Wednesday, October 1, 1924. Vol. LX. No. 1552.

THE ARCHITECTS' JOURNAL & Architectural Engineer

With which is incorporated "The Builders' Journal."

FROM AN ARCHITECT'S NOTEBOOK.

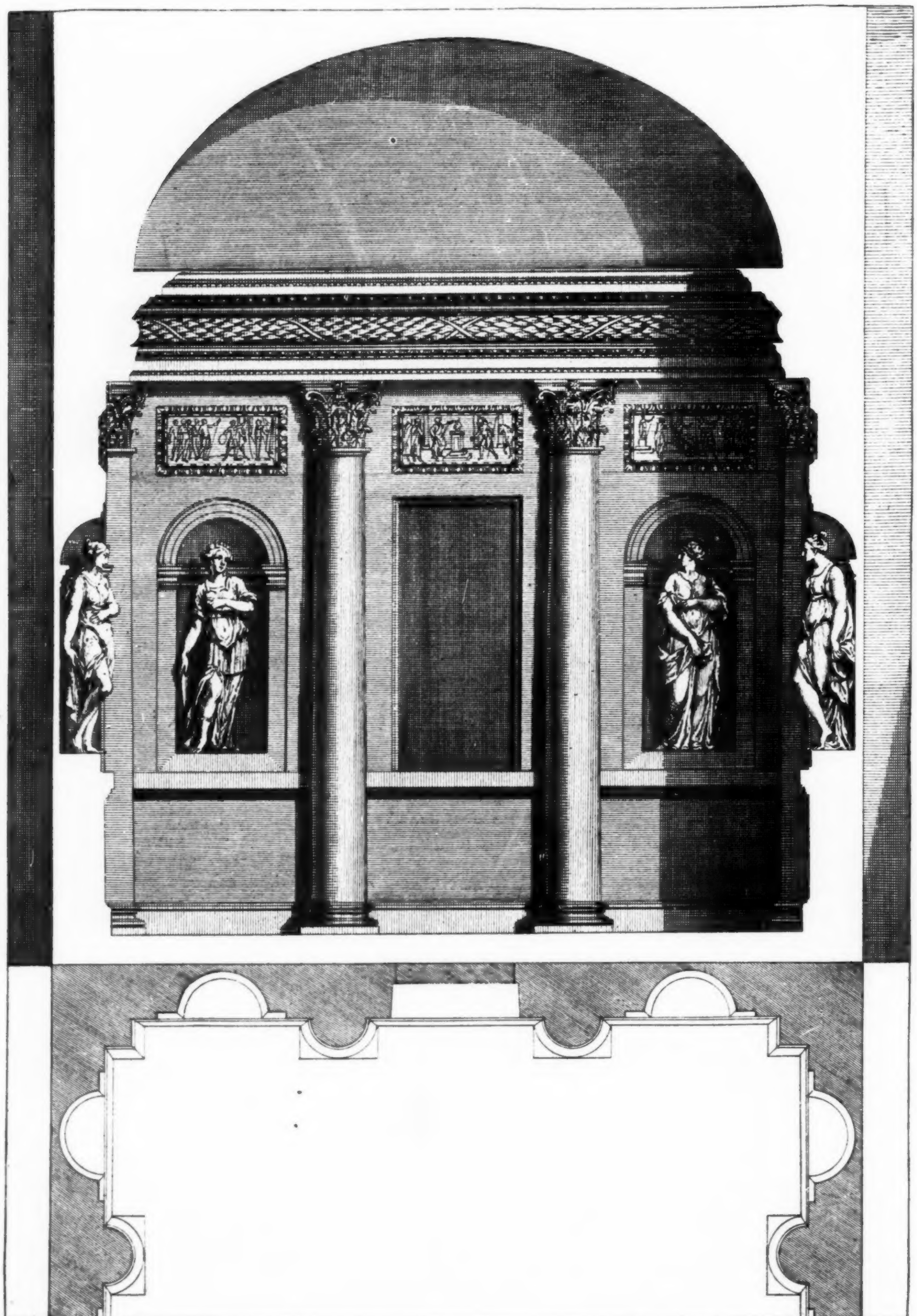
'Tis God gives skill,
But not without men's hands: He could not make
Antonio Stradivari's violins
Without Antonio.

GEORGE ELIOT: "STRADIVARIUS."

27-29 Tothill Street, Westminster, S.W.1.

A Corinthian Hall

Measured by Andrea Palladio



B Picart Sculp

The Corinthian Halls, writes Palladio, were of two kinds. The first had their columns only laid on the floor (as may be seen above), and the second were laid on pedestals. But the columns in both were always near the wall, and the architrave, frieze, and cornice were made with stuc, or else of wood, and there was but one row of pillars.

THE

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Corner Sites and Banks

IF the outward and visible signs of a nation's prosperity be its banks, then every foreigner travelling about England, whether in her cities, her towns, or her villages, must, indeed, be impressed, and it would seem that the day is not far distant when every corner site throughout the length and breadth of the land will be occupied by banking premises. It is not our purpose to discuss the economic aspect of this wholesale acquisition of corner sites. The big banking combines, it may safely be presumed, know their own business, and the growth of their policy of corner-site acquisition may be taken as evidence that their revenue is thereby increased.

As architects and town planners, however, whose business it is to see things in a broad and comprehensive manner, to see the relation of one interest to another, and the whole in relation to the common needs and welfare, how do we view this matter ? Both the beauty and the science of town planning depend not a little upon a certain formality in arrangement, and upon orderliness and the co-related disposition of buildings, both according to their purposes and their appearance. It makes both for efficiency and—shall we call it ?—tidiness in urban life if we can recognize certain buildings both by their position and by their appearance. Such a generalization, of course, cannot be carried to an extreme, or it becomes absurd; we do not, for example, suggest that certain areas should be devoted to churches, all built to a pattern, and others to swimming-baths built to another pattern, but that this generalization is more or less accepted is apparent from the use of such phrases as "shopping centres," "residential districts," and the like. A certain orderliness is therefore achieved by the placing of banks at corner sites. Unfortunately, however, although the business of banking plays an enormously important part in national life, the actual branch premises of banking concerns are of immediate use only to the few; that is to say, that the average man in the street enters a tobacconist's or a post office far more often than he enters a bank. Public convenience, therefore, would have been better served if the post office and tobacconists had made it a practice to occupy corner sites, particularly the post office; and we can think of no reason why this has not been done, unless it be that the banks are so determined to have the corners that they are willing to outbid all other competitors.

We say especially the post office advisedly, and for at least two reasons. A post office is far less easily distinguished than a tobacconist's. The tobacconist has his shop front in which he displays his wares, and his fascia board upon which is—or can be—written his trade. That most tobacconists' shops are ugly is not a basis for a logical objection to their occupation of corners, for there is no inherent reason why this should be so, and we have contradiction enough in the fact that one of the most beautiful old shop fronts in the West End of London is occupied by a tobacconist. A post office, however, is by no means so easy to find, and although this defect might be partially remedied by hanging out a sign, a multiplicity of signs about the streets tends towards restlessness and untidiness, and in due course defeats its own purpose. In addition to the advantage of such a useful and important building as a post office occupying a uniform position in the street, the corner site obviously serves a greater number of persons, inasmuch as it is readily accessible from three or, if it be at a road-crossing, four directions.

From the town-planning point of view, therefore, there is much to be said in favour of the bankers' policy, but we would add a rider to the effect that it would be to the public advantage if the post office would adopt a similar procedure.

Now, however, let us examine the matter architecturally. Is the immediate beauty of the street enhanced or decreased by the occupation of so many important corner sites by bank premises ? For the most part, in the business quarters of our towns the alternative to banks would be shops. Now we know that the chief demand of a shop is a large area of glass for the display of goods. Modern methods of construction have made it possible to satisfy this demand without loss of *actual* stability, but not—if the maximum glass area compatible with constructional safety is to be given—without loss of *apparent* stability. At present, at any rate, the eye demands some apparent firm foundation for a heavy superstructure, and it is offended by the prospect of an immense building balanced on a sheet of glass. With the possibility of its later accommodating itself to this sight we are not at the moment concerned. Such a change can come about only slowly. Architecture cannot be good and at the same time be offensive to the eye. Now this sense of insecurity is much greater at a corner site than anywhere else. Whatever the composition of a block of buildings, the eye demands some extra solidity at the corners. This balancing feat, therefore, is most offensive of all at corner sites. But a bank building does not require large, unobstructed glass areas, and so it would seem that better architectural results are likely to be achieved by the occupation of corner sites by banks than by shops. Indeed, is there not something significant of solidity, which pleases not only the eye but the mind in the presence of banks at the street corners, provided always that the building be designed so that it be at once expressive of its purpose and in harmony with its neighbours ?

Fortunately, there is a very great improvement in the design of bank premises. At one time it would seem that the banks paid very little attention to their outward appearance, so that one was almost justified in assuming that a suitable bank balance, rather than architectural proficiency, was the needful credential for securing the commission. This state of affairs has happily changed, not only in London and the big cities, but also in country towns, and bank premises are now, more often than not, designed with due regard to their surroundings. The corner site policy gives opportunities for an imposing building having that solidity which the special situation demands, and to the casual observer the presence of so many banks in prominent positions gives a sense of national security, the precise value of which we must leave to psychologists to determine.

Finally, there is one more advantage which we cannot afford to ignore. Our banking concerns have fortunately a sufficient sense of dignity and decency to refuse to allow themselves to become public hoardings, offending equally by day and night with messages, in lurid print and dazzling light, of commercial vulgarity and mendacity; a far more insidious evil than the open public sewers which once ran down the width of our streets.

Sir Edwin's Piccadilly Bank

We are always glad to find architecture noticed in the general Press, yet we must confess to a feeling of regret when the notice takes the form of a criticism such as that which appeared in last week's "Observer" on Sir Edwin Lutyens's new bank building in Piccadilly. The writer admits that "the wit and whimsical originality, which never fail Sir Edwin's domestic architecture, are again much in evidence," but finds that "the quaint picturesqueness of the red brick and white stone building, which is based to a certain extent on the English seventeenth-century tradition, does not make up for the utter disregard of scale and the absence of that architectural logic which demands that the inner plan should be revealed by the articulation of the outer shell." It is a moot point whether the work of an original genius should be expected to answer to the stock tests of the schoolroom (the phrase which we quote above has a distinct flavour of the professo ial "crit"); but when the writer goes on to reprove Sir Edwin for building in harmony with Wren's St. James's Church (the latter is "next door" and set back from the street front) and for "dropping far below the prevailing sky-line," we are on ground that seems to admit of no two opinions. It is surely far better that this bank building should be in sympathy with Wren's church than that it should accord with the rather undistinguished architecture that stands upon its other side. Dropping below the prevailing sky-line was, we imagine, a necessity, for the building is a bank only, without any of the customary unrelated offices above, and, moreover, it occupies a peculiar site that admits of a somewhat unconventional treatment. To build to the prevailing sky-line would have meant a building that the bank apparently did not require. Sir Edwin has met the practical requirements in an interesting way and has produced a building which, if it does not fulfil the demands of "architectural logic" to the satisfaction of our critic, is nevertheless a work of genius and a distinct architectural asset to Piccadilly.

Wanted—A New Material

Mr. Wheatley is credited with the intention of offering a big prize—a sum of £50,000 has been mentioned—for the invention of a new building material that shall "rid us of the tyranny of bricks and mortar." Already there are many materials in existence that claim to do this, yet bricks and mortar persist. Concrete, in one form or another, is so far the only material that has seriously threatened the supremacy of brick, but on the whole it is little if at all cheaper, and certainly does not supply the "dirt-cheap" panacea for housing difficulties that many people are so persistently yet so vainly pursuing. Much is heard of mass production. We are told that the problem can be solved if we decide to turn out our working-class houses in some unspecified material to standard designs. Nothing is said of architectural character; it is apparently enough that shelters of any kind should be put up, no matter what their effect upon the unlucky people who have to live in them, nor what ugliness they inflict upon the countryside. Yet there seems to be some doubt about the much-vaunted efficacy of mass production. Mr. J. E. Drower, who has lately contributed a very well-considered series of articles on housing to "The Times," shows clearly that large-scale building operations do not necessarily imply cheapness. "Local resources in men and materials are soon exhausted," he writes, "and can hardly be taken into account; the contractor has to go far afield for his material and, more important still, he has to import workmen from the great labour centres, who bring with them their high wages and their trade unionism. The organization which will suffice for building two or three cottages in six months will not suffice for building 500 in the same time; machinery has to be brought into use; light railways have to be laid; arrangements have to be made for the reception, storage, and distribution of large quantities of material; supervision and clerical organization must be on a large and expensive scale. So the houses cost more, and the extra price paid for each to the large contractor is for building 500 of them in the same time as the small builder wants for his two or three." It is apparent, therefore, that cheapness is not necessarily inherent in the principle of mass production. The committee which the Minister of Health has appointed to enquire into new materials and methods of construction may discover a cheap system of building which will satisfy all requirements, practical and architectural. Alternatively, the big prize of which there are rumours may bring it to light. We must hope for the best and resign ourselves to waiting and seeing.

Insuring through the Architects' Benevolent Institution

In our correspondence columns this week Mr. Maurice Webb makes the very practical and useful suggestion that architects, in effecting new insurances—whether on life or property—should do so through the Architects' Benevolent Institution, which will of course receive the agency commissions. The number of insurances taken out by architects in the course of a year must be very considerable, and the commission arising therefrom should form a by no means negligible source of income—at present lost to the Institution. Architects, we are sure, have only to know of this philanthropic method of taking out their insurances to adopt it. The principle is one that is well established. As Mr. Webb points out, the medical profession realized the advantages of it years ago, and as a result medical charities have greatly benefited—are, indeed, assured a large income from this source alone.

Mr. Kapek on English Architecture

Mr. Karel Kapek has told us very delightfully in the columns of "The Manchester Guardian" how it feels to be in England. He is charmed with the architecture of "merry old England"—the black rafters and carved frontages of Chester, York, and Salisbury. Salisbury Cathedral is "so hopelessly perfect that it makes you feel uneasy." But he finds no pleasure in London's whole streets of red bricks—"as if an angel had smeared them with blood" (an allusion to suburbia, apparently). For all the imaginative futurism of his plays, Mr. Kapek's architectural sympathies seem to be entirely in the past. He has nothing to say about our major current achievements; he seems only to have detected our past fondness for "all kinds of projecting stories and gables." Mr. Kapek's views on something rather more modern—Regent Street, for instance—should make interesting reading. Better still, would he give us his ideas about the architecture of the future?

High Buildings: An American View

By LEWIS MUMFORD (of Brooklyn, New York)

I HAVE been recently looking through the report of a discussion on high buildings for London; and I am happy to see how sensibly most of the members of the R.I.B.A. treated the matter, and how sympathetic they were to Mr. Raymond Unwin's accurate criticism of the conditions the high building has created in America. The history of the American skyscraper has been dealt with so misleadingly by all sorts of amateur investigators and special pleaders that perhaps a glimpse of its real history would serve to aid Londoners in their discussion of the problem, although it seems to me that the last word on its economic and social defects were spoken by Mr. Unwin in the paper to which I have referred.

So cloudy have been our notions as to the skyscraper's reason for existence that a distinguished American geographer, Mr. Ellsworth Huntington, has even attributed the growth of the high building in New York to the narrowness of Manhattan Island; whereas it is plain to anyone who troubles to consult contemporary maps that there never was any physical lack of building space on Manhattan Island during the years when the skyscraper was undertaking its first timid flights. The exciting cause of the high building was the discovery, during the 'eighties, that the ground rent of a plot increased in value in proportion to the height of the building erected thereon. This discovery was not exactly new; but the means of profiting by it were new, for it was not until the passenger elevator—first used in a tower adjacent to the Crystal Palace in New York in 1854—was invented that it became possible to build upwards without restriction.

Even before the steel cage was used instead of the supporting wall, buildings of masonry were put up in Chicago to the height of fifteen stories. The development of the skyscraper was, however, greatly facilitated by the use of structural steel beams; for the new lightness and thinness of wall, which this construction permitted, made it possible to erect skyscrapers on very narrow lots; and furthermore, placed practically no limit upon the height to which the building might go, except that set by the character and depth of the foundations. There is no need to go into the notorious defects that resulted from the growth of the skyscraper in America, particularly in New York and Chicago: it is much more important to realize that these defects are inseparable from any advantages that the high building may offer. I note that there are sanguine people in London who fancy that it is possible to have high residential buildings surrounded by open spaces and gardens; they even talk as if the problems of housing might be solved on a grand scale by erecting such buildings; but these are paper illusions!

Once a high building is erected the land about it automatically becomes too valuable to be used for gardens: the carrying charges for such idle land are so great that it must be speedily turned over to building. This in fact is what has happened repeatedly in the outlying sections of New York when, to attract tenants to their high apartment houses, the landlords have surrounded them with playgrounds and tennis courts. The economic paradox is that open spaces can be conserved in great quantities only by spreading the buildings out over the land and keeping low the number of persons per acre; once the population is concentrated in tall buildings, the surrounding open spaces are doomed to disappear.

Visitors to New York may attempt to refute this notion by pointing out the new apartment houses on Park Avenue, where the great internal court is a garden; unfortunately, the cost of these apartments offers no index as to what must happen to the community at large when it attempts to live in such a style, or rather, it points to the fact that without a Park Lane income it is quite impossible to apportion open spaces on this scale. That the view from tall buildings is frequently glorious, that an apartment or an office thirty stories above the ground is as salubrious as an aerie or a Swiss Kurort, and that the skyscraper itself may be an æsthetic success—all these views are true but, alas, narrow. They neglect the fact that one must judge the achievements of the high building from the base rather than from the pinnacle, and from this point of view it is neither a social, an economic, nor an æsthetic success. A single tall building may be a monument; a nest of tall buildings destroys the sense of scale and blots out the approach to any one of them, and this is what has happened in the Grand Central district of New York, in spite of zoning and heights of buildings regulations. In less than six months after its erection the excellent Shelton Hotel, for example, has been completely hidden by other skyscrapers; and in another part of the district, the same thing has happened to the Bush Tower, which once stood in solitary glory.

As for the effect upon the life of the community that has been caused by the congestion of the workers in great lofts and offices during the day, and in dismal, distant dormitories at night, the waste of energy, time, and human strength has been so great that it practically robs the urban worker of the benefits he might otherwise have derived from the eight-hour day and a living wage. I say nothing about the vast expenditure of coal for transportation and for artificial light; nor about the increased cost of fireproof construction and fire-prevention devices like the automatic sprinkler; but it should be obvious that the visible quantitative losses from this intensive form of congestion could be readily treated in dollars and cents. Moreover, it needs no very shrewd eye to see that New York is rapidly approaching the point where, as in Imperial Rome, vehicular traffic will be prohibited from its principal streets during the day; where, in spite of numerous man-sewers, called subways, which have been provided for the plebeians, the transportation system will be no longer adequate to its daily load. To build a sufficiently great recreation area which shall be accessible to this concentrated population is even now impossible, and the more high buildings are erected the more remote the possibility becomes.

