doing in educational work. At that moment 1,100 showroom windows throughout the country were giving special refrigeration displays. It was only by such collaboration that the movement could be crowned with success. In closing, Mr. Berg stated that he had asked two questions which would be answered by Mr. T. Hall, borough engineer of Burton-on-Trent and chairman of the E.D.A. Refrigeration Subcommittee, and by Mr. J. Raymond, hon. secretary of the British Association of Refrigeration.

The first was: "What is the use of refrigeration to the supply industry?" and Mr. Hall, in his reply, outlined that it was of special value to the electric supply companies. He estimated that the extra yearly consumption of electricity for each household using a refrigerator would be 300 units. In Mr. Hall's home town there were 10,000 houses, and he considered that at least 2,500 of these would ere long become refrigerator users. It was evident, therefore, that the refrigeration load was very desirable indeed. The cause for electrical refrigeration would be considerably strengthened, he said, if the current was at a lower rate, and he hoped the time would speedily come when this would be possible.

Mr. Raymond, replying to the second question, "Will refrigeration come?" said he was of the opinion that it had already done so. Refrigeration had been of secret national service for a long time; over 100 industries were occupied in supplying the demands. It was, perhaps, not generally known that refrigerators were used in the manufacture of artificial silk, in blast furnaces for the manufacture of steel, and to obtain the "glossy" appearance on chocolates. These were only a few of the many industries in which refrigeration was used, said Mr. Raymond.

NEW INVENTIONS

[The following particulars of new inventions are specially compiled for THE ARCHITECTS' JOURNAL, by permission of the Controller of H.M. Stationery Office, by our own patent expert. All inquiries concerning inventions, patents, and specifications should be addressed to the Editor, 9 Queen Anne's Gate, Westminster, S.W.1. For copies of the full specifications here enumerated readers should apply to the Patent Office, 25 Southampton Buildings, London, W.C.2. The price is 1s. each.]

LATEST PATENT APPLICATIONS

17607. Heath, F. T. Building construction. June 18.
17895. Jaeger, G. Loader-agitators for concrete-mixing machines. June 20.
18258. Metallbank und Metallurgische Ges. Akt.-Ges. Roof, etc., coverings. June 23.
18138. Morriss, F. E. Collapsible building structures. June 22.
17574. Smith, A. F. Manufacture of concrete bricks, etc. June 18.

SPECIFICATIONS PUBLISHED

292191. Houston, J. D. Refrigerating, heating, and air-circulating systems.
292267. McNay, J. T. Metal reinforcements for concrete road foundations and other concrete structures.
281603. Item, J. Van. Gripping and lifting tackle for the handling and transport of building-blocks and the like.
292378. Page, A. H. Drawing, setting-out, and like instruments.
292388. Sticha, K., Hubacek, J., and Kenifl, J. Manufacture of marble substitutes.

ABSTRACT PUBLISHED

290038. Sorensen, H., P.O. Box 2191, San Francisco, U.S.A. Reinforced concrete.

THE WEEK'S BUILDING NEWS

The COLCHESTER Corporation has approved plans prepared by Mr. John Gairweather, F.R.I.B.A., for a new theatre, St. John's Street, to be erected for Messrs. E. H. Bostock and Sons, Ltd.

*

Plans passed by the COLCHESTER Corporation: Almshouses, Winsley Square, for the Trustees of Winsley's Charity; four houses, Turner Road, for Mr. E. Mower; shop, Folley Road, for Messrs. Goodey and Cressall; butcher's shop, Wimpole Road, for Colchester and East Essex Co-operative and Industrial Society, Ltd.; house, North Station Road, for Mr. A. T. Clarke; shop and house, Old Heath, for Mr. R. Bruce; warehouse and alterations to premises, Osborne Street, for Messrs. W. A. Hills and Son.

*

Plans passed by the EAST HAM Corporation: Two houses, Sheringham Avenue, for Mr. W. Geach; additions, coachbuilder's shop, St. Nicholas, Whitta Road, for London Co-operative Society, Ltd.; rearrangement of seats and alterations of floor, Empire Kinema, Barking Road, for Mr. G. Coles; F.R.I.B.A.; alterations, 175 High Street, for Messrs. J. Stokes and Sons; additions, Oddfellows' Hall, Denbigh Road, for Mr. T. S. Fone; alterations, 715-19 Romford Road, for Messrs. Heywood and Heywood; alterations, Picture Coliseum, Green Street, for Messrs. Scriven and Huxtable; four houses, Church Road, for Mr. G. H. Stickland; workroom, 407-13, Green Street, for Mr. T. J. Maycock; joinery store, Barking Road, for Messrs. Austins, Ltd.

*

Plans have been prepared by Messrs. T. A. Page and Son, architects, on behalf of Mr. Milton Swales, for the layout of the building estate at the corner of King George Road and Sunderland Road, SOUTH SHIELDS.

*

The AUDENSHAW U.D.C. has decided to grant a further forty housing subsidies.

*

The GLASGOW Corporation has considered an application by the Western Heritable Investment Co., Ltd., for a grant in respect of 1,308 houses of four apartments, proposed to be erected by them for letting purposes at King's Park, 552 of which will be within the city boundaries, and the remainder will be immediately without the boundaries, and the committee recommends application in respect of the 552 houses proposed to be erected within the city boundary.

*

The SMETHWICK Corporation is seeking sanction to raise a loan in respect of the cost of the new distribution workshops and premises, stores, etc., in Piddock Road, the estimated cost being £16,000.

*

A Wesleyan church is to be erected in Abbey Road, SMETHWICK.

The GLASGOW Corporation Baths Committee has purchased ground for the erection of baths and washhouses at: 1: Greenholme Street, Cathcart; 2: Wolseley Street and Fauldhouse Street, Hutchesontown; 3: Barrowfield Street, Mile End; and 4: Avenue Park Street, North Kelvin. The city engineer has been instructed to submit rough sketches of the proposed establishments showing the possible utilization of the ground in each case, along with an estimated cost of each establishment.

*

Plans passed by the GLASGOW Corporation: Forty-one bungalows, Hillington, Cardonald, for Mr. David Paul; three blocks of houses, Titwood Road and Carnmill Street, for Messrs. Andrew Paul; seventy-one houses, King's Park Avenue, for Messrs. Mactaggart and Mickel, Ltd.

*

Plans passed by the COULSDON U.D.C.: Six bungalows, Woodfield Hill, Coulsdon, for Mr. S. Jones; eight houses and garages, Riddlesdown Avenue, Purley, for Mr. G. Peskett; eight houses, Beverley Road, Whyteleafe, for Messrs. E. O'Sullivan, Ltd.; alterations and additions, Sanderstead Court, Sanderstead, for Mr. A. D. Sanderson; two houses, Old Lodge Lane, Purley, for Messrs. E. Best & Co.; sixteen garages, Sanderstead Court, Sanderstead, for Mr. Hugh Macintosh; building line for proposed houses, junction of Smitham Downs Road with Brighton Road, Purley, for Mr. R. D. Taylor; five houses, Addington Road, Selsdon, for Mr. B. Brown; hall, for religious purposes, Whytecliffe Road, Purley, for Mr. A. Beattie; eight houses, Addington Road, Sanderstead, for Messrs. Crowley Bros.; two bungalows, Old Lodge Lane, Purley, for Mr. H. Sykes; two houses and garages, Brighton Road, Purley, for Mr. R. D. Taylor; sixteen garages, Grovelands Road, Purley, for Mr. R. O. Baker; parochial hall, Rickman Hill, Coulsdon, for Messrs. J. D. Mathews, Son and Ridley.

*

The BIRMINGHAM Corporation has in view a scheme for the reconstruction of the Rotton Park destructor works at a cost of about £125,000.

*

The BIRMINGHAM Corporation Electricity Committee is acquiring property at Dale End at a cost of £30,000 for the provision of additional office accommodation for the department.

*

Plans passed at BURSLEM: Additions laboratory, Rolling Mills, Milton, for British Aluminium Co.; additions, biscuit factory, Newcastle Street, for Messrs. J. Maddock and Sons; two houses, Sneyd Street, for Mr. J. Jackson; two houses, High Lane, for Mr. C. Kearton; additions, Woodland Pottery, Williamson Street, for Messrs. W. H. Grindley & Co.

Plans passed by the WATFORD Corporation: Additions, Shepherds Road, for Watford Boys' Grammar School; additions, 83 and 85 High Street, for Messrs. H. Kingham; three houses, Nascott Avenue, for Mr. S. W. Cocks; extension to generating station, Cardiff Road, for the Watford Borough Electricity Department; ten houses, Bushey Mill Crescent, for Mr. John Goss; washhouse, etc., Rickmansworth Road, for the Watford Peace Memorial Hospital; four houses, Whippendell Road, for Mr. J. S. North; two houses, Kelmscott Crescent, for Messrs. Richards & Co.; six houses, St. Albans Road, for Mr. S. Horwood; alterations, 123 High Street, for Messrs. W. E. Pearkes; two houses, Bushey Mill Crescent, for Mr. R. Pratt; addition to saw-mill, Merton Road, for Messrs. W. H. Lavers and Sons; six houses, Wood Way, for Mr. A. J. Eldridge; four houses, Bushey Mill Crescent, for Mr. F. Pearce; twelve houses, Bushey Mill Crescent, for Messrs. T. Rolfe and Sons; alterations and additions, 6 and 9 The Parade, for Messrs. Clements; additions, Baptist Church, Farraline Road, for the trustees; two houses, Wood Way, for Mr. A. J. Eldridge.

