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FROM AN ARCHITECT'S NOTEBOOK.

In architecture, an art which is half a science . . . our country could boast at the time of the Revolution of one truly great man, Sir Christopher Wren; and the fire which laid London in ruins, destroying 13,000 houses and 89 churches, gave him an opportunity unprecedented in history of displaying his powers. The austere beauty of the Athenian portico, the glowing sublimity of the Gothic arcade, he was, like most of his contemporaries, incapable of emulating, and perhaps incapable of appreciating; but no man born on our side of the Alps has imitated with so much success the magnificence of the palace churches of Italy.

MACAULAY.

9 Queen Anne's Gate, Westminster.

Architecture of the Italian Renaissance. 22.—The Church of the Orphanage, Venice

The Orphanage Church of the Visitation, formerly belonging to the Jesuits, is situated on the Zattere, a promenade which anciently served—and still serves—as a wharf for the *zattere* or rafts of timber floated down from the Alps.

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St. Paul's and Its Repair

Dismantling Unnecessary

"I BUILD for eternity," said Wren in a mood of optimistic prophecy, a mood that came often upon him. He frequently lauded the "fine Roman manner," but, as events have shown, while observing its outward forms, he failed to copy its solid method of building. It has been suggested that he was imposed upon by his contractors. This is doubtful. It must be remembered that Wren was designing his Renaissance buildings in what to all intents and purposes were mediæval times, and that his workmen were carrying on mediæval building traditions. Hence the ashlar casing and rubble filling of the piers of St. Paul's, which are largely the cause of the Cathedral's present perilous condition.

Wren, in spite of his noble aspirations, seems to have had a fairly shrewd idea of the weaknesses of his great building, for upon another occasion he is reported to have estimated the life of the Cathedral at two hundred years. And somewhat more than two centuries after its completion it is scheduled as a dangerous structure.

The condition of St. Paul's is not, however, entirely due to an unsound method of building. Wren, constructive genius that he was, did not provide for the proper distribution over the substructure of the enormous weight of his dome. If we search for an explanation of this extraordinary lapse on the part of the great architect we may perhaps find it in the fact that St. Paul's was built largely under Wren's personal directions on the site. No drawings were left representing it as we see it to-day. The existing building bears no resemblance to the Warrant Design that King Charles endorsed as being "very artificiall, proper, and useful" (the Royal permission to make modifications "ornamental rather than essential" was considerably stretched by Wren in the interpretation). No one, of course, would have it otherwise, for the Warrant Design was an architectural monstrosity that did no credit to his genius. With the design for a new St. Paul's taking shape in his mind almost with the laying of one stone upon another, it is to be imagined that Wren, giant though he was, must have found himself now and again in some awkward difficulties, especially in connection with the support of the dome which, though a masterpiece of constructive genius, sits so very unequally upon the piers that take its crushing weight.

Serious as the condition of the Cathedral undoubtedly is, there is no need, in the opinion of those who are qualified to judge, for such extreme measures as the removal of the dome and the taking down and rebuilding of the eight main piers. The necessary work of structural strengthening and repair can be carried out with little disturbance to the fabric. In this issue Mr. William Harvey, who has made a special study of his subject and has had much practical experience in the repair of ancient monuments, shows very clearly how the structural deficiencies of the building may be remedied. Mr. Harvey needs no introduction to our readers, who know him by the many informative, scholarly, and practical articles that he has contributed to our columns. We would point out, however, that he is specially qualified to offer an opinion on such a problem as that of St. Paul's.

To Mr. Harvey the study of vaulted building has been a life interest that he has been able to gratify in visiting the cathedrals and abbeys of England, and the ancient and mediæval works of South Europe and the Near East. He brings to the examination of St. Paul's Cathedral personal memories of the mud-brick vaults of Thebes, and the domes of Byzantine buildings in Greece and Turkey, some of which he has surveyed and recorded in measured drawings.

Among buildings of colossal size, he has studied in the Pantheon, the mosque of Sultan Hassan, the domes of Sta Maria del Fiore, and of St. Peter's at Rome.

He came in contact with methods of conservation of dilapidated buildings in Egypt and Palestine, where masonic traditions of vault building are still in use among native craftsmen. He has also been associated with the growing science of conservation by means of internal consolidation and reinforcement that has made such remarkable progress during the past twelve years. In this connection he has enjoyed special facilities for inquiring into the behaviour of heavy structural masses of dilapidated masonry both before and after their repair at the hands of the Office of Works Historic Buildings Branch.

His survey of Tintern Abbey included a minute search of all wall faces with the object of ascertaining the relationship between eccentric loads and the fractures which occur in adjoining and even in distant parts of the building. The result of this investigation was to show that defects in the application of pressures have surprisingly far-reaching effects, and that these effects can be depended upon to conform approximately to regular lines of action. His analysis of the pressures of Westminster Hall roof has been illustrated in our pages, and the model embodying it is now exhibited in the Science Museum at South Kensington. It will thus be seen that Mr. Harvey is singularly qualified to suggest, as he does in this issue, a remedy for the structural deficiencies of St. Paul's.

Though there must be no delay in dealing with the repair of the building, we hope there will be no taking of drastic dismantling decisions, such as those suggested in the recent interim report of the St. Paul's Commission. The first thing to do is to take the necessary emergency measures to make the cathedral temporarily safe—such as shoring up the external walls and erecting centering within the arches that transmit to the piers the weight of the dome. With

the building safe from any danger of collapse, the whole structural problem should be thoroughly investigated, and measures taken accordingly. Piecemeal methods of repair have shown themselves to be of little effect. Forcing liquid grout into the main piers under pressure and replacing fractured stonework with new masonry may stay the process of disruption, but will not remove its fundamental causes. Though the skin be sound there is rottenness at the core.

Fortunately, modern methods of restoration are equal to the emergency. It is possible for this generation to put St. Paul's into a thoroughly satisfactory condition of repair and to remove the bogey of structural instability, humanly speaking, for all time.

An Old Problem

The repair of St. Paul's is, of course, no new problem. When the full weight of the dome came on to the piers it caused serious shattering of the stone walling, and this went on during the first half of the eighteenth century, as the rubble filling of the piers dried and became compressed. Mr. Mervyn Macartney, the surveyor to the fabric, has recorded that the serious destruction of the stonework had been covered up in an unsatisfactory way, and it was determined, so early as 1781, to carry out a complete restoration, and the Cathedral was closed for nearly two years. This restoration was performed under the direction of Robert Mylne, surveyor from 1765 to 1821, who seems to have used a large amount of stone veneer and iron cramps in his repairs. Owing to the formation of rust some of the masonry cracked and split in all directions. Under Mr. Macartney's direction every iron cramp and dowel has been removed from the south-west pier of the dome so as to safeguard the public from danger of falling stone. While repairing this pier it was discovered that many of the carved capitals were not the originals, but poor copies insecurely fixed to the stone behind them by cramps, dowels, and lead. In many cases so badly had they been fixed that they fell off at the slightest attempt to examine them. A further interesting discovery was that, in the construction of the main arches, Wren built the voussoirs at the springings of the arches on a level bed, with only a short portion of the stone worked to a radius. This is shown in one of the diagrams reproduced on page 106. In connection with the dome and its supports, we remember hearing it said that so crushing is the compression of the piers that pieces of stone are known to burst off with the report of a pistol shot.

The Chain in the Dome

Some time ago Karshish in one of his articles recalled a story that is told in connection with the chain that is embedded within the masonry of the dome of St. Paul's. The story goes that before this chain was completely hidden in the masonry, Wren, for his private satisfaction, caused one link to be secretly cut through. It is scarcely necessary to mention that a chain is only as strong as its weakest link, and that half-an-hour's work with a file would completely stultify all purposes served by the chain. There is a true magnificence in the cool assurance of one who, for the sake of justifying his own self-respect as a craftsman, pits the reasoning capacity of his solitary brain against the wise caution of tradition, and who, at the risk of wrecking his *chef d'œuvre* and destroying his reputation, defies the unproved forces of Nature. The chain, says Karshish, is of wrought-iron plates, linked together at the ends, and is now "on view"; but, as it is buried some two feet within the masonry, the task of opening it up throughout its entire length is not lightly to be undertaken—if, indeed, possible of accomplishment. It is likely, however, that the continuity, or otherwise, of the chain, and the position of fractures (if any) may be determined by some system of testing for electrical resistances. Thus it may happen that the examination of a bit of cold iron—immured for two hundred years—may strangely navigate us into the remote secret channels of a great intellect and a noble spirit.

Against Extremism in Art

Modern art, as variously represented by cubism, vorticism, dadaism (we believe that is the description of one of its numerous offshoots), has had a long run of popularity, but signs are not wanting not only of reaction against it, but of definite opposition. For some years now it has been the custom to accept any jigsaw puzzle of weird angular shapes and violent contrasting colours as an inspired form of art expression. The public, largely as a result of the publicity which the Press is always ready to give to the sensational and the *bizarre*, have accepted it as the work of genius—as the manifestation of a new and vital movement in art. Many of those artists who have remained aloof from the movement have refrained from condemning it, partly because of a lingering dread that "there might be something in it," and partly because they have not liked to confess themselves behind the times. Others, with more courage than sincerity, have plunged boldly into the "new movement" and produced eccentricities with the best of them. All the time there has been a strong undercurrent of disapproval, occasionally becoming angrily vocal, but mostly remaining rather sullenly silent. At long last comes the announcement of the formation of "The Art-lovers' League"—an organization the objects of which are to "combine artists and public in the support of sane, healthy, and progressive art, and to discourage the interested exploitation of degenerate, reactionary, and incompetent work." Now that the lead against extremism has been given, it will not be surprising to see a great swelling of the assaulting ranks. Let us hope that the "back to sanity" movement (if so we may be allowed to christen it) will not go too far back. No useful purpose can be served by going from one extreme to another. The sensible course must be always the middle one.

Steel Houses

Details of the scheme whereby steel houses of the Weir type will be erected in certain areas for inspection by the public were settled last week at a conference of representatives of selected local authorities held in the offices of the Ministry of Health. It was made clear to the delegates at the outset that the Ministry had no intention of recommending steel houses to the local authorities as immediately desirable in housing schemes, but that it was prepared to help to defray the cost of erecting two such houses of the bungalow type in the area of every council represented, as experimental houses. The only condition imposed was that these houses should remain unoccupied for at least a month after their completion, and should be open for inspection by the general public. After that period the local bodies should be at liberty to deal with them as they pleased. It is understood that each house will cost about £400 for the purposes of this experiment. That price, it has already been explained, may be considerably lowered if houses in large numbers are subsequently ordered. Together with land, foundations, and sewers it is assumed that the total cost of every specimen house will be about £500. Only the one type of house was before the conference. Steel houses of two stories were not considered and the grant from the Ministry of £200 which was agreed to will apply solely to the Weir bungalow house.

—and their Cost of Upkeep

Houses that are cheap in first cost are not necessarily cheap in upkeep. This fact should be carefully borne in mind in connection with steel houses. Their principal upkeep charge will be for paint to preserve the steelwork from rust. This should be no inconsiderable item, and one that in the course of a few years is likely to dissipate any saving in first cost. Before they decide to adopt steel houses upon any extensive scale local authorities should investigate this very important point of upkeep for themselves. If repainting will amount to no more than a few shillings a year, then the one practical objection to steel houses is removed. In our opinion it will be found to be a much heavier charge than is commonly believed.

St. Paul's Cathedral and the Method of its Repair—I

By WILLIAM HARVEY

THE preservation of St. Paul's Cathedral is a matter of world-wide importance, and a means of restoring it to a sound structural condition must be found.

At the moment, such a scheme as will synthetically supply the deficiencies of Wren's wonderful building has not been laid before the public, and in its place are two rival proposals, each of which fails essentially to do justice to one side or the other of this complex problem.

The dangerous-structure notice served by the surveyor of the City Corporation upon the Dean and Chapter of St. Paul's Cathedral comes as a natural corollary to the partial proposals hesitatingly put forward by the commission appointed in 1921 to investigate the condition of the structure. The recommendation of the commission to repair the shattered and yielding piers with cement grout and by the piecemeal replacement of damaged stones with new is capped by the suggestion that the dome and its supporting piers be demolished forthwith. It would be difficult to determine upon two alternative proposals more repugnant to the principles and practices of sound conservation as understood in this country by professed lovers of ancient and historical buildings.

Stated in their simplest terms these principles are to conserve all original work and to introduce only such alterations and additions of new material as will be required to fulfil the conditions of permanent stability and safety.

In practice some concessions may have to be made in the face of overwhelming physical difficulties opposed to the carrying-out of these principles in their ideal completeness, but the prospect of the possibility that one point or another may have to be conceded on compulsion is no argument for abandoning the whole position without a struggle.

Ultimately, rebuilding will be required, as the commission itself indicates, even if the proposal to patch the piers is put in hand, and the admission is enough in itself to condemn the obnoxious and ill-conceived scheme.

It should not be considered permissible to entertain for a moment the thought of either demolishing the dome or of allowing it to decay towards its fall for lack of intelligent treatment courageously applied.

Wren's veritable inventions in building construction have a value as landmarks in the history of structural science that would be absent from any imitative reconstruction, however sound, and though the present commission confesses in its report its lack of will or lack of power to preserve the important historic objects, it would be both stupid and incorrect to suppose that the world holds no architect capable of taking a sounder view of the problem and of turning legitimate aspirations into accomplished facts.

The feebleness of the proposals contained in the commission's report is the more incomprehensible in that England is possessed of a public office endowed with an admirable tradition in respect to the examination and structural analysis of ruinous buildings, and their repair by scientifically-applied consolidation and reinforcement.

St. Paul's dome, condemned as a dangerous structure, may be fittingly examined in the light of experience gained in the study of other partially-ruined buildings containing imperfectly-buttressed arch and vault thrusts and heavy and eccentric loads.

The behaviour of ancient vaulted buildings falling into decay is in some particulars constant, and the habitual examination of many examples is a necessary preliminary to the acquirement of facility in diagnosing correctly the causes of defects in any building newly brought under observation.

Whether the commission does or does not possess this facility for mental grasp of the meaning of the defects they examine must interest all who care in the slightest degree for the safety of St. Paul's Cathedral, either as a sublime work of architecture, or as a mass of material dangerously poised aloft.

The question may admit of an affirmative answer as regards individual members of the commission, but evidence in support of such an answer would be looked for in vain in their recently-issued second interim report.

Under the conditions of loading to which the dome piers are subjected the proposal to repair their external stonework facings by piecemeal replacement is fundamentally inadequate and unsound.

Under the terrific and unequally applied pressures that are causing the defects in the building, each stone in the neighbourhood of the principal fractures is in the nature of a potential sacrifice to the inexorable laws of gravitation. A new stone is stronger than an old one, no doubt, but, unless the resistance of the piers can be increased in very much more adequate measure than can reasonably be hoped for by the grouting scheme, the introduction of a new stone is attended with the grave present risk that an adjoining old stone will be fractured in turn. In the course of months and years this risk of cracks extending is not merely a risk, but a certainty, a certainty which the commission seems dimly to foresee in its reference to "a later generation," but which it is not prepared to face with the necessary courage at the present time. The danger of new patches in old garments is familiar as a household proverb all the world over, and former repairs at St. Paul's Cathedral are practical demonstrations of the near relationship between the theory and the facts.

Wren's work at St. Paul's is not all of equal value, either in design or execution, for between the commencement and the completion of the building a whole new world of scientific invention as applied to structure was discovered by Wren himself as his experience accumulated, and as his attention was directed to one new problem after another.