But why, says the Brighter and Higher Londoner stubbornly, should we not enjoy the high building without suffering from its defects? The answer is plain: it is much simpler to decentralize the population, and to build new centres of commerce and industry, than it would be to readapt the existing city to high buildings. If new enterprises must find a place in London, it is much simpler to provide for the steady exodus of the older industries to garden cities and villages than it would be to attempt to make room for everybody in a city that is already overcrowded. The problems of congestion occasioned by the high buildings are so huge that in New York Mr. Clarence Stein, the Chairman of the New York State Commission on Housing and Regional Planning, has publicly stated that he sees no way of solving them without instituting a thorough-going policy of industrial and regional planning, which will deliberately colonize and restore the countryside and at the same time depopulate, to a degree, the metropolis itself. London's city-planning problems are already huge enough, it seems to a sympathetic American, without assuming the additional burdens that the high building will carry with it. As Mr. Unwin has well said again and again: There is nothing gained by overcrowding! In America we are just awakening to this fact, and we hope it will not sound too familiar to the Londoner to have any effect. The debacle of Regent Street is a bad sign, but we trust it is not a harbinger of worse to follow.

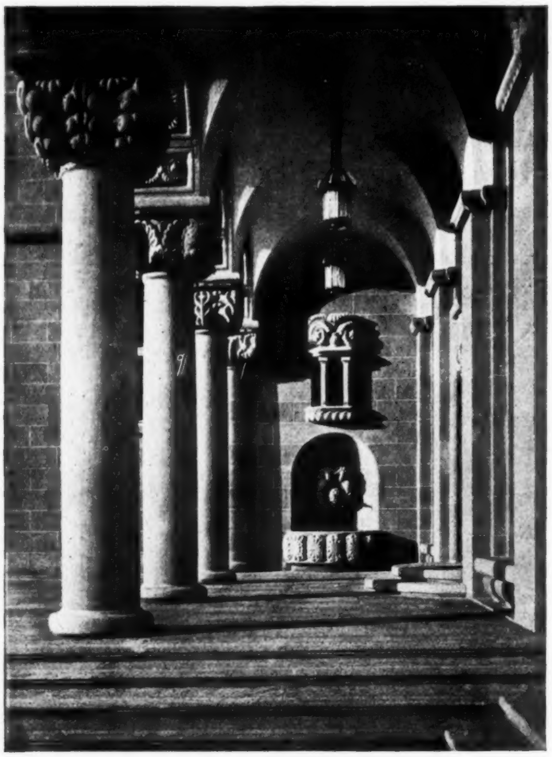
The Modern Architecture of Zurich

By W. WOHLGENANNT, Dipl. Arch. F.T.H., Zurich

ZURICH, the largest as well as the most industrial town of Switzerland, owes its existence to an early Abbey founded in the time of Charlemagne. Developing on both banks of the estuary of the River Limmath, as the natural outlet of the Lake of Zurich, the picturesque centre testifies its great historical past, and its aspect has been the basis for the development of the surrounding country. Zurich, as it exists to-day, extends over the whole plain, and rises to the summit of two lengthy, thickly-wooded ridges, which, together with the lake, almost envelop the whole town with a natural and æsthetic framework.

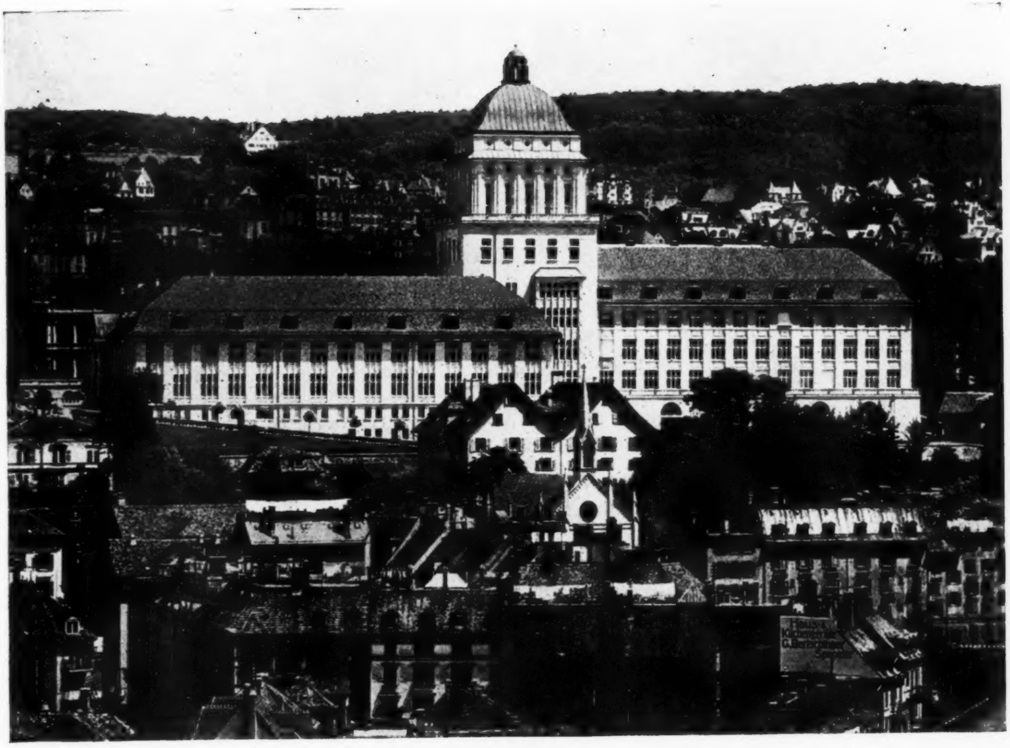
Owing to its historical antecedents its citizens have never indulged in imposing and luxurious architecture, but have confined themselves largely to perpetuating the sound and practical tradition of their ancestors, and imparting to their creations a character tempered to the necessities of time, space, and resources. They, nevertheless, have assimilated great foreign artistic movements, and tried to mould them into their local customs. Thus Zurich can pride itself upon a great many handsome buildings of all epochs, till the war of 1914 and the post-war inertia arrested the expansion of enterprises by embarrassing the economical situation of Switzerland as well as of all belligerent countries. In spite of these obstacles, the natural resourcefulness of Zurich and its customs enabled several architectural works of remarkable value to be executed. It is not my intention to enumerate the recently erected buildings, or to give to any particular one of them personal preference, because it is not so much individual selection that matters but rather the general law of purpose and beauty which unites all good buildings and makes them distinctive again.

Naturally the buildings erected shortly before the war have not the same character as those that came into existence afterwards, even when owing their origin to the same architect. Exterior circumstances cause developments in architectural as in other domains, and reactions have followed upon upheavals. But if purpose and beauty in equal proportion gave life to a building, such building would not fail to be and remain of worth. Every element of a building should express its reason for existence, and beauty depends upon the author's sense of space and proportions.

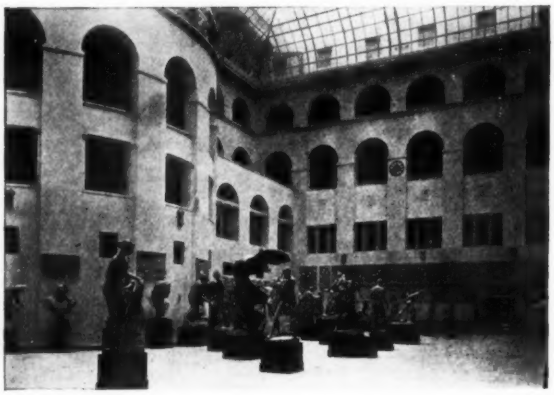


THE UNIVERSITY: ENTRANCE LOGGIA.

For instance, the University, on the slope of "Zurichberg," was completed just before the outbreak of war. Its situation necessitated three distinct structures, viz., the two spacious wings with the tower as their connecting member. By no means complicated in its composition or in its detail, the exterior expresses the interior organism. The decorative elements, strong in light and shade, and contrasting with the smooth surface of the walls, ignore paltry detailing. Nor are the colours in timorous shade, for the architect applies them with predilection for strengthening the charm of interiors. On entering the halls there is an inviting display of all the primary colours, which partly continues through the vestibules, staircases, and connecting corridors, which communicate their blue,



THE UNIVERSITY, ZURICH



The College Court.

The Vestibule.

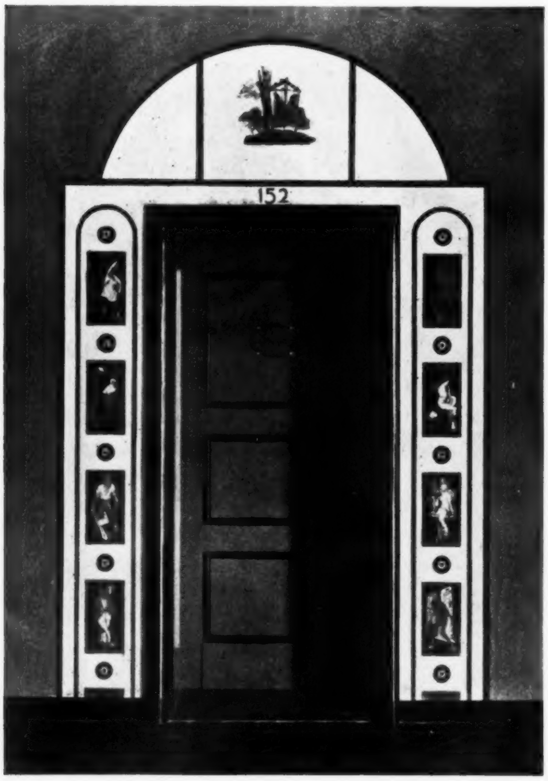
THE UNIVERSITY, ZURICH.

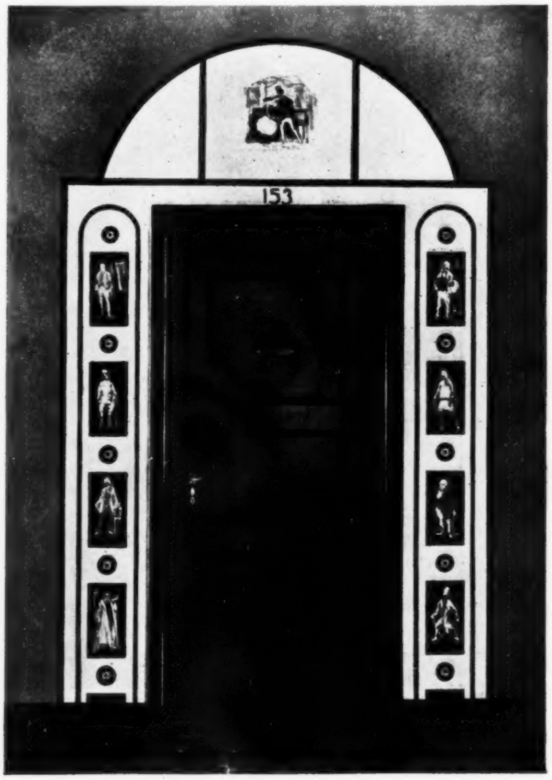
red, and yellow through broad arcades to the college court, a large glass-covered area with light rose walls. This central room is the principal architectural feature of the building, and it shows in its expression, form, and colour the thought conveyed by the term "modern," viz., the breaking away from the tradition of classical treatment, but the retention of the true functions of construction and material—Creation.

In the District Law Courts, erected in 1916, a strong effect of contrast has been obtained by the concentration of relatively rich parts, in simple elevations. The main surface is governed by a powerful gable, which adds to the official character of the whole building, and there is a beautiful high-relief of "St. George and the Dragon," set amidst this huge triangle. The decorative sculpture is applied on the different prominent parts of the building, and either distinguishes an entrance or marks a prominent law hall by accentuating the lines round its windows. Everywhere the view shows a positive clearness in structure. Decorative features underline only the architecture, and are never used as a pretentious element. The interior is balanced in a strong colouring of red, white, and black, producing impressions which cannot be shown by a photograph. There are many interesting details, and an original treatment of geometrical painting work has been adopted for the door frames leading to the principal sitting halls. The portraits painted upon them are noteworthy.

At the end of the war a church was built upon a prominent site of the "Zurichberg." Closely set in form and contour, it is reminiscent of the sober days of the nineteenth century. There are the hall and the tower, those two elements of the church in primitive, symmetrical relation, forming the centre of a proposed quarter, to be built round in an artistic unity.

(To be concluded.)



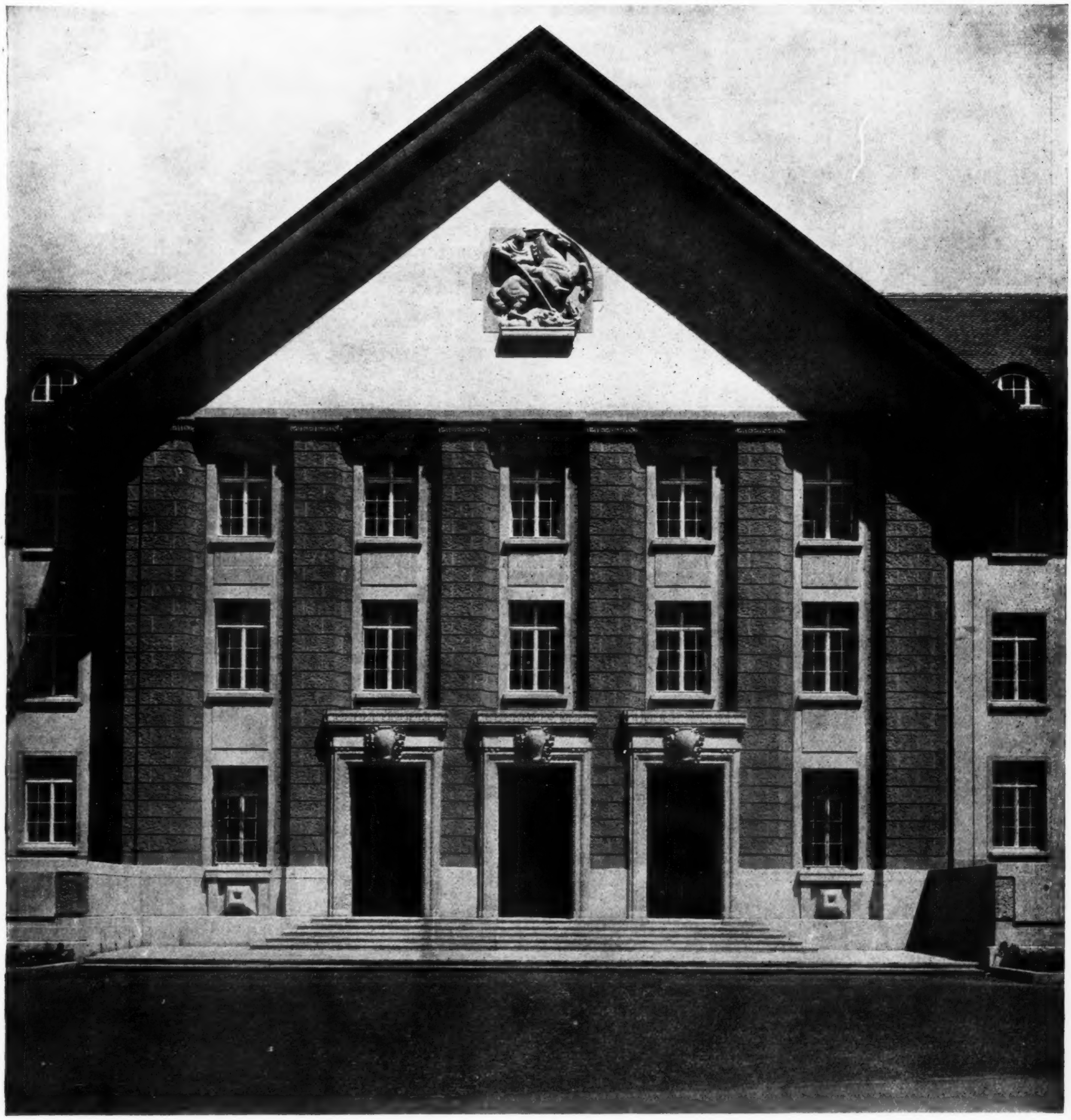


THE LAW COURTS: DETAILS OF INTERNAL DOORS. OFLEGHARDT AND HAEFELI, ARCHITECTS.

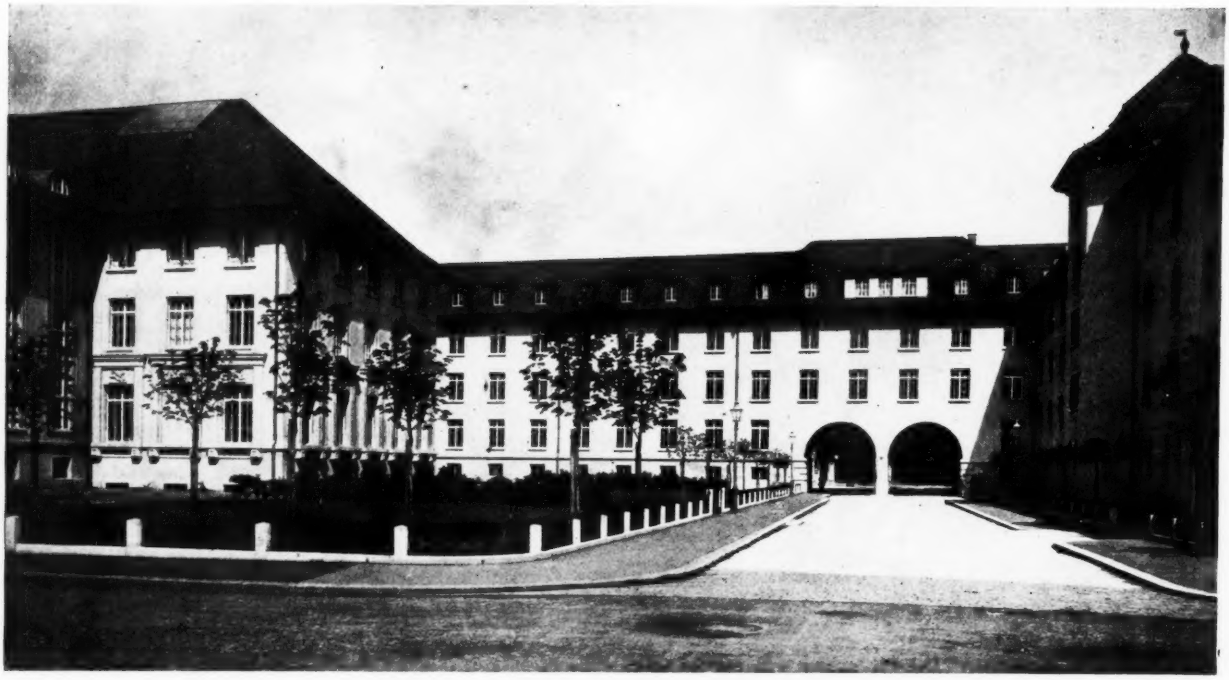
The University, Zurich : The Tower

Professor Dr. K. Moser, Architect

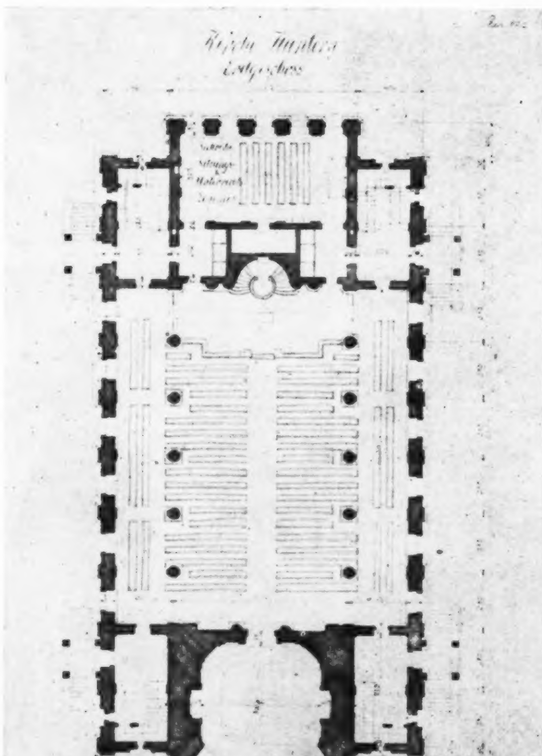
The University, completed just before the outbreak of the War, occupies a prominent position on the slope of the "Zurichberg." It consists of two spacious wings, connected and unified by a great tower.