*

Plans submitted to the ILFORD Corporation: Twenty-two houses, Waverley Gardens, for Mr. J. Aldridge; alterations and additions, 157-161 High Road, for Messrs. Hobden and Perri.

*

Plans submitted to the CROYDON Corporation: Ninety-one houses, Verdayne Avenue, for Mr. P. Richardson; four shops and houses, Wickham Road, for Mr. P. Richardson; five shops, houses and garages, Purley Way, for Mr. A. Andrews; six houses, The Glade, for Mr. P. Richardson.

*

The STOKE-ON-TRENT Corporation are compulsorily acquiring twenty-four acres at Swan Lane, Trent Vale, for a housing scheme.

*

Plans passed by the DORCHESTER Corporation: Stable and vegetable store, Bridport Road, for Mr. G. Clement Pope; booster house plant, Icen Way, for the Dorchester Gas and Coke Co., Ltd.; two houses, High Street, Fordington, for Mr. G. Hellard; repairs and alterations, 6 High West Street, for Colonel Sir R. Williams, V.D.

*

Plans passed at HANLEY: Three houses, Hammersley Street, for Messrs. W. Ball and Sons; five houses, Park Avenue, for Mr. H. Broad; alterations, 80 Piccadilly, for Messrs. Ridgway & Co.; alterations, Church Street, for Messrs. J. C. Sherwin and Sons; alterations, Etruria Pottery, for Messrs. Josiah Wedgwood and Sons, Ltd.; alterations, Etruria Road, for Weir and Haynes Glass Co.

Plans passed by the STOKE-ON-TRENT Corporation: Six houses, Trentham Road, for Messrs. Holloway & Co.; six houses, Nelson Road, Hartshill, for Mr. B. James; eight houses, Waterloo Road, Hartshill, for Messrs. Holloway & Co.; four houses, Gravelley Bank, Lightwood, for Mr. J. Bartholomew; alterations and additions, Campbell Place and South Wolfe Street, for Messrs. F. W. Woolworth & Co.

*

The DOUGLAS (ISLE OF MAN) Corporation has authorized the Borough Engineer to proceed with the work of demolition in the New Street area.

*

Plans passed by the TRURO Corporation: Alterations to premises, Lemon Quay, for Messrs. Reed Bros. of Plymouth; house, The Crescent, for Mr. Carveth; cycle store, Eliot Road, Hendra, for Mr. Taylor; six garages, Chapel Hill, for Mr. Ansley.

*

Plans passed by the GRAVESEND Corporation: Additions, 11 Milton Road, for Mr. W. Gould; house, Ferndale Road, for Messrs. Dagnall Bros; alterations, 15 Darnley Street, for Mr. E. W. Filkins; shop, 10 King Street, for Messrs. Parnall and Sons, Ltd.; bowling club pavilion, Milton Road, for the Imperial Paper Mills, Ltd.; alterations, 16 High Street, for Messrs. Foster Bros.' Clothing Co., Ltd.

*

At a meeting of the DOUGLAS (ISLE OF MAN) Corporation, Mr. J. E. Teare submitted plans of the lay-out of St. George's Field, Pulrose estate, for the erection of 100 houses, and he was instructed to obtain tenders for the erection of the houses.

*

The GRAVESEND Corporation has considered the question of the improvement of the Gordon promenade and asked the engineer to submit a combined scheme with estimates for a paddling pool, boating pool and putting green.

*

The BIRMINGHAM Corporation has decided upon the expenditure of £22,000 to replace the existing heating and domestic hot water systems, to install electric lighting throughout the building, to modernize the laundry machinery, and to make good the cold water cisterns and piping where necessary at the mental hospital.

*

The BARKING TOWN U.D.C. has considered plans and estimates submitted by the engineer for the erection of a grandstand on the south-west side of the Vicarage football field, capable of seating 780 people. A design and tender for the erection of the grandstand from Messrs. Johnson & Co., of London, was also laid before the Committee and was approved.

*

Plans have been submitted to the WOKING U.D.C. by Captain Sinker for a new wing to Hoe Place School.

Plans passed by the WEYMOUTH Corporation: Alterations, 67 Franchise Street, for Messrs. S. Jackson and Sons; alterations, 11 High Street, for Mr. L. Basso; alterations and additions, Adelaide Hotel, Abbotsbury Road, for Messrs. Crickmay and Sons; alterations and additions, Gloucester Hotel, Gloucester Row, for Lady Honywood; extensions, 28 High West Street, for Messrs. Theo. Conway, Ltd.; two houses, Roman Road, for Messrs. Andrews and Andrews.

*

Plans passed by the OXFORD Corporation: Two houses and shops, Abingdon Road, for Messrs. T. H. Kingerlee; extension to premises, 61 and 62 George Street, for the Oxford Co-operative Society; alterations to Hannington Hall, New-Inn-Hall Street, for the Rev. C. M. Chavasse (Hannington Hall Trustees); house, Capel Close, for Mr. G. E. Payne; additions, Fellows' common room, for the president and fellows of Corpus Christi College; additions to pavilion, Iffley Road, for the Oxford University Rugby Football Club; additions to servants' quarters, West Block, Walton Street, for Somerville College; extensions, Electra Palace, for the Electra Palace Co.; blacksmith and carpenters' shop, Collins Street, for Messrs. Tuckwell and Sons; business premises, Board Street, for Messrs. North, Robbins and Wilsdon; additional school house accommodation, Apsley Paddock, for Mr. L. A. Wilding; school for girls, Headington Hill, for Messrs. Headington School (Oxford), Ltd.; extension to factory, Botley Road, for Messrs. W. Baker & Co.; squash racquet court, New College Ground, St. Cross Road, for the senior bursar; two houses, Summerhill Road, for Messrs. Hunt and Church; alterations, 17 Cornmarket Street, for Messrs. Milward and Sons; business premises, Worcester Street, George Street and George Street Mews, for Mr. J. C. Warland; laundry, Harpes Road, for the Electric Laundry (Oxford), Ltd.; alterations and additions, 36 St. Giles' Street, for the rector and fellows of Exeter College.

*

Plans passed by the WOKING U.D.C.: Bungalow, Brewery Road, Horsell, for Mr. H. J. Wheeler; six houses, Highclere, Knaphill, for Mr. H. Pallant; house, Rosebery Crescent, Kingfield, for Mr. A. E. Jones; house, Berry Lane, Worplesdon, for Col. T. Lawrenson; house, Woodham Road, for Mrs. Craven; house, Bullbeggars Lane, for Mr. R. Radford; house, Hook Hill Lane, for Mr. H. C. Allen; bungalow, Victoria Road, Knaphill, for Mr. Armstrong; house, Brooklyn Road, for Mr. A. Last; house, Horsell Birch, for Mr. L. H. Aldridge; house, Shaftesbury Road, for Mr. P. J. Wetton; alterations and additions, bailiff's house, for the Brookwood Mental Hospital.

*

The PORTLAND U.D.C. is to discuss the St. Martin's estate housing scheme with the officials of the Ministry of Health.

The Herts Education Committee is negotiating for a site in the new town area of HATFIELD for the erection of an elementary school.

*

The Herts Education Committee is acquiring further land for the site of the proposed new elementary school at Burford Street, HODDESDON.

*

Plans passed by the BRADFORD Corporation: Eight houses, Victoria Drive and Victoria Road, Eccleshill, for Mr. A. Dickinson; four bungalows, Hawes Mount, for Mr. S. Priestley; four bungalows, Lodore Road, for Mr. E. A. Cadie; four houses, Ashbourne Drive, for Messrs. H. Sugden, Son & Co.; four houses, Second Avenue, for Messrs. J. H. Pitchers and Son; twenty-four houses, High Park Drive and High Park Crescent, for Mr. H. Proctor.

*

Plans passed by the HASTINGS Corporation: Alterations, 44a Robertson Street, for Messrs. Callow and Callow, architects; two houses, Bexhill Road, St. Leonards, for Messrs. H. Ward and Son, architects; alterations, Bohemia Road, for Mr. H. W. Coussens, architect; alterations, 238 Old London Road, for Mr. J. Hunt, architect; seven houses, Grove Road, Ore, for Mr. J. Hunt, architect; bungalow, Adelaide Road, St. Leonards, for Mr. P. H. Oxley, architect; garages and workshop, High Street, for Mr. J. Hunt, architect; two Salvation Army meeting halls, St. Andrew's Square, for Mr. O. Archer, architect; ten houses, Bexhill Road, St. Leonards, for Messrs. H. Ward and Son, architects; workshops, Cross Street and King's Road, St. Leonards, for Mr. H. M. Jeffery, architect; eight houses, Amberst Road, St. Leonards, for Mr. H. M. Jeffery, architect; addition, Silverhill Mansions, London Road, St. Leonards, for Mr. P. Oxley, architect; two houses, Old Church Road, St. Leonards, for Mr. H. M. Jeffery, architect; four houses, Woodland Vale Road, St. Leonards, for Mr. H. M. Jeffery, architect; new parish hall, St. Saviour's Road, St. Leonards, for Mr. J. B. Mendham, architect; four houses, Elphinstone Avenue, for Mr. H. M. Jeffery, architect.