The inner dome, the cone, and the lantern of St. Paul's Cathedral embody the result of mature knowledge and discretion, a profound insight into the nature of structural stresses, and of the expedients proper to deal with them. Lower parts of the building, designed and put in hand before Wren's exceptional powers of inquiry had been directed to all aspects of building construction, continue the Gothic traditions of structural material and method, which were still in force and which, but for his personal love of experimental science, might well be in force to-day.

Looking at the problems of repair at St. Paul's Cathedral with a knowledge of the expedients that Wren himself devised in its upper parts, and from the point of view of the new science of conservation that has been created within the last decade, it is possible to claim that modern British architecture is in possession of powers amply sufficient for their solution. But these powers are still potential powers not yet gathered together in the person of a single individual architect, nor yet directed to the case of St. Paul's Cathe-

dral with its peculiar difficulties due to its exceptional dimensions and the materials of which it is composed.

Rejecting as insufficient the proposal to patch the piers, and protesting against the suggested demolition of the dome as an altogether outrageous breach of trust, it is necessary to determine what alternative measures are practicable, and for this a comprehensive examination of the structure is necessary.

Much information would have to be obtained and digested before a scheme could be evolved in all its details, but before descending to detail it is possible to review the most obvious structural movements of the building, and by comparison of these movements with recorded defects in other buildings to determine whether St. Paul's Cathedral must be regarded as altogether exceptional or whether its defects are indeed the ordinary results of ascertainable causes. Vibration produced by traffic or the undermining and draining of the subsoil in building operations near the cathedral were formerly considered as primary causes of the cracks that have developed and are developing in its masonry, but though these elements are important they are now recognisable as only contributory to the defects which are accounted for by the imperfect statical equipoise of the building and the comparatively weak material of its construction.

The ground plan (Fig. 1) shows an arrangement of piers and masonry masses disposed around the central point of the church in a fashion admirably adapted to receive the weight of the high and heavy erection of drum, domes, cone and lantern, piled up above them, and even to act as buttresses to the lateral thrusts of the arches and of wind pressures to which the outer dome is exposed.

Four masses of building projecting bastion-wise at the re-entrant angles of the transepts and aisle walls seem to promise security in resisting loads and in their capacity for buttress action.

The section of the building shows, however, that the full strength of these masses of material is not adequately employed, and while some of them are subjected to enormous concentrated eccentric pressures, others are comparatively lightly burdened. (Figs. 2 and 3.)

Wren very seriously under-estimated the importance of diffusing the pressures upon the supports throughout the lower parts of the work, and in consequence even such provision as he made for the diffusion of pressures has been rendered still less effective by the movements in the structure during and since its erection. It is an invariable rule in heavily-loaded masonry that fractures tend to occur between heavily-loaded and lightly-loaded portions of the support, and at St. Paul's the symmetrical disposition of the cracks approaches very nearly to uniformity consistently with this rule.

The arches bridging the spaces between the main piers of the dome and the surrounding walls are all severely dislocated, for the dome piers have compressed bodily to a much greater degree than the lightly-loaded exterior masses. The arches, semicircular or elliptical, were not designed to transmit thrusts satisfactorily as flying buttresses. In addition to being heavily loaded in comparison with other parts of the building the eight dome piers are so placed in regard to the position of the inner drum, the pendentives, and the great arches of the dome that they receive their weight as a concentrated eccentric load upon a small portion of their area. The eccentricity is so severe as to have occasioned a series of fissures between the heavily-loaded and lightly-loaded portions in the substance of the piers themselves. The fissures which penetrate the substance of the rubble core of the piers, as well as its ashlar facing, have given rise to anxiety as to the safety of the building.

That they have opened principally in response to inequalities of pressure and consequent inequalities in contraction in the masonry is confirmed by the behaviour of other parts of the building subjected to similar damaging conditions. At the level of the whispering gallery the inner and outer drums are surrounded by a series of thirty-two buttresses, which have all been shattered by the stresses produced by the inequality of pressure upon their inner ends, which are descending with the heavily-loaded drums, and their outer ends which are held up by the tops of the less heavily burdened portions of the arches, barrel vaults, and semi-domes connecting the eight main piers. A series of fractures throughout the higher parts of the building tends to isolate the heavily-loaded inner drum from the lightly-loaded outer drum and peristyle and the cone from the upper drum of masonry surrounding its base.

While these conditions of loading remain as they are at present an attempt to deal with defects in the piers by

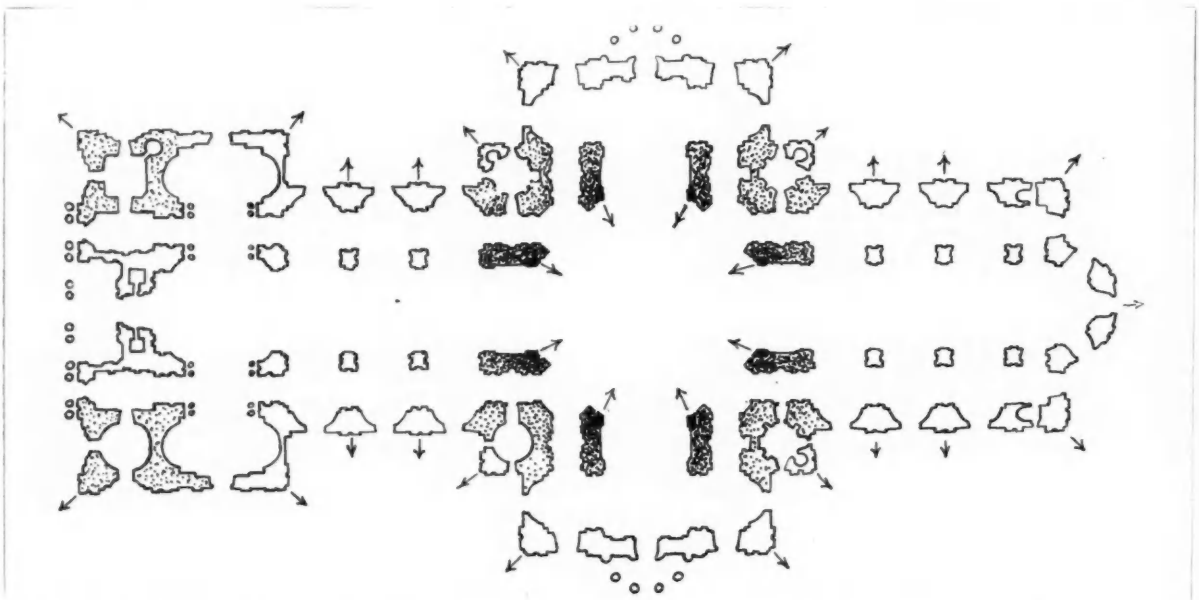


FIG. 1.—A DIAGRAMMATIC GROUND PLAN OF ST. PAUL'S CATHEDRAL.

The masses of masonry surrounding the eight piers of the dome should afford them support, but adequate means of distributing the weight upon them are lacking at present. Such means might be supplied in a comprehensive scheme of repair. Intense pressures black. General tendency of supports to overhang shown by arrows. The overhang is not absolutely uniform, but the heavily loaded portions of the central piers tend to tear free from the surrounding work.

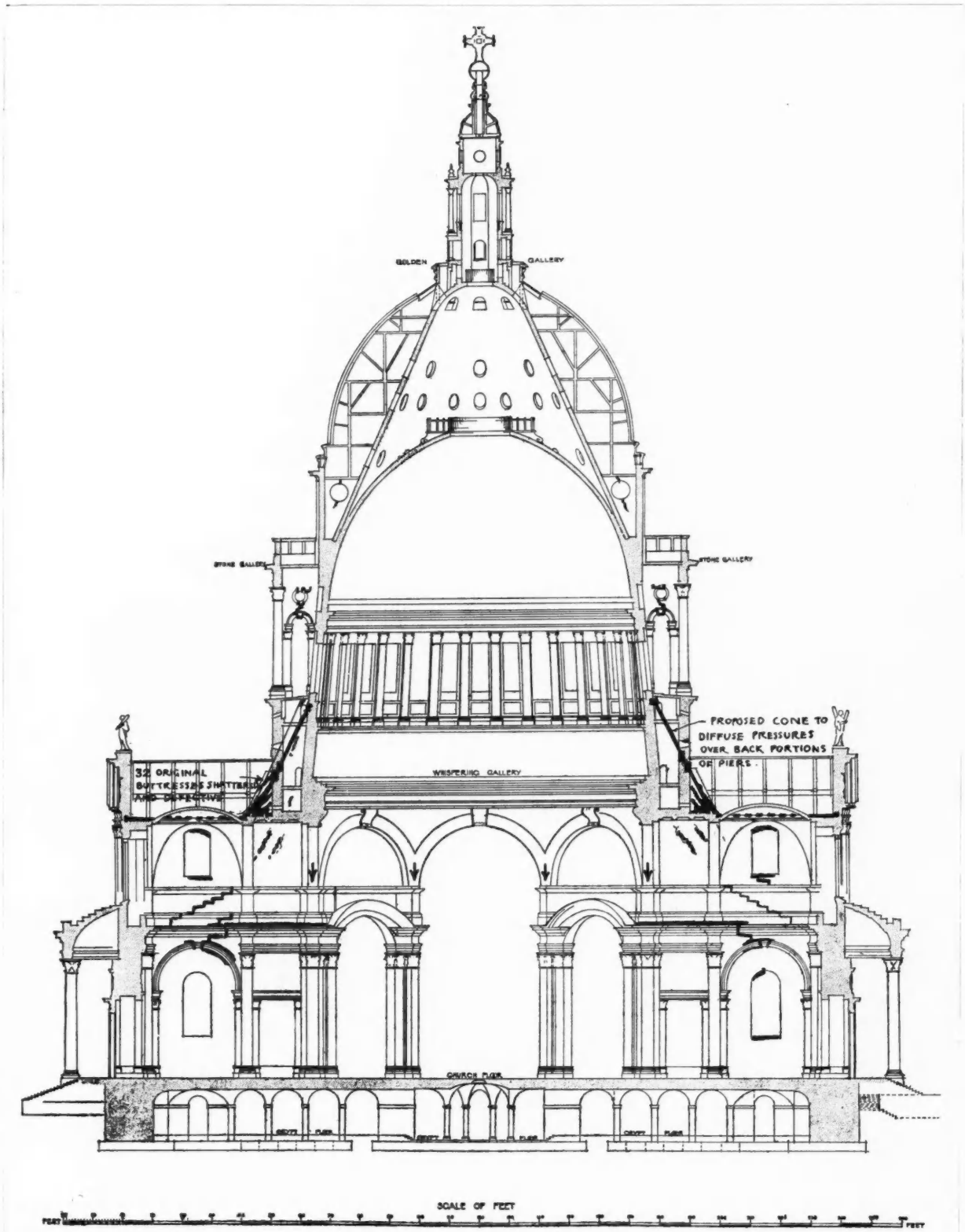


FIG. 2.—ST. PAUL'S CATHEDRAL.

A cross-section showing positions of principal defects and suggested cone to diffuse the weight of the drum over the tops of piers now being crushed by eccentric loading on one inner corner of each.

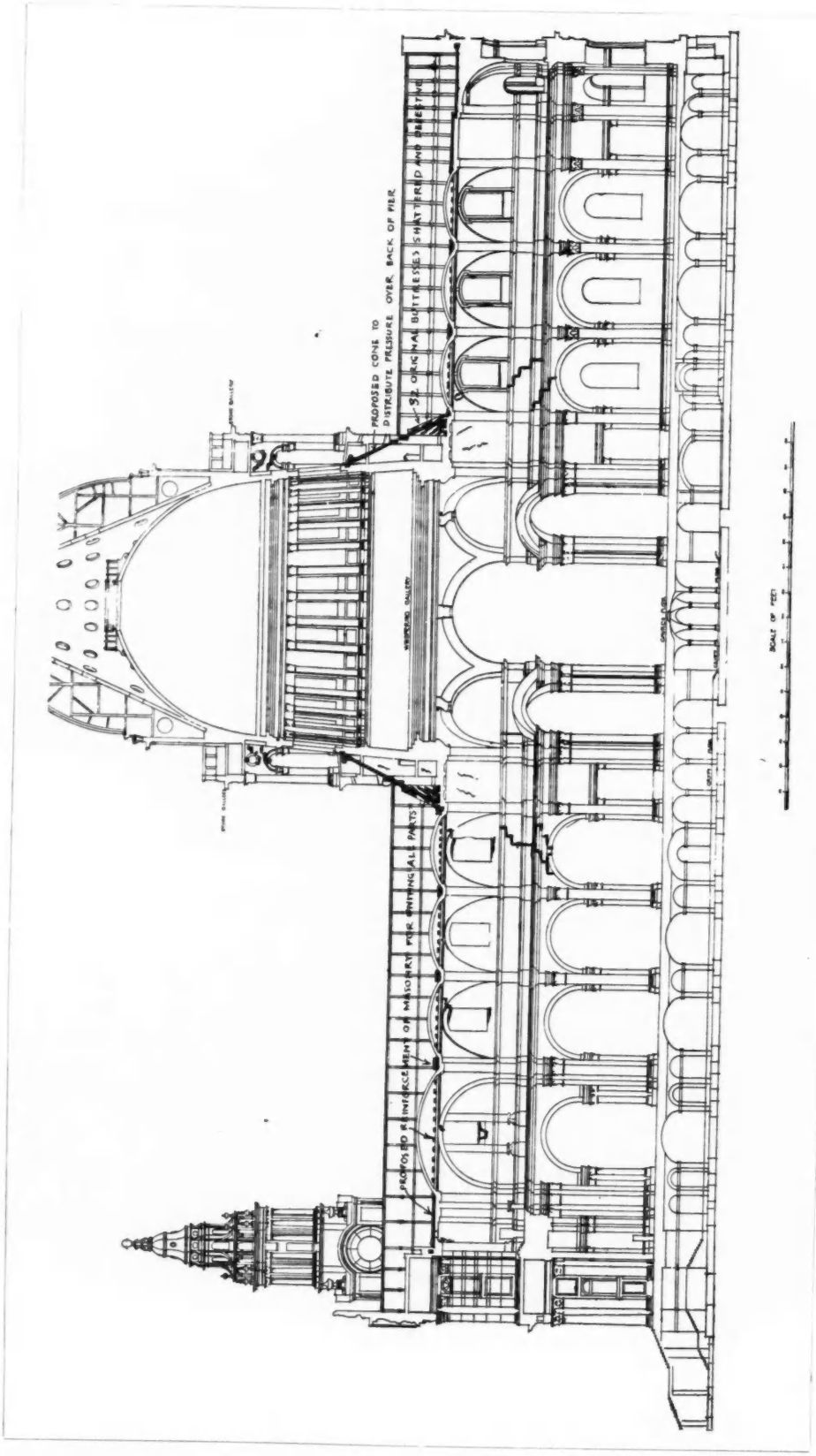


FIG. 3.—ST. PAUL'S CATHEDRAL.

A longitudinal section showing the position of the principal defects. The eight central piers are being crushed by the eccentrically-applied weight of the drum. Fractures and dislocations of the masonry separate them from the remainder of the building.

An Air View of St. Paul's Cathedral

This view is of interest as showing how the drum bearing the great dome is in turn supported on its eight piers. The view also reveals the true walls of the nave, transepts, and chancel behind the screen walls which alone are seen from the street.