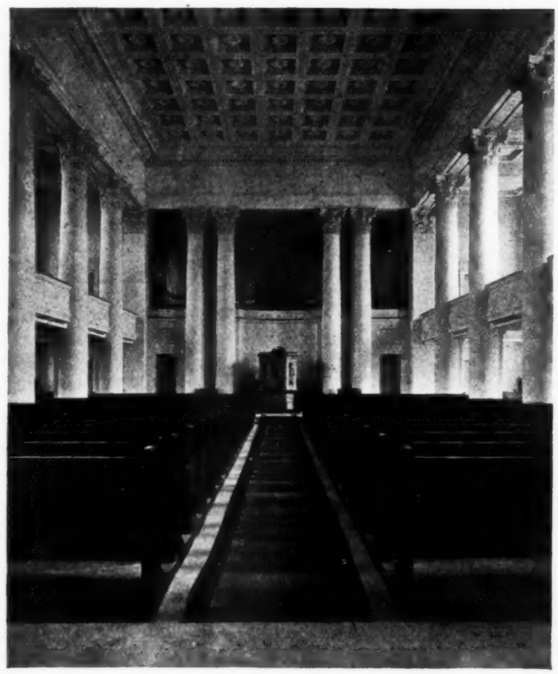


THE LAW COURTS, ZURICH: PRINCIPAL ENTRANCE.
OFLEGHARDT AND HAEFELI, ARCHITECTS.



THE LAW COURTS, ZURICH: AN INTERNAL COURT.





THE FLUNTERN CHURCH, ZURICH.

PROFESSOR DR. K. MOSER, ARCHITECT.

This church is built upon a prominent site of the "Zurichberg," and in architectural character recalls the sober days of the nineteenth century. The plan of the church is in the adjacent column.

THE FLUNTERN CHURCH, ZURICH. PROFESSOR DR. K. MOSER, ARCHITECT

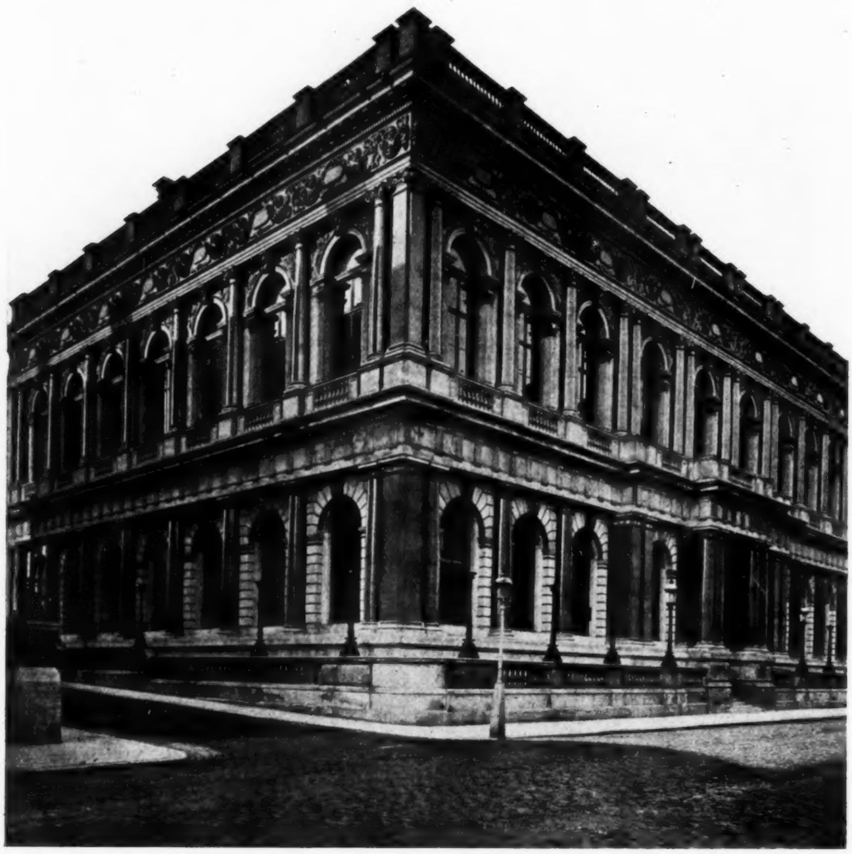
The Refacing of the Carlton Club

SIR REGINALD BLOMFIELD, R.A., Architect

THE Carlton Club was designed in 1850 by Sydney Smirke, who took for his model Sansovino's Libreria Vecchia, at Venice—following the cult of copyism that distinguished the second quarter of the nineteenth century, though achieving far less success in it than Barry, who, in his "Reform," adapted the Farnese Palace at Rome to the requirements of a London clubhouse with considerable success. Smirke's comparative failure in the case of the Carlton was to be attributed to two things; first, the breaking up of Sansovino's rhythmical arched colonnade into bays in series of threes, and, second, the use of highly-polished columns and pilasters of red Aberdeen granite. For all this, the building, though erected at an unfortunate period, had about it much that was interesting and much that distinguished it from the merely vulgar and superficial.

The stone used for the elevations generally was Caen. This stone decayed very badly, and last year it was decided to reface the building entirely with Portland stone. This work has been carried out from the designs of Sir Reginald Blomfield, R.A., who, though preserving all the door and window openings, has taken the opportunity of redesigning the façades on simpler and more economical lines, substituting a rusticated arcade on the ground floor for the lower order, and replacing the upper order by a Doric order and entablature. No alteration has been made to the interior.

The work, which was of considerable difficulty and delicacy, was carried out by Messrs. Trollope and Colls, Ltd., with carving by Mr. Aumonier. The actual work of refronting was begun on July 30, 1923, over 40,000 ft. cube of the old Caen stone and granite columns and pilasters having to be removed. The operation was undertaken without in the slightest degree interfering with the inside of the building, excepting to darken some of the rooms owing to the windows having to be protected and covered over. Everything was worked from the outside, and the members had the use of the club premises throughout the entire contract.

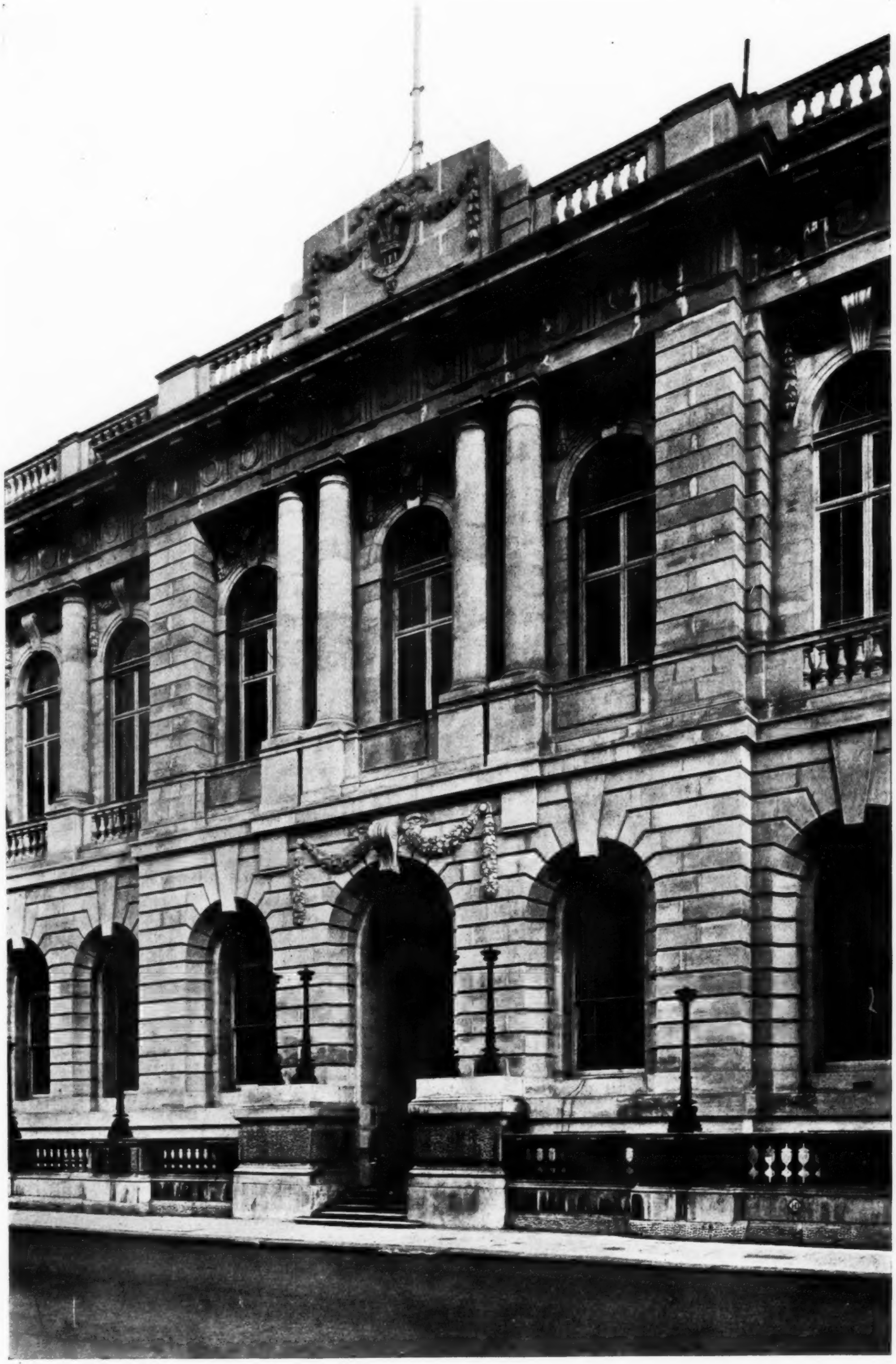


THE CARLTON CLUB, PALL MALL, AS DESIGNED BY SYDNEY SMIRKE.

The time allowed in the contract for the whole of the work was ten months, and the contractors were, at the end, complimented on their success, May 24, 1924, seeing the finish of everything. The new stone was prepared in readiness to fit into its place at the contractors' stone yard at Camberwell before the work actually began on the building itself.

Current Architecture. 247.—The Carlton Club, Pall Mall : A Detail of the Central Feature

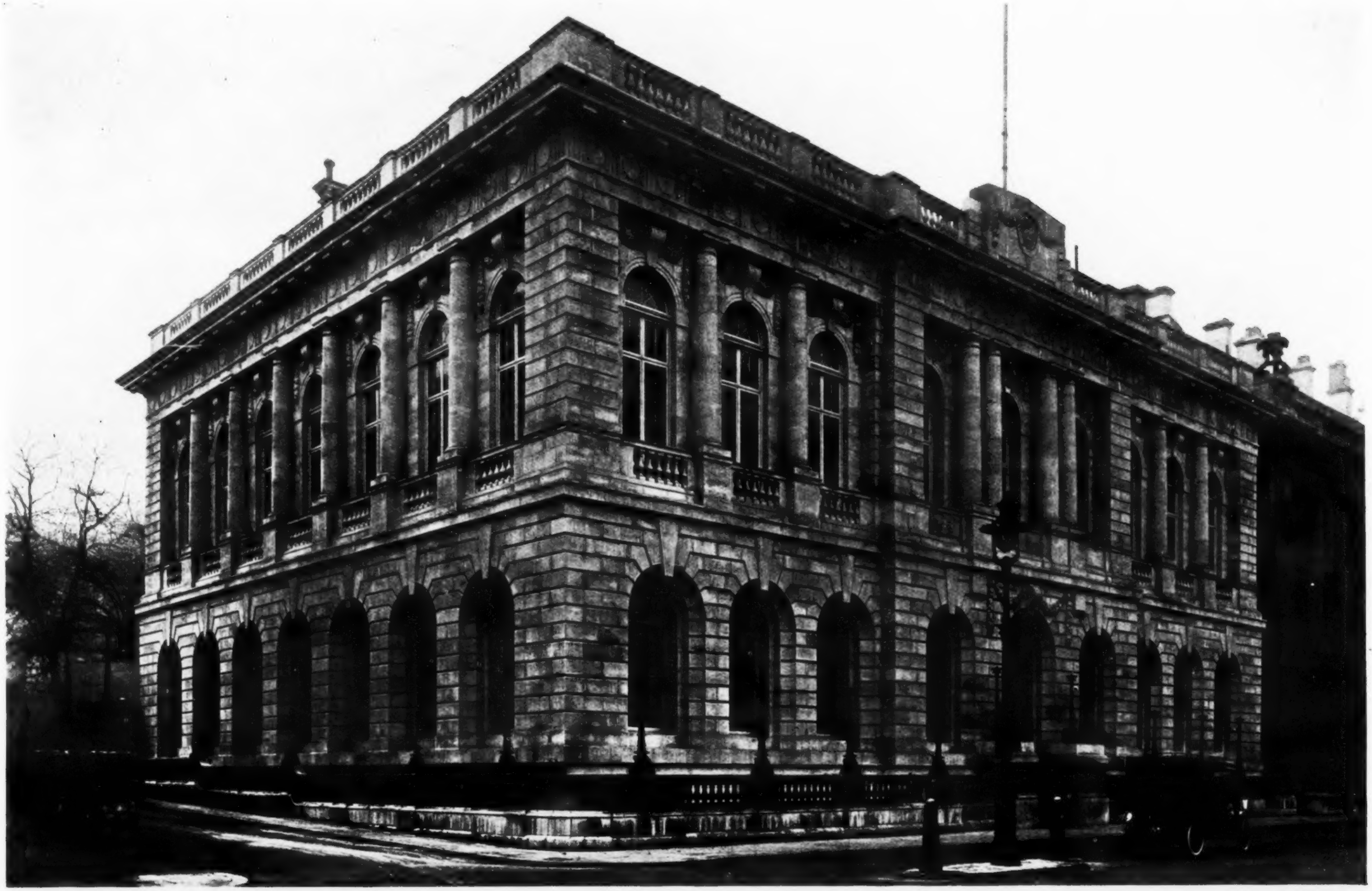
Sir Reginald Blomfield, R.A., Architect



The stonework of the Carlton Club having become badly decayed, the elevations have been refaced with Portland stone. Sir Reginald Blomfield has taken the opportunity of redesigning the façades on simpler and more economical lines.

Current Architecture. 248.—The Carlton Club, Pall Mall, as Refaced

Sir Reginald Blomfield, R.A., Architect



The façades have been refaced with Portland stone. A rusticated arcade takes the place of the lower order of the old building, and the upper order is replaced by a Doric order and entablature. The interior remains unchanged.

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Correspondence

The Architects' Benevolent Society's Insurance Scheme

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—May I trespass on your columns for a little space in which to call the attention of your readers to a very simple way in which they can help the Architects' Benevolent Society?

If, in the next insurance they effect—be it on their life, their house, its contents, or any other thing that is theirs—they will ask their insurance company to put it through the agency of the Architects' Benevolent Society, the commission will be given to the society as a subscription in their name.

Architects are not usually agents for insurance companies, and therefore these agency commissions, which in the aggregate must amount to a very large sum per annum, are dissipated as far as the profession is concerned. The aim of the Benevolent Society is to collect them and expend them for the good of the profession.

This is one of those simple proposals which, like "daylight saving," are so obvious that one wonders why no one thought of it before. The medical profession thought of this one some years ago, and are now, I understand, making a large income for medical charities out of it.

We architects can now do the same without even trouble for ourselves, and with great benefit to our Benevolent Society.

MAURICE E. WEBB,
Chairman, A.B.S. Insurance Sub-Committee, London.

The Heating and Ventilation of Houses

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—"The Times" has recently published some letters of a controversial nature dealing with a subject of great interest to all architects, i.e., the heating and ventilation of houses. Professor Fraser Harris, one of the correspondents, argues in favour of diffused as against radiant heating. There is no field of scientific research which holds out more prospect of social and material gain than the heating and ventilation of the small house. My own belief is that success lies in the proper application and use of electric energy.

Some ten years ago I was privileged to attend a demonstration in Canada of a combined system of heating and ventilation which the inventor claimed was based purely on the principle of radiation. My experience may be of interest. Five of us assembled in a room about 14 ft. square and smoked cigars furiously until we were wellnigh asphyxiated. Our host then pressed a switch, and as if by magic, the smoke in the room melted away, while the temperature rose from 50 deg. to 70 deg. Fahrenheit in less than ten minutes without our being conscious of any appreciable current of air in the room. All that could be seen was a faint glow through a metal grid in the skirting board under a window, but the apparatus was afterwards dissembled for our inspection, and consisted of nothing more than a wire coil surrounded by a number of polished metal reflectors set at various angles to one another in the middle of a horizontal duct between the skirting board and the outside wall. There was sufficient space between the reflectors to allow the free passage of air. No mechanical device was employed, the reflectors, apparently, being so arranged as to cause the air to flow in the required direction as the coil became heated, and to force it into the room with sufficient pressure to maintain a steady flow of warm, fresh air through the room. Two medical men who were present at the demonstration expressed the opinion that the application of this system to dwelling-houses in cold climates would eliminate tuberculosis.

This was ten years ago, and I have quite lost touch with the inventor. I do not even know if he is still alive. He assured me, however, that his invention was fully protected, so there can be no harm, in view of the importance of the subject, in publishing the above facts in the hope that they may point the way to a line of investigation by some of our own scientists.

London. J. W. MAWSON.

Liverpool Cathedral

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—Professor Lionel B. Budden's article in your issue for September 10 would have been appreciated a great deal more if he had graciously withheld his sixth paragraph. It is strange how Christianity must always war amongst its members, but architecture has no creed, and it should not be embroiled or made the pretext in any personal feelings relating to matters spiritual.

The Church of *Rome*, it would seem, naturally "permits" the erection of buildings in styles other than Gothic; such other styles are *exotic*, and, therefore, possibly more suited to its religion.

The Anglican Church has many buildings that are not Gothic, but if a preference is shown to a national type of architecture, is not this correct? The religion adopted by a country is the one best suited to its needs.

In fact, Liverpool Cathedral has produced "sour grapes," and the rival sects have their teeth set on edge.

That such feelings should be shown over so great an architectural triumph, seems to me petty, and I write this holding no brief for any sect, preferring to leave my faith "upon the knees of the Gods."

A. ARCHER-BETHAM.

London.