*

Plans passed by the CAMBERWELL B.C.: Shops and tenements, Hill Street, and sheds and stores, Blue Anchor Lane, for the L.C.C.; rebuilding of premises, 150 Rye Lane, for Messrs. W. and E. A. Hunt; rebuilding, 593-613 Old Kent Road, for Mr. E. A. Stone; addition, Hippodrome, High Street, for Mr. F. T. Verity; addition, 112 Peckham Rye, for Mr. J. W. S. Burmester; building, Old Kent Road, next Marlborough Road, for Messrs. W. Andrews and Sons.

*

The Salvation Army is acquiring a site in Barnfield Road, on the Watling estate, HENDON, for the erection of a citadel.

READERS' QUERIES

The Editor welcomes readers' inquiries on all matters connected, directly or indirectly, with architectural practice. These inquiries are dealt with by a board of experts, to which additions are constantly being made as, and when, need arises. No charge is made to readers for this expert service. Diagrams must be clearly and legibly drawn out and lettered in black ink. Querists must enclose name and address. — Ed. A. J.

HOT-WATER SUPPLY

J. H. writes: "The accompanying section shows the position of a boiler cistern cylinder and bath in a bungalow. Which is the best way to run the circulating pipes for the hot-water supply and draw-offs to bath, lavatory, and scullery sink?"

The conditions indicated in the diagram seem to have been devised to keep the unfortunate fitter in spiritual "hot water" rather than to provide material hot water for the household. With the bottom of the cylinder below the level of the boiler there would be almost as much water "dead" as there would be in circulation. If the positions of windows and doors permit, it might be possible to run the flow and return with a reasonable fall around the near sides of the rooms and still get the flow into the cylinder near its top, and the return about half-way up its height; but even then, the length of pipe run would be excessive and the pipes would have to be heavily lagged to avoid almost total loss of heat.

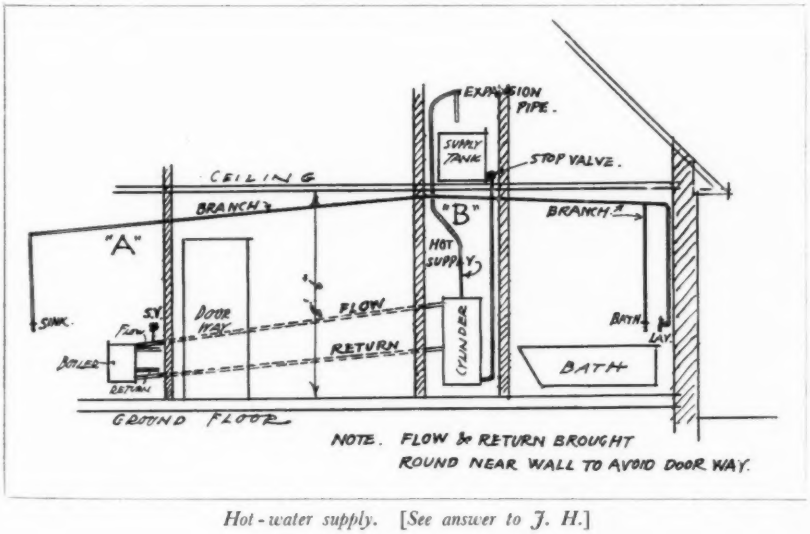
It is better to place the cylinder at A as near as possible to the boiler, with the top of the cylinder a few inches below the ceiling, so as to minimize length of flow and obtain a reasonable amount of aid from gravitation in assisting heat to produce circulation. This position also helps to make the most of the heating power of the fuel by reducing the length of the large-bore pipes to a minimum, and by keeping them in an atmosphere that is almost certain to be warmed by the fire and the boiler. An alternative would be to place the cylinder at B, with the supply tank raised sufficiently to give it room when its underside is raised slightly above the level of the doorway, but this compromise is not likely to be as efficient as a system with cylinder in position A.

Pipe lines must be arranged to free the whole system of air through the expansion pipe, and of water through draw-offs at the base of the cylinder and boiler. To this end all pipes are given a slight fall towards the boiler, or rise towards the expansion pipe, and the flow pipe from the boiler is fitted into its top in such a manner as allows the boiler to be completely filled with water, with no air trapped above water level. The system is filled by means of a supply pipe from near the bottom of the supply tank to the side of the cylinder near its base. This pipe is provided with a capstan head full-way stop valve near the cistern to allow of water being cut off during repairs.

The flow pipe from the top of the boiler enters the side of the cylinder near its top, and the return leaves the side of the cylinder near the bottom and enters the boiler near the bottom. Flow and return should be made of large-bore pipe, particularly in districts provided with hard water, where their connections should permit of easy cleaning. The hot-water supply, or draw-off, rises from the highest part of the top of the cylinder, which is made domed in good work, so that the cylinder frees itself of air. The hot-water supply pipe continues up into the expansion pipe, which is often bent over to discharge over the cold-water cistern. It is imperative that the expansion pipe should remain unchoked by ice, wasps' nests, etc., in order that steam pressure may be relieved if steam is accidentally produced. The service branches are taken from the hot-water supply at a high level (though below the level of the bottom of the cold supply cistern), and are made to fall towards their taps at bath, lavatory, and scullery sink, so that air can pass freely up from any tap and find an exit through the expansion pipe.

A safety valve is placed on the flow pipe between boiler and cylinder, or immediately on top of the boiler. A safety valve should always be placed where it will be easily seen, and where escaping steam will do little damage.

The lines of pipes indicated upon the drawing must not be taken as suggesting that this arrangement is a good one; they are merely inserted as a possible answer to the question. W. H.



Hot-water supply. [*See answer to J. H.*]

BEDDING AND POINTING PANTILES

F. G. C. writes: "Is it necessary to bed and point pantiles of the Old English type, or would they be satisfactory if hung on battens, without bedding, with underlining of tarred felt on rafters (no boarding)? I have heard so many different opinions on the question of bedding them that I am in doubt on the subject, but if bedded they would appear to me to work out dearer than plain tiling for the house under consideration, and I should not be able to use them.

"The position is a country one in open surroundings, the pitch of roof would be a good one, 55 deg. except on some small dormers, where it would be flattened to 35 deg. or 40 deg."

Pantiles must be both bedded and pointed to make them watertight. On pitches above 40 deg. there is a reasonable chance that they will prove efficient, but they are only reliable when enough money is forthcoming to make a particularly sound job, and when the client is patient over the maintenance work.

The idea of using tarred underlining felt on the rafters is a sound one, and if properly carried out with adequate laps arranged scientifically in such a way as to discharge the water which leaks in upon it, amounts to an additional safeguard. The danger is that the tiler will put a foot through the tarred felt and concentrate a stream of water on to the plaster ceiling. The dependence upon pointing mortar at the joints of the pantiles necessarily involves periodical repairs when the tiles shift and crack the mortar as the rafters sag in the course of years, so that the initial cost is not by any means final, and the discomfort of leakage may make itself felt whenever a new movement has shaken out the pointing. Modern pantiles with a much deeper curvature are now procurable, or, if economy has to be considered, interlocking tiles, somewhat resembling pantiles in effect, might be used. W. H.