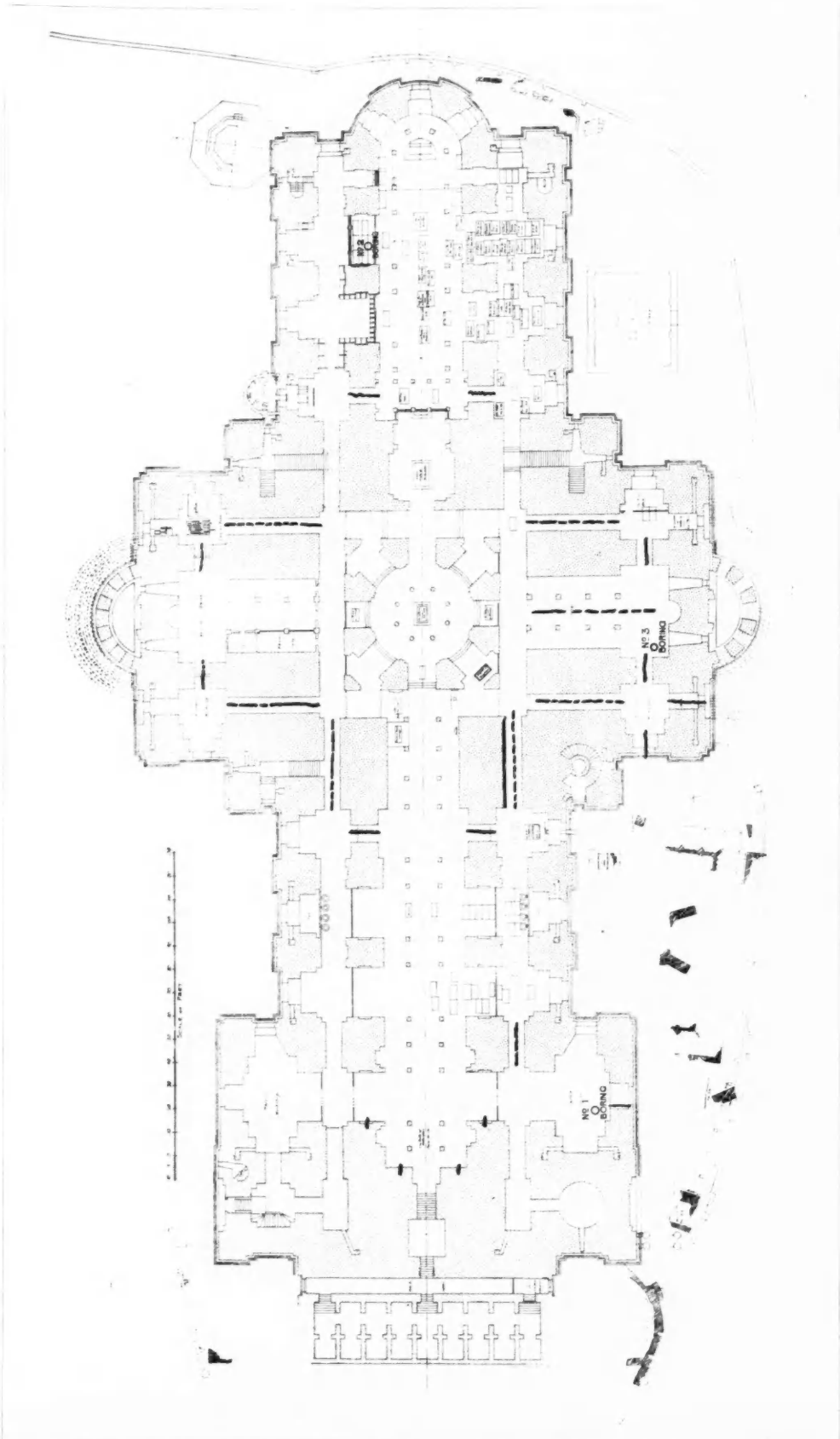


FIG. 4.—ST. PAUL'S CATHEDRAL: CRYPT PLAN.

Ample masses of masonry provided in piers, but weights unevenly distributed upon them.

grouting and patching can only be in the nature of a temporary palliation of symptoms and not a cure of the disease. The statement that the two piers already treated have been examined, and that the treatment has been found successful, can only be accepted as relative and conditional, for it is only a question of time before the essential trouble commences once more to reveal its presence in the former manner. An impartial search, diligently conducted, would certainly reveal traces of movement in or near recently executed repairs to the stonework.

Another general cause of movements and of fractures throughout the building is to be found in the thrusts of the vaults, which have tended to overturn the outer walls away from the centre of the building, and have contributed to the formation and widening of cracks between the eight central piers and the other parts of the fabric.

A diagrammatic statement of these principal tendencies is shown on Fig. 1, where the arrows indicate the general movements of the building. The black patches indicate the positions of the most concentrated pressures. It should be noticed that the main piers overhang inwards under the combined effect of the heavy eccentric loads on their inner ends, and of the thrusts of the aisle vaults. As well as the fractures and disintegration in the main piers, which must be considered as principal defects, subordinate movements of the towers and walls require control, and in a complete scheme of repair it might be practicable to improve the condition of several portions of the building by dealing with them as parts of a whole which, disunited at present, must be brought to a united condition.

The considerations which would be kept in view in devising such a scheme would be : (1) conservation of the maximum amount of original work compatible with safety; (2) the avoidance of new material where it would encroach unpleasantly to the detriment of the artistic amenities of the building; (3) to remedy the structural condition of each defective part in such a manner as will best serve to unite the whole.

The fundamental difference between such a scheme and the proposal to mend by patching is that mending by patching can only remove the outward signs of decay, and the structural improvement attainable by this means is at the best confined to increasing the resistance of the material in the parts actually patched. The more comprehensive scheme aims at adjusting the pressures and the whole statical condition of the damaged building in conjunction with the repair of specific defects in detail.

FIG. 5.—THE FRACTURED FRIEZE OF ONE OF THE PIERS.

Resistance of the material is improved, and at the same time the most excessive stresses are reduced by the suitable application of the remedial measures. The cost of patching may be less at a given moment, but where there is no adequate safeguard against the continued developments of defects, and the need of further patching, or of "larger operations," is certain in the near future, the financial outlook is not really favourable to the patching system.

The increased cost of a comprehensive scheme pays for itself in the course of years by reduction in maintenance charges and scaffolding, and, above all, in the convenience of peaceful enjoyment of the building for its legitimate purposes. Of the two methods, patching makes far lighter

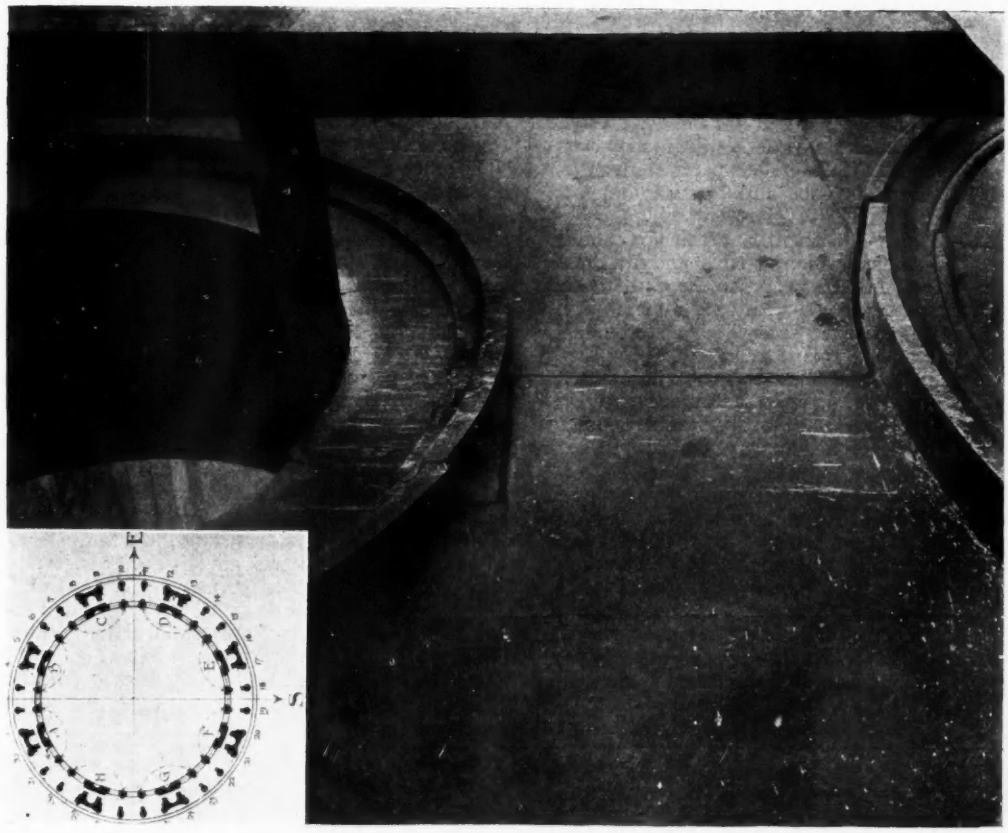


Fig. 7.—Unequal loading and settlement open joints in buttresses of peristyle around drum.

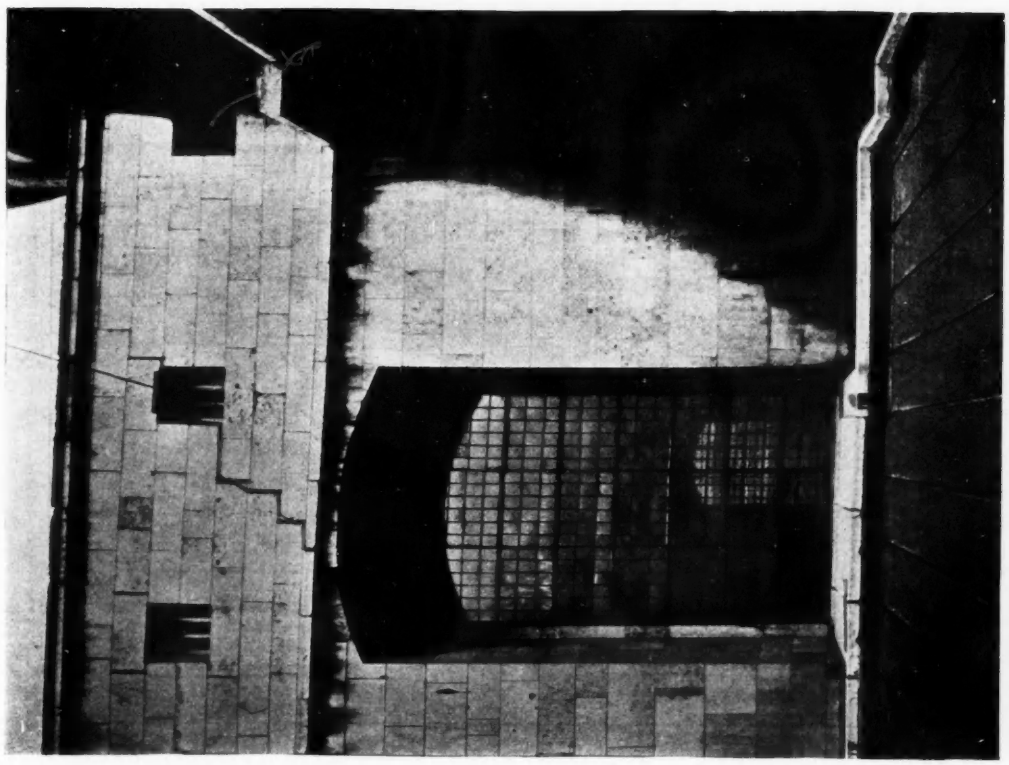


Fig. 6.—Dislocation of Masonry. Right-hand side is dragged down by the weight of the dome.

ST. PAUL'S CATHEDRAL: VIEWS SHOWING FISSURES.

demands upon the creative abilities of the conservator, and although instances may be quoted of buildings that have been rendered permanently secure by the combined improvement of the material and the adjustment of the stresses by means of a comparatively slight amount of internal reinforcement, it cannot be said that the better and more scientific method has yet achieved complete popular recognition. The patcher still has the dead weight of a bad old tradition behind him, whereas the modern conservator must be prepared to take endless pains in invention and adaptation of means to ends and be misunderstood into the bargain.

Two of the greatest assets of scientific repair are metallic reinforcement and Portland cement. Most ancient buildings fall asunder before actually falling to the ground, and if the several parts are connected with tensile members of adequate strength, equilibrium may be restored and prolonged for a very considerable time.

Buildings erected before the general use of reinforcement may have their strength increased enormously by its introduction, and several metal tie-bars have been put in position in various parts of St. Paul's Cathedral in past times to restrain overturning movements.

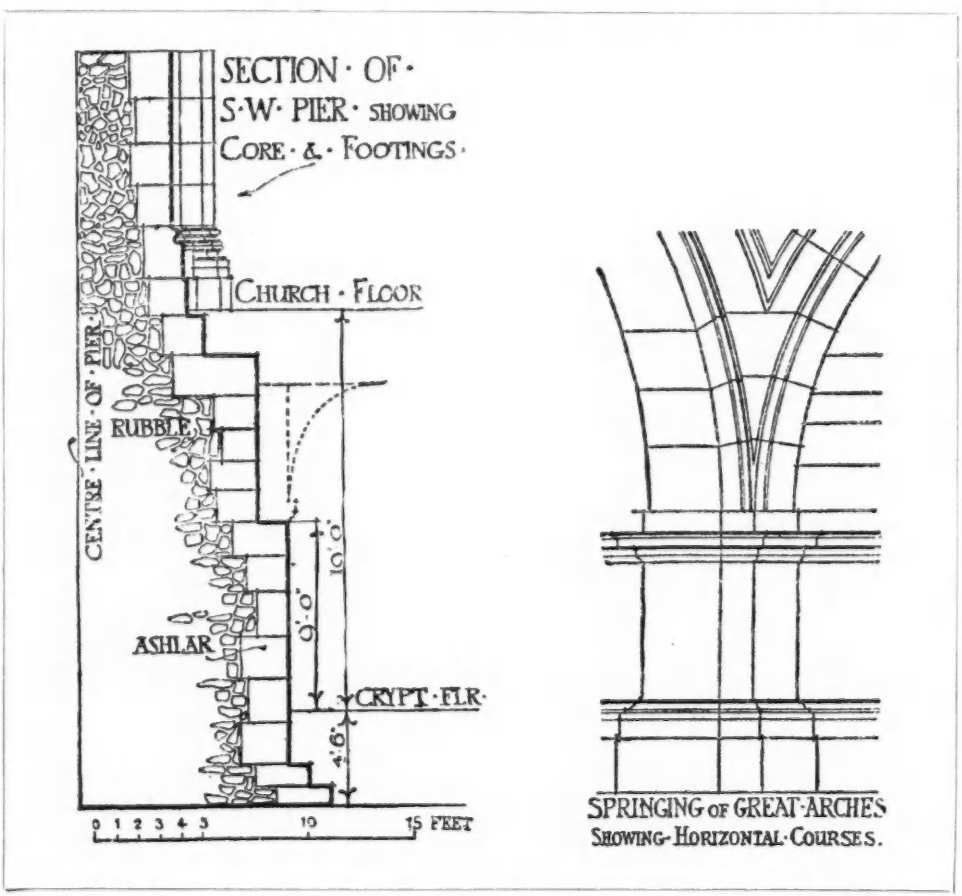
Wren's famous reinforcement of the dome and cone is itself evidence of the benefit to be derived from the scientific use of tension members in conjunction with brickwork or masonry, but modern tensional patchings in the building have been little less fragmentary than the usual patchings with compressional material. The metal has been exposed instead of securely imbedded in concrete beams within the interior of the old work, and has been applied in an opportunist fashion just as seemed convenient at any particular moment.

A proposal to treat the building by up-to-date methods would mean, over and above the minute search for all defects, a re-examination of the building with a view to discovering the best places for inserting tensile reinforcement, in the double interest of permanently curing local defects and of compelling different parts of the building now severed through decay to act together in future. Certain parts of the fabric could obviously be greatly improved by such means.