Architecture and the Press

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—It is extremely gratifying to note the competent attention which the lay Press is giving nowadays to architecture. Whereas not so very long ago the subject was often dealt with by writers who, truth to tell, knew nothing about it, it is now frequently handled by men who obviously know their job. I noticed in a recent issue of "The Yorkshire Post" a very well-informed article on "Ugly Buildings." The concluding paragraphs contain so much wisdom that I feel they deserve quotation. "Architecture," says the writer, "must be regarded not as a tool, not even as an adornment, but as an expression of daily life. We shall not create beautiful buildings simply by drawing pleasant paper designs and copying them in stone, nor by imitating beautiful buildings of the past. What we have to do is to create in stone or in brick buildings which will express through the nature of their material substance a true and modern conception of their highest purpose. A railway station should look like a station, and fulfil with the utmost efficiency a station's function, but it may also be—as some American stations are—a beautiful and expressive architectural creation. In this country such buildings as Liverpool Cathedral and the Bush Building in Kingsway are striking evidences of progress; but they are still exceptional; we need to apply universally the ideals behind them, starting with the humblest cottages." More writing of this kind in the daily Press would do much to help the cause of good architecture.

"READER."

Leeds.

A Small House at Folkestone

J. L. SEATON DAHL, F.R.I.B.A., Architect

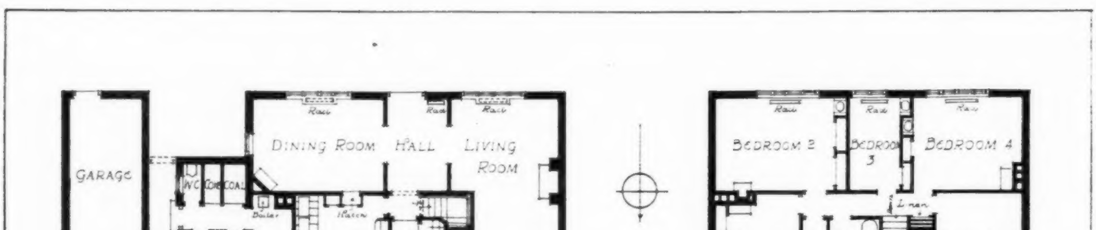
THE manner in which this house is planned enables the occupants to run it with the minimum of labour. The kitchen, scullery, and the other servants' quarters are arranged as close as possible to the main and tradesmen's entrances; central heating is installed, and gas fires are provided. In the kitchen is a gas cooker and an independent range; and the bedrooms have washhand basins fitted, and good cupboard accommodation.

The walls are of hollow brick, rendered in cement externally, and cream colour-washed. The plinth of the house is of red brick. The main roof is covered with tiles, and the outhouse, comprising the garage, etc., has a vulcanite flat roof.

The central heating and hot-water supplies are taken from a "Classic" boiler with coil in calorifier in the usual way.

The general contractors were Messrs. Hayward and Paramor, Folkestone; and the sub-contractors were as follows: Marchant & Co., Folkestone (electric work); Mr. Pierce, Dover (heating); Tylors (sanitary fittings); Smith and Wellstood (ranges).

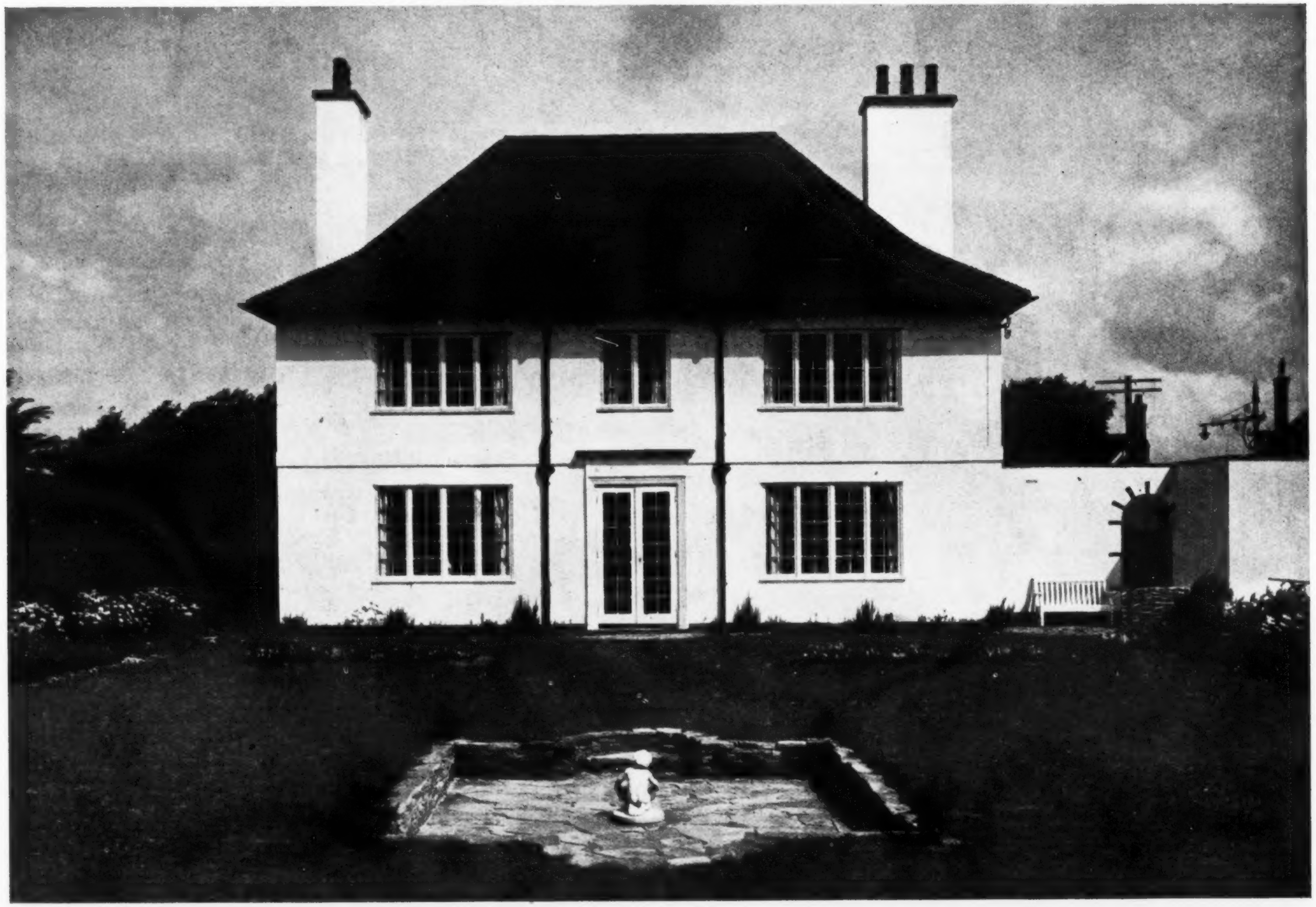
The Entrance Front.



"RANBURY," BATHURST ROAD.

Modern Domestic Architecture. 91.—"Ranbury," Bathurst Road, Folkestone: The Garden Front

J. L. Seaton Dahl, F.R.I.B.A., Architect



The garden front faces south. The double doors lead to the hall, and on the left and right hand sides are the living-room and dining-room respectively. The walls are of brick, cement rendered and cream colour-washed, and the roof is tiled.

The British Drama League National Theatre Competition

The Winning Design. W. L. Somerville, Architect

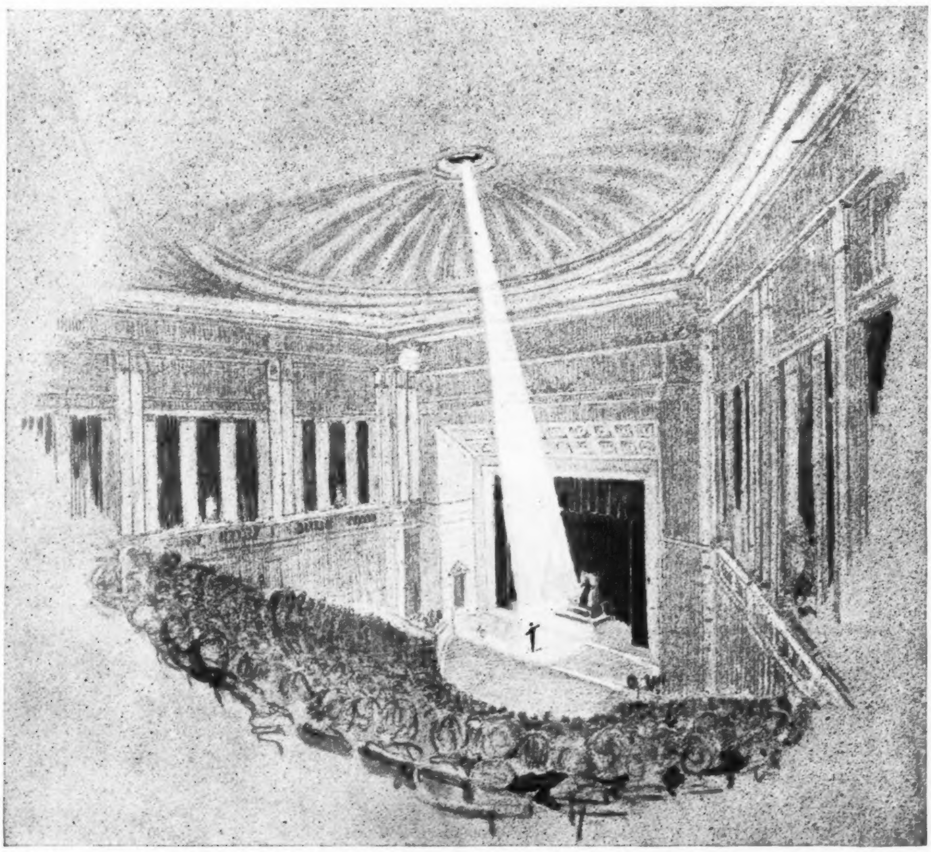
On this and the following pages we illustrate the design of Mr. W. L. Somerville, of Toronto, which has been awarded the first prize of £250 in the competition promoted by the British Drama League for a National Theatre. The assessors were Mr. J. Alfred Gotch, P.R.I.B.A.; Sir Edwin Lutyens, R.A., F.R.I.B.A.; Sir Lawrence Weaver, K.B.E., F.S.A.; Professor C. H. Reilly, F.R.I.B.A.; Mr. H. Granville-Barker, and Mr. Albert Rutherston; with Mr. Geoffrey Whitworth as secretary. The other awards were as follows: second prize, £100, Mr. W. J. H. Gregory, A.R.I.B.A.; special prize for merit, £25, Mr. W. J. Theodore Godwin.

Mr. Granville-Barker, writing in "Drama," by whose courtesy the accompanying illustrations are reproduced, puts forward several reasons why it is desirable to have two auditoria in the National Theatre, after which he points out that the need of an apron stage for the playing of Shakespeare may not yet be beyond dispute. But opinion on the point is at least too strong to be defied. And it is not a thing that can be added to a theatre otherwise designed: lines of sight will be all upset. Mr. Somerville, he says, provides for an apron stage in both auditoria (and for a Greek orchestra in both, too, though this was not required). But it can be removed, and rows of stalls can take its place. So either method of production can be followed. The Greek "orchestra" is equally removable.

The obligations thus forced on him Mr. Somerville has faced boldly. To secure good lines of sight he has adopted the "Bayreuth" plan (which in essence is the plan of a Greek theatre). The drawback to this is, that it throws the furthest spectators to a great distance from the stage, in the larger theatre 110 ft., in the smaller 75 ft. It may be questioned whether a compromise could not be made over the last twelve rows of the larger theatre. If these could be steeply banked by the help of a shallow gallery, that is, if the whole auditorium could be brought to all intents and purposes under the main ceiling, it might be better. The only other sacrifice made is of stage boxes, not a great one. The actual box accommodation may be thought a little unusual. Boxes in such a theatre, however, are mainly for ceremony; they should have consideration, but the more general amenity must not be sacrificed. These side boxes—a little more privacy secured them—would suffice. The others are more open to criticism, but they are hardly needed in any case.

It should be noted that the traditional semi-circular fashion of seating has been preserved. This is important; it keeps the audience in a living relation to each other as well as to the play.

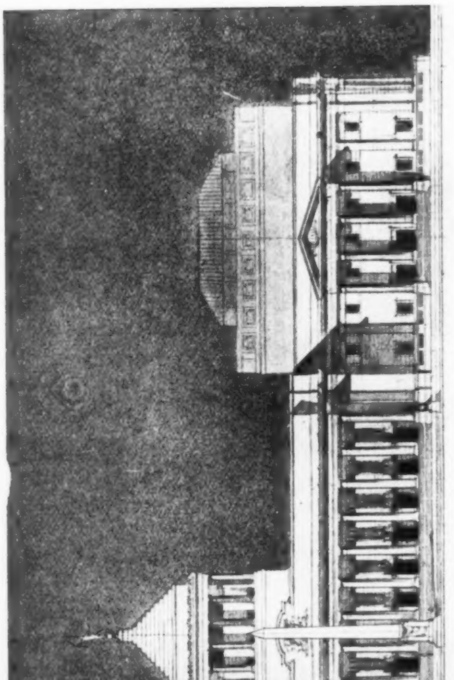
Care would have to be taken not to use too much stone and marble in either auditorium. They are one's enemies acoustically and in more than one sense have a chilling



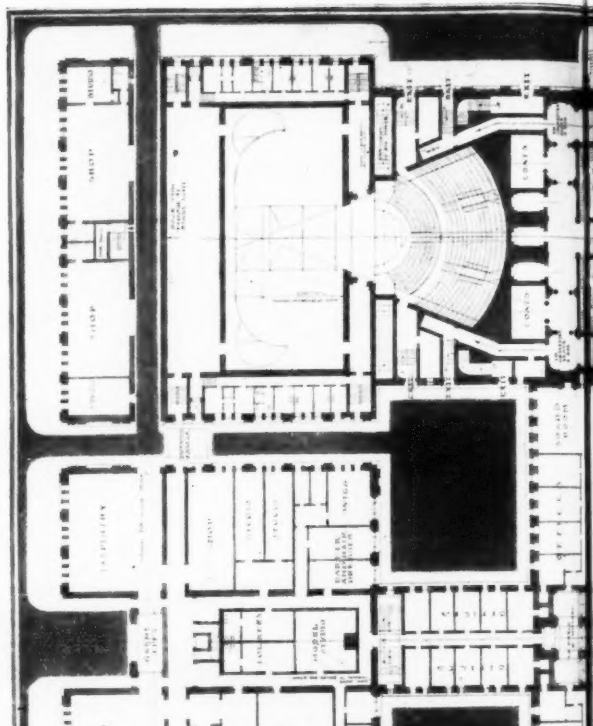
THE INTERIOR OF THE LARGE AUDITORIUM.

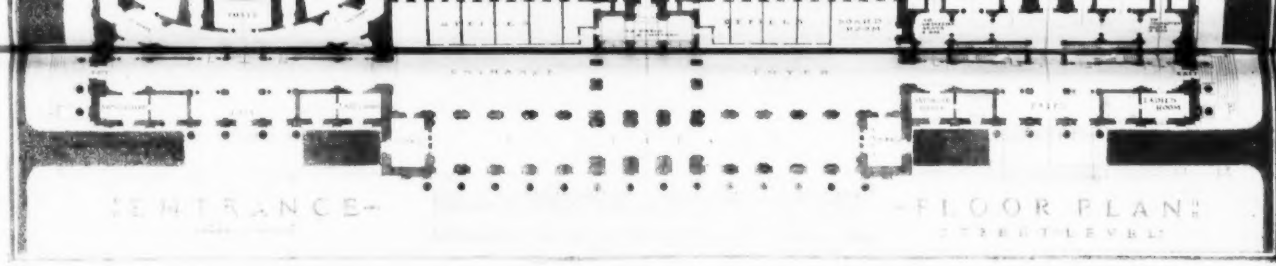
Architectural Designs. 23.—The British Drama League National Theatre Competition: The Winning Design

W. L. Somerville, Architect

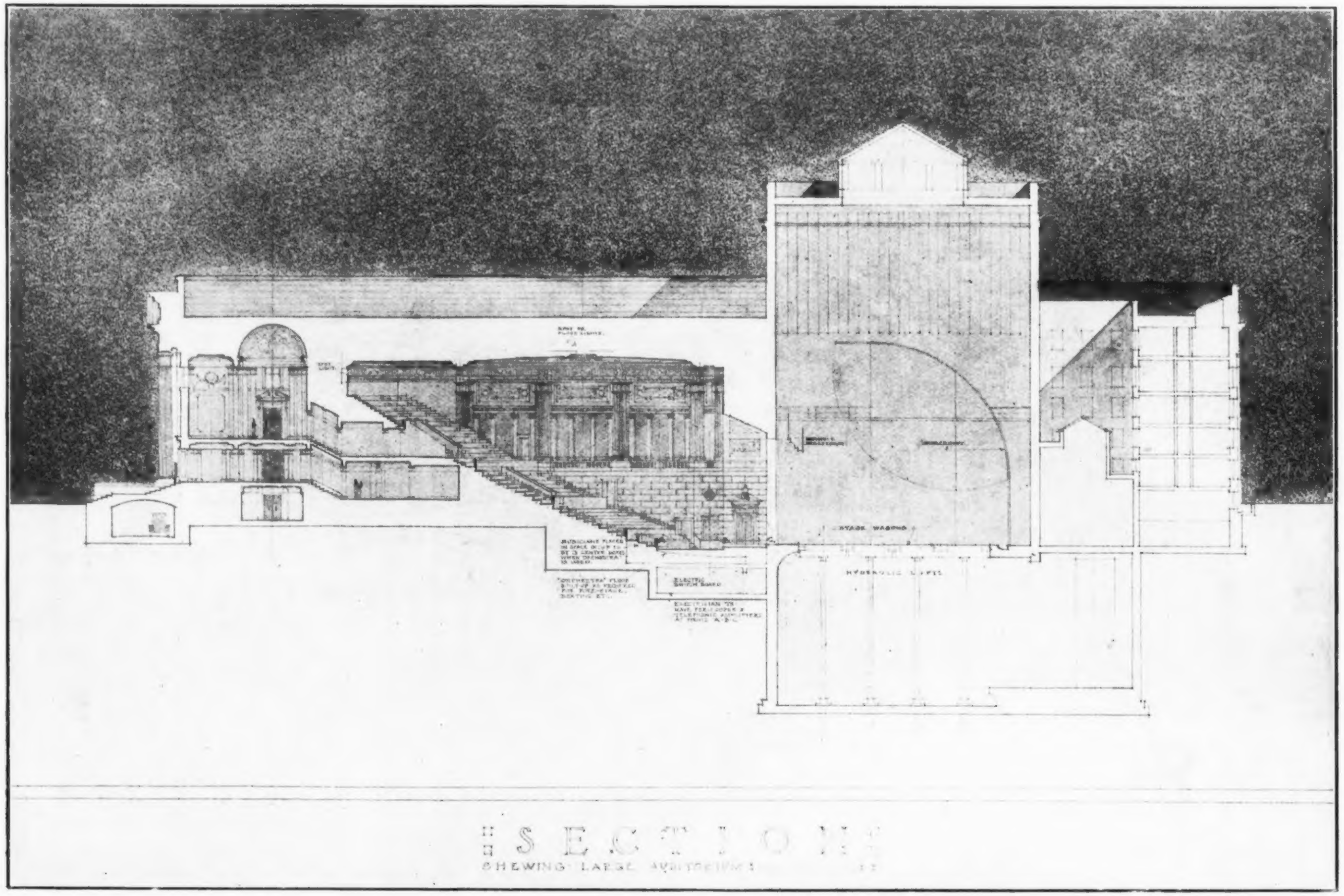


THE PRINCIPAL ELEVATION.