RATES OF WAGES

			I	II
			s. d.	s. d.
A	ABERDARE	S. Wales & M.	1 7½	1 2¼
A1	Abergavenny	S. Wales & M.	1 7	1 2½
B	Abingdon ..	S. Counties	1 5½	1 1½
A	Accrington	N.W. Counties	1 7½	1 2¼
A3	Addlestone	S. Counties	1 6	1 1½
A	Adlington ..	N.W. Counties	1 7½	1 2¼
A	Airdrie ..	Scotland	*1 7½	1 2¼
C1	Aldeburgh	E. Counties	1 3	1 1½
A	Altrincham	N.W. Counties	1 7½	1 2¼
B2	Appleby ..	N.W. Counties	1 4	1 0
A	Ashton-under-Lyne	N.W. Counties	1 7½	1 2¼
A3	Atherstone	Mid. Counties	1 6	1 1½
B3	Aylesbury ..	S. Counties	1 4	1 0
B3	BANBURY ..	S. Counties	1 4	1 0
B2	Bangor ..	N.W. Counties	1 4½	1 0½
A	BarnardCastle	N.E. Coast	1 7½	1 2¼
A	Barnsley ..	Yorkshire	1 7½	1 2¼
B1	Barnstaple	S.W. Counties	1 5	1 0½
A	Barrow ..	N.W. Counties	1 7½	1 2¼
A	Barry ..	S. Wales & M.	1 7½	1 2¼
B3	Basingstoke	S.W. Counties	1 4	1 0
B	Bath ..	S.W. Counties	1 5½	1 1½
A	Batley ..	Yorkshire	1 7½	1 2¼
B	Bedford ..	E. Counties	1 5½	1 1½
A2	Berwick-on-Tweed	N.E. Coast	1 6½	1 2
A2	Bewdley ..	Mid. Counties	1 6½	1 2
B3	Bicester ..	Mid. Counties	1 4	1 0
A	Birkenhead	N.W. Counties	*1 7½	1 2¼
A	Birmingham	Mid. Counties	1 7½	1 2¼
A	Bishop Auckland	N.E. Coast	1 7½	1 2¼
A	Blackburn	N.W. Counties	1 7½	1 2¼
A	Blackpool	N.W. Counties	1 7½	1 2¼
A	Blyth ..	N.E. Coast	1 7½	1 2¼
B3	Bognor ..	S. Counties	1 4	1 0
A	Bolton ..	N.W. Counties	1 7½	1 2¼
A2	Boston ..	Mid. Counties	1 6	1 1½
B1	Bournemouth	S. Counties	1 5	1 0½
B2	Bovey Tracey	S.W. Counties	1 4½	1 0½
A	Bradford ..	Yorkshire	1 7½	1 2¼
A2	Brentwood	E. Counties	1 6½	1 2
A	Bridgend ..	S. Wales & M.	1 7½	1 2¼
B2	Bridgwater	S.W. Counties	1 4½	1 0½
A1	Bridlington	Yorkshire	1 7	1 2½
A1	Brighouse ..	Yorkshire	1 7½	1 2¼
B1	Brighton ..	S. Counties	1 5	1 0½
A	Bristol ..	S.W. Counties	1 7½	1 2¼
B3	Brixham ..	S.W. Counties	1 4	1 0
A2	Bromsgrove	Mid. Counties	1 6½	1 2
C	Bromyard ..	Mid. Counties	1 3½	11½
A	Burnley ..	N.W. Counties	1 7½	1 2¼
A	Burslem ..	Mid. Counties	1 7½	1 2¼
A2	Burton-on-Trent	Mid. Counties	1 6½	1 2
A	Bury ..	N.W. Counties	1 7½	1 2¼
A1	Buxton ..	N.W. Counties	1 7	1 2½
B	CAMBRIDGE	E. Counties	1 5½	1 1½
B2	Canterbury	S. Counties	1 4½	1 0½
A	Cardiff ..	S. Wales & M.	1 7½	1 2¼
A	Carlisle ..	N.W. Counties	1 7½	1 2¼
B	Carmarthen	S. Wales & M.	1 5½	1 1½
B2	Carnarvon	N.W. Counties	1 4½	1 0½
A1	Carnforth ..	N.W. Counties	1 7	1 2½
A	Castleford	Yorkshire	1 7½	1 2¼
B1	Chatham ..	S. Counties	1 5	1 0½
B1	Chelmsford	E. Counties	1 5	1 0½
A3	Cheltenham	S.W. Counties	1 6	1 1½
A	Chester ..	N.W. Counties	1 7½	1 2¼
A	Chesterfield	Mid. Counties	*1 7½	1 2¼
B3	Chichester	S. Counties	1 4	1 0
A	Chorley ..	N.W. Counties	1 7½	1 2¼
B2	Cirencester	S. Counties	1 4½	1 0½
A	Clitheroe ..	N.W. Counties	1 7½	1 2¼
A	Clydebank	Scotland	1 7½	1 2¼
A	Coalville ..	Mid. Counties	1 7½	1 2¼
B	Colchester ..	E. Counties	1 5½	1 1½
A	Colne ..	N.W. Counties	1 7½	1 2¼
A2	Colwyn Bay	N.W. Counties	1 6	1 1½
A	Consett ..	N.E. Coast	1 7½	1 2¼
A3	Conway ..	N.W. Counties	1 6	1 1½
A	Coventry ..	Mid. Counties	1 7½	1 2¼
A3	Crewe ..	N.W. Counties	1 6	1 1½
A3	Cumberland	.....	1 6	1 1½
A	DARLINGTON	N.E. Coast	1 7½	1 2¼
A	Darwen ..	N.W. Counties	1 7½	1 2¼
B2	Deal ..	S. Counties	1 4½	1 0½
A3	Denbigh ..	N.W. Counties	1 6	1 1½
A	Derby ..	Mid. Counties	1 7½	1 2¼
A	Dewsbury	Yorkshire	1 7½	1 2¼
B	Didcot ..	S. Counties	1 5½	1 1½
A	Doncaster	Yorkshire	1 7½	1 2¼
C1	Dorchester	S.W. Counties	1 3	11½
A3	Driffield ..	Yorks	1 6	1 1½
A3	Droitwich	Mid. Counties	1 6	1 1½
A1	Dudley ..	Mid. Counties	1 7	1 2¼
A	Dundee ..	Scotland	1 7½	1 2¼
A	Durham ..	N.E. Coast	1 7½	1 2¼
B1	EASTBOURNE	S. Counties	1 5	1 0¾
A	Ebbw Vale	S. Wales & M.	1 7½	1 2¼
A	Edinburgh	Scotland	1 7½	1 2¼
A	E. Glamorganshire & Monmouthshire	S. Wales & M.	1 7½	1 2¼
B	Exeter ..	S.W. Counties	*1 5½	1 1½
B4	Exmouth ..	S.W. Counties	1 4½	1 0½
B	FELIXSTOWE	E. Counties	1 5½	1 1½
A3	Filey ..	Yorks	1 6	1 1½
A	Fleetwood ..	N.W. Counties	1 7½	1 2¼
B2	Folkestone	S. Counties	1 4½	1 0½
A	Frodsham ..	N.W. Counties	1 7½	1 2¼
B3	Frome ..	S.W. Counties	1 4	1 0
A	GATESHEAD	N.E. Coast	1 7½	1 2¼
B1	Gillingham	S. Counties	1 5	1 0½
A3	Gloucester	S.W. Counties	1 6	1 1½
A2	Goole ..	Yorkshire	1 6½	1 2
B	Gosport ..	S. Counties	1 5½	1 1¼
A3	Grantham	Mid. Counties	1 6	1 1½
A1	Gravesend	S. Counties	1 7	1 2½
A	Greenock ..	Scotland	*1 7½	1 2¼
A	Grimsby ..	Yorkshire	1 7½	1 2¼
B1	Guildford ..	S. Counties	1 5	1 0½
A	HALIFAX ..	Yorkshire	1 7½	1 2¼
A	Hanley ..	Mid. Counties	1 7½	1 2¼
A	Harrogate ..	Yorkshire	1 7½	1 2¼
A	Hartlepools	N.E. Coast	1 7½	1 2¼
B2	Harwich ..	E. Counties	1 4½	1 0½
B2	Hastings ..	S. Counties	1 4½	1 0½
B1	Hatfield ..	S. Counties	1 5	1 0¾
B	Hereford ..	S. W. Counties	1 5½	1 1½
B	Hertford ..	E. Counties	1 5½	1 1½
A1	Heysham ..	N.W. Counties	1 7	1 2½
A	Howden ..	N.E. Coast	1 7½	1 2¼
A	Huddersfield	Yorkshire	1 7½	1 2¼
A	Hull ..	Yorkshire	1 7½	1 2¼
A	ILKLEY ..	Yorkshire	1 7½	1 2¼
A	Immingham	Mid. Counties	1 7½	1 2¼
B	Ipswich ..	E. Counties	1 5½	1 1½
C1	Isle of Wight	S. Counties	1 3	11½
A	JARROW ..	N.E. Coast	1 7½	1 2¼
A	KEIGHLEY	Yorkshire	1 7½	1 2¼
B1	Kendal ..	N.W. Counties	1 5	1 0½
B1	Keswick ..	N.W. Counties	1 5	1 0½
A3	Kettering ..	Mid. Counties	1 6	1 1½
A2	Kidderminster	Mid. Counties	1 6½	1 2
B2	King's Lynn	E. Counties	1 4½	1 0½
A	LANCASTER	N.W. Counties	1 7½	1 2¼
A2	Leamington	Mid. Counties	1 6½	1 2
A	Leeds ..	Yorkshire	1 7½	1 2¼
A	Leek ..	Mid. Counties	1 7½	1 2¼
A	Leicester ..	Mid. Counties	1 7½	1 2¼
A	Leigh ..	N.W. Counties	1 7½	1 2¼
B3	Lewes ..	S. Counties	1 4	1 0
A3	Lichfield ..	Mid. Counties	1 6	1 1½
A	Lincoln ..	Mid. Counties	1 7½	1 2¼
A	Liverpool ..	N.W. Counties	*1 10	1 4½
A3	Llandudno	N.W. Counties	1 6	1 1½
A	Llanelly ..	S. Wales & M.	1 7½	1 2¼
	London (12 miles radius)		1 9	1 4
	Do. (12-15 miles radius)		1 8½	1 3½
A	Long Eaton	Mid. Counties	1 7½	1 2¼
A	Loughborough	Mid. Counties	1 7½	1 2¼
A3	Luton ..	E. Counties	1 6	1 1½
A	Lytham ..	N.W. Counties	1 7½	1 2¼
A1	MACCLESFIELD	N.W. Counties	1 7	1 2½
B	Maidstone	S. Counties	1 5½	1 1½
A3	Malvern ..	Mid. Counties	1 6	1 1½
A	Manchester	N.W. Counties	1 7½	1 2¼
A	Mansfield	Mid. Counties	1 7½	1 2¼
B2	Margate ..	S. Counties	1 4½	1 0½
A3	Matlock ..	Mid. Counties	1 6	1 1½
A	Merthyr ..	S. Wales & M.	1 7½	1 2¼
A	Middlesbrough	N.E. Coast	1 7½	1 2¼
A3	Middlewich	N.W. Counties	1 6	1 1½
B2	Minehead ..	S.W. Counties	1 4½	1 0½
A	Monmouth & S. and E. Glamorganshire	S. Wales & M.	1 7½	1 2¼
A1	Morecambe	N.W. Counties	1 7	1 2½
A3	NANTWICH	N.W. Counties	1 6	1 1½
A	Neath ..	S. Wales & M.	1 7½	1 2¼
A	Nelson ..	N.W. Counties	1 7½	1 2¼
A	Newcastle ..	N.E. Coast	1 7½	1 2¼
A	Newport ..	S. Wales & M.	1 7½	1 2¼
A	Normanton	Yorkshire	1 7½	1 2¼
A1	Northampton	Mid. Counties	1 7	1 2½
A	North Staffs.	Mid. Counties	1 7½	1 2¼
A	North Shields	N.E. Coast	1 7½	1 2¼
A3	Norwich ..	E. Counties	1 6	1 1½
A	Nottingham	Mid. Counties	1 7½	1 2¼
A	Nuneaton ..	Mid. Counties	1 7½	1 2¼
B	OAKHAM ..	Mid. Counties	1 5½	1 1½
A	Oldham ..	N.W. Counties	1 7½	1 2¼
A3	Oswestry ..	Mid. Counties	1 6	1 1½
B	Oxford ..	S. Counties	1 6	1 1½
A	PAISLEY ..	Scotland	*1 7½	1 2¼
C	Pembroke	S. Wales & M.	1 3½	11½
A	Perth ..	Scotland	*1 7½	1 2¼
A3	Peterborough	Mid. Counties	1 6	1 1½
A	Plymouth	S.W. Counties	*1 7½	1 2¼
A	Pontefract	Yorkshire	1 7½	1 2¼
A	Pontypridd	S. Wales & M.	1 7½	1 2¼
B	Portsmouth	S. Counties	1 5½	1 1½
A	Preston ..	N.W. Counties	1 7½	1 2¼
A	QUEENSFERRY	N.W. Counties	1 7½	1 2
A3	READING	S. Counties	1 6	1 1½
B	Reigate ..	S. Counties	1 5½	1 1½
A3	Retford ..	Mid. Counties	1 6	1 1½
A	Rhondda Valley	S. Wales & M.	1 7½	1 2¼
A3	Ripon ..	Yorkshire	1 6	1 1½
A	Rochdale ..	N.W. Counties	1 7½	1 2¼
B	Rochester ..	S. Counties	1 5½	1 1½
A1	Ruabon ..	N.W. Counties	1 7	1 2½
A2	Rugby ..	Mid. Counties	1 6½	1 2
A3	Rugeley ..	Mid. Counties	1 6	1 1½
A	Runcorn ..	N.W. Counties	1 7½	1 2¼
A3	ST. ALBANS	E. Counties	1 6	1 1½
A	St. Helens ..	N.W. Counties	1 7½	1 2¼
B3	Salisbury ..	S.W. Counties	1 4	1 0
A1	Scarborough	Yorkshire	1 7	1 2½
A	Scunthorpe	Mid. Counties	1 7½	1 2¼
A	Sheffield ..	Yorkshire	1 7½	1 2¼
A	Shipley ..	Yorkshire	1 7½	1 2¼
A3	Shrewsbury	Mid. Counties	1 6	1 1½
A2	Skipton ..	Yorkshire	1 6½	1 2
A3	Slough ..	S. Counties	1 6	1 1½
A2	Solihull ..	Mid. Counties	1 6½	1 2
A3	South'pton	S. Counties	1 6	1 1½
A3	Southend-on-Sea	E. Counties	1 6½	1 2
A	Southport ..	N.W. Counties	1 7½	1 2¼
A	S. Shields ..	N.E. Coast	1 7½	1 2¼
A2	Stafford ..	Mid. Counties	1 6½	1 2
A	Stockport ..	N.W. Counties	1 7½	1 2¼
A	Stockton-on-Tees	N.E. Coast	1 7½	1 2¼
A	Stoke-on-Trent	Mid. Counties	1 7½	1 2¼
B	Stroud ..	S.W. Counties	1 5½	1 1½
A	Sunderland	N.E. Coast	1 7½	1 2¼
A	Swadlincote	Mid. Counties	1 7½	1 2¼
A	Swansea ..	S. Wales & M.	1 7½	1 2¼
B	Swindon ..	S.W. Counties	1 5½	1 1½
A1	TAMWORTH	N.W. Counties	1 7	1 2½
B1	Taunton ..	S.W. Counties	1 5	1 0½
A	Teeside Dist.	N.E. Counties	1 7½	1 2¼
B	Teignmouth	S.W. Coast	1 5½	1 1½
A	Todmorden	Yorkshire	1 7½	1 2¼
A2	Torquay ..	S.W. Counties	1 7	1 2½
C	Truro ..	S.W. Counties	1 3½	11½
B1	Tunbridge Wells	S. Counties	1 5	1 0½
A	Tunstall ..	Mid. Counties	1 7½	1 2¼
A	Tyne District	N.E. Coast	1 7½	1 2¼
A	WAKEFIELD	Yorkshire	1 7½	1 2¼
A1	Walsall ..	Mid. Counties	1 7	1 2½
A	Warrington	N.W. Counties	1 7½	1 2¼
A2	Warwick ..	Mid. Counties	1 6½	1 2
A	Wellingborough	Mid. Counties	1 6	1 1½
A	West Bromwich	Mid. Counties	1 7½	1 2¼
B	Weston-s-Mare	S.W. Counties	1 5½	1 1½
A2	Whitby ..	Yorkshire	1 6½	1 2
A	Widnes ..	N.W. Counties	1 7½	1 2¼
A	Wigan ..	N.W. Counties	1 7½	1 2¼
B2	Winchester	S. Counties	1 4½	1 0½
A3	Windsor ..	S. Counties	1 6	1 1½
A	Wolverhampton	Mid. Counties	1 7½	1 2¼
A3	Worcester	Mid. Counties	1 6	1 1½
A3	Worksop ..	Yorkshire	1 6	1 1½
A1	Wrexham ..	N.W. Counties	1 7	1 2½
B	Wycombe	S. Counties	1 5½	1 1½
B1	YARMOUTH	E. Counties	1 5	1 0¾
B2	Yeovil ..	S.W. Counties	1 4½	1 0½
A	York ..	Yorkshire	1 7½	1 2