The outward leaning walls and west towers might be anchored back to parts of the building at present leaning in the opposite directions. The whole circuit of the outer walls could be united by an endless reinforced concrete beam buried in their thicknesses, and the further distortion and spread of Wren's concealed flying buttresses would be prevented by this means and by the return ends of the beams at the bastions and at the extremities of the building.

This system of reinforcement, taken together with the strength of the walls, with which it would act in conjunction would form a secure outer frame within which to attempt the far more difficult repairs required at the centre of the church. A scheme of reinforcement hidden within the defective piers would be preferable both to rebuilding and to the patching-to-death proposals mentioned in the commission's report, in that the familar stonework with all its historical associations could be retained.

Work of this kind has already been successfully performed in the case of the Norman tower piers of Jedburgh Abbey, whose stonework was far more dilapidated than that of the piers of St. Paul's, and given a suitable contrivance of temporary works there is no reason to suppose that the system could not be applied practically to the larger building.



ST. PAUL'S CATHEDRAL.

FIG. 8. Diagrams showing constructive method unsuitable for the reception of concentrated or eccentric pressures, and springing of great arches designed in a manner which concentrates pressure on one corner of each pier.

Extensions from the reinforcement of the piers would be made to traverse the lengths of the main high walls and unite with the reinforcement encircling the exterior.

These measures would restrain the possibility of the ugly and dangerous inward bend of the piers, and prevent the threatened collapse of their important heavily loaded inner corners by separation from the remainder of the piers.

In combination with the insertion of the reinforcement the consolidation of the piers would be put in hand on a proper basis, with the removal of the old defective core material and its replacement with new.

Before this attempt could be made important temporary works of shoring and centering would be required, as, indeed, they will be required in the commission's proposed patching scheme, but their design would be so directed as to be in harmony with the special character of the proposed works. For the safe upholding of the dome, during the operations to the supporting piers, other works would be required beside the centres below the main arches. Absolute steadiness in the superstructure would be essential to the success of the operations, and the apparatus temporarily required to assist in controlling movements in the drums should be devised to become part of the permanent building, and capable of spreading the weight of the high central drums and domes upon the surrounding masonry masses below.

These, as has been mentioned, would have been united previously to one another by reinforcement. What Wren attempted with his thirty-two buttresses of masonry, and failed to achieve through their insufficiency for their purpose, could now be accomplished by adopting the principle of a cone-shaped support that Wren himself designed and used at a higher stage of the building. The outer and inner drums would be connected and in part supported upon a truncated cone of reinforced concrete whose base would reach to the outer and unloaded portions of the eight main piers upon which the pressures would be more evenly diffused by a base plate of reinforced concrete covering the vaults surrounding the dome.

The base plate would be united at its extremities with the reinforced beams in the wall tops.

The new reinforced cone would be of light construction, but strong by virtue of its shape, and stiffened by diaphragms adjoining and reinforcing the thirty-two defective buttresses.

Above its truncated summit at the level of the dome's clerestory window-sills only local repairs would be needed, though in these reinforcement would be still valuable.

The buttresses surrounding the inner drum have all separated from it in a greater or lesser degree, for in its descent under the load of cone or lantern it has left the light outer peristyle at a higher level.

The masonry connections between drum and peristyle which could not withstand the immense shearing stresses should be reinforced with non-corrosive metal, since the section of the stonework is comparatively slight. Although trivial compared with the serious trouble in the main piers, these defects in the upper portion of the building assume importance because of its exposure to wind-pressure at a great height. Adequate connection of part with part is necessary if destructive vibration is to be avoided.

On the conclusion of the works outlined above the building would be far stronger than at any time in its history, but defective foundations, vibration, and subsidence of the subsoil would still be dangers to be guarded against, and deep digging that would draw water away from under the cathedral site would have to be prevented for an indefinite period. *(To be concluded.)*

In Praise of St. Paul's

Oh, sweetheart, see ! how shadowy,
Of some occult magician's rearing,
Or swung in space of heaven's grace
Dissolving, dimly reappearing,
Afloat upon ethereal tides
St. Paul's above the city rides !

JOHN DAVIDSON.

St. Paul's appears to me unspeakably grand and noble, and the more so from the throng and bustle continually going on round its base, without in the least disturbing the sublime repose of its great dome, and indeed of all its massive height and breadth. Other edifices may crowd close to its foundation and people may tramp as they like about it; but still the great cathedral is as quiet and serene as if it stood in the midst of Salisbury Plain. There cannot be anything else in its way so grand in the world as just this effect of St. Paul's in the very heart and densest tumult of London. It is much better than staring white; the edifice would not be nearly so grand without this drapery of black. NATHANIEL HAWTHORNE.

It is really the better for all the incense which all the chimneys since the time of Wren have offered at its shrine; and are still flinging up every day from their foul and grimy censers. GEORGE AUGUSTUS SALA.

When in walking up Ludgate Hill we see the spire of St. Martin's brought clear against the dome of the cathedral we discern a new majesty in St. Paul's, a new inimitable elegance in St. Martin's. We see what scale and distance is given to the building behind by the dark leaden tone of the steeple in front; we see how its slender form and subtle curves give size and boldness to the cathedral dome. And in return for this good service done the mother-church lends the little spire a delicacy and a gentle loveliness surpassing that it would of itself possess. A. H. MACKMURDO.

St. Paul's, like St. Peter's, testifies of the genius of a man, not of the spirit of humanity awed before the divine. Neither grew as Gothic churches grew; both were ordered to be built after the plans of the most skilful architects of their time and race, and both are monuments to civilizations which had outlived mystery. HOWELLS.

A deep, low, mighty tone swung through the night. At first I knew it not; but it was uttered twelve times, and at the twelfth colossal hum and trembling knell, I said, "I lie in the shadow of St. Paul's." . . . The next day I awoke, and saw the risen sun struggling through fog. Above my head, above the housetops, co-elevate almost with the clouds, I saw a solemn, orbed mass, dark—blue and dim—the DOME. While I looked, my inner soul moved; my spirit shook its always fettered wings half loose; I had a sudden feeling as if I who had never yet truly lived, were at last about to taste life; in that morning my soul grew as fast as Jonah's gourd. CHARLOTTE BRONTË—*"Villette."*

Set down a brave Sir Christopher in the middle of black ruined stone heaps, of foolish unarchitectural Bishops, red-tape officials, idle-Nell-Gwynne Defenders of the Faith; and see whether he will ever raise a Paul's Cathedral out of all that, Yea or No ! . . . Pious munificence, and all help, is so silent, invisible like the gods; impediment, contradictions manifold are so loud and near ! O brave Sir Christopher, trust thou in those notwithstanding, and front all these; by valiant patience, noble effort, insight, by man's strength, vanquish and compel all these, and, on the whole, strike down victoriously the last topstone of that Paul's edifice; thy monument for certain centuries, the stamp "Great Man" impressed very legibly on Portland-stone there ! CARLYLE—*Essay on "Labour."*

H. J.

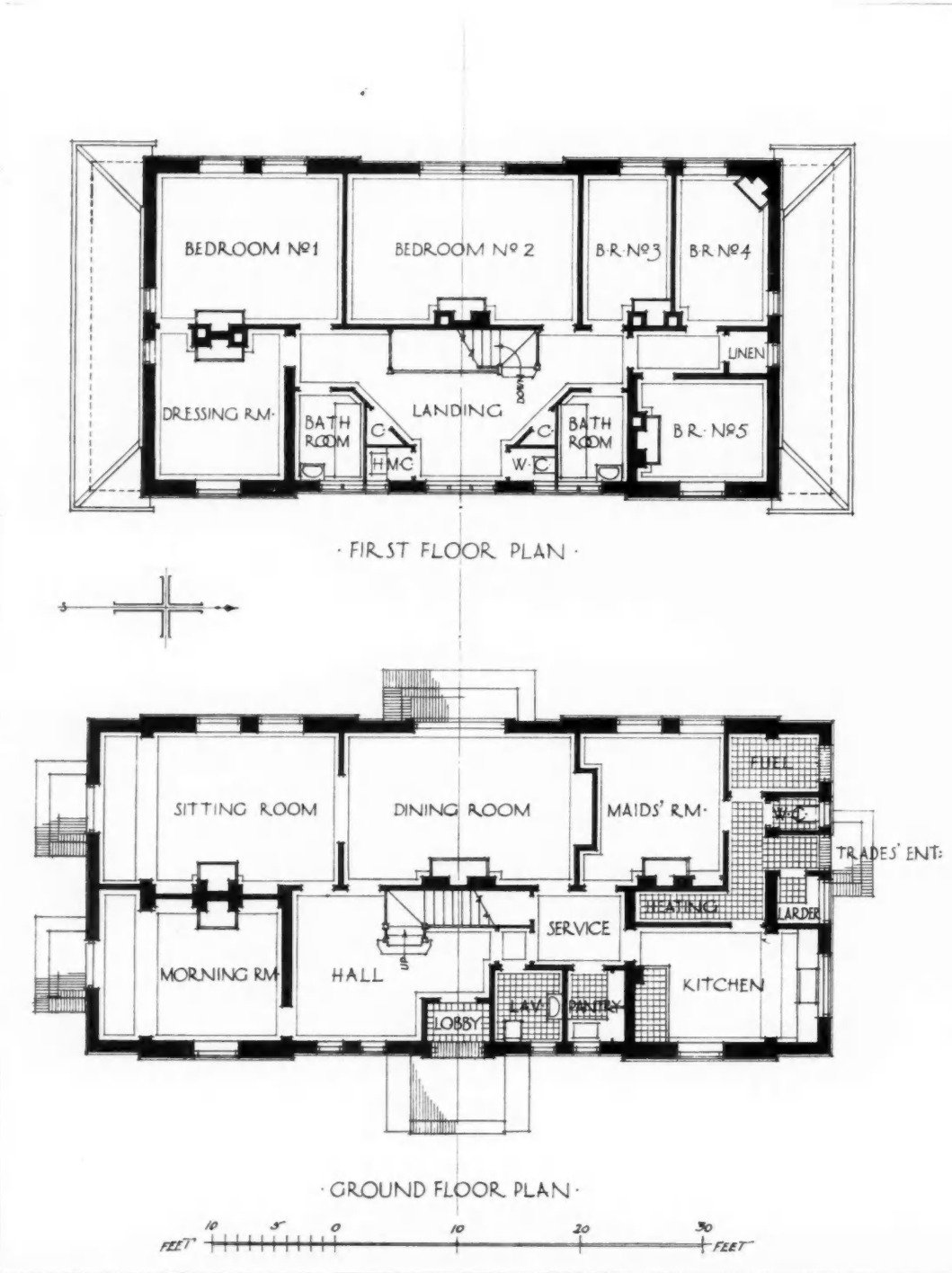
A House at Bickley, Kent

LESLIE MANSFIELD, F.R.I.B.A., Architect

THIS is a five-bedroom house in the outer suburbs of London. It is situated very fortunately upon a good site which is practically level and has a convenient aspect. It is an attempt to produce for a comparatively limited sum of money a house of to-day which is modern in appearance and accommodation.

Careful thought was given to the running of the house, and the plan was designed to separate as far as possible the administrative side from the "living" side, but a link between these two sides had to be provided for efficiency. It is conceivable that criticism might be levelled at the plan as being just a trifle extravagant, but it should be remembered that the wise man does not build a house solely for his own immediate needs, and if it is possible to arrange his scheme in such a way that altered conditions

(*Continued on page* 116.)



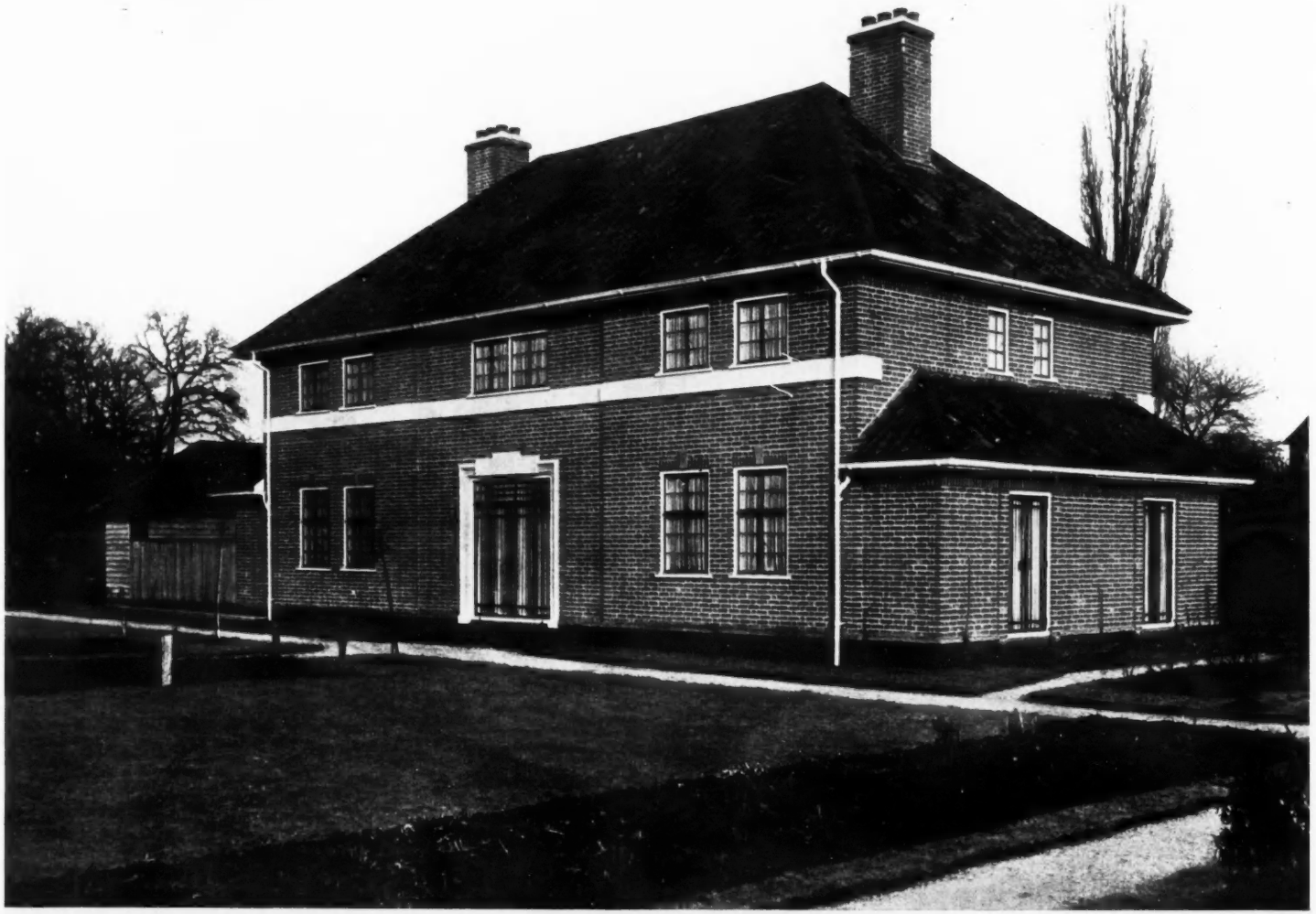
Modern Domestic Architecture. 104.—"Sunny Corner," Bickley, Kent : The Entrance Front

Leslie Mansfield, F.R.I.B.A., Architect

This is a five-bedroom house in the outer suburbs of London. It is situated upon a practically level site and has a convenient aspect. The plan was designed to separate as far as possible the administrative side from the "living" side, though a link between these two sides is provided.