THE ENTRANCE FLOOR PLAN.



LONGITUDINAL SECTION OF LARGE AUDITORIUM.

The above design has been awarded the first prize of £250 in the competition for a National Theatre promoted by the British Drama League.

Comment upon the design appears on page 505.

effect. For the mellowing of sound nothing is better than wood panels. It will be a pity, perhaps, if the smaller auditorium too closely resembles the larger. (But Mr. Somerville may not mean this to extend beyond the general plan.) For one thing, it is likely to be more used for comedy; for another, an audience sitting now in this theatre and now in that will (one may suppose) prefer a difference to a likeness.

In both instances the horizontal lines of sight are excellent.

By Mr. Somerville's arrangement (which needs very little amending) of the scene store and workshops, between twenty and thirty productions could be kept in the theatre, and moved between shop, store and stage with the minimum of labour by lift and electric trolley.

The front of the house needs little comment. One is glad to see ample "foyer" room and good coat rooms. The subway for cabs and motors is surely—especially on a wet night—an excellent idea. But in its present form it needs a little amendment (a widening of the track might be enough).

Finally, it is the library which should mark this theatre out from all others as the National Theatre.

The Construction of Septic Tanks

A Simple Specification

By WILLIAM HARVEY

A CORRESPONDENT writes: "Can you give me a good, simple specification, which could be worked to by a small country builder, and, if possible, a small sketch, for a septic tank suitable for taking the sewage from the w.c.? A new bathroom is proposed, including the w.c., bath, and basin. Could the waste from the latter be taken to the septic tank, or would it be safer to form a soakaway? What is the minimum safe distance from the building for the tank? It is not feasible to connect up with existing tank owing to conditions."

As the conditions of installation affect the size of the septic tank the end of the enquiry must be considered first.

Minimum Safe Distance.—Septic tanks are not yet recognized in the printed by-laws of all country districts, but they probably would be classed as cesspools for which a minimum distance of 50 ft. from any dwelling-house is generally specified. In connection with the question of distance it should be borne in mind that a septic tank with open filter bed exposes putrid tank liquor to air and flies more freely than a cesspool, and if placed on the sunny or the windward side of the house the minimum distance may profitably be exceeded in the interests of health and comfort. In the South of England south-west is the windward side on two days out of three, and it is therefore better to place the septic tank on the north-east side of the house wherever practicable. Neighbours' rights must also be considered.

Bath and Lavatory Waste.—The waste water will be useful in flushing the length of drain between house and septic tank, and may therefore be treated in it. Excess of soap and soda such as is contained in laundry waste is harmful, as it tends to produce a mass of jelly ("colloidal matter" according to the books) in the septic tank, which might block the overflow to the filter-bed. Stoppage is the more likely to occur as a slow rate of flow is arranged between inlet and outlet of the tank in order to permit of the formation of a scum and promote the digestion of solids.

No universally applicable specification can be given for a septic tank irrespective of conditions of site, etc. The following notes should be adapted to special cases in the light of these considerations, viz.:—

1. That the desired end of the process is to get rid of the sewage in a form harmless to human beings—self or neighbours.

2. Without creating a nuisance by flies or smell at any intermediate stage of the proceedings.

3. That the breaking down of solids in the septic (i.e., poison) tank is a process of putrefaction, not of purification.

4. That the application of putrid tank liquor for purification on and in the filter bed must be carried out in a manner which permits of its oxidation by means of aerobic bacteria.

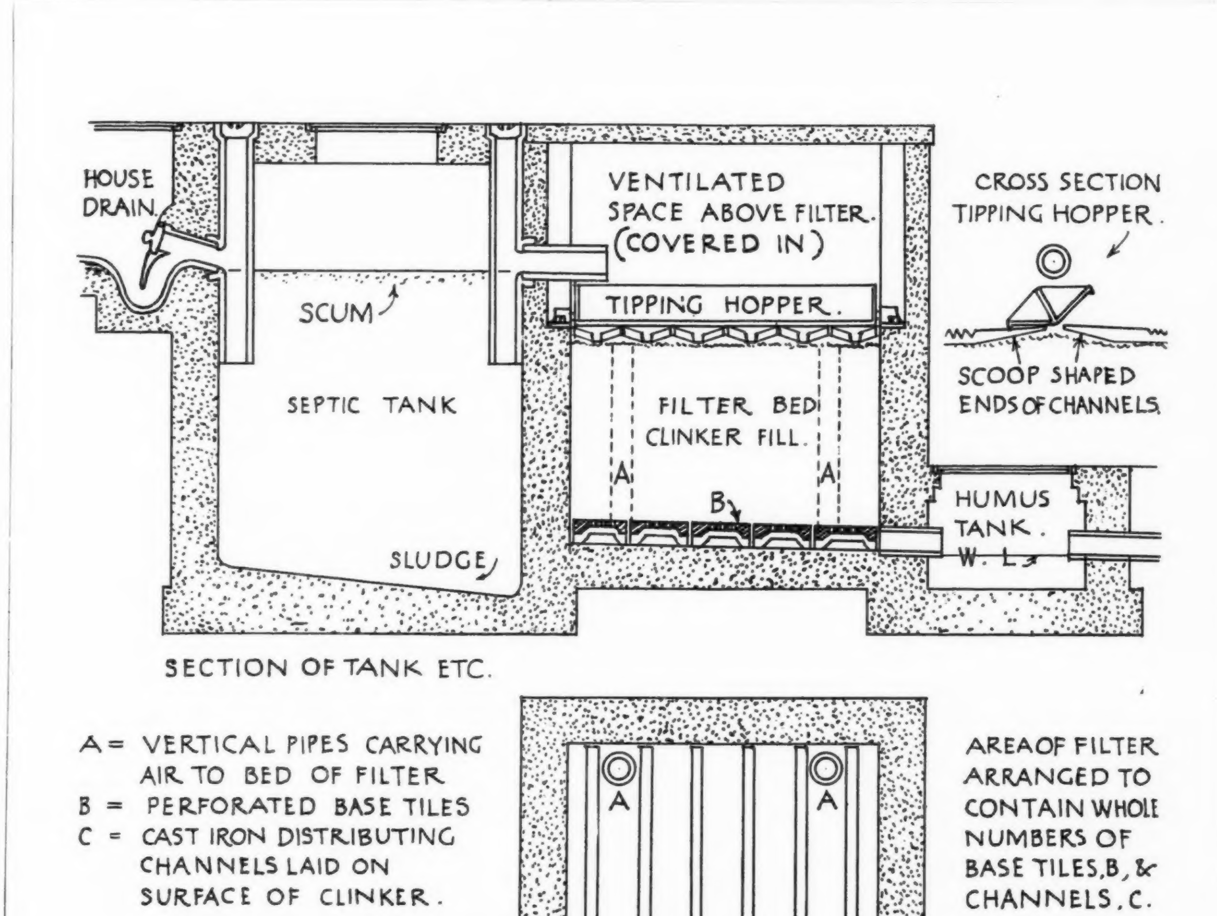
5. That dilution of the effluent in a stream of water sufficiently large for the purpose, or its absorption by the roots of plants are final stages in its purification.

6. That the consent of local authorities must be obtained.

A septic tank for a household of five persons to take soil and waste water, but not rain or surface water.

Excavate Soil.—Adjoining the disconnecting trap of drain, excavate earth for septic tank and filter bed. Replace excavated earth around septic tank and in banks on each side of filter bed with garden mould kept separate, and spread on top of mounds. The fall from outlet of tank to outlet of filter bed to be at least 3 ft. 6 in. The accompanying diagram is drawn with a fall of approximately 4 ft. 6 in. Also excavate (*a*) for laying 100 ft. run of 3 in. agricultural drain pipes, 1 ft. deep between rows of small fruit bushes in orchard to dispose of effluent; or (*b*) excavate for soakage-pit down to absorbent subsoil about 3 ft. deep, capacity of pit 3 cub. yd.; (*a*) would be suitable on clay; (*b*) above chalk or gravel, and where room is lacking for making use of the liquid in irrigation. Alternately the effluent might be drained into a running stream of sufficient size to complete its purification.

Septic Tank.—The septic tank to be constructed as an impervious cistern in sound brickwork rendered in Portland cement, and "Pudlo" in two coats, or in concrete, finished with a smooth, impervious surface. To be given sufficient foundation to avoid settlement and fracture, according to the nature of the ground. Walls to be strong enough to stand the alternate pressure of the liquid contents and of the surrounding soil. As a cesspool it would be required by the by-laws in certain districts to be surrounded with puddled clay as a precaution against possible leakage. The roof of the septic tank to be constructed of reinforced concrete, and to be provided with a manhole and air-tight cover, and with two stoppered cleaning-eyes to the inlet and outlet pipes. The space above water-level to be provided with an outlet for the escape of gas in the form of two lengths of 4 in. cast-iron pipe coated with Dr. Angus Smith's solution, and carried to a height of at least 10 ft. above the surface of the ground, and provided with a wire balloon cage on top. This outlet serves to disperse the sewer-gas which forms an explosive mixture with air in certain proportions. The dimensions of the submerged portion of the tank to be 2 ft. 3 in. by 5 ft. by 5 ft. deep, or equivalent volume may be provided by means of pre-cast concrete tubes of 3 ft. diameter. The floor to slope down to one point under the manhole to facilitate removal of sludge by pumping. The inlet and outlet pipes to be 4 in. diameter



DRAWN BY WILLIAM HARVEY.

salt-glazed stoneware with T-heads carried down 1 ft. 6 in. under water-level and carried up to and through top of tank, and fitted with screw stoppers as cleaning-eyes. Where the upper part of the septic tank is relatively high and the tank itself small, the upper parts of the T-heads need only be carried 1 ft. above water-level, as a cane for cleaning could be introduced into them from a manhole centrally placed.

Filter Bed.—The filter bed to be constructed on an impervious concrete floor with 9 in. brickwork surrounding walls. The floor to slope towards outlet to collect effluent into discharge pipe. The floor surface to be covered with a layer of approved vitrified stoneware ventilating tiles, arranged to permit effluent to drip on to the concrete floor surface, and to allow of free circulation of air to the underside of the filtering material.

Where the lay of the ground permits of the walls of filter bed being exposed to the air the ventilating tiles may be carried through under the enclosing walls.

Where earth will be in contact with the walls air must be supplied to the bottom of the filter bed by vertical 4 in. pipes, four in number, each provided with a wire balloon case. The dimensions of the mass of filtering material shown in the diagram are 5 ft. by 10 ft. by 3 ft.

Distributing Apparatus.—The filter bed to be filled with the hardest quality destructor clinker screened free from dust and capable of passing a 1½ in. ring, and resting upon a 1 in. ring. The upper surface of the clinker to be raked flat and provided with proper serrated edge cast-iron distributing troughs treated with Dr. Angus Smith's solution, six to each side of an alternate acting galvanized wrought-iron tipping-hopper, mounted on gunmetal-bushed butts placed centrally under the outlet from the tank.

Outlet from Filter Bed.—The effluent from the filter bed should be fit for dispersal into cultivated top soil by means of agricultural drains or small spade-dug trenches, as described under the heading "Excavate Soil." The uppermost layers of cultivated soil are alone provided with bacteria capable of completing the purification of the effluent. Discharge into subsoil is only permissible where the site is remote from any source of water supply for drinking purposes.

Covers for Filter Bed.—Raise walls of filter bed to a height sufficient to clear the top of the outlet from septic tank and deck over the space with pre-cast reinforced concrete slabs, each provided with a lifting ring at each end to permit of its removal as necessary for cleaning and renewing filtering material, oiling bearings of tilting hopper, etc.

The use of the decking is to prevent nuisance from flies and smell. Ventilating inlets in the upper part of the brickwork should be provided with fine wire gauze fly-screens.

Additional Works, Double Filtration.—In a district devoted to the purposes of a catchment area for water supply the purity of effluent becomes a matter of vital importance, and distribution over a second filter may be necessary.

Humus Tank.—In order that the quality of effluent may be examined from time to time with a view to ascertaining whether the plant is functioning properly, the outlet from the filter may be made to discharge into a humus tank, in which samples may be taken, and any suspended solids remaining in the effluent may be precipitated.

The humus tank may take the form of an ornamental lily-pool with goldfish, or be simply an inspection chamber provided with a manhole cover. An outlet from the humus tank is connected with the system of agricultural drain-pipes, irrigation trenches, soakaway or stream, whichever method is used for getting rid of the effluent.

The Business of an Architect

15.—Contracts (*continued*)

By C. MURRAY HENNELL, F.S.I.

CLAUSE 26 of the R.I.B.A. Conditions of Contract is a lengthy one, which prescribes the procedure when the contractor suspends the works, the usual reason being that he has got into financial difficulties. In such cases the first thing for the architect to do is to give written notice to the contractor requiring him to proceed within a reasonable time—fourteen days is usually long enough—and care must be taken to state that the notice is given under the provisions of this clause, also to have such notices left by hand at the contractor's place of business or sent by registered post.

It is most advisable at the same time to inform the police of the neighbourhood in which the works are situated of the state of affairs, requesting them to keep a watch that no plant or materials are removed from the site. The clerk of works, when there is one, will prevent so far as possible such removal, but as a rule he cannot be on the spot continuously, and there are merchants and sub-contractors who will do their utmost to save the loss of materials and plant which they have delivered, even though they know that in the circumstances the recovery by stealth of goods which they have supplied and for which they have not been paid is, unfortunately for them, tantamount to theft. The employer has a lien upon all such plant and materials, and the unlucky merchants must rank as creditors of the defaulting contractor.

If the builder has gone into liquidation it is invariably a wise plan for the architect to meet the liquidator and get on good terms with him. Each can, if he wishes, make considerable difficulties for the other, and these may be avoided if amicable relations and mutual confidence exist. It should be remembered that the liquidator does not represent the late lamented contractor, with whom the architect may feel justifiably out of humour, but that he is acting on behalf of the creditors who probably have considerably more cause for annoyance than has the architect. In order to get a good idea of the position, the architect, if he can manage it, will do well to attend a meeting of the creditors. This will guide him as to the best course to pursue in order to get his work finished. The creditors may wish to complete contracts in hand, and, provided they can show ability to do so satisfactorily and with dispatch, it is often advisable to allow this course, but every case must be judged on its own merits, for circumstances vary so greatly that no golden rule can be laid down. In the majority of cases it is necessary to employ another contractor to complete, and the employer, acting on the advice of his architect, has to decide on what basis the new contract shall be made, whether at a fixed sum or on the prime cost plus percentage for profit, etc., but if the liquidator's concurrence with the course to be adopted is obtained at an early stage, it will save disputes later on. This individual has no right to dictate on the matter, nor can any objections of his carry weight if everything is done in a proper manner without the introduction of unnecessary expense and extra works.

Much additional work falls upon the shoulders of the architect when a contractor fails, and his worries are multiplied. He can claim no recompense for the latter, but he is entitled to make a reasonable charge for the extra services he has to give. This will be one of the expenses "properly incurred" by the employer, and will be accounted for in the balance, if there is any, that is finally paid over to the contractor or his creditors. If it costs more to complete the work than the balance in hand, the employer cannot recover the difference from a contractor who financially no longer exists, but becomes a creditor and must rank with the rest of them.

The architect may receive applications from merchants and sub-contractors who have supplied goods or executed work to the order of the liquidated firm but at the selection of the architect, to certify for payment directly to them for what they have supplied or done. There are conflicting opinions as to the legality of the architect complying with such requests, but apart from questions of law and unless an arrangement to this effect was made before the smash came, he will be well advised not to do anything of the sort. It is, of course, impossible for him to decide that one creditor has a more deserving case than another, and he has no right to attempt to do so, and the adoption of such a course leaves him open to strong suspicion as to what he is getting out of this action of favouritism.

The next clause defines the words "Prime Cost," upon which there is much misunderstanding, often intentional. "Prime Cost" does not mean the catalogue price, nor does it mean that price with so much per cent. off when the builder is going to be allowed a further deduction. It means the trade price of an article, with all discounts, except a limited cash discount, knocked off. That cash discount should be limited, although clause No. 27 does not provide for this, for it is an easy matter to show a large cash discount and a small trade discount in order to depart from the intention of the contract without conflict with its wording. Two and a half per cent. is a reasonable discount for cash payments, and more than this usually represents, in fact, something additional to a rebate on account of prompt payment. It is a good plan to insert in this clause, after "but not deducting discount for cash," the words "up to two and one half per cent." This makes the point perfectly clear from the start, and obviates disputes. There are some manufacturers and merchants who are extremely loth to quote to the architect the prime cost. They give him one quotation and charge the builder a lower figure, because, as they will say when the fact is discovered, they must look after their customers, the builders. This is false reasoning. In the first place they are allowing the builder a commission to which he is not entitled under the terms of his contract, for he has ostensibly included in his tender the profit he expects on prime cost items. Secondly, the builder is only purchasing these goods on behalf of the employer, and is not the voluntary customer, but is acting under instructions. Thirdly, if they had quoted the true price they might have sold better and more expensive articles and have still kept within the architect's p.c. sums. Furthermore, the conscientious architect almost invariably discovers the facts, for he, or his quantity surveyor, demands production of the *receipted* invoices in adjusting prime cost and provisional items at the settlement of the final account with the builder, and realizes that he might have had the higher class goods which he desired, but he had been misled into thinking that they could not be afforded. He is not inclined to deal again with a firm that he feels has deceived him.

Clause 28 deals with provisional sums, and 29 with artists and tradesmen engaged directly by the employer. These are self-explanatory.

Clause 30 provides for payments under the architect's certificates, and suggestions as to filling in the blank spaces may not be amiss. In works of modest proportions fourteen days is generally a sufficient limit of time for a client to make arrangements for payment. The minimum value of work to be done before a certificate is issued is entirely a matter for agreement with the contractor when discussing the proposed contract, but the rate per cent. of the value of work executed at which advances are to be made should not, as a rule, exceed eighty, leaving a balance in hand of 20 per cent. until this balance amounts to at least 10 per cent. of the contract sum. Thereafter certificates are for the full value of the work subsequently executed, and a proportion of the money retained, usually half of it, is included in the completion certificate, leaving a retention of 5 per cent. during the maintenance period, which is the same length of time as that already inserted in Clause 17.

Clause 31 prescribes the contractor's remedy if the employer does not meet the architect's certificates, and Clause 32 is a submission of disputes to arbitration. It is by no means necessary to nominate the arbitrator in the contract, although spaces are left in the clause for this to be done, and many architects prefer to cross out the intervening words so as to leave the selection, at the request of either party, to the President of the Royal Institute of British Architects. It should be noted in this connection that there are certain matters arising under this form of building contract that cannot be thus referred, unless both parties should agree otherwise, these being left to the sole discretion of the architect. They are decisions as to the course to be followed when there is a discrepancy between the drawings and specification, the dismissal from the works of any person who is incompetent or misconducts himself, the removal of improper work, the right to have any work opened up, and the giving or withholding of consent to sub-letting. It behoves the architect always to be scrupulously fair, but in matters relating to which his decision is the final one, it is his duty to be most careful, considerate, and just.

The R.I.B.A. form of contract only provides for a fixed contract price, but owing to the fluctuations in prices since the war, the majority of builders are not willing to take the risk of increases in costs that may take place during the period of the contract. Federated builders are now instructed to attach a slip to their tenders stating that the amount of the tender is subject to fluctuations in the rates of wages and sometimes in the prices of materials as well.