The initial letter opposite each entry indicates the grade under the Ministry of Labour schedule. The district is that to which the borough is assigned in the same schedule. Column I gives the rates for craftsmen; column II for labourers; the rate for craftsmen working at trades in which a separate rate maintains is given in a footnote. The table is a selection only. Particulars for lesser localities not included may be obtained upon application in writing.

* In these areas the rates of wages for certain trades (usually Painters and Plasterers) vary slightly from those given. The rates for each trade in any given area will be sent on request.

PRICES CURRENT

EXCAVATOR AND CONCRETOR

EXCAVATOR, 1s. 4d. *per hour*; LABOURER, 1s. 4d. *per hour*; NAVVY, 1s. 4d. *per hour*; TIMBERMAN, 1s. 5½d. *per hour*; SCAFFOLDER, 1s. 5d. *per hour*; WATCHMAN, 7s. 6d. *per shift.*

Broken brick or stone, 2 in., per yd.	£0 11 6
Thames ballast, per yd.	0 11 0
Pit gravel, per yd.	0 18 0
Pit sand, per yd.	0 14 6
Washed sand	0 15 0
Screened ballast or gravel, add 10 per cent. per yd.	
Clinker, breeze, etc., prices according to locality.	
Portland cement, per ton	£2 15 0
Lias lime, per ton	2 10 0
Sacks charged extra at 1s. 9d. each and credited when returned at 1s. 6d.	
Transport hire per day:	
Cart and horse £1 3 0 *Trailer*	£0 15 0
3-ton motor lorry 3 15 0 *Steam roller*	4 5 0
Steam lorry, 5-ton 4 0 0 *Water cart*	1 5 0

EXCAVATING and throwing out in ordinary earth not exceeding 6 ft. deep, basis price, per yd. cube . . 0 3 0
Exceeding 6 ft., but under 12 ft., add 30 per cent.
In stiff clay, add 30 per cent.
In underpinning, add 100 per cent.
In rock, including blasting, add 225 per cent.
If basketed out, add 80 per cent. to 150 per cent.
Headings, including timbering, add 400 per cent.