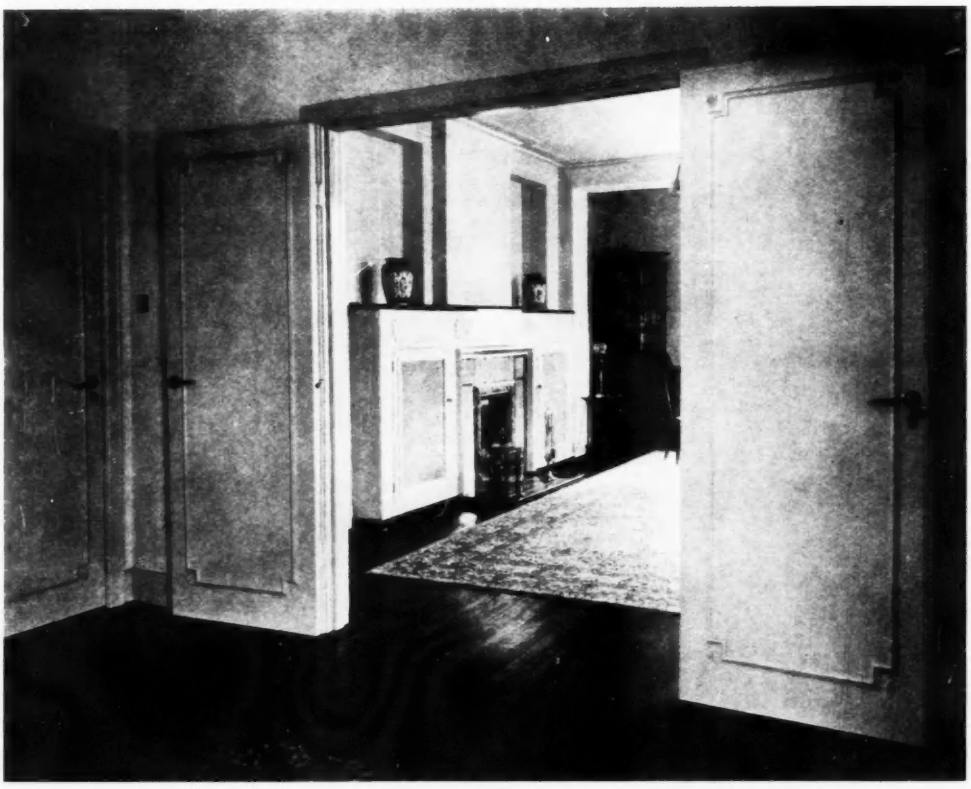
Modern Domestic Architecture. 105.—"Sunny Corner," Bickley, Kent : The Garden Front

Leslie Mansfield, F.R.I.B.A., Architect

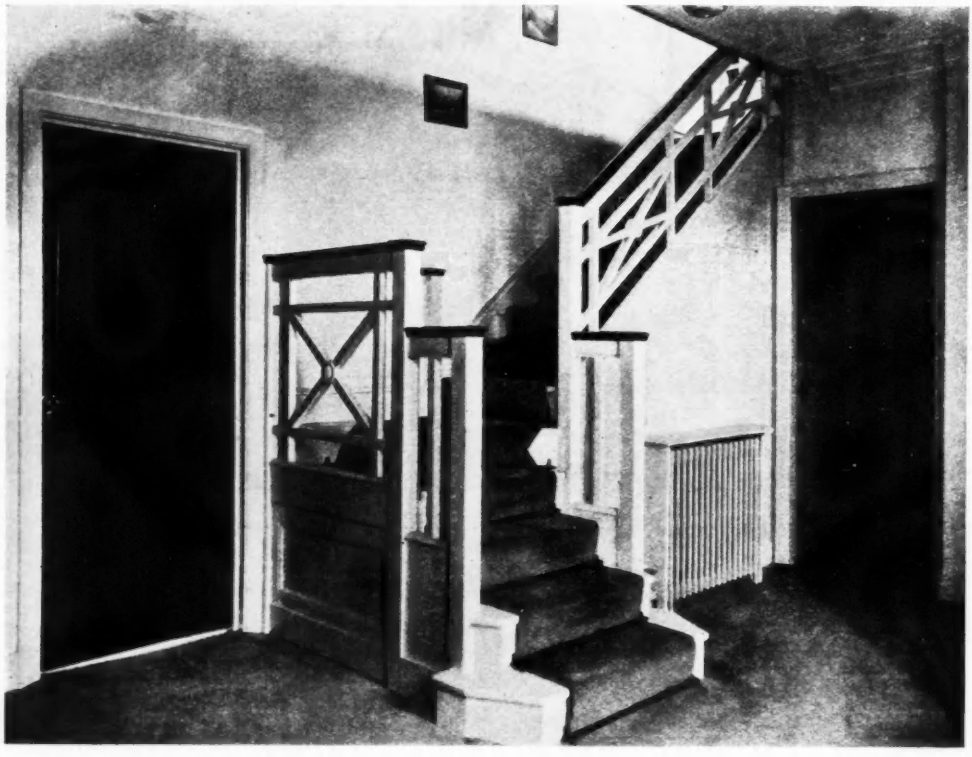


Old Norfolk pantiles have been used for the roof, and some interesting facing bricks for the walls. The introduction of a small amount of Victoria stone has helped to give the scheme a sense of completeness.

"SUNNY CORNER," BICKLEY, KENT: A DETAIL OF THE ENTRANCE FRONT
LESLIE MANSFIELD, F.R.I.B.A., ARCHITECT.



THE DRAWING ROOM FROM THE DINING ROOM.



THE HALL.

"SUNNY CORNER, BICKLEY, KENT. LESLIE MANSFIELD, F.R.I.B.A., ARCHITECT.

THE DINING ROOM.

THE GARDEN WINDOWS: THE DINING ROOM.

"SUNNY CORNER," BICKLEY, KENT. LESLIE MANSFIELD, F.R.I.B.A. ARCHITECT.

do not affect the working, then he becomes the possessor of a valuable property. These remarks refer chiefly to the somewhat spacious servants' sitting-room and to the addition of a second bathroom. Both these compartments are valuable in the event of the house becoming a family residence.

The internal finish and decoration are dealt with with restraint, the desire being to obtain a background for furniture rather than create any competitive interest. With this in mind the whole of the sitting-rooms and bedrooms are carried out in one scheme of colour, both for walls and paintwork, with the one exception of the doors in the hall which are coloured a tone of soft red. An attempt was also made to limit the number of metal fittings in the house, and this has resulted in a certain restfulness.

The external appearance of the house is greatly enhanced by the use of old Norfolk pantiles for the roof, and some extremely interesting facing bricks. The introduction of a small amount of Victoria stone helped to give the scheme a sense of completeness.

The general contractor was Mr. E. H. Burgess, of Gerrard's Cross, who handled the work entirely, including all the joinery work which was made in his shops. The sub-contractors were as follows: Norris and Dutton (heating); Crittall & Co. (casements and metal doors); Martin Van Straaten & Co. (internal tiling); H. Pontifex and Sons (sanitary fittings); James Gibbons, Ltd. (door furniture); Roberts, Adlard & Co. (roof); Ames and Finnis (facing bricks); The Patent Victoria Stone Co. (Victoria stone). The remainder of the sub-contract work was carried out by the general contractor.

Proposed Congregational Church, Southbourne, Bournemouth

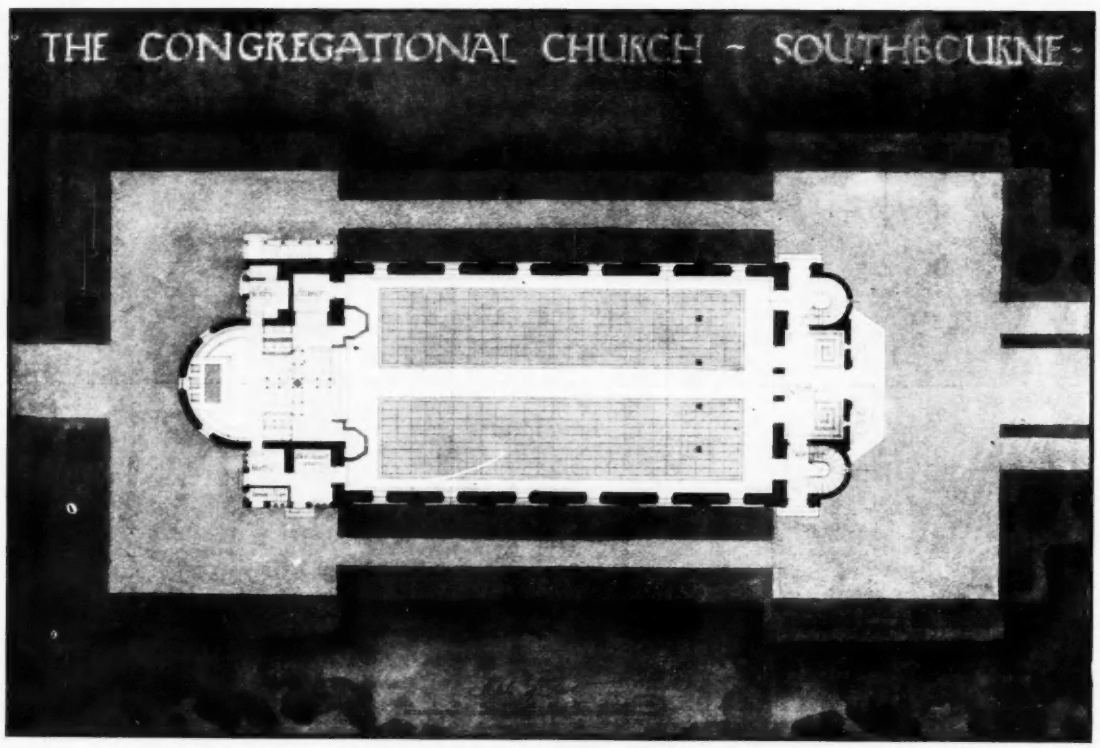
This church will stand in a large area of ground surrounded by pine trees, and the main entrance will face south. Seating accommodation will be provided for 650 people. A gallery faces the chancel, which is entered from the vestibule. The chancel, nave, and aisle floors will be covered with black and white marble, and the whole of the woodwork will be in oak. The interior will be as simple as possible, and the exterior will be of brickwork in Flemish bond, Portland stone dressings, and Roman tiles on the roof. The church will be heated by low-pressure system, and the chancel will have secret lighting. The architects are Messrs. Pearson and Burrell, in collaboration with Mr. E. W. Lewis. The perspectives are the work of Mr. E. W. Lewis.

Mr. Alfred C. Bossom on London's Traffic

"By 1950 the traffic problem may be entirely changed again. By then we may ascend by lifts in landing towers, step on board some form of aircraft, be carried to our destination, there to descend, thus creating new traffic problems in an entirely new direction. The need of future landings for aircraft, although in no way a feature to-day, should not be ignored, for the time is undoubtedly coming, and coming soon, when this form of locomotion will introduce its own problems."

This was one of the remarks contained in an interesting paper on "The Traffic Problem of London," by Mr. Alfred C. Bossom, and read before the London Society. He said that with a problem of economy such as one hears of on all sides, the first point that struck one who had been interested in this traffic situation, was how could the situation, as it stands, be relieved without much expense, and immediately one answer came to mind, that was, though something foreign to the English disposition —definite control! Making practically no structural changes whatever, the situation in London could be most materially relieved if a Board of Traffic Control with compelling power be created. In New York, for example, where congestion had almost reached the height of impossibility, relief was instantaneous to a very great degree when a definite control was introduced and carried out with a firm hand.

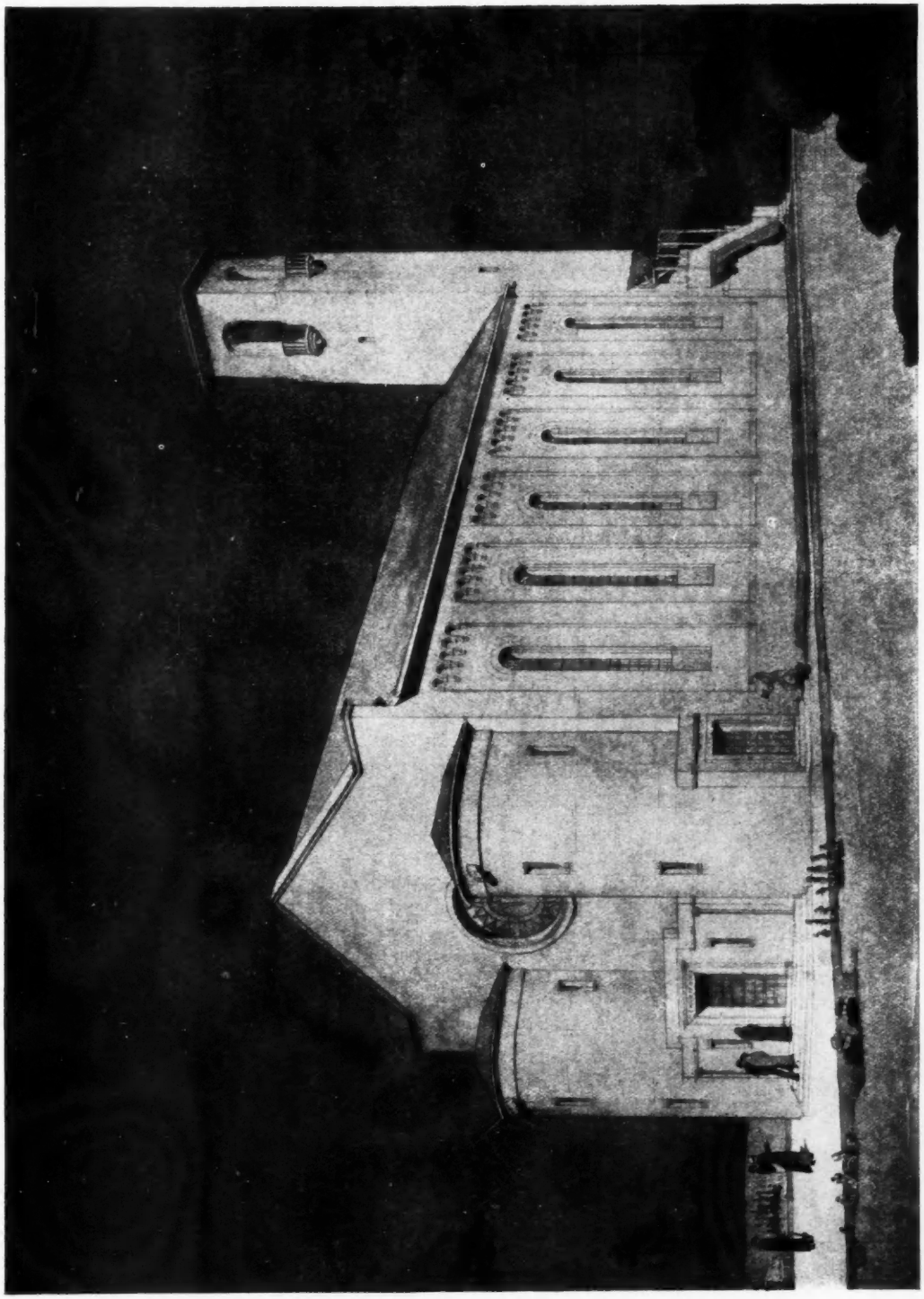
Amongst the suggestions which he makes for the alleviation of the traffic congestion the most important are the establishment of a traffic control board to regulate and re-route the traffic and to educate the public. Horse-drawn vehicles should be entirely eliminated from the important arteries. All repairs should be carried on



PEARSON AND BURRELL, IN COLLABORATION WITH E. W. LEWIS, ARCHITECTS.