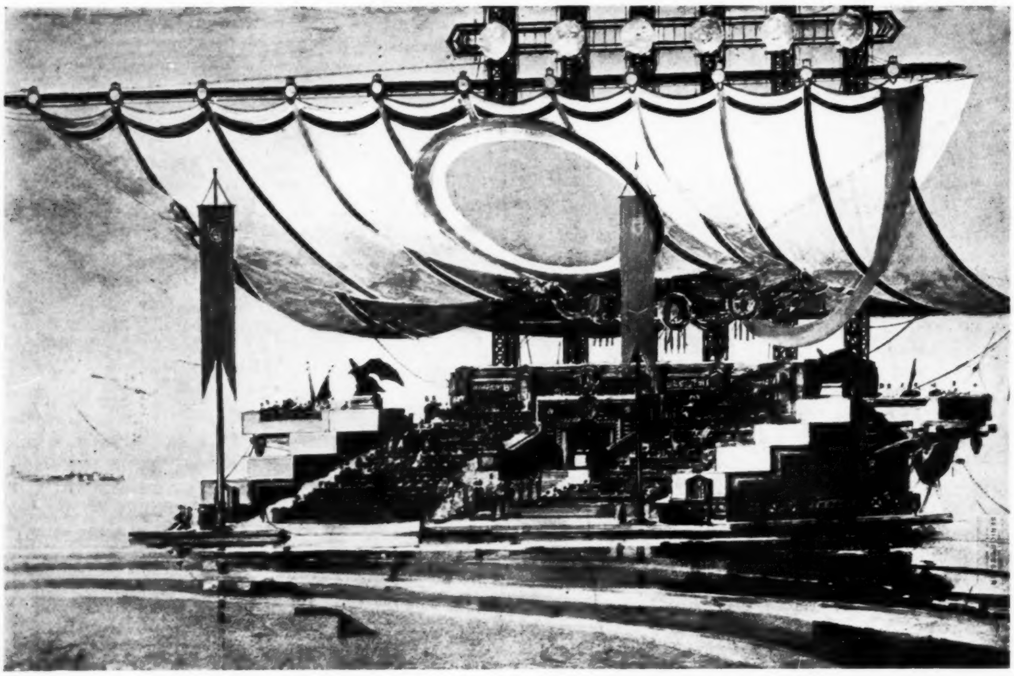
To provide for this, the following, is a suggested "up and down" clause which can be added to the Conditions of Contract :—

"If at any time between the ....(the date of the tender) and the date of completion of the works, any alteration takes place (*a*) in the standard rates of wages of any class of workpeople employed by the Contractor for the purpose of the works, or (*b*) in the current cost of any materials used in the execution of the works, the contract price shall be increased or decreased, as the case may require, by the amount of the actual increase or decrease in the wages or cost paid by the Contractor in respect of the works. Provided that in the event of any increase in the current cost of any materials on account of which an adjustment in the contract is claimed by the Contractor, the Contractor shall, before purchasing such materials, give notice thereof to the Architect and shall produce such evidence as the Architect may consider satisfactory that the addition to the contract price is not due to any unreasonable delay or failure on the Contractor's part to purchase the materials before the increase occurred. The Contractor shall, from time to time, furnish the Architect with such evidence as the Architect may require as to the actual rates and prices paid both for labour and materials employed and furnished by the Contractor for the purpose of adjusting the contract price."

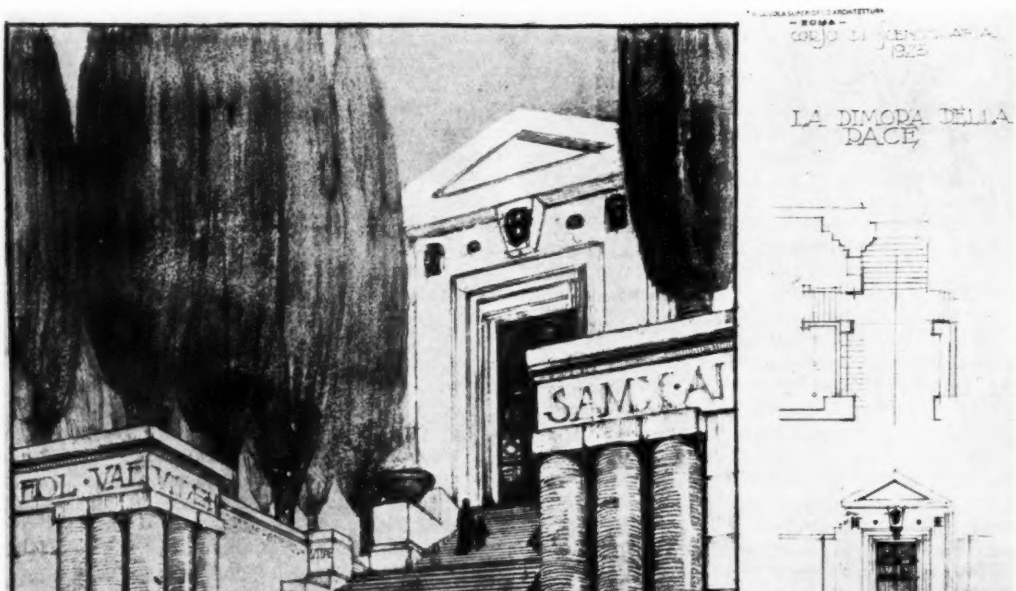
If wages only, and not materials, are to affect the contract sum, this clause can readily be modified accordingly.

[The previous articles in this series appeared in our issues for April 4, 11, 25; May 9 and 30; June 27; July 18; August 1; November 7 and 21; December 12, 1923; and January 23; February 20; June 25, and August 20, 1924.]

Some Drawings from the Recent Exhibition held in connection

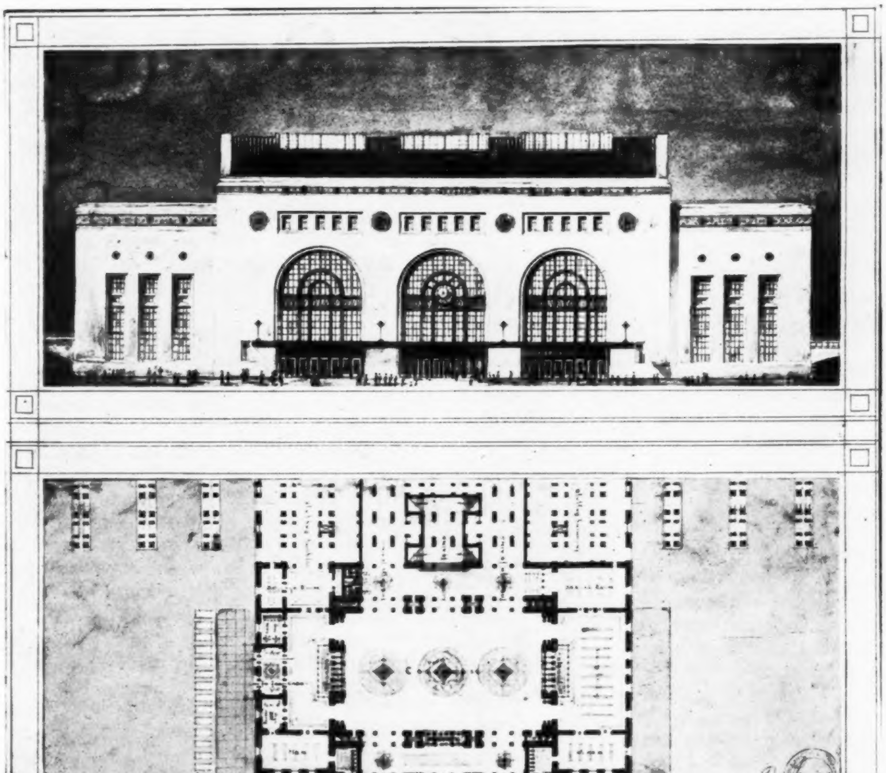


Cornell University College of Architecture, N.Y.



Royal High School of Architecture, Rome.

with the R.I.B.A. Conference on Architectural Education



By V. H. Stromquist (Harvard University).

The Practical Design of Steel Beams and Pillars in Buildings

9.—Bending Moment

By W. BASIL SCOTT, M.I.Struct.E.

THE statement (see article 3 of this series) that for equilibrium the moment of resistance must not be *less* than the bending moment, is an indication of the importance of the latter in the design of beams.

The BENDING MOMENT (standard abbreviation = B) at any point in the length of a beam is the measure of the tendency of the external forces (loads and reactions) to cause bending or rotation about that point. (A.9.)

The general rule for the calculation of the bending moment at any point in the length of a beam and due to any system of loading is as follows :—

The BENDING MOMENT at any point in the length of a beam is equal to the algebraic sum of the moments about such point of all the external forces acting *either* to the left or to the right of it. (B.9.)

The beams for buildings that are the subject of our consideration, are usually of uniform section throughout, except when all the flange plates of heavily plated compound girders do not run the full length. In the great majority of cases, therefore, it is sufficient for us to know the value of the maximum bending moment and where it occurs, as this maximum gives us the moment of resistance required, and consequently determines the section of the beam. But apart from this, and apart also from the fact that there is a simple method by which the position of the maximum bending may be ascertained, it is desirable to be able to calculate the value of the bending moment at any point.

The general rule (B.9) may be expanded with some advantage to the special conditions of simply supported beams. In doing so, the point at which we wish to calculate the bending moment is the fulcrum; the left-hand reaction (RL) is an upward or positive force, and the loads or weights (W) between the left-hand reaction (RL) and the chosen point are downward or negative forces. A load or weight (W) immediately above the point is eliminated, because it has "no moment" about that point. Further, if we retain the left-hand reaction (RL) as the origin (as was done for reactions), then the loads to the right of the point or fulcrum do not enter into the calculation, as it is only the moments of the external forces acting on one side of the point that are considered. It may be noted, incidentally, that if we work from the right-hand reaction (RR), it is a negative force, as it tends to rotate the beam anti-clockwise, and the loads between the right-hand reaction and the point are positive, as they tend to rotate the beam clockwise.

Rule B.9 may now be restated in this way.

The BENDING MOMENT at any point in the length of a simply supported beam is equal to the positive moment of the left-hand reaction (RL) about that point, less the sum of the negative moments of the loads or weights (W) between the left-hand reaction (RL) and the point. (C.9.)

Example 1. (9)—

As a general example, take the beam and loading of Fig. 8, article 8. The bending moment is required at each of the points *a*, *b*, *c*, and *d*. RL, as previously calculated, is 12·18 tons.

B at a = RL.$l1$
= 12·18 tons × 2 ft. = 24·36 ton-feet.

B at b = RL.$l12$ − W1.$l2$
= 12·18 × 8·0 − 8·0 × 6·0 = 49·44 ton-feet.

B at c = RL.$l123$ − (W1.$l23$ + W2.$l3$)
= 12·18 × 12·0 − (8·0 × 10·0 + 3·0 × 4·0) = 54·16 ton-feet.

B at d = RL.$l1234$ − (W1.$l234$ + W2.$l34$ + W3.$l4$)
= 12·18 × 19·0 − (8·0 × 17·0 + 3·0 × 11·0 + 6·0 × 7·0)
= 20·42 ton-feet.

In an example such as this, it is simpler to calculate the bending moments at *c* and *d* by taking RR instead of RL as the origin :—

B at c = RR.($l4$ + $l5$) − W4.$l4$
= 6·82 × 10·0 − 2·0 × 7·0 = 54·2 ton-feet.

B at d = RR.$l5$
= 6·82 × 3·0 = 20·46 ton-feet.

The slight differences between these and the foregoing values of B at *c* and *d* are occasioned by RL and RR only being taken to the nearest second decimal, this being an ample degree of accuracy.

B at c = 54·2 ton-feet is the highest value found above, but we cannot say definitely that it is the possible maximum. Let us calculate B at the points of *e* and *f* (each 1 ft. from *c*) by taking moments of the forces to the right of these points.

B at e = 6·82 × 11·0 − (2·0 × 8·0 + 6·0 × 1·0)
= 75·02 − (16·0 + 6·0) = 53·02 ton-feet.

and B at f = 6·82 × 9·0 − 2·0 × 6·0
= 61·38 − 12·0 = 49·38 ton-feet.

As each of these is less than B at *c*, it is safe to conclude that the maximum occurs, as it does, at *c* under the weight W3.

But the point of maximum bending moment may be determined simply and definitely in this manner:

Consider, as before, that RL is positive, and that W1, W2, etc., are negative. Starting from the left-hand support of the beam, the maximum bending moment occurs under the weight, which being added to these on its left, produces a negative value equal to, or greater than, the positive value of RL. (D.9.)

In the example, W1 added to W2 is only 11 tons, which is less than RL; but W1 + W2 + W3 is 17 tons, which is a negative value of 4·82 tons greater than RL. The maximum bending moment occurs at *c*, therefore, as already calculated.

Rules B.9, C.9, and D.9 are of general application to any system of loading, the following point in connection with distributed loading being noted.

For the calculation of reactions, it was sufficient to consider a distributed load as if it were a concentrated load acting at its centre of gravity. This also pertains to the calculation of bending moment, but it must be remembered that if the bending moment value is required at a point under the centre of gravity of a distributed load, such load is not entirely eliminated, as in the case of a concentrated load, because one half of the load still remains as a downward force between the chosen point and either the left-hand or right-hand reaction, according to the end taken as the origin.

Example 2.(9) :—

An example will make this clear. The beam is the same as in Example 1.(9), but weights W1 and W3 are distributed over lengths of 2 ft. and 4 ft. respectively, instead of being concentrated as before. The values of RL and RR are not affected by this change.

With RL as origin, take moments about *c*, which we know to be the point of maximum bending moment.

Then B = RL.$l123$ − (W1.$l23$ + W2.$l3$ + $\frac{1}{2}$W3.$l6$)
= 12·18 × 12·0 − (8·0 × 10·0 + 3·0 × 4·0 + 3·0 × 1·0)
= 146·16 − (80·0 + 12·0 + 3·0) = 51·16 ton-feet.

Or with RR as origin :—

$B = 6{\cdot}82 \times 10{\cdot}0 - (2{\cdot}0 \times 7{\cdot}0 + 3{\cdot}0 \times 1{\cdot}0) = 51{\cdot}2$ ton-feet, or B is 3 ton-feet less than if W_3 were concentrated.

For certain cases of load and support, there are reduced formulæ for the maximum values of B. These obviate the preliminary calculation for reactions, and as they are very simple they are usually memorized. The derivation of these standard formulæ will now be given.

The first case is generally that of a cantilever or semi-beam supporting a single load concentrated at its free end. Cantilevers are not very common in ordinary buildings, but they *do* occur as brackets and as overhanging beams, so we may include them. It may be observed that by the general rule B.9, every beam is treated as if it were a cantilever, because the whole of that portion of the beam beyond the point about which moments are taken, is considered to be solidly fixed, just as if it were built into a wall.

Example 3.(9). Standard case 1 :—

Equilibrium of position is maintained by the downward weight of the wall in opposition to the upward reaction RL.

By taking moments about the wall face, the forces at the bearing are eliminated. Strictly, moments should be taken at the centre of application of the external forces at the wall, but it is usual to take the wall face as the point of maximum bending moment. We are left, therefore, with only the negative external force W to consider. Its moment arm about the wall face is l, and its moment, or B(max.) is Wl.

Example 4.(9). Standard case 2 :—

The only difference between this case and the preceding one is that here W is uniformly distributed, and is considered as acting at its centre of gravity. Its moment arm about the wall face is reduced to $l/2$, and its moment, or B(max.), is $\frac{Wl}{2}$.

Example 5.(9). Standard case 3 :—

A simply supported beam with a single concentrated central load.

From Example 4, article 8, we know that R L and RR each equal $W/2$. With RL as origin, take moments about the centre. This eliminates W and RR exactly as if the beam were a cantilever built into a wall from W to RR, and RL is like a single concentrated load at the free end, but acting upwards or positive instead of downwards and negative as W of case 1. The moment of RL is B(max.), and is equal to $W/2.l/2 = \frac{Wl}{4}$.

Example 6.(9). Standard case 4 :—

A simply supported beam with a load distributed uniformly over its entire length.

From example 5, article 8, RL and RR each equal $W/2$. With RL as origin, take moments about the centre. We have RL or $W/2$ upwards and positive with a moment arm of $l/2$; we have also the load on the half span between RL and the centre, again equal to $W/2$, and acting downwards or negative at its centre of gravity, giving it a moment arm of $l/4$ about the centre.

$$B(\text{max.}), \text{ therefore}, = \frac{W}{2}\cdot\frac{l}{2} - \frac{W}{2}\cdot\frac{l}{4}$$
$$= \frac{Wl}{4} - \frac{Wl}{8} = \frac{Wl}{8}$$

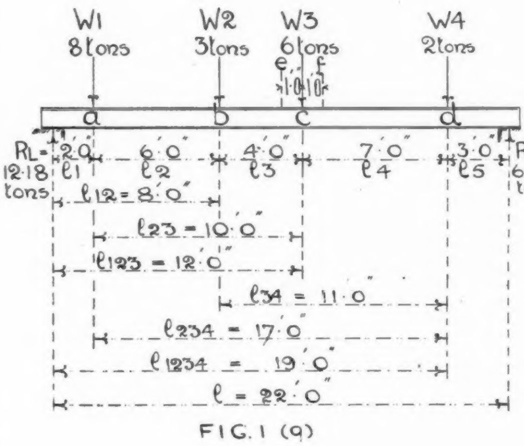


FIG. 1 (9)

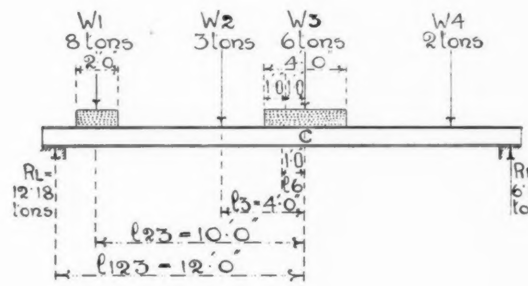


FIG. 2 (9)

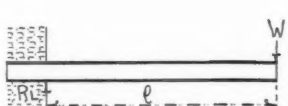


FIG. 3 (9)

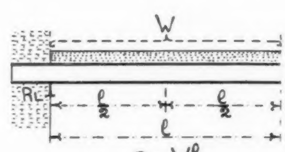


FIG. 4 (9)

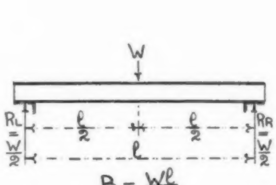


FIG. 5 (9)

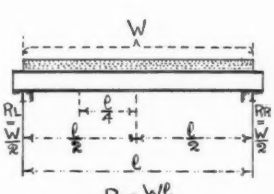


FIG. 6 (9)

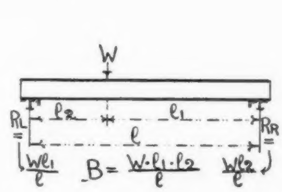


FIG. 7 (9)

Example 7.(9). Standard case 5 :—

A simply supported beam with a single concentrated but not central load.

This case differs from case 3 in that the reactions are not equal. (See example 1, article 8.)