RETURN, fill, and ram, ordinary earth, per yd.	£0 1 6
SPREAD and level, including wheeling, per yd.	0 1 6
FILLING into carts and carting away to a shoot or deposit, per yd. cube	0 10 6
TRIMMING earth to slopes, per yd. sup.	0 0 6
HACKING up old grano. or similar paving, per yd. sup.	0 1 3
PLANKING to excavations, per ft. sup.	0 0 5
DO. over 10 ft. deep, add for each 5 ft. in depth, 30 per cent.	
IF left in, add to above prices, per ft. cube	0 2 0
HARDCORE, 2 in. ring, filled and rammed, 4 in. thick, per yd. sup.	0 2 1
DO. 6 in. thick, per yd. sup.	0 2 10
PUDDLING, per yd. cube	1 10 0
CEMENT CONCRETE, 4-2-1, per yd. cube	2 3 0
DO. 6-2-1, per yd. cube	1 18 0
DO. in upper floors, add 15 per cent.	
DO. in reinforced-concrete work, add 20 per cent.	
DO. in underpinning, add 60 per cent.	
LIAS-LIME CONCRETE, per yd. cube	£1 16 0
BREEZE CONCRETE, per yd. cube	1 7 0
DO. in lintels, etc., per ft. cube	0 1 6
CEMENT concrete 4 2–1 in lintels packed around reinforcement, per ft. cube	0 3 9
FINE concrete benching to bottom of manholes, per ft. cube	0 2 6
FINISHING surface of concrete spade face, per yd. sup.	0 0 9

DRAINER

LABOURER, 1s. 4d. *per hour*; TIMBERMAN, 1s. 5½d. *per hour*; BRICKLAYER, 1s. 9d. *per hour*; PLUMBER, 1s. 9d. *per hour*; WATCHMAN, 7s. 6d. *per shift.*

Stoneware pipes, tested quality, 4 in., per ft.	£0 0 10
DO. *6 in., per ft.*	0 1 3
DO. *9 in., per ft.*	0 2 3
Cast-iron pipes, coated, 9 ft. lengths, 4 in., per yd.	0 5 6
DO. *6 in., per yd.*	0 8 6
Portland cement and sand, see "Excavator" above.	
Leadwool per cwt.	£2 0 0
Gaskin, per lb.	0 0 4½

STONEWARE DRAINS, jointed in cement, tested pipes, 4 in., per ft.	0 4 3
DO. 6 in., per ft.	0 5 0
DO. 9 in., per ft.	0 7 9
CAST-IRON DRAINS, jointed in lead, 4 in., per ft.	0 8 0
DO. 6 in., per ft.	0 10 0

Note.—These prices include digging concrete bed and filling for normal depths, and are average prices.
Fittings in Stoneware and Iron according to type. *See* Trade Lists.

BRICKLAYER

BRICKLAYER, 1s. 9d. *per hour*; LABOURER, 1s. 4d. *per hour*; SCAFFOLDER, 1s. 5d. *per hour.*

London stocks, per M.	£4 15 0
Flettons, per M.	3 0 0
Midhurst white facing bricks, per M	5 0 0
T.L.B., multi-coloured facings, per M	7 7 9
DO. *red best facings, per M*	7 7 9
DO. *rubbers 9¼ in., per M*	12 0 6
Staffordshire blue, per M.	9 10 0
Firebricks, 2½ in., per M.	11 3 0
Glazed salt, white, and ivory stretchers, per M.	24 10 0
DO. *headers, per M.*	24 0 0
Colours, extra, per M.	5 10 0
Seconds, less, per M.	1 0 0
Cement and sand, see "Excavator" above.	
Lime, grey stone, per ton	2 17 0
Mixed lime mortar, per yd.	1 6 0
Damp course, in rolls of 4½ in., per roll	0 2 6
DO. *9 in. per roll*	0 4 9
DO. *14 in. per roll*	0 7 6
DO. *18 in. per roll*	0 9 6

BRICKWORK in stone lime mortar, Flettons or equal, per rod	£33 0 0
DO. in cement do., per rod	36 0 0
DO. in stocks, add 25 per cent. per rod.	
DO. in blues, add 100 per cent. per rod.	
DO. circular on plan, add 12½ per cent. per rod.	
DO. in backing to masonry, add 12½ per cent. per rod.	
DO. in raising on old walls, etc., add 12½ per cent. per rod.	
DO. in underpinning, add 20 per cent. per rod.	
HALF-BRICK walls in stocks in cement mortar (1–3), per ft. sup.	£0 1 0
BEDDING plates in cement mortar, per ft. run	0 0 3
BEDDING window or door frames, per ft. run	0 0 3
LEAVING chases 2½ in. deep for edges of concrete floors not exceeding 6 in. thick, per ft. run	0 0 2
CUTTING do. in old walls in cement, per ft. run	0 0 4
GUTTING, toothing and bonding new work to old (labour and materials), per ft. sup.	0 0 7
TERRA-COTTA flue pipes 9 in. diameter, jointed in fireclay, including all cuttings, per ft. run	0 3 6
DO. 14 ft. by 9 in. do., per ft. run	0 6 0
FLAUNCHING chimney pots, each	0 2 0
CUTTING and pinning ends of timbers, etc., in cement	0 1 0
FACINGS fair, per ft. sup. extra	0 0 3
DO. picked stocks, per ft. sup. extra	0 0 7
DO. red rubbers gauged and set in putty, per ft. sup. extra	0 4 9
DO. in salt white or ivory glazed, per ft. sup. extra	0 5 6
TUCK pointing, per ft. sup. extra	0 0 10
WEATHER pointing, do. do.	0 0 3
TILE creasing with cement fillet each side per ft. run	0 0 6
GRANOLITHIC PAVING, 1 in., per yd. sup.	0 5 0
DO. 1½ in., per yd. sup.	0 6 0
DO. 2 in., per yd. sup.	0 7 0
If coloured with red oxide, per yd. sup.	0 1 0
If finished with carborundum, per yd. sup.	0 0 6
If in small quantities in finishing to steps, etc., per ft. sup.	0 1 4
Jointing new grano, paving to old, per ft. run	0 0 4
Extra for dishing grano, or cement paving around gullies, each	0 1 6
BITUMINOUS DAMP COURSE, ex rolls, per ft. sup.	0 0 7
ASPHALT (MASTIC) DAMP COURSE, ½ in., per yd. sup.	0 8 0
DO. vertical, per yd. sup.	0 11 0
SLATE DAMP COURSE, per ft. sup.	0 0 10
ASPHALT ROOFING (MASTIC) in two thicknesses, ½ in., per yd.	0 8 6
DO. SKIRTING, 6 in.	0 0 11
BREEZE PARTITION BLOCKS, set in cement, 1½ in. per yd. sup.	0 5 3
DO. DO. 3 in.	0 6 6
BREEZE fixing bricks, extra for each	0 0 3

THE wages are the Union rates current in London at the time of publication. The prices are for good quality material, and are intended to cover delivery at works, wharf, station, or yard as customary, but will vary according to quality and quantity. The measured prices are based upon the foregoing, and include usual builders' profits. Though every care has been taken in its compilation it is impossible to guarantee the accuracy of the list, and readers are advised to have the figures confirmed by trade inquiry.

MASON

MASON, 1s. 9d. *per hour*; DO. *fixer*, 1s. 10d. *per hour*; LABOURER, 1s. 4d. *per hour*; SCAFFOLDER, 1s. 5d. *per hour.*

Portland Stone:	
Whitbed, per ft. cube	£0 4 6
Basebed, per ft. cube	0 4 7
Bath stone, per ft. cube	0 3 0
Usual trade extras for large blocks.	
Fork paving, av. 2½ in., per yd. super	0 6 6
Fork templates sawn, per ft. cube	0 6 9
Slate shelves, rubbed, 1 in., per ft. sup.	0 2 6
Cement and sand, see "Excavator," etc., above.	

HOISTING and setting stone, per ft. cube	£0 2 2
DO. for every 10 ft. above 30 ft. add 15 per cent.	
PLAIN face Portland basis, per ft. sup.	£0 2 8
DO. circular, per ft. sup.	0 4 0
SUNK FACE, per ft. sup.	0 3 9
DO. circular, per ft. sup.	0 4 10
JOINTS, arch, per ft. sup.	0 2 6
DO. sunk, per ft. sup.	0 2 7
DO. DO. circular, per ft. sup.	0 4 6
CIRCULAR-CIRCULAR work, per ft. sup.	1 2 0
PLAIN MOULDING, straight, per inch of girth, per ft. run	0 1 1
DO. circular, do., per ft. run	0 1 4

HALF SAWING, per ft. sup.	£0 1 0
Add to the foregoing prices, if in York stone, 35 per cent.	
DO. Mansfield, 12½ per cent.	
Deduct for Bath, 33⅓ per cent.	
DO. for Chilmark, 5 per cent.	
SETTING 1 in. slate shelving in cement, per ft. sup.	£0 0 6
RUBBED round nosing to do., per ft. lin.	0 0 6
YORK STEPS, rubbed T. & R., ft. cub. fixed	1 9 0
YORK SILLS, W. & T., ft. cub. fixed	1 13 0
ARTIFICIAL stone paving, 2 in. thick, per ft. sup.	0 1 6
DO. 2½ in. thick, per ft. sup.	0 1 9

SLATER AND TILER

SLATER, 1s. 9d. *per hour*; TILER, 1s. 9d. *per hour*; SCAFFOLDER, 1s. 5d. *per hour*; LABOURER, 1s. 4d. *per hour.*
N.B.—Tiling is often executed as piecework.

Slates, 1st quality, per 1,200:	
Portmadoc Ladies	£14 0 0
Countess	27 0 0
Duchess	32 0 0
Old Delabole *Med. Grey*	*Med. Green*
24 in. × 12 in. £42 11 3	£45 1 0
20 in. × 10 in. 31 4 3	33 0 6
16 in. × 10 in. 20 18 0	22 4 9
14 in. × 8 in. 12 1 0	12 16 3
Green Randome, per ton	8 3 9
Grey-green do., per ton	7 3 9
Green peggies, 12 in. to 8 in. long, per ton	6 3 9
In 4-ton truck loads, delivered Nine Elms station.	
Clips, lead, per lb.	£0 0 6
Clips, copper, per lb.	0 2 0
Nails, compo, per cwt.	1 6 0
Nails, copper, per lb.	0 1 10
Cement and sand, see "Excavator," etc., above.	
Hand-made tiles, per M.	£5 18 0
Machine-made tiles, per M.	5 8 0
Westmorland slates, large, per ton	9 0 0
DO. *Peggies, per ton*	7 5 0

SLATING, 3 in. lap, compo nails, Portmadoc or equal:	
Ladies, per square	£4 0 0
Countess, per square	4 5 0
Duchess, per square	4 10 0
WESTMORLAND, in diminishing courses, per square	6 5 0
CORNISH DO., per square	6 3 0
Add, if vertical, per square approx.	0 13 0
Add, if with copper nails, per square approx.	0 2 6
Double course at eaves, per ft. approx.	0 1 0

SLATING with Old Delabole slates to a 3 in. lap with copper nails, at per square.