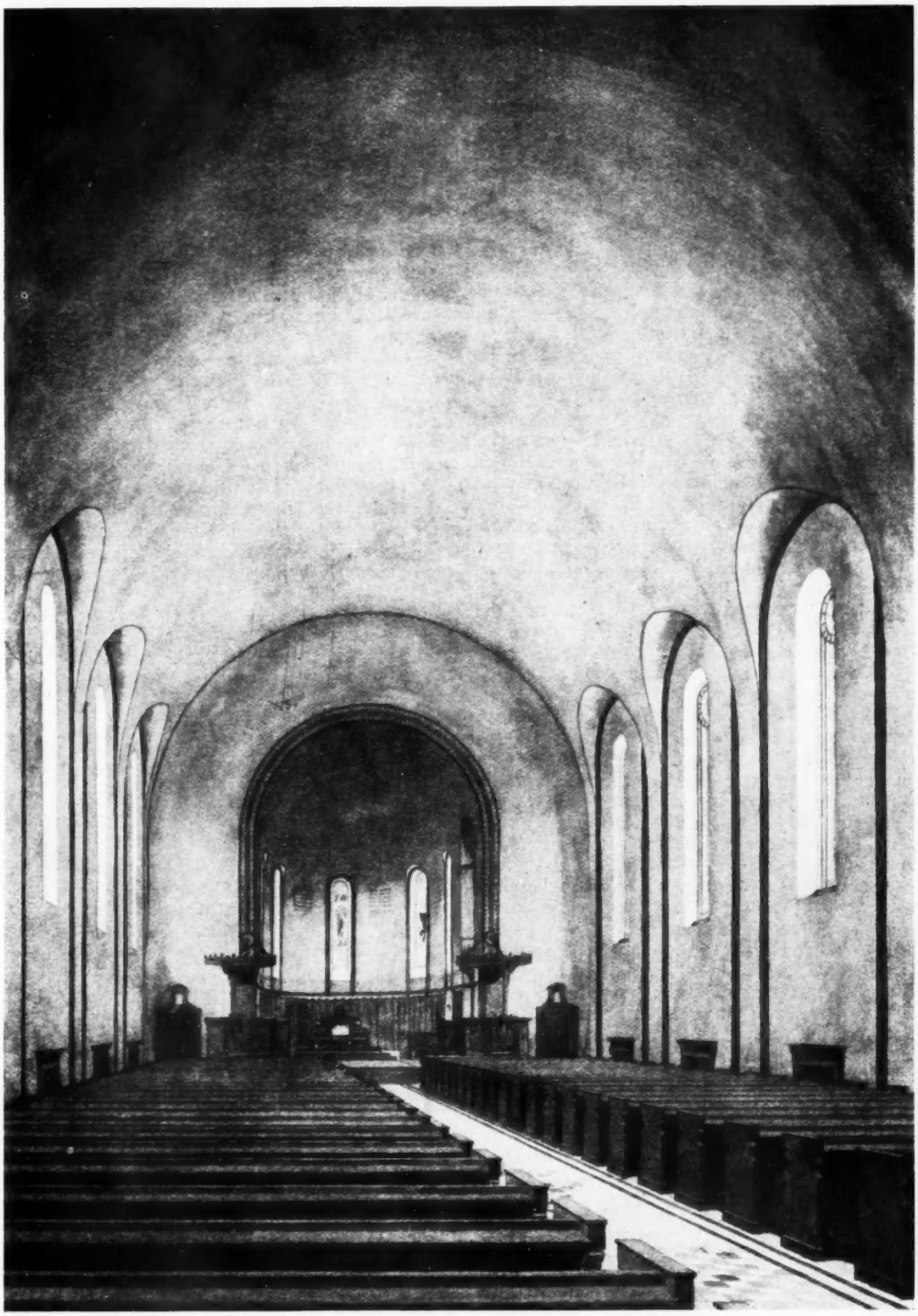
A Proposed Congregational Church, Southbourne, Bournemouth

Pearson and Burrell, in collaboration with E. W. Lewis, Architects



From a perspective by E. W. Lewis.

This church will stand in a large area of ground surrounded by pine trees, and the main entrance will face south. Seating accommodation will be provided for 650 persons.



THE PROPOSED CONGREGATIONAL CHURCH, SOUTHBOURNE: A VIEW OF THE INTERIOR.
PEARSON AND BURRELL, IN COLLABORATION WITH E. W. LEWIS, ARCHITECTS.

without interruption, and the roadways should be of materials that will be of the longest possible wearing quality for motor traffic. Slow-moving vehicles and parked vehicles should be removed from all congested thoroughfares. Lamp-posts and islands should be removed from narrow roads. A signal system should be instituted to enable traffic to know at some distance ahead where it would have to stop, and where it could run freely in each direction. Pavements with the curves and corners should be considered with a view to improvement. Overhead bridges at a few of the strategic spots should be provided for pedestrians, and upper level sidewalks, also allowing an upper floor shop window, could be provided to remove the crowd from the ground and widen the roadway. Certain important points should be tunnelled to allow vehicular traffic to "by-pass" already overcrowded areas.

Dr. Raymond Unwin, F.R.I.B.A., who presided, thought the first requirement was to secure better distribution of the population, so that there was no unnecessary travelling between home and place of work. The difficulty could be relieved if life in London were localized, as it is in the small provincial towns.

Obituary

Mr. Benjamin Hannen

A VERY charming and gracious personality has just passed away in the person of Mr. Benjamin Hannen—one of the partners in that fine old business firm, Messrs. Holland and Hannen and Cubitts—a firm whose name stands for all that is best and most enduring in the world of building.

It may be that Mr. Hannen's upbringing contributed in large measure to the happy relations which he succeeded in establishing with all those with whom he was brought into contact. Entering Rugby as a small boy he soon made his mark, and as a member of the Rugby fifteen gained a position in sport as well as the place his steady solid work earned for him—a happy mixture of interests that was to serve him well in later years. Both as host and as guest his Scotch holidays provided the fishing and shooting that were his chief delight outside of office duties—not that those delights came first—no man was more meticulously careful to subordinate his pleasure to the well-being of the firm of which he was a member. From Rugby to Cambridge, and from Cambridge to his father's office? No. From Cambridge for a two years' period in an architect's office, an office where he was to learn the other side of the contractor's business. To learn and to appreciate the skill and thought and care that go into a building before one brick of that building is laid. It is here, perhaps, that we have a glimpse into the origin of his wonderful insight into, and sympathetic treatment of, the various problems and difficulties which must be solved before the contractor begins his work. No man was more helpful in such difficulties, and his wide experience and knowledge made smooth many a stony path; made many an architect's way easier and less troublous. There will be many such men who look back with thankful feeling to the help he gave, with feelings of regret that the kindly aid can no longer be had.

Moreover the architect's office into which Mr. Hannen entered was the place of all places for him. Mr. MacVicar Anderson had endeared himself with all who knew him, at least with all who had the saner, steady, straightforward purpose, as he always set before himself; and so Mr. Hannen was fortunate, indeed, to start under such auspices, and it may be that he owed some measure of the charm of manner, which was so essentially his own, to the early training at Stratton Street.

For his manner was quite charming—if there was an iron hand inside the velvet glove, few knew it; always courteous and considerate to the newest member of the staff, he was just the same as to the lordly clients whom he served; the same to his office boy as to a duchess. Those members of the staff at Gray's Inn Road, and there are many, who have served the firm for more years than perhaps they would like to admit, will be unanimous in their testimony that no employer was ever more thoughtful or more careful of their interests. The great and important buildings erected by the firm need no cataloguing in a personal notice; but there were certain departments of work which specially fell to his lot, and the courage with which he tackled a new and difficult problem was amazing. One instance only—when war broke out, Marconi wireless stations were required in the remotest places possible. Under Mr. Hannen's care everything was prepared: buildings, apparatus with staff for erection were shipped out, and the whole thing carried through—the first station in December, 1914, and by March, 1915, no less than twelve of these stations had been got through. Courage was required to engineer the great dock scheme at Liverpool, the site of the present Cunard building. Mr. Hannen, accompanied by his brother, accomplished what everyone for years had fought shy of. Visiting Liverpool and, seeing the site, they bought it on the spot, to the envy, afterwards, of everyone when it was realized what a magnificent opportunity had been missed. The same with Devonshire House, in Piccadilly. Amazing courage is needed to shoulder such a burden, with prophets of woe on every hand, but Mr.

THE LATE MR. BENJAMIN HANNEN.

Hannen lived just long enough to know that success had come here, too.

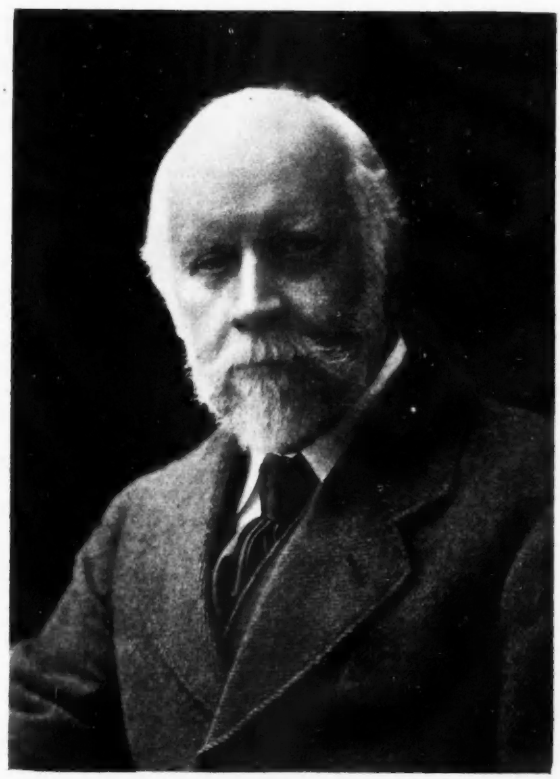
His memory, with affectionate regret, will long remain with those architects whose work he did—work commenced, perhaps, with him and his firm as new and strange contractors, but in the briefest time the strangeness had passed; instead, they were friends working together for the common good, and friendship that remained long after all thought of contracts had ended. ARNOLD MITCHELL.

Christopher Whall

When, on December 23 last, after many months of painful and incapacitating illness, Mr. Christopher Whall passed peacefully away at the age of seventy-five, there was lost to the ranks of our English stained-glass painters an artist not only of the first distinction in his own work, but also of widely-spreading influence in that special branch of fine art to which he had devoted his life.

On coming up to London as a youth, Whall passed as a student in the ordinary course through the schools of the Royal Academy, and afterwards for some years studied on his own account in Italy, much influenced there by the teaching of Ruskin and the appeal searchingly made to him by the earlier masters. In appreciating his after-career these two facts have to be remembered as significant; for they mean that when, in 1884, he definitely resolved not merely to concentrate his talent on designing for stained glass, but on himself carrying the whole production of it right through from first sketch to finished window, he was already a soundly-trained artist, and a man of widely-cultured taste and experience. Certainly from the start two artistic qualities of the first moment he always markedly possessed—an exceeding sensitiveness to beauty, and a really passionate insistence on thoroughness of knowledge and workmanship in any craft a man professed.

In large measure no doubt it was this latter quality that not only led Whall to determine finally on devoting himself entirely to the craft of stained glass, and that brought about his own original treatment of glass design and execution, but it was this also that accounts for the influence he has so markedly exercised on his generation in the development of the art—exercised directly through his personal pupils, or through the many examples of his work up and down the country, or further, through his written treatise on the subject, entitled, "Stained Glass Work." This book was published in 1905, and it is no exaggeration to say that for exhaustive practical exposition of its matter, delivered in simple attractive language, it is a quite typical example of what such a treatise should be. By 1905 Whall had completed his splendid series of windows in the Lady Chapel of Gloucester Cathedral, and in this treatise we see, set before us clear as daylight, what were his ideals, and what were his methods of study and of execution in the prosecution of his art. For him what one may call the *necessities* of the craft, while on the one hand they unquestionably limit, yet on the other hand, once frankly accepted and utilized, they do but bring out the special virtues of the art, for the expression of which the craft exists. Thus, for example, to Whall a design for a window was not a design, however beautiful in itself, turned into glass, it was a design thought out from the first stroke of the initial sketch in the essential terms of glass. In some degree this nowadays may seem an obvious truism. But five-and-thirty years ago it was by no means a truth universally appreciated; and so far as to-day amongst the best of our glass designers it is appreciated, this is not a little due to Whall's teaching and practice.



THE LATE CHRISTOPHER WHALL.

Another debt we owe to him is our deliverance from the fear of using strong and rich colours. Away in the 'eighties what went by the name of "art" colours were all the fashion, and especially, perhaps, in the reds and greens only the more subdued tints were thought æsthetically admissible. From the first Whall broke loose from this quakerish timidity, and employed more and more boldly in his work the most pronounced colours and contrasts—skilfully manipulated indeed, yet never so as to lose their strength and richness. Always are his windows aglow with brave resplendent colour.

To note but one point more. Christopher Whall was a man of many lively interests, and amongst these, side by side with his devotion to art, came foremost his life-long devotion to natural history. Any intimacy with his work would reveal this. How on every opportunity, for instance, he loves to introduce animals and birds—or even, on occasion, insects—all carefully studied direct from nature. Nay, more than this. The purely ornamental features in his designs are for the most part based fundamentally on the growth of trees and herbage closely observed and skilfully adapted to his artistic purposes.

Well, he has gone, this master craftsman indeed! But it was his express wish that the tradition of his school should, as far as possible, be continued, when he himself had passed away. With this one end in view he had for many years carefully trained his daughter, that she might be in a position to carry the work on after him. I am more than glad to know that this ardent desire of my old friend has every chance of being fulfilled. One has only to look at Miss Veronica Whall's cartoon for a St. Catharine window now in the permanent collection of the Victoria and Albert Museum to feel how safely in her hands have been left the guardianship and continuation of her father's art.

SELWYN IMAGE.

Sir William Emerson

Sir William Emerson's old friends are gone: H. W. Lonsdale, W. Wallis, Axel Hermann Haig, Weekes the sculptor, and others of the Burges generation. Having passed out of active practice, and time having sped so rapidly since the days of his presidency at the Institute, one finds his very potent influence is difficult to recall.

He stood between the Gothic revival and our present Renaissance mood without really sacrificing his ideals. The Liverpool Cathedral design was, in fact, his culminating

THE LATE SIR WILLIAM EMERSON, P-P.R.I.B.A.

work. The Victoria Memorial building at Calcutta followed, but it is doubtful whether his reputation will rest upon this, as his early Gothic work was of more architectural importance.

The limitations of a modern Gothic mind in treating of Renaissance, or its value rather than its limitations, may be seen in the building on the Victoria Embankment, as also in his design for the South Kensington Museum.

The Embankment building can be compared with E. M. Barry's Temple buildings close by, where the contrast of the work of a man trained in the Italian school with that of Emerson is significant. The marked interest in the detail, its real want of relation to the whole, and its freedom from what we might call academic composition, are at once the interest and the weakness of this building. The want of classical training is scarcely compensated for by the value of Indian interest in the Victoria Memorial, Calcutta, a building which again marks the most interesting period of the contact of the Gothic revival traditions with the classical requirement.

In this position Emerson stands, perhaps pathetically, but certainly without weakness. In another way he marks the loss that the whole profession at present suffers from, the cessation of the real personal school of a master. The devotion and friendship created by an office tradition, exemplified in Burges, Scott, Street, and Norman Shaw's ateliers is a loss that must be deplored. I am doubtful if our general advance in academic methods and conformity to Parisian ideals compensates for this. The character of the master and his atmosphere as a training was real, and it is for this past fragrance that we value the memory of Emerson.

BERESFORD PITE.