B(max.) occurs under W. With RL as origin, take moments about W. Then, $B(\text{max.}) = RL.l_2 = \frac{W.l_1}{l}.l_2 = \frac{W.l_1.l_2}{l}$

Similar reduced formulæ may be derived and memorized for other simple cases of loading, but the great thing is to understand the general principle of moments, as it is usually necessary to know the values of the reactions for the pressures on walls and pillars, in addition to the maximum bending moment.

Example 8.(9) :—

The maximum bending moment of the beam of example 9, Fig. 15, article 8, may now be calculated.

The position of the maximum bending moment must be ascertained first.

The left-hand reaction, RL, is 31·9 tons, and the right-hand reaction, RR, is 28·1 tons.

By inspection, it is practically certain that B(max.) will occur under the 9-ton partition load at 14 ft. from RL.

Counting from RL, the loads we meet in succession up to and including this point are: 5 tons+9 tons+9 tons=23 tons, to which has to be added the proportion of the distributed load of 27 tons on the length of 30 ft. or 14/30ths of 27 tons, which is 12·6 tons; total=23·0+12·6=35·6 tons. As this is greater than RL, we must be up to, if not beyond, the point of maximum bending moment. It is apparent, however, that as soon as we return along the beam towards RL, we immediately drop the partition load of 9 tons, which brings us below the value of RL. So B(max.) occurs at the point supposed.

And

$$B(\text{max.}) = 31{\cdot}9 \times 14{\cdot}0 - (5{\cdot}0 \times 10{\cdot}0 + 12{\cdot}6 \times 7{\cdot}0 + 9{\cdot}0 \times 6{\cdot}0)$$
$$= 446{\cdot}6 - 192{\cdot}2 = 254{\cdot}4 \text{ ton-feet.}$$

It is usual to deal with the theory of shear immediately before or after that of bending moment, but in our case shear is relatively unimportant, therefore preference will be given to the resistance of the internal stresses followed by the application of what we have learned, so far, to the design of beams.

[The previous articles in this series appeared in our issues for September 5, October 17, November 14, 1923; and January 26, March 12, May 7, July 9, and August 27.]

The Drainage of Roofs—4

By ERNEST G. BECK, Wh.Ex., Assoc.M.Inst.C.E.

TURNING now to a consideration of gutters, it is first necessary to draw some reliable inference as to whether snow or rain is likely to impose the more severe demands for clearance. The weight of snow is about 5·2 lb. per cub. ft.; and as roofs in this country are seldom covered with snow to a thickness greater than 1 ft., it may be assumed that the most severe demand for clearance of water from snow will be 5·2 lb. per sq. ft. of roof surface. Since water weighs about 62·2 lb. per cub. ft., the water formed from the thawing of snow 1 ft. thickness will be $\frac{5{\cdot}2}{62{\cdot}2} \times 12$ in. = 1 in. thickness. Snow of such thickness will not be thawed completely in less than five or six hours; and hence, even with the most rapid thawing, the demand for clearance is not likely to exceed that of rainfall at the rate of ¼ in. per hour. The demand for clearance of rainfall at the rate of 1 in. per hour, which has been assumed as a basis for calculation in previous articles of this series, is, therefore, much more severe than any demand likely to arise from the thawing of snow—provided the gutters and outlets be kept clear for both.

The tendency is for snow to fill and cover gutters completely. Even with moderate snowfalls, drifts are formed to considerable depths in valleys of roofs, as indicated in

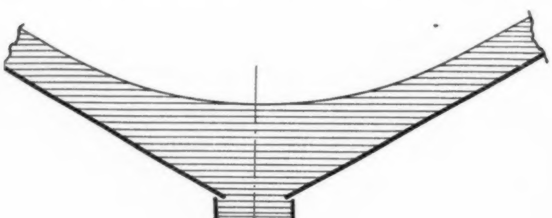


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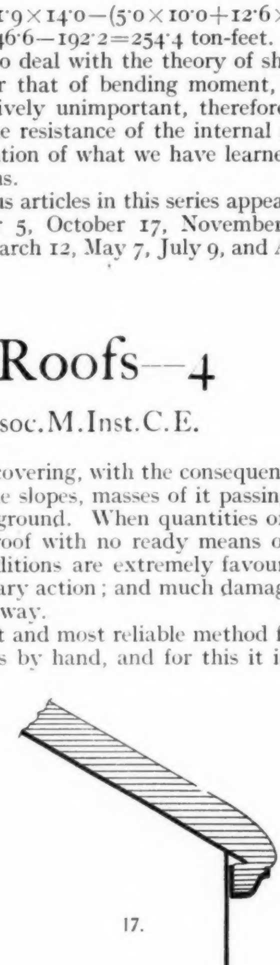
Fig. 16; while eaves gutters are usually covered as in Fig. 17. The upper layers of snow are the first to thaw, and it is clearly impossible for the water thus formed to find its way rapidly to the outlets. With the eaves gutters, some of the water falls to the ground clear of the gutter; but much of it soaks into the remaining snow and through it to the roof covering, with the consequence that the snow slides down the slopes, masses of it passing the gutter and falling to the ground. When quantities of saturated snow remain on a roof with no ready means of escape for the water the conditions are extremely favourable for leakage through capillary action; and much damage to buildings is caused in this way.

The simplest and most reliable method for clearing snow from gutters is by hand, and for this it is only necessary



17.

to ensure that all gutters shall be readily and safely accessible, to provide valley gutters of sufficient widths to afford easy walking space for a man, and to ensure facilities for the disposal of the cleared snow.

Another method which might be suitable in some cases (particularly where the provision of means for the removal of the cleared snow is likely to be difficult or costly) would be by the installation of piping, for the circulation of steam, immediately beneath each valley gutter. By this means the gutters would be kept sufficiently warm to melt the snow as it fell, and the running water thus formed would doubtless keep all gutters and outlets clear. The accumulation of snow on roof slopes might be prevented by the installation of pipes for the circulation of steam immediately beneath all roof glazing and in continuous ventilator frames. Of course, for this to be of any real service the gutters and outlets must be kept clear also. A comparatively small amount of heat would be sufficient to melt the snow as it fell. Eaves gutters do not lend themselves so readily as do valley gutters to such treatment; but the risk of damage is less with the former. The provision of boarding or slats on framing to cover valley gutters as a protection from snow is not only useless, but positively pernicious; and their cost should certainly be employed more profitably in other directions.

With regard to the rational design of gutter systems generally, the question of gradients, which arises first, is both important and interesting—important because it influences the first cost and maintenance of buildings, and interesting because it depends upon principles and actions, concerning the flow of liquids in open ducts, which are applicable to very few other cases of practical construction.

Apparently it was decided long ago—and the decision has not been seriously challenged—that gutters should decline towards the outlets; and the gradient of 1:120 (i.e., 1 in. of vertical fall for each 10 ft. of horizontal going) seems to have been adopted as right and proper. Moreover, this gradient of 1:120 is adopted by plumbers and pipe-fitters generally for the piping of water services, heating apparatus, subsidiary drainage systems, and other work, as well as for gutters. Perhaps it was one of the Guild rules of the craft in former days; but it does not seem to have been deduced on a rational basis, and there is reason to doubt whether it is of practical service under modern conditions.

Whether gutters were straight from end to end in the past need not form the subject of enquiry here. If they were, of course a gradient of 1:120 may have been to some extent effective; but with gutters as they are made to-day a reasonably straight length is somewhat of a curiosity, and it is by no means rare to find the middle portion of a 6 ft. length ¼ in. below the ends. With such curving, a gradient of 1:120 is useless; for some portions of the gutter may be actually sloping in the reverse direction, as indicated (with much exaggeration for the sake of clearness) in Fig. 18.

18.

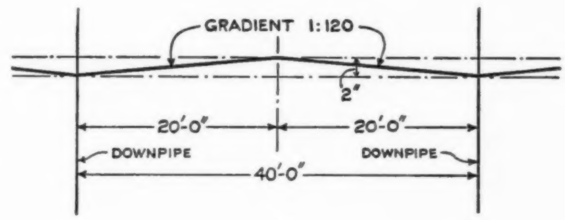
Even among plumbers, of course, the rule of 1 in. fall in 10 ft. going is not always observed; indeed, on some roofs it would be altogether impracticable, and there are many existing gutters, new and old, having no appreciable gradients. Since these gutters do not give more trouble than others which are graded in accordance with the rule, there would seem to be some justification for enquiry as to whether gradients in gutters are necessary or desirable; and, if so, what is the most advantageous ratio of fall to going.

The old rules of 20 ft. and 40 ft. as the maximum spacings for downpipes were in all probability formulated to comply with the gutter gradient of 1:120; and it is also probable that the old rules allowing one square inch of downpipe bore for every 60 or 75 sq. ft. of roof surface were "deduced" by similar argument in reverse order, i.e., inferring a "basis" which has no merit beyond conformity with usual practice.

With a gradient of 1:120, the lip of a gutter in a 20 ft. stretch is 2 in. lower at the outlet than at the watershed, and with an unbroken stretch at moderate height even this causes an appearance of dilapidation about the eaves gutter of a new building, due to the tapering shadow visible between the lip of the gutter and the edge of the roof-covering, and to the lines of the gutter being plainly not parallel with the courses of the walling or with other horizontal lines of the main framing. When the gutters are not initially straight, and as they take on the slight distortions which are almost inevitable with the passage of time in ordinary circumstances, this appearance of dilapidation becomes accentuated; and were a gradient steeper than 1:120 allowed for an eaves gutter of considerable length between downpipes, the building would probably appear so crooked as to suggest a lack of stability.

For gutters falling continuously in one direction, therefore, it may have seemed to the propounders of the old rule that downpipes should be not more than 20 ft. apart. In practice, however, gutters of considerable length are not laid to fall continuously in one direction, and hence, this rule is seldom observed.

For gutters arranged (as they very frequently are) to fall in both directions from watersheds or summits between downpipes, as indicated in Fig. 19, the limitation of 2 in.



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for the maximum difference of level between watersheds and outlets, with a gradient of 1:120, would locate the outlets at 20 ft. to each side of a watershed—giving 40 ft. as the maximum permissible distance between downpipes, as provided by the less extravagant of the two rules.

Further, an ordinary roof of 40 ft. span, with slopes inclined about 30 deg. with the horizontal, would be about 22 ft. between ridge and eaves; and a 4 in. downpipe receiving the drainage from a 40 ft. length of one such slope would provide about 12 sq. in. of bore to 40×22 =880 sq. ft. of roof surface, or 1 sq. in. of downpipe bore to 73·3 sq. ft. of roof surface, which agrees so closely with the 75 sq. ft. of the rule as to suggest that the rule is but a summary of usual practice, instead of being a reliable guide for it, deduced from an independent consideration of the facts and influences concerned.

There would, of course, be little ground for objection to a rule which summarized usual practice, if such practice could be shown to combine adequate provision with economy; but in this case, as has been shown, there is reason to suppose that compliance with the rule may involve unjustifiable extravagance.

If it could be proved that gradients in gutters are not necessary for drainage purposes, considerable saving should be effected through their elimination. Not only would the work of laying and fixing for all gutters be simplified, but portions of the building construction which are required solely to provide for gutter gradients might be omitted. For example, with the watersheds in a valley gutter 2 in. above the outlets, the vertical distance between the lips of the gutter and the edges of the roof-covering (which, of course, are horizontal) must be 2 in. more at the outlets than at the watersheds. Were the gutter horizontal, the former level at the outlets being maintained throughout the stretch, the edges of the roof-covering might be lowered 2 in. Along each side of the valley gutter, and extending throughout its length, there is of necessity some form of construction amounting virtually to an enclosure of the building; and the saving to be effected through a 2 in. reduction in the height of these enclosures alone must be considerable, while in many cases the entire roof-covering might be lowered by 2 in., with a corresponding reduction in the heights of all the main enclosures.

In the next article we shall examine the conditions which govern the flow of water along ordinary gutters, with the object of deducing some reliable inference as to whether gradients in gutters are necessary or desirable for the purposes of roof drainage.

(*To be concluded.*)

[The previous articles in this series appeared in our issues for July 23, August 13, and September 10.]

Enquiries Answered

Enquiries from readers on points of architectural, constructional, and legal interest, etc., are cordially invited. They will be dealt with by a staff of experts, whose services are specially retained for this purpose. If desired, answers will be sent direct through the post. In no case is any charge made for this service. Whenever diagrams accompany an enquiry, they should be clearly drawn and lettered and inked in.

PLASTERING UNDER CONCRETE FLOORS.

"W. M. A." writes: "What is the best method of ensuring a good key for the plastering on the under surface of ordinary suspended concrete floors reinforced with steel joists? Of course, I refer to methods other than the expedient of hacking over the surface."

—It would be far better to adopt some form of surface treatment of the concrete itself than to attempt to plaster it after it has already set hard, when vigorous hacking is probably the only satisfactory method of obtaining a key.

The following process has been recommended as an alternative to hacking, and is the same as is used in bonding together old and new concrete surfaces.

First brush the concrete surface clean and soak it with water, then apply a coat of cement mortar, 1 pint cement to 3 of sand; make up as stiff as it can be worked.

For new concrete works it should be possible to prepare the moulds with any desired surface before pouring the bulk of the concrete, and in this connection an Eastern method of plastering a concrete dome or vault may be of interest. The centre is prepared by making a pile of timbers, natural boughs and brushwood in the compartment to be vaulted. The surface is brought to a good curve by modelling a handsbreadth, or less, of good garden loam above the brushwood. This surface is heavily whitewashed and after it has been allowed to settle the vault is built on it with rubble and mortar with a thick bed of mortar between the stones and the plastered centre. Removal of the centre leaves the vault with its lower surface smoothly plastered and ready for either a further coat of whitewash or for the addition of ornament in hand-modelled plaster, etc. Reinforced concrete vaults on this type of centre have been successfully erected in the new buildings of Imperial Delhi (see the "Architectural Review," July, 1922). The application to a carefully joined European centre should not be difficult, as a thin skim of loam would suffice to cover the edges and the grain of the boards forming the mould. W. H.

MODERN METHODS OF CASTING IRON PIPES.

"W. H." writes: "What modern methods of casting iron pipes are in use, and how is it possible to strengthen the pipes and reduce the weight?"

—Modern methods of casting iron pipes are developed from the invention of a French engineer, Mons. D. Sensand de Lavaud, and are carried out under licence from the International de Lavaud Corporation, Limited. The sand mould and the core of sand or loam are dispensed with, and the molten metal is made to take the shape of a pipe by the action of centrifugal force applied to it within a cylindrical mould, which is revolved about its own axis. The increase in strength is obtained (*a*) by the elimination of irregularities in the thickness of the casting, which were difficult to avoid in sand and moulded work, and by (*b*) a physical change in the internal structure of the metal.

After the application of the centrifugal process the casting is found not only to be free from blow-holes and finer in grain, but the constituents of the metal are arranged in a more advantageous manner. The graphite carbon contained in normal sand-cast iron is seen by microscopic examination to have separated out in elongated forms, which are potential planes of cleavage among the metallic particles and which impair the strength of the material. The rotation of the molten metal in the modern centrifugal process causes the graphite to be broken up into finer particles, which are isolated from one another by more intimate mixture with the other constituents, and a very great increase of tensile strength is obtained.

Ordinary cast iron has a tensile strength of about 9½ to 11 tons per sq. in., whereas iron of exactly similar chemical composition, after having been subjected to the centrifugal process, has a tensile strength of from 17 to 20 tons per sq. in. The lightness of the finished pipe is made possible by this increased strength of the material; 25 per cent. taken off the weight still leaves the pipe 30 to 40 per cent. stronger than normal.

The operations of pipe making by the centrifugal process include production of molten metal of suitable composition, and its application to the revolving mould by means of a tilting ladle holding the necessary quantity of metal at the required temperature. A small core for the socket of the pipe is fastened to the socket end of the accurately bored steel cylinder forming the mould, and the cylinder is revolved within a water-cooled jacket by means of a Pelton wheel. The mould is also capable of movement in the direction of its long axis, which is slightly inclined to the horizontal to allow of a regular flow of metal down a cantilever trough into the interior. The proper speed of revolution having been attained, the tilting ladle is made to pour out its contents in a steady stream by the use of hydraulic machinery.

The socket end of the pipe is first formed, and the mould is gradually withdrawn from the cantilever trough until the end of the spout appears outside the mould, and any excess of metal left in the cantilever trough runs into a side discharge. The rate of flow of the metal and the rates of revolution and withdrawal of the mould are all in constant relationship for any particular size of pipe. Contact with the water-cooled mould solidifies the metal in a few seconds, and contraction releases the pipe, which is taken out of the mould by being held with internal pipe tongs at its socket end while the mould is moved back towards the tilting ladle.

While still hot from the mould the pipes are carried to a gas-fired annealing furnace and further heated to 1800° F., being afterwards allowed to cool slowly to a black heat and dipped in a bath of Dr. Angus Smith's solution kept at a constant temperature of 300° F. When dried the pipes are tested under hydraulic pressure 50 per cent. in excess of the requirements of the British Standard Specification for cast-iron pipes. Pipes manufactured by the centrifugal process may be tapped for gas connection, a full thread being formed free from chipped edges. W. H.

THE STAINING OF OAK PANELLING.

"A.R.I.B.A." writes: "I wish to stain some oak panelling (Elizabethan in character) almost black without losing the figure. Can you give me particulars as to the best method?"

—(1) The best method of staining oak is to have it fumed with strong ammonia in a properly constructed airtight chamber. The wood is coloured to a perceptible depth, and does not show a light surface when accidentally scratched or worn. Small pieces of wood become self-coloured throughout and may even be carved, planed, or sandblasted after treatment. A very rich dark brown colour is obtainable if the process is carried far enough and the grain of the wood remains absolutely distinct. Expert timing and handling are necessary with this process, which has, nevertheless, the advantage of permanence. Wood so treated can be left unpolished or will receive a high polish with either wax or shellac.

(2) A superficial stain can be given by coating the woodwork with liquid ammonia, but as the fumes make the operation unpleasant, it is seldom persisted in long enough to bring the wood to a really dark tone, for which several applications are necessary. The same very dark colour can be obtained as by fuming, but six or seven washes and dryings would be required.

(3) A colder dark tone can be obtained by painting the surfaces of the wood with a solution of iron sulphate in water. Like ammonia, this reagent acts upon the chemical substances of the wood and leaves the grain clear. To get a colour "almost black," the solution would be needed fairly strong, 1 oz. per four gallons, and experiment would be advisable, both with regard to strength of solution and number of applications. The final colour can only be judged when the wood has dried for some time, and if the iron sulphate solution is adopted the same treatment and the same strength of solution must be used for the whole job, as touching up is not likely to be satisfactory.

(4) Water stains can be purchased in most oil and colour merchants' shops, which will colour oak almost black in two or three coats, or permanganate of potash dissolved in water has the same effect. These stains are inclined to fade slightly on exposure and are liable to be dislodged by water unless covered with French polish as soon as they are dry. W. H.

Contemporary Art

Elliott and Fry's Gallery at 63 Baker Street.

In this well-lighted, airy, and otherwise pleasant gallery two Canadian artists have been showing their fresh, and in some ways, unconventional work. Colour and design are the prominent features of these canvases by G. N. Norwell and Harold Beament. The buildings, such as they are, are weak, the best being Norwell's "Château Laurier," an exception to the other exhibits as being carefully drawn with pencil and white on a grey paper. The rest are shacks in unfrequented parts of Canada. It is not architecture but Nature that these two painters so successfully subdue to their purpose of design, however.