	Med. Grey	Med. Green
24 in. × 12 in.	£5 0 0	£5 2 0
20 in. × 10 in.	5 5 0	5 10 0
16 in. × 10 in.	4 15 0	5 1 0
14 in. × 8 in.	4 10 0	4 15 0
Green randoms		6 7 0
Grey-green do.		5 9 0
Green peggies, 12 in. to 8 in. long		4 17 0

TILING, 4 in. gauge, every 4th course nailed, in hand-made tiles, average per square	5 6 0
DO., machine-made do., per square	4 17 0
Vertical Tiling, including pointing, add 18s. 0d. per square.	
FIXING lead soakers, per dozen	£0 0 10
STRIPPING old slates and stacking for re-use, and clearing away surplus and rubbish, per square	0 10 0
LABOUR only in laying slates, but including nails, per square	1 0 0

See "Sundries for Asbestos Tiling."

CARPENTER AND JOINER

CARPENTER, 1s. 9d. *per hour*; JOINER, 1s. 9d. *per hour*; LABOURER, 1s. 4d. *per hour.*

Timber, average prices at Docks, London Standard Scandinavian, etc. (equal to 2nds):	
7 × 3, per std.	£21 0 0
11 × 4, per std.	33 0 0
Memel or Equal. Slightly less than foregoing.	
Flooring, P.E., 1 in., per sq.	£1 2 6
DO. *T. and G., 1 in., per sq.*	1 2 6
Planed boards, 1 in. × 11 in., per std.	30 0 0
Wainscot oak, per ft. sup. of 1 in.	0 1 4
Mahogany, Honduras, per ft. sup. of 1 in.	0 1 3
DO. *Cuba, per ft. sup. of 1 in.*	0 2 3
DO., *African, per ft. sup.*	0 1 0
Teak, per ft. sup. of 1 in.	0 1 3
DO., *ft. cube*	0 12 6

FIR fixed in wall plates, lintels, sleepers, etc., per ft. cube	0 5 6
DO. framed in floors, roofs, etc., per ft. cube	0 6 6
DO. framed in trusses, etc., including ironwork, per ft. cube	0 7 6
PITCH PINE, add 33⅓ per cent.	
FIXING only boarding in floors, roofs, etc., per sq.	0 13 6
SARKING FELT laid, 1-ply, per yd.	0 1 6
DO. 3-ply, per yd.	0 1 9
CENTERING for concrete, etc., including horsing and striking, per sq.	2 10 0
TURNING pieces to flat or segmental soffits, 4½ in. wide, per ft. run	0 0 4½
DO. 9 in. wide and over per ft. sup.	0 1 2

continued overleaf.

CARPENTER AND JOINER: *continued.*

SHUTTERING to face of concrete, per square	£1	10	0
DO. in narrow widths to beams, etc., per ft. sup.	0	0	6
USE and waste of timbers, allow 25 per cent. of above prices.			
SLATE BATTENING, per sq.	£0	12	6
DEAL boarding to flats, 1 in. thick and firrings to falls, per square	2	10	0
STOUT feather-edged tilting fillet to eaves, per ft. run	0	0	6
FEATHER-edged springer to trimmer arches, per ft. run	0	0	4
STOUT herringbone strutting (joists measured in), per ft. run	0	0	6
SOUND boarding, ¾ in. thick and fillets nailed to sides of joists (joists measured over), per square	2	0	0
RUBEROID or similar quality roofing, one ply, per yd. sup.	0	2	3
DO., two-ply, per yd. sup.	0	2	6
DO., three-ply, per yd. sup.	0	3	0
TONGUED and grooved flooring, 1¼ in. thick, laid complete with splayed headings, per square	2	5	0
DEAL skirting torus, moulded 1¼ in. thick, including grounds and backings, per ft. sup.	0	1	0
TONGUED and mitred angles to do.	0	0	6
WOOD block flooring standard blocks laid herringbone in mastic :			
Deal 1 in. thick, per yd. sup.	0	10	0
DO. 1¼ in. thick, per yd. sup.	0	12	0
Maple 1¼ in. thick, per yd. sup.	0	15	0
DEAL moulded sashes, 1¼ in. with moulded bars in small squares, per ft. sup.	0	2	6
DO. 2 in. do., per ft. sup.	0	2	9
DEAL cased frames, oak sills and 2 in. moulded sashes, brass-faced pulleys and iron weights, per ft. sup.	0	4	6
MOULDED horns, extra each	0	0	3
DOORS, 4-panel square both sides, 1¼ in. thick, per ft. sup.	0	2	6
DO. moulded both sides per ft. sup.	0	2	9
DO. 2 in. thick, square both sides, per ft. sup.	0	2	9
DO. moulded both sides, per ft. sup.	0	3	0
DO. in 3 panels, moulded both sides, upper panel with diminished stiles with moulded bars for glass, per ft. sup.	0	3	6
If in oak, mahogany or teak, multiply 3 times.			
DEAL frames, 4 in. × 3 in., rebated and beaded, per ft. cube	£0	15	0
Add for extra labours, per ft. run	0	0	1
STAIRCASE work :			
DEAL treads 1¼ in. and risers 1 in., tongued and grooved including fir carriages, per ft. sup.	0	2	6
DEAL wall strings, 1¼ in. thick, moulded, per ft. run	0	2	6
If ramped, per ft. run	0	5	0
SHORT ramps, extra each	0	7	6
ENDS of treads and risers housed to strings, each	0	1	0
2 in. deal mopstick handrail fixed to brackets, per ft. run	0	1	6
4½ in. × 3 in. oak fully moulded handrail, per ft. run	0	5	6
1½ in. square deal bar balusters, framed in, per ft. run	0	0	6
FITTINGS :			
SHELVES and bearers, 1 in., cross-tongued, per ft. sup.	0	1	6
1¼ in. beaded cupboard fronts, moulded and square, per ft. sup.	0	2	9
TEAK grooved draining boards, 1¼ in. thick and bedding, per ft. sup.	0	4	6
IRONMONGERY :			
Fixing only (including providing screws) :			
TO DEAL—			
Hinges to sashes, per pair	0	1	2
DO. to doors, per pair	0	1	7
Barrel bolts, 9 in., iron, each	0	1	0
Sash fasteners, each	0	1	0
Rim locks, each	0	1	9
Mortice locks, each	0	4	0

SMITH

SMITH, *weekly rate equals* 1*s.* 9½*d. per hour ;* MATE, *do.* 1*s.* 4*d. per hour ;* ERECTOR, 1*s.* 9½*d. per hour ;* FITTER, 1*s.* 9½*d. per hour ;* LABOURER, 1*s.* 4*d. per hour.*

*

Mild Steel in British standard sections, per ton	£12	10	0
Sheet Steel :			
Flat sheets, black, per ton	17	0	0
DO., *galvd., per ton*	19	0	0
Corrugated sheets, galvd., per ton	18	10	0
Driving screws, galvd., per grs.	0	1	10
Washers, galvd., per grs.	0	1	1
Bolts and nuts per cwt. and up	1	18	0

*

MILD STEEL in trusses, etc., erected, per ton	25	10	0
DO., in small sections as reinforcement, per ton	16	10	0
DO., in compounds, per ton	17	0	0
DO., in bar or rod reinforcement, per ton	20	0	0
WROT-IRON in chimney bars, etc., including building in, per cwt.	2	0	0
DO., in light railings and balusters, per cwt.	2	5	0
FIXING only corrugated sheeting, including washers and driving screws, per yd.	0	2	0

PLUMBER

PLUMBER, 1*s* 9½*d. per hour ;* MATE OR LABOURER, 1*s.* 4½*d. per hour.*

*

Lead, milled sheet, per cwt.	£1	9	0
DO. *drawn pipes, per cwt.*	1	10	0
DO. *soil pipe, per cwt.*	1	12	0
DO. *scrap, per cwt.*	1	0	0
Copper, sheet, per lb.	0	1	3
Solder, plumber's, per lb.	0	1	3
DO. *fine, per lb.*	0	1	9
Cast-iron pipes, etc. :			
L.C.C. soil, 3 in., per yd.	0	4	0
DO. *4 in. per yd.*	0	4	9½
R.W.P., 2½ in., per yd.	0	2	2
DO. *3 in., per yd.*	0	2	7
DO. *4 in., per yd.*	0	3	6½
Gutter, 4 in. H.R., per yd.	0	1	6½
DO. *4 in. O.G., per yd.*	0	1	10½