Sir Thomas Jackson's Estate

Sir Thomas Graham Jackson, Bt., R.A., of Evelyn Gardens, Kensington, S.W., the architect, who died on November 7, in his eighty-ninth year, left estate of the value of £37,174, with net personalty £19,131. He gives the portfolio containing his original drawings for the illustrations of "The History of Wadham College," and the MSS. bound volumes of collections from the college archives, to Wadham College for the library; £400 to Wadham College, expressing a wish that it may form the nucleus of a fund for repairs to the fabric; the bound volumes of drawings of the buildings which he had erected for the university, viz., the New Radcliffe Library in the parks next the museum and the new electrical laboratory in the parks beyond the museum, and, if they care to have them, the plans relating to the Bodleian Library, with the volume of specifications, to the University of Oxford for the Bodleian Library. The bound volumes of drawings for the Sedgwick Memorial Museum of Geology, the Squire Law Library, and the Law Schools and the Physiological School and Laboratory given by the Drapers' Company, to the library of the University of Cambridge. His diplomas of the Royal Academy of Arts and the Académie Royale de Bruxelles, his patent of baronetcy, and other diplomas and certificates, and two bound volumes of his "Recollections," to his son Hugh, to be treated as heirlooms, it being understood that they were not written for publication or suitable for it, but that they may be accessible to anyone who may have occasion to consult them.

Mr. William Extone

We regret to record the death of Mr. William Extone, the chairman of Messrs. Haywards, Limited, 187 to 201 Union Street, Borough, London, engineers and ironfounders.

The Memorial Service for Mr. Paul Waterhouse

A memorial service for Mr. Paul Waterhouse, M.A., F.S.A., F.R.I.B.A., Past-president of the Royal Institute of British Architects, was held at St. George's, Hanover Square, on January 5. Among those present at the service were the following :—

Adams, P. H.
Adams, Maurice B.
Ambler, Louis.
Ashley, Henry V.
Atkin-Berry, W. H.
Baker, Herbert, A.R.A.
Baxter, R. W.
Berkshire, A.
Blomfield, Sir Reginald, R.A., Litt.D.
Braddell, T. A. Darcy.
Brown, A. Burnett.
Bullock, A. E.
Carter, George, and Mrs.
Cave, Walter.
Clarke, Max.
Collins, M. O.
Collins, O. H.
Comyn, Heaton.
Corlette, Major H. C., O.B.E. (representing the Federal Council of the Australian Institutes of Architects).
Crossland, R. E.
Crowder, Mrs., and Household.
Cubitt, Horace.
Cullifford, L. A.
Currey, H. W.
Daniel, T. B.
Davidge, W. R.
Dawber, E. Guy, F.S.A., Vice-President R.I.B.A.
Dircks, Rudolf.
Fay, P. J.
Field, Horace.
Fletcher, H. M., and Mrs.
Gabriel, Edward.
Gibson, James S.
Goldsmith, F. T. W.
Gordon —
Gotch, J. Alfred, F.S.A., President R.I.B.A.
Green, W. Curtis, A.R.A.
Hall, H. Austen.
Hamp, Stanley.
Harris, E. Vincent.
Harrison, W. H.
Haynes, The Rev. Dr.
Haynes, Everard J.
Hewetson, Edward.
Hornblower, George.
Hubbard, George, F.S.A.
Hunt, W. G., and Mrs.
Jenkins, Gilbert.
Lanchester, H. V.
Lawrence, G. C. (President of the Wessex Society of Architects).
Lishman, Frank.
Lovegrove, Henry.
Macfarlane, H. C.
McGarel-Hogg, The Hon. A.
Mathews, H. E.
Messer, A. A.
Middleton, G. A. T.
Minty, E. Arden.
Monson, E. C. P.
Moore-Smith, J. R.
Newman, F. Winton.
Niven, D. Barclay.
Northover, George.
Oakley, Harold.
Osler, Francis.
Paterson, H. L. (President of the Sheffield Society of Architects).
Pinkerton, Godfrey.
Pite, W. A.
Powell, E. Turner.
Prentice, A. N.
Prosser, D. S.
Riley, W. E.
Roberts, Llewellyn.
Rogers, Harold S. (Chairman of the Oxford Society of Architects).
Ryan-Tenison, H., and Mrs.
Sadgrove, E. J.
Searles-Wood, H. D.
Scott, Sir Giles Gilbert, R.A.
Shepherd, Herbert.
Simpson, W. B.
Smith, J. Arthur (representing the Hampshire and Isle of Wight Architectural Association).
Smith, Professor R. Elsey.
Smith, W. H. Seth.
Stanmore, Lord (representing St. Bartholomew's Hospital).
Sugden, H. T.
Tanner, Sir Henry, C.B., I.S.O.
Tapper, Walter J.
Tatchell, Sydney J.
Thomas, Sir A. Brumwell.
Thompson, E. P.
Troup, F. W.
Verity, Frank T.
Wagstaff, Professor (representing the Royal Society of Literature).
Walters, Edmund (representing Mr. Detmar Blow).
Warren, E. P., F.S.A. (President of the Berks, Bucks, and Oxon Architectural Association).
Waterhouse, Michael, and Mrs.
Watson, W. E.
Webb, Maurice E., D.S.O.
Welch, Herbert A.
Welch, Roland.
White, W. Henry.
Wills, H. W.
Wilsdon, W. J.
Wimperis, Edmund.
Windsor, Frank.
Woodward, Wm.
Woodward, Frank.
Yates, T. C.
Young, Clyde.
Young, Keith.

The Christian Science Church and Sunday School Competition, Southport

OWING to the limited number of Christian Science churches in existence in this country, the average British architect is not yet familiar with the requirements for such a building, and this was clearly shown by the majority of the designs submitted. The problem confronting the competitors was not lessened by the fact that the area of the site available for building purposes was very irregular, being approximately "L" shaped, with the internal angle softened off diagonally. Thirty-six sets of drawings were submitted from all parts of the country, and some interesting solutions of the problem were produced.

The special requirements for a building of this description are that the congregation should be concentrated as much as possible in a compact area, within easy hearing and speaking distance of the platform and of one another; that the building should be monumental in character, and designed on modern lines, and at the same time suggest a place of worship. The former condition ruled out a number of designs which were based on the ordinary long, narrow nave type. In striving to attain the latter a number of the competitors appear to have lost sight of the fact that the building was primarily a church, many of the elevations being suggestive of secular public buildings, and even places of amusement. Accommodation was to be provided for 500 in the church, and a Sunday school, with central hall and classrooms, was to form part of the scheme.

The designs sent in may be roughly classified under two heads, those in which the main entrance is at the extremity of the arm of the "L" facing Lord Street West, and those in which it is set at the internal angle between the church and Sunday school.

The author of the winning design, Mr. W. Braxton Sinclair, F.R.I.B.A., of London, has chosen the former alternative, and has submitted a very well-considered and satisfactory scheme, although he has frankly departed from the minimum seating space as laid down in the conditions. The auditorium is octagonal on plan, with the platform at the end farthest from the street, and is designed with a particular view to its acoustic properties. The floor having a slope forward of one in fifteen, and the seats being set out on a slight curve, it will be possible for every person in the church to see, or be seen, from the platform. The entrance is by means of a low vestibule, or narthex, with apsidal ends, from which corridors branch to right and left and follow round the walls of the auditorium with suitable entrances thereto. Cloak-rooms and lavatories for ladies and gentlemen open out of these corridors close to the vestibule.

The corridor to the left runs right round to the platform end, and from it are approached the organ and platform, and retiring-rooms for the readers. That to the right leads into a foyer on the central cross-axis of the church, through which an exit can be obtained direct into the open air. This foyer, the use of which does not appear to have been clearly understood by many of the competitors, was one of the special requirements in the conditions, and was intended for use as a room for small meetings as well as for a place of meeting after the services, and not merely as a vestibule. The space immediately behind the platform is occupied by the organ, which is hidden behind a grill—the author rightly considering that a satisfactory treatment of the pipes would be difficult, but I doubt whether this effect could be achieved without the loss of a considerable amount of tone from the instrument.

The auditorium is covered by a flat dome, formed with steel ribs, and covered with asphalt, and resting on four steel lintols, the angles being filled in with brackets. The internal walls are broken up into large panels. The natural lighting is through a central lantern, and by four very large windows, one in the centre of each of the main elevations, the lower halves of which light direct into the church, and the upper halves through glazed panels in the dome. These windows are divided up into a sort of crazy-paving effect, which, on the drawings, at any rate, is not pleasing. There are also two smaller windows lighting the platform.

The artificial lighting is so arranged that during the assembly and dispersal of the congregation and during the sermon a subdued light is reflected from the dome. Wall brackets and pendants supply direct light when required for the singing or reading. Heating and ventilating have also been carefully considered, and the author has gone the length of preparing acoustical diagrams.

The Sunday school occupies the other branch of the "L," and is on an axis at right angles to that of the church. It comprises a large central hall, with three small class-rooms off it. It can be reached from the church, but has its own entrance, with cloakrooms for boys and girls, from a public right of way which forms one of the boundaries of the site.

The elevations are almost entirely of multi-coloured brick, stonework being reduced to a minimum. The style is free classical, with an attached order entirely carried out in brick. A glance at the section shows that the main walls of the auditorium rise to a height considerably greater than is actually necessary to conceal the exterior of the dome. The extra height gained, whilst admittedly essential to the proportion of the façade, is, nevertheless, in the nature of a sham, and, as such, is an unfortunate feature of the design. A broad flight of steps leads up the main entrance with three sets of large bronze doors. The Sunday school part of the building has, as in most of the designs submitted, been kept subsidiary, and interest is thus centred on the church. The author in his report states that he has striven after a building that "definitely asserts in its character the qualities of truth, honesty, and peace," and he is to be congratulated on the result of his efforts.

The second premiated design, by Messrs. Wynn Thomas and Button, of Bolton, is of a more severe type, and is also in brick. The elevations are simple and effective, and interest is kept up by the introduction of circular-headed windows and arches. The main hall is almost square in plan, with a flat ceiling supported by heavy warren girders. It is difficult to imagine that the proportions of this hall would be pleasing, although it fulfils the condition of centralizing the congregation. The platform is too much in the nature of a stage, being entirely recessed. The lighting is by large clerestory windows, in addition to ground-floor windows on one side. The main entrance is through a large vestibule facing Lord Street West, with a foyer on one side and cloakrooms on the other. The organ is again behind a grill at the platform end, and both in this design and in that placed third, low ambulatories are provided at each side of the main seating area.

In the third premiated design, by Mr. Herbert Langman, F.R.I.B.A., of Southport, the main entrance is on the diagonal between the church and the Sunday school at the internal angle of the "L." This necessitates rather a long approach from the street, but provides a most interesting plan with the platform at the Lord Street end of the site. The elevations, however, are not so successful, and the hipped roofs seem to deprive the building of its true character.

Of the remaining designs the most interesting are the

following: No. 32, by Mr. Gordon Hemm, Liverpool, is a simple basilican type, with a barrel vault and good restrained elevations, but a very long narrow nave unsuitable for Christian Science services.

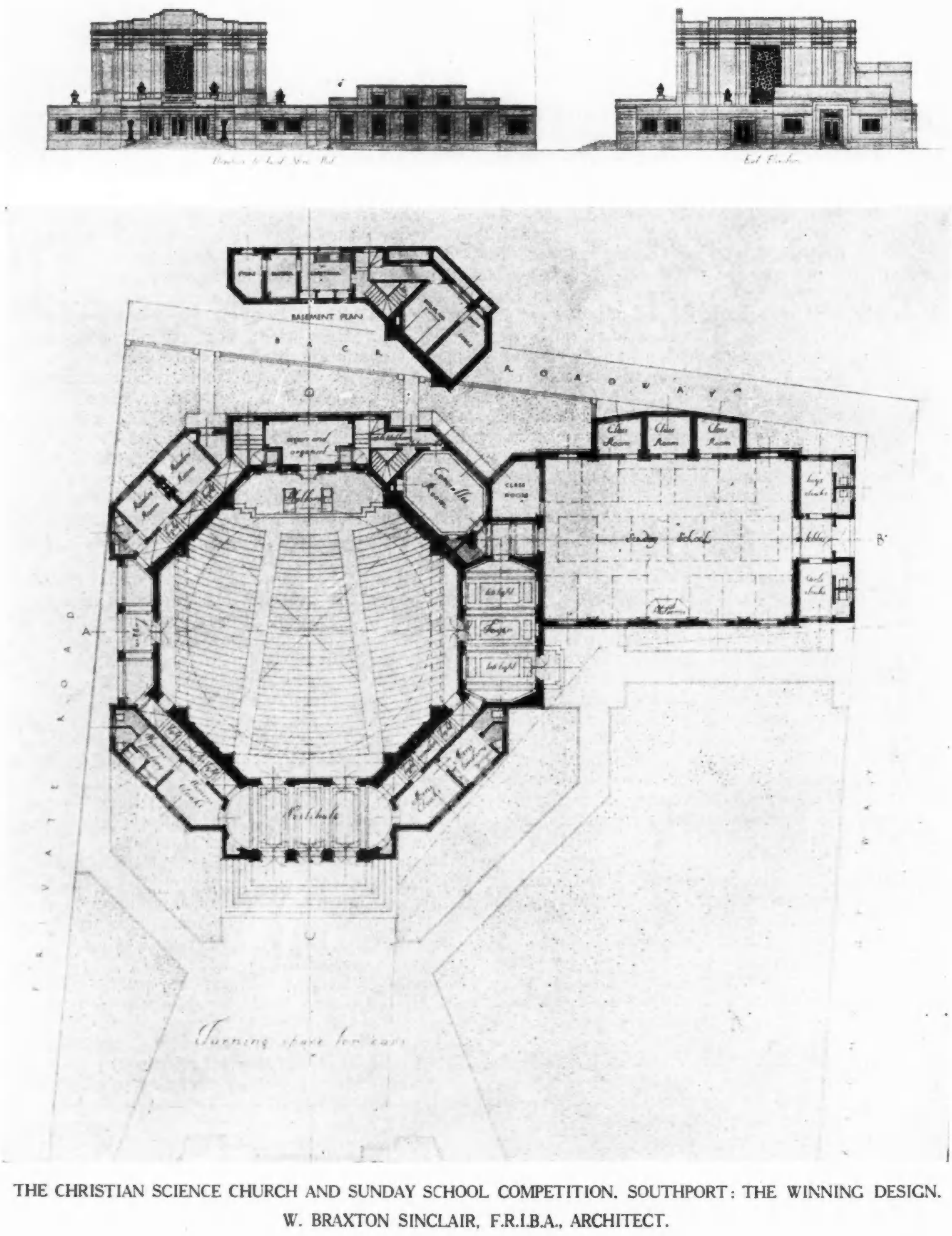
No. 23, by Mr. E. Vincent Harris, London, has an octagonal plan, with the octagon carried up and showing from the exterior in the form of a huge lantern.

No. 15, by Messrs. Budden and Marshall, Liverpool. In this case the plan is good, but the French theatre type of mansard roof does not seem to be in keeping with the purpose of the building.