The Royal Photographic Society.

All the errors and misconceptions that photographers commit and encourage cannot destroy the essential value of the photography of buildings. Faults of perspective and projection are few, but faults of lighting and misconceptions of pictorialism are many. Several photographs of buildings and groups of buildings in the present exhibition are obviously of good subjects, but their treatment for effect has largely gone to destroying their value. In a pathetic effort to avoid definition, architectural distinction has been sacrificed. It is a pity to think that by avoiding definition either in exposure or in printing that an imitation of an etching or engraving can be achieved. Why an imitation of anything? Moreover, good etchings and engravings are always well defined, and a muddy printing is a lost print. Photography has no need to think of anything but photography; it is quite sufficient unto itself and to try to make it anything else is to debase it.

"Old Cornwall," by F. L. Baskerville, suffers in printing after a supposed mezzotint fashion; "Pont de Cheval, Bruges," by C. J. Symes, has sacrificed definition for no compensation; "Silver and Grey, Peterborough," by T. H. B. Scott, is architecture undefined, a mere attempt at pictorialism in which the value of the architecture has been cruelly sacrificed; and the muddiness of "Trafalgar Square at Night," by Frank Judge, quite spoils a good subject. These are some illustrations of mistakes. On the other hand, there are admirable examples of a better understanding of architectural values: A. Keighley's "Piazza"; the roofs and mountains of No. 90, by H. L. Wainwright; "Canal, Venice," by Lionel Wood, is dark and light, but a fair balance has been preserved; the backs of the houses and the canal of "Les Blanchisseuses," by W. H. Ashbee, are delightfully rendered; "La Punta di Balleaniello," printed in resinotype, by D. Marchi Gherini, has a nice dark tone; "Le Vieil Amiens—Maison des Ramoneurs," by Vicomte de Santeul, is a real attempt at honest natural representation; and there are illustrations of the legitimate applications of the lens to buildings, as well as of the printing process.

Excellent photographs are S. Watson's "Salisbury," a street and the spire; Bertram Park's Wembley subject, "Mandalay to the Gold Coast"; the palladiotype of "Stirling Bridge," by Jas. McKissack; and "Shadow Patterns," by J. Dudley Johnston. "The Shipyard" is a good rendering by F. J. Mortimer of a modernist subject, but "Pump Court," by W. G. Hayes, suffers from the too dead out-of-tone blackness of the leafless tree.

As is usual at this exhibition the architectural and sculptural interests are most largely displayed in the lantern slides section. Here there is the straight desire to make everything of the buildings, leaving pictorialism to look after itself—a sound idea. There is a group of slides from No. 297 to No. 318 which are the work of Edgar R. Bull. These are altogether admirable, and create a longing for a private lantern by which they could be exposed and studied at leisure. These are all of views, vistas, and details from various fine structures from Canterbury and York to Cobham and Haddon, gems all of the first water, and taken in all love and veneration for their beauty. There are other excellent slides of Ely, by W. H. A. Fincham, J. A. Hall, by M. O. Dell and K. N. Beach of French subjects; of Cornwall, by A. S. Gannon; of Oxford, by Ronald Rigby; and of Cambridge, by Robert Chalmers. The canal and buildings of H. W. Pratt's "Rio Torreselle," and the quiet square, "Deva," by K. N. Beach, and "An Old Gateway," by W. E. Gundill, are very pleasant. Other so-called "pictorial slides" of architectural value are the good views of "Carnarvon," by C. J. Unsworth; "Across the Nave, Ely," by W. H. Fincham; "Canterbury Crypt," by P. S. Salt; and "Chartres," by K. N. Beach.

The coloured transparencies are as usual not at all good; this is an art that is still undeveloped, but even if developed, of doubtful efficacy.

There is an exposition of the recently invented photo-sculpture process, which, except in one respect, has nothing to recommend it. The exception is the "Life Mask," in which there is a *raison d'être* which would apply also to a possible death mask; both might conceivably be useful, outside art, of course. To the lover of Nature and to the artist who cares for bird, fish, and quadruped forms, the stereoscopic prints and transparencies, the natural history section of this extraordinarily interesting exhibition is of the greatest value and fascination. KINETON PARKES.

Trade and Craft

Messrs. F. De Jong & Co.

Messrs. F. De Jong & Co., Ltd., of Albert Works, 84 Albert Street, London, N.W.1, have appointed Mr. C. W. Edwards as manager of their decorating and painting department in succession to Mr. H. W. Campbell, who has resigned his position with the company. The fibrous plaster department will be carried on as before by Mr. Charles Velloni and Mr. William Velloni. The directors of the company are as follows: Mr. Charles Velloni, managing director; Mr. Sydney Howard, managing director; and Mr. William Velloni, director.

Messrs. Bell's United Asbestos Co., Ltd.

The directors of Messrs. Bell's United Asbestos Co., Ltd., of Southwark Street, London, S.E.1, have declared an interim dividend on the ordinary shares of 6d. per share, being $2\frac{1}{2}$ per cent. (actual), less income tax, on account of the profits of the current year. The dividend will be paid on October 20 to shareholders on the register on October 6, and the ordinary share transfer books will be closed from October 6 to 18, both dates inclusive.

The "Magnet" Domestic Electric Outfit.

It is remarkable that while electric lighting is enjoyed in the vast majority of British homes, the development of the demand for electricity for heating and cooking and ironing has not made commensurate progress. This is doubtless due to lack of knowledge and practical experience on the part of the householder, and the General Electric Co., Ltd., have now made it possible for every user of electric light to acquire at a most reasonable outlay a serviceable outfit of domestic electrical appliances, consisting of an electric kettle, an electric toaster, an electric iron, and a portable pedestal heater. This outfit consists of standard "Magnet" products, carefully chosen as being of the maximum service to the average householder. Full particulars of the outfit and of the special offer have been mailed to nearly 1,000,000 users of electric light, the information being contained in a folder, No. H.3419, which explains in simple fashion what the domestic outfit will do for the user.

Industrial Lighting Fixtures.

Messrs. Simplex Conduits, Ltd., of Garrison Lane, Birmingham, have sent us a copy of their new catalogue (No. 1040) of industrial lighting equipment. The complete range of fittings shown has an especially wide application, having been very carefully prepared with a view to satisfying the most exacting, general and particular lighting requirements—industrial, municipal and commercial. The constant and extensive employment of Simplex equipment by competent authorities for the illumination of factories, mills, yards, docks, public thoroughfares, stations, etc., provides in itself evidence sufficient to substantiate the claims made for individual fittings, and to some extent indicates their strict moderation. Efficient illumination is now thoroughly recognized and appreciated as an exact science, the established principles of which permit of an accurate determination of resultant effects before installation; and in this connection, to ensure that the present catalogue itself should be of greater practical assistance, useful tables, together with a guide to the foot-candle power required, have been included. The list is not exhaustive of the company's manufacturing capacity in this direction, but there are in it fittings suitable for most industrial purposes, and it can at all times be supplemented by the services of their designers and illuminating engineers, which will be placed at the disposal of clients who may wish advice on their lighting propositions. The reflectors catalogued here are the outcome of data gathered during the company's careful investigations into the requirements of many industries, and in all cases have been designed and made throughout under strict supervision at their Birmingham works. They are rust-proof, durable, inexpensive, and comply with Home Office recommendations, abstracts from which are given. A chart is included to give practical assistance in the planning of installations.

Rates of Wages in the Building Trades‡

The following table shows the revised rate of wages for craftsmen (bricklayers, masons, carpenters and joiners, woodcutting machinists, slaters, plumbers, plasterers and painters) and labourers in the building trade. The labour rates for London are given in the Table of Current Prices published on pages xxv, xxvi.

Grade.	Craftsmen.	Labourers.	Grade.	Craftsmen.	Labourers.	Grade.	Craftsmen.	Labourers.
	s. d.	s. d.		s. d.	s. d.		s. d.	s. d.
A	1 8	1 3½	B	1 6	1 1¾	C	1 4½	1 0½
A1	1 7½	1 2¾	B1	1 5½	1 1¼	C1	1 4	1 0¼
A2	1 7	1 2½	B2	1 5	1 1	C2	1 3½	11¾
A3	1 6½	1 2	B3	1 4½	1 0½			

Grading of Towns.

The towns in which the above grade rates have been reported to apply are shown below, divided into their main area groups. The principal exceptions are indicated in the notes appended to each Group. In towns marked* the rate for painters is 1d. less than that paid to other craftsmen, and in those marked† it is ½d. less than the craftsmen's rate.

NORTH-EAST COAST :—

Grade A.—Alnwick, Annfield Plain, Barnard Castle, Bishop Auckland, Blackhill, Blyth, Chester-le-Street, Consett, Crook, Darlington, Durham, Gateshead, Hartlepools, Hebburn, Hexham, Jarrow, Middlesbrough, Morpeth, Newcastle, North and South Shields, Seaham Harbour, Shildon, Stanely, Stockton-on-Tees, Sunderland, Thornaby, Wallsend, Whitburn, Whitley Bay, Willington, and Wooler. **Grade A2.**—Berwick-on-Tweed.

YORKSHIRE :—

Grade A.—Barnsley, Batley, Bingley, Birstall, Bradford, Brighouse, Castleford, Cleethorpes, Colne Valley, Crosshills, Dewsbury, Doncaster, Grimsby, Guiseley, Halifax, Harrogate, Hebden Bridge, Holmfirth, Horbury, Hoyland, Huddersfield, Hull, Ilkley, Immingham, Keighley, Leeds, Mexborough, Mirfield, Morley, Normanton, Ossett, Penistone, Pontefract, Pudsey, Rawdon, Rotherham, Scunthorpe, Selby, Sheffield, Shipley, Sowerby Bridge, Spen Valley, Stocksbridge, Wakefield, Wombwell, Yeadon, and York. **Grade A1.**—Bridlington and Scarborough. **Grade A3.**—Barnoldswick, Beverley, Goole, Skipton, Whitby, and Worksop. **Grade B3.**—Kirby Moorside, Malton, and Norton.

NORTH-WESTERN COUNTIES :—

Grade A.—Accrington, Alderley Edge, Altrincham, Ashton-in-Makerfield, Ashton-under-Lyne, Atherton Bacup, Barrow, Birkdale, Bispham, Blackburn, Blackpool, Bolton, Broughton (Flints), Burnley, Bury, Carlisle, Chester, Chorley, Church, Clayton-le-Moors, Cleveleys, Clitheroe, Colne, Connah's Quay, Darwen, Denton, Dukinfield, Eccles, Farnworth, Fleetwood, Frodsham, Glossop, Great Harwood, Haslingden, Hawarden, Helsby, Heywood, Horwich, Hyde, Kirkham, Leigh, Leyland, Littleborough, Lytham, Manchester, Middleton, Mossley, Nelson, Oldham, Ormskirk, Oswaldtwistle, Padiham, Pendlebury, Poulton, Preston, Prestwich, Queensferry, Radcliffe, Ramsbottom, Rawtenstall, Rishton, Rochdale, Runcorn, St. Anne's-on-the-Sea, St. Helens, Saddleworth, Sale, Salford, Shaw, Shotton, Southport, Stalybridge, Stockport, Swinton, Thornton, Todmorden, Tyldesley, Walkden, Warrington, Westhoughton, Whalley, Whitefield, Widnes, Wigan, and Wilmslow. **Grade A1.**—Wrexham. **Grade A2.**—Lancaster, Morecambe, and Carnforth. **Grade A3.**—Buxton, Cleator Moor, Congleton, Crewe, Distington, Egremont, Grange-over-Sands, Harrington, Hayfield, Knutsford, Macclesfield, Maryport, Market Drayton, Middlewich, Millom, Nantwich, New Mills, Northwich, Sandbach, Tarporley, Ulverston, Whitehaven, Winsford, and Workington. **Grade B1.**—Colwyn Bay, Conway, Llandudno, Llandudno Junction, Prestatyn, and Rhyl. **Grade B2.**—Ambleside, Bala, Bowness-on-Windermere, Cockermouth, Grasmere, Kendal, Langdale, and Windermere. **Grade B3.**—Bangor.

[NOTE.—*In the Liverpool and Birkenhead districts the rates are 1s. 8½d. for carpenters and joiners, woodcutting machinists, and painters, 1s. 9d. for other craftsmen, and 1s. 3½d. for labourers.*]

MIDLAND COUNTIES :—

Grade A.—Alfreton, Belper, Bilston, Birmingham, Blackheath, Chesterfield, Coalville, Coventry, Derby, Heanor, Hinckley, Ilkeston, Langley Mill, Leicester, Lincoln, Long Eaton, Loughborough, Mansfield, Nottingham, Nuneaton, Oldbury, Ripley, Sutton Coldfield, Sutton-in-Ashfield, West Bromwich, Willenhall, and Wolverhampton. **Grade A2.**—Brierley Hill, Burton-on-Trent, Darlaston, Dudley, Halesowen, Knowle, Northampton, Old Hill, Rugby, Solihull, Stafford, Stourbridge, Swadlincote, Walsall, and Wednesbury. **Grade A3.**—Atherstone, Boston, Bromsgrove, Cannock, Droitwich, Gainsborough, Grantham, Hednesford, Kidderminster, Leamington, Leek, Lichfield, Louth, Malvern, Matlock, Melton Mowbray, Newark, Peterborough, Redditch, Retford, Rugeley, Shrewsbury, Skegness, Sleaford, Stourport, Stratford-on-Avon, Tamworth, Warwick, Wellington, and Worcester. **Grade B.**—Kettering, Market Harborough, and Wellingborough (except plasterers). **Grade B1.**—Oakham, Raunds, Rushden, and Uttoxeter. **Grade B2.**—Bridgnorth, Horncastle, Newport, Spalding, and Wirksworth. **Grade C.**—Huntingdon and District.

EASTERN COUNTIES :—

Grade A3.—St. Albans and Welwyn Garden City. **Grade B.**—Brentwood. **Grade B1.**—Baldock, Bedford, Cambridge, Chelmsford, Clacton-on-Sea, Colchester, Frinton, Halstead, Harpenden, Hatfield, Hemel Hempstead, Hertford, Hitchin, Ingatestone, Ipswich, Letchworth, Luton, Norwich, Ongar, Southend-on-Sea, Stevenage, Stotfold, Walton-on-the-Naze, and Ware. **Grade B2.**—Dovercourt, Felixstowe, Gorleston, Harwich, Lowestoft, Newmarket, and Yarmouth. **Grade B3.**—Ampthill, Attleborough, Aylsham, Bishop's Stortford, Braughing, Cromer, Dunstable, Ely, King's Lynn, Leighton Buzzard, March, Much Hadham, Sawbridgeworth, Southwold, Standon, Stowmarket, and Woodbridge. **Grade C1.**—Aldeburgh, Halesworth, Leiston, Saxmundham Wickham Market, and Wymondham. **Grade C2.**—Coltishall, Royston, and Saffron Walden.

SOUTHERN COUNTIES :—

Grade A3.—Cobham, Gravesend, Leatherhead,† Northfleet, and Weybridge. **Grade B1.**—Abingdon, Addlestone, Amersham, Ascot, Beaconsfield, Bournemouth, Bracknell, Brighton, Byfleet, Chalfonts, Chatham, Chesham, Christchurch, Dorking, Eastbourne, Eastleigh, Eton, Gillingham, Gosport, Guildford, Henley, Hove, Maidenhead, Maidstone, Oxford, Poole, Portsmouth, Reading, Redhill, Reigate, Rochester, Slough, Southampton, Tonbridge, Tunbridge Wells, Windsor, Woking, and Wokingham. **Grade B2.**—Bexhill, Bramley, Cranleigh, Fareham, Godalming, Haslemere, Littlehampton, New Forest (including Brockenhurst, Lymington, Lyndhurst, Milford, New Milton, and Ringwood), Oxted, Sevenoaks, Winchester, Witley, and Worthing. **Grade B3.**—Ashford (Kent), Aylesbury, Banbury, Basingstoke, Bicester, Bognor, Bosham, Broadstairs, Buckingham, Burgess Hill, Canterbury, Chichester, Deal, Dover, East Grinstead, Faringdon, Faversham, Fenny Stratford, Folkestone, Hastings, Horsham, Hythe, Lingfield, Margate, Milton Regis, Newbury, Newport Pagnell, Pangbourne, Petworth, Ramsgate, Sandgate, Sittingbourne, Stony Stratford, Walmer, Westgate, Winslow, Witney, Wolverton, and Woodstock. **Grade C1.**—Andover, Haywards Heath, Isle of Wight, and Tidworth. **Grade C2.**—Alton,* Bishop's Waltham, Farnham, Hartley Wintney,* and Staplehurst.

SOUTH-WESTERN COUNTIES :—

Grade A.—Bristol. **Grade B.**—Bath, Cheltenham, Exeter,* Gloucester,* Newton Abbot, and Paignton. **Grade B1.**—Hereford,* Ross-on-Wye,* Princetown,* Swindon,* and Weston-super-Mare.* **Grade B2.**—Barnstaple, Stroud,† and Taunton. **Grade B3.**—Box,* Bradford-on-Avon,* Bridgwater, Burnham-on-Sea, Chipping Sudbury, Cirencester,* Clevedon, Coleford,* Corsham,* Exmouth, Fairford,* Lydney,* Melksham,* Tetbury,* Thornbury, Totnes,† Trowbridge,* Weymouth,* Westbury,* and Yeovil.* **Grade C1.**—Bruton, Castle Cary, Cheddar,* Glastonbury, Midsomer Norton, Minehead,* Ottery St. Mary, Radstock, Tiverton,* Wells.

SOUTH WALES AND MONMOUTHSHIRE :—

Grade A.—Aberdare, Abertillery, Ammanford, Barry, Blaina, Bridgend, Briton Ferry, Brynaman, Brynmawr, Burry Port, Cardiff, Caerphilly, Clydach, Ebbw Vale, East Glamorganshire and Monmouthshire Valleys, Gorseinon, Llanelly, Maesteg, Merthyr, Mountain Ash, Neath, Newport, Ogmore Vale, Penygroes, Pontardawe, Pontardulais, Pontypool, Pontypridd, Porthcawl, Rhondda Valley, Skewen, Swansea, Tredegar, and Ystalyfera. **Grade A2.**—Abergavenny, and Chepstow. **Grade B.**—Brecon, Carmarthen, Llandilo, Llandrindod Wells, and Milford Haven. **Grade C.**—Haverfordwest, and Pembroke Dock.

SCOTLAND :—

Grade A.—Airdrie, Alloa, Alva, Ayr, Barrhead, Bridge of Weir, Burntisland, Clydebank, Coatbridge, Dalkeith, Dumbarton, Dundee, Dunfermline, Edinburgh, Falkirk, Glasgow, Gourock, Grangemouth, Greenock, Haddington, Hamilton, Irvine, Johnstone, Kilmarnock, Kirkcaldy, Lanark, Larbert, Leith, Leslie, Markinch, Motherwell, Musselburgh, Neilston, Newmains, North Berwick, Paisley, Pencaitland, Perth, Port Glasgow, Renfrew, Stenhousemuir, Stirling, Uddingston, and Wishaw. **Grade 2.**—Arbroath, Montrose, Peebles. **Grade B.**—Dumfries, Galashiels, Hawick, Maxwelltown, and Selkirk.

[NOTE.—*The rates quoted do not apply to plasterers and painters in Scotland, who are not affiliated to the National Wages and Conditions Council.*]

‡ From "The Labour Gazette."