*

MILLED LEAD and labour in gutters, flashings, etc. per cwt.	3	0	0
LEAD PIPE, fixed, including running joints, bends, and tacks, ½ in., per ft.	0	2	0
DO. ¾ in., per ft.	0	2	3
DO. 1 in., per ft.	0	3	0
DO. 1½ in., per ft.	0	4	0
LEAD WASTE or soil, fixed as above, complete, 2½ in., per ft.	0	6	0
DO. 3 in., per ft.	0	7	0
DO. 4 in., per ft.	0	9	9
WIPED soldered joint, ½ in., each	0	2	6
DO. ¾ in., each	0	3	2
DO. 1 in., each	0	3	8
BRASS screw-down stop cock and two soldered joints, ½ in., each	0	11	0
DO. ¾ in., each	0	13	6
CAST-IRON rainwater pipe, jointed in red lead, 2½ in., per ft. run	0	1	7
DO. 3 in., per ft. run	0	2	0
DO. 4 in., per ft. run	0	2	10
CAST-IRON H.R. GUTTER, fixed, with all clips, etc., 4 in., per ft.	0	2	0
DO. O.G., 4 in., per ft.	0	2	3
CAST-IRON SOIL PIPE, fixed with caulked joints and all ears, etc., 4 in., per ft.	0	4	6
DO. 3 in., per ft.	0	3	6
Fixing only :			
W.C. PANS and all joints, P. or S., and including joints to water waste preventers, each	2	5	0
BATHS, with all joints	1	3	6
LAVATORY BASINS only, with all joints, on brackets, each	1	10	0

PLASTERER

PLASTERER, 1*s.* 9½*d. per hour (plus allowances in London only) ;* LABOURER, 1*s.* 4*d. per hour.*

*

Chalk lime, per ton	£2	17	0
Hair, per cwt.	2	0	0
Sand and cement see "Excavator," etc., above.			
Lime putty, per cwt	£0	2	9
Hair mortar, per yd.	1	7	0
Fine stuff, per yd.	1	14	0
Sawn laths, per bdl.	0	2	5
Keene's cement, per ton	5	15	0
Sirapite, per ton	3	10	0
DO. *fine, per ton*	3	18	0
Plaster, per ton	3	0	0
DO. *per ton*	3	12	6
DO. *fine, per ton*	5	12	0
Thistle plaster, per ton	3	9	0
Lath nails, per lb.	0	0	4

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LATHING with sawn laths, per yd.	0	1	7
METAL LATHING, per yd.	0	2	3
FLOATING in Cement and Sand, 1 to 3, for tiling or woodblock. ¾ in., per yd.	0	2	4
DO. vertical, per yd.	0	2	7
RENDER, on brickwork, 1 to 3, per yd.	0	2	7
RENDER in Portland and set in fine stuff, per yd.	0	3	3
RENDER, float, and set, trowelled, per yd.	0	2	9
RENDER and set in Sirapite, per yd.	0	2	5
DO. in Thistle plaster, per yd.	0	2	5
EXTRA, if on but not including lathing, any of foregoing, per yd.	0	0	5
EXTRA, if on ceilings, per yd.	0	0	5
ANGLES, rounded Keene's on Portland, per ft. lin.	0	0	6
PLAIN CORNICES, in plaster. per inch girth, including dubbing out, etc., per ft. lin.	0	0	3
WHITE glazed tiling set in Portland and jointed in Parian, per yd., from	1	11	6
FIBROUS PLASTER SLABS, per yd.	0	1	10

GLAZIER

GLAZIER, 1*s.* 8*d. per hour.*

*

Glass : 4ths in crates :			
Clear, 21 oz.	£0	0	4½
DO. 26 oz.	0	0	5
Cathedral white, per ft.	0	0	7½
Polished plate, British ⅛ in., up to 2 ft. sup. per ft.	0	1	2
DO. *4 ft. sup.* ,,	0	2	3
DO. *6 ft. sup.* ,,	0	2	6
DO. *20 ft. sup.* ,,	0	3	1
DO. *45 ft. sup.* ,,	0	3	3
DO. *65 ft. sup.* ,,	0	3	5
DO. *100 ft. sup.* ,,	0	3	10
Rough plate, ⅛ in., per ft.	0	0	6½
DO. *¼ in. per ft.*	0	0	6¾
Linseed oil putty, per cwt.	0	15	0

*

GLAZING in putty, clear sheet, 21 oz.	0	0	11
DO. 26 oz.	0	1	0
GLAZING in beads, 21 oz., per ft.	£0	1	1
DO. 26 oz., per ft.	0	1	4

Small sizes slightly less (under 3 ft. sup.).
Patent glazing in rough plate, normal span, 1*s.* 6*d.* to 2*s.* per ft.

LEAD LIGHTS, plain, med. sqs. 21 oz., usual domestic sizes, fixed, per ft. sup. and up	£0	3	0

Glazing only, polished plate 6½*d.* to 8*d.* per ft. according to size.

PAINTER AND PAPERHANGER

PAINTER, 1*s.* 8*d. per hour ;* LABOURER, 1*s.* 4*d. per hour ;* FRENCH POLISHER, 1*s.* 9*d. per hour ;* PAPERHANGER, 1*s.* 8*d. per hour.*

*

Genuine white lead, per cwt.	£2	7	6
Linseed oil, raw, per gall.	0	3	6
DO., *boiled, per gall.*	0	3	8
Turpentine, per gall.	0	4	0
Liquid driers, per gall.	0	3	6
Knotting, per gall.	0	18	0
Distemper, washable, in ordinary colours, per cwt., and up	2	5	0
Double size, per firkin	0	3	6
Pumice stone, per lb.	0	0	4½
Single gold leaf (transferable), per book	0	2	0
Varnish, copal, per gall. and up	0	12	6
DO., *flat, per gall.*	1	2	0
DO., *paper, per gall.*	0	16	0
French polish, per gall.	0	17	6
Ready mixed paints, per gall. and up	0	15	0

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LIME WHITING, per yd. sup.	0	0	3
WASH, stop, and whiten, per yd. sup.	0	0	6
DO., and 2 coats distemper with proprietary distemper, per yd. sup.	0	0	9
KNOT, stop, and prime, per yd. sup.	0	0	7
PLAIN PAINTING, including mouldings, and on plaster or joinery, 1st coat, per yd. sup.	0	0	10
DO., subsequent coats, per yd. sup.	0	0	9
DO., enamel coat, per yd. sup.	0	1	2½
BRUSH-GRAIN, and 2 coats varnish, per yd. sup.	0	3	8
FIGURED DO., DO., per yd. sup.	0	5	6
FRENCH POLISHING, per ft. sup.	0	1	2
WAX POLISHING, per ft. sup.	0	0	6
STRIPPING old paper and preparing, per piece	0	1	7
HANGING PAPER, ordinary, per piece	0	1	10
DO., fine, per piece, and upwards	0	2	4
VARNISHING PAPER, 1 coat, per piece	0	9	0
CANVAS, strained and fixed, per yd. sup.	0	3	0
VARNISHING, hard oak, 1st coat, yd. sup.	0	1	2
DO., each subsequent coat, per yd. sup.	0	0	11

SUNDRIES

Fibre or wood pulp boardings, according to quality and quantity.			
The measured work price is on the same basis . . . per ft. sup.	£0	0	2½
FIBRE BOARDINGS, including cutting and waste, fixed on, but not including studs or grounds per ft. sup. . . . from 3d. to	0	0	6
Plaster board, per yd. sup. . from	0	1	7
PLASTER BOARD, fixed as last, per yd. sup. . . . . from	0	2	8
Asbestos sheeting, ⅛ in., grey flat, per yd. sup.	0	2	3
DO., *corrugated, per yd. sup.*	0	3	3
ASBESTOS SHEETING, fixed as last, flat, per yd. sup.	0	4	0
DO., corrugated, per yd. sup.	0	5	0
ASBESTOS slating or tiling on, but not including battens, or boards, plain "diamond" per square, grey	2	15	0
DO., red	3	0	0
Asbestos cement slates or tiles, ⅛ in. punched per M. grey	16	0	0
DO., *red*	18	0	0
ASBESTOS COMPOSITION FLOORING : Laid in two coats, average ¾ in. thick, in plain colour, per yd. sup.	0	7	0
DO., ½ in. thick, suitable for domestic work, unpolished, per yd.	0	6	6
Metal casements for wood frames, domestic sizes, per ft. sup.	0	1	6
DO., *in metal frames, per ft. sup.*	0	1	9
HANGING only metal casement in, but not including wood frames, each	0	2	10
BUILDING in metal casement frames, per ft. sup.	0	0	7

Waterproofing compounds for cement. Add about 75 per cent. to 100 per cent. to the cost of cement used.

PLYWOOD, per ft. sup.

Thickness	1/16 in.			¼ in.			⅜ in.			½ in.		
Qualities ..	AA. d.	A. d.	B. d.	AA. d.	A. d.	B. d.	AA. d.	A. d.	B. d.	AA. d.	A. d.	B. d.
Birch	4	3	2	5	4	3	7½	6	4½	8½	7	6
Alder	3½	3	2	5	4	3	6½	5½	4½	8	7	6
Gaboon Mahogany	4	3	3.	6½	5½	4	9½	7½	—	1 0½	10	—
Figured Oak 1 side	8½	7	—	10	8	—	11½	—	—	1 6	—	—
Plain Oak 1 side	6½	6	—	7½	7	—	9½	—	—	1 0	—	—
Oregon Pine	5	4	—	6½	5	—	8	—	—	—	—	—