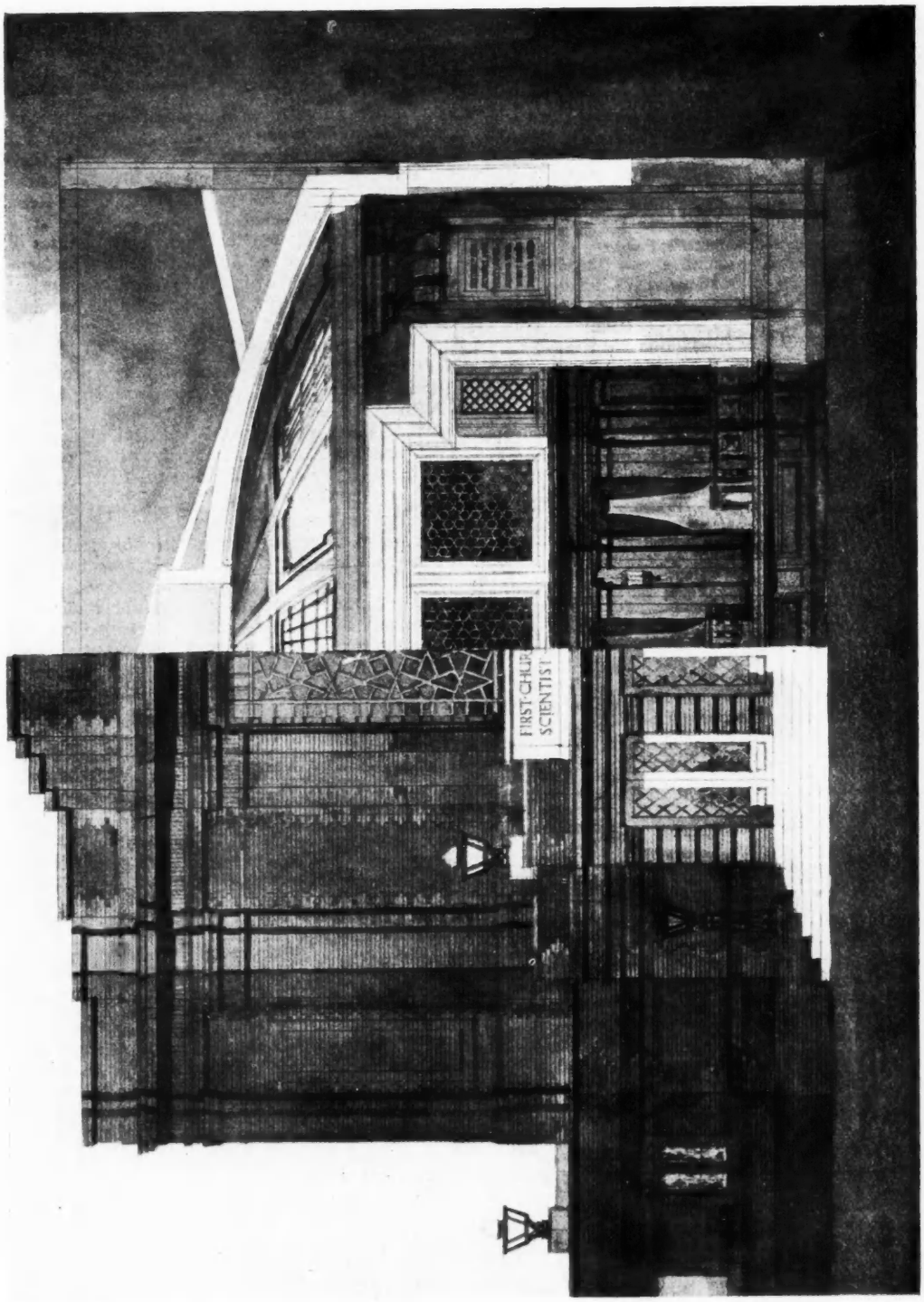
No. 34, by Messrs. Tonge and Holt, Southport, is a clever design with a huge dome, which would be very costly in execution.

No. 13, by Messrs. Crouch, Butler and Savage, Birmingham, is an unorthodox, but effective, design. The plan, however, is rather spoilt by four piers in the auditorium.

DUNCAN A. CAMPBELL.



THE CHRISTIAN SCIENCE CHURCH AND SUNDAY SCHOOL COMPETITION, SOUTHPORT: THE WINNING DESIGN. W. BRAXTON SINCLAIR, F.R.I.B.A., ARCHITECT.



THE CHRISTIAN SCIENCE CHURCH AND SUNDAY SCHOOL COMPETITION, SOUTHPORT: A DETAIL OF THE WINNING DESIGN.
W. BRAXTON SINCLAIR, F.R.I.B.A., ARCHITECT.

Contemporary Art

Accomplished Draughtsmanship.

There is something new and something dangerous in the display of minute pen-drawing at the exhibition at Colnaghi's Gallery by S. L. Brockhurst. His virtuosity in oil painting is left behind by the astonishing technique of his pen-and-ink portraits; the virtuosity of the small paint brush has given place to that of the pen, which allows an even greater advance in particularity of linear and dot work. There are four pen portraits in which minuteness of execution is brought to the extreme verge of normal vision. This can no farther go. As if to emphasize it, the artist has so treated only the flesh surfaces, leaving all draperies as simple statements. The contrast is not altogether desirable; "Malvina" and "Girl with a Basket" are examples, and the heavy modelling of the head and hands of the latter call for a corresponding treatment of the dress. That Brockhurst is able to treat woven textures with similar skill is abundantly evident in "A Dancer," a prodigious effort of the pencil in which the satin bodice gleams. The projecting leg of this figure is modelled with a delicacy which is quite masterly, and the plastic feeling of "Simone," also in pencil rendering, is no less astonishing. In all these subjects the artist proclaims his efficiency of draughtsmanship, but on turning to the only piece of an architectural character, it is instantly seen that his powers are essentially of figure and character statement.

Turning to the etchings, there is a tendency also to the contrasts between over-elaboration of line and slightly-treated blank spaces, as in Nos. 35, 57, 59, and 64, in which the effects are instantaneous but slightly meretricious. This is not so apparent in the etchings as in the drawings. Brockhurst's accomplishment in the rendering of textures is not less with the needle than with the pencil, and the gleaming effect noticeable in "A Dancer," is secured in the frock and head-covering of the plate "Almina." All these etchings have fine quality, rich and satisfying, like a good sherry, dark as in "Ranunculus," less sophisticated as in most of the others. Figure and character again announce their presence, and in attempting landscape, as in "Seule," the artist at once becomes formal.

Continental Printing.

At the London School of Printing and Kindred Trades an exhibition of Continental and American printing afforded comparison with British. For good class, for art, for craft, it was not to be compared with British in any serious way. Commercially, it was ahead of the native work, and no better from an artistic standpoint. In colour reproduction the Continent is remarkably efficient. Indeed, in all picture and print reproduction it is very good indeed, and is able to produce fine work at a much less price than is possible in Great Britain. This is not an art matter, but one of science pure and simple; applied science in which Germany can always pull ahead. France is a good runner-up, and Italy is effective also, and it is in this direction that England is open to improvement.

At this exhibition no attempt was made to show real examples of the finest printing of America and the Continent; the splendid art magazines of the Continent were not available. This was a pity, because, after all, commercial printing, with all its vulgarities, encouraged because they attract the eye quickly, is not everything, and, indeed, this quick attraction may readily lead to a quicker abstraction. The newspapers of England are being visibly affected by the wide vogue of the woodcut in art, and a far greater amount of taste is being shown. The moral is that the nearer commercialism verges on art, the more successful it will be. The Germans have taken to the woodcut abundantly, and it is without doubt making its mark. Its only drawback abroad is that the woodcut reflects the whole of the vogue for ugliness that is destroying the old sense of beauty. The sooner it rejects ugliness and current vulgarity of subject and applies itself to beauty by means of its technical accomplishment the better it will be for Continental printing. This is why warning notices might have been displayed at this interesting and enlightening exhibition, stating that it was more to show the way to do it than to show what to do.

At the Macrae Gallery, at 16 Fulham Road, South Kensington, Paul Edmonds exhibits a pretty talent for water-colour drawing, and among his renderings are three slight architectural subjects in Italy. His woodcuts are simple plain prints in silhouette.

KINETON PARKES.

Correspondence

Vagaries of Town Planning

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—The stimulating contribution entitled "The Vagaries of Town Planning," by Mr. H. B. Creswell, in last month's issues of your journal has provoked me to make some belated comments on his tirade against the modern town planner.

Your contributor, to use his own phrase, most certainly "does no more than flog a dead horse," for the designs he illustrates as the work of town planners during the Renaissance and later were, of course, of little practical value. With all their faults, however, the artists of the Renaissance do provide some evidence that men were then striving for ordered cities as opposed to the mediæval mazes of which Mr. Creswell speaks so highly. If these men preferred order to chaos, and coherence of plan to formless mass, it does at least prove that man was determined to regain control of his own destiny in the matter of civic development after a lapse of centuries.

Mr. Creswell's article contains so many profound truths that it is difficult to extricate them from the fallacies with which they are woven, but the essential point which he appears to have overlooked is that no modern attempts at city planning can be successful without proper regard for the topography of the site and the function of the city, in its entirety and in its parts.

If a city plan be truly inspired it will be based on logic, and yet will possess all those qualities of vitality, mystery, and surprise which Mr. Creswell desires, and which are too frequently lacking in the plans of ancient and modern cities. But your contributor no doubt realizes that we unfortunately live in an age of rapid mechanical transport, and the modern city plan must of necessity hold up the mirror to that form of civilization to which we, for good or evil, are committed. Main arteries must be obvious, and important public buildings must assert their social significance in the pattern of the city, but this being so, there is still no need to take as models the puerile essays of draughtsmen depicted by Mr. Creswell as typical examples of the town planner's achievements in the last two thousand years. One must indeed delve a little deeper into the history of the subject to arrive at a true measure of our success or failure.

W. HARDING THOMPSON.

London.

"Hotel Classed as Public Building"

To the Editor of THE ARCHITECTS' JOURNAL.

SIR,—In your issue for December 24 your contributor, "S. J. S.," expresses the opinion that an hotel, which is a public building within the definition of section 5 of the London Building Act, 1894, is not subject to the provisions of section 41 of that Act.

In L.C.C. v. Rowton Houses (1897) 77 L.T., it was held that a building may be both a public building and a dwelling-house within the meaning of the definitions contained in section 5 before referred to, and it would seem, therefore, that although an hotel may be a public building, it would, as a dwelling-house, have to comply with the provisions contained in part 5 of the London Building Act, 1894.

In 1914 proceedings were taken against me with respect to a notice of objection I had served in the case of an hotel in which it was not proposed to provide the statutory open space at rear. The case was argued at Bow Street Police Court by counsel on both sides, and the learned magistrate, the late Mr. Hopkins, upheld my notice of objection.

W. G. PERKINS, *District Surveyor,*
Borough of Holborn.

Underground Dwellings and Small Underground Workshops*

By F. R. JELLEY, A.R.I.B.A.

IT is not unusual for the citizen of the modern State to boast of his freedom. Under stress of emotion he may even sing of it. But a very cursory perusal of history will show that the advantages possessed by the present generation in this respect are really fewer than those enjoyed by Englishmen under the feudal system, or by the tribesmen of Cathay under Kublai Khan seven hundred years ago.

Even so far back as the year 1661 it will be found that attempts were being made to restrict the natural expansion of the metropolis by prohibiting the erection of any new building within the cities and suburbs of London and Westminster, or within two miles of the gates of the City of London, except upon the foundation of a former building. Again, in the year 1671, Charles II issued a proclamation forbidding the construction or completion of any further buildings in the suburbs of Westminster, which were alleged to be "Choaking up the Aire of His Majesties Palaces and Parks, and endangering the Infection, if not the total loss of those waters, which by many Expencefull Drains and Conduits, are conveyed from those Fields to His Majesties Palace at Whitehall: Whereof some Decay is already perceived by His Majesties Sergeant Plummer, and more is daily feared. . . ."

With the growth of London the artificial restrictions placed on its free expansion from time to time have become correspondingly numerous. Many of them rapidly degenerate into anachronisms, and of these one of the most remarkable is the limitation on heights of buildings imposed by the London Building Act of 1894. Others are merely vexatious. Thus, it is surely ludicrous that whilst there is no law to prevent ten people from sleeping in one bedroom (or, for that matter, in one bed) on the ground or upper floors of a house, nobody can sleep in the basement if the ceiling happens to be less than a foot above the level of the pavement without contravening a clause of the Public Health Act of 1891 and risking a fine of twenty shillings a night.

The Offices Regulation Bill, which is now before Parliament, is a typical example of the kind of legislation that is mainly restrictive. It seeks to prohibit the use of any underground room as an office, unless it is being so used at the time of the passing of the Act. It demands a percentage of sanitary and lavatory accommodation that is not attained, at the present time, in the most palatial commercial buildings. And it stipulates a minimum figure in cubic feet of space for each person employed in a basement room, that looks like a misprint. The Offices Regulation Bill gives no indication of any methods that can be adopted to provide alternative accommodation in congested areas for workers who will be displaced if its provisions become law. It stipulates that every office must be kept free from effluvia and in a cleanly state, but it does not stipulate that the thoroughfare upon which the office abuts shall also be kept free from effluvia and in a cleanly state. It is, in short, obstructive without being also constructive.

When free expansion in any desirable area is subjected to innumerable artificial restrictions of this kind, the problem of overcrowding naturally becomes intensified. And although the overcrowding of human beings in dwellings is, to a certain extent, influenced by the overcrowding of human beings in workshops and offices, a state of society wherein there is always ample accommodation in both homes and workshops in any desirable area can never be maintained for any length of time owing to the constant fluctuation of modern commercial conditions.

Under certain circumstances, therefore, the use of underground premises as dwellings or workshops is permissible, because it is essential, and in spite of the fact that it can never meet the Utopian ideal. No one will maintain that the conversion of existing underground premises into habitations for human beings is anything more than a temporary expedient for relieving the pressure on the inadequate accommodation now available in desirable areas.

The fact remains that the practical difficulties to be overcome in rendering basements habitable and comfortable are small in comparison with the difficulty of overcoming existing prejudices against their use as homes.

If human beings are to be asked to inhabit basements they are entitled to expect that they shall be reasonably dry basements, and the whole of the flooring of a damp basement should be removed. When such flooring is of wood construction the wood must be burnt, for the spores of dry-rot are of so infectious a nature that they may be transferred to a perfectly sound piece of timber on the teeth of a saw. The subsoil must be excavated to a sufficient depth to enable the floor of each room to be covered with a bed of cement concrete not less than 6 in. thick, spread on a base of rammed hardcore. Should the headroom of the basement be low, the opportunity may then be taken of lowering the general level of the floor so that the level of the new surface concrete is at least 3 in. above the top course of any footings the existing walls may possess. It will be seen that by the adoption of this expedient the underground drainage system can easily be uncovered and thoroughly overhauled, and any alteration in the floor-level will be regulated to allow sufficient clearance at their highest point over the existing drains that pass under the premises.

The internal faces of the external and party-walls should be stripped, and the mortar joints raked and flush-pointed in cement. At a distance of not less than 3 in. from these faces a half-brick partition wall should be built in cement off the surface concrete to the full height of the basement, forming thereby a cavity wall enclosing the premises (see Diagram 1). Top and bottom air-gratings, 9 in. high by 3 in. wide, inserted in rendered channels cut through the existing outer walls where they abut on open areas, will provide an efficient method of ventilation to the cavity, but they should be backed with tarred expanded metal to prevent the ingress of vermin. The removal of the small section of lath and plaster ceiling over the cavity is essential, and will serve to ventilate the ground-floor joists. And if the surface concrete at the bottom of the cavity is rendered to a slight fall towards the external area, the bottom air-grating at the end will also act as a weep-hole for any moisture that may percolate through the old wall.

The erection of these partition walls is not an expensive matter. It results in a loss of $7\frac{1}{4}$ in. run of floor space, but it also provides valuable support to the joists of the ground floor at the very point where they are usually found to be weakest. And provided the work is carried out in a conscientious manner, and the bottoms of the cavities are cored before the lower air-gratings are finally inserted, the advantages of the ordinary 11 in. cavity wall will be obtained without incurring some of its more obvious disadvantages. Should the sacrifice of $7\frac{1}{4}$ in. run of floor space appear excessive, it may be advanced in extenuation that the thickness of the plaster, wood dadoes, and skirtings removed from the old walls is always much greater than

* Extracts from an essay awarded a bronze medal in the Royal Sanitary Institute Henry Saxon Snell Competition.

BASEMENT PLAN OF A GEORGIAN TOWN HOUSE IN A ROW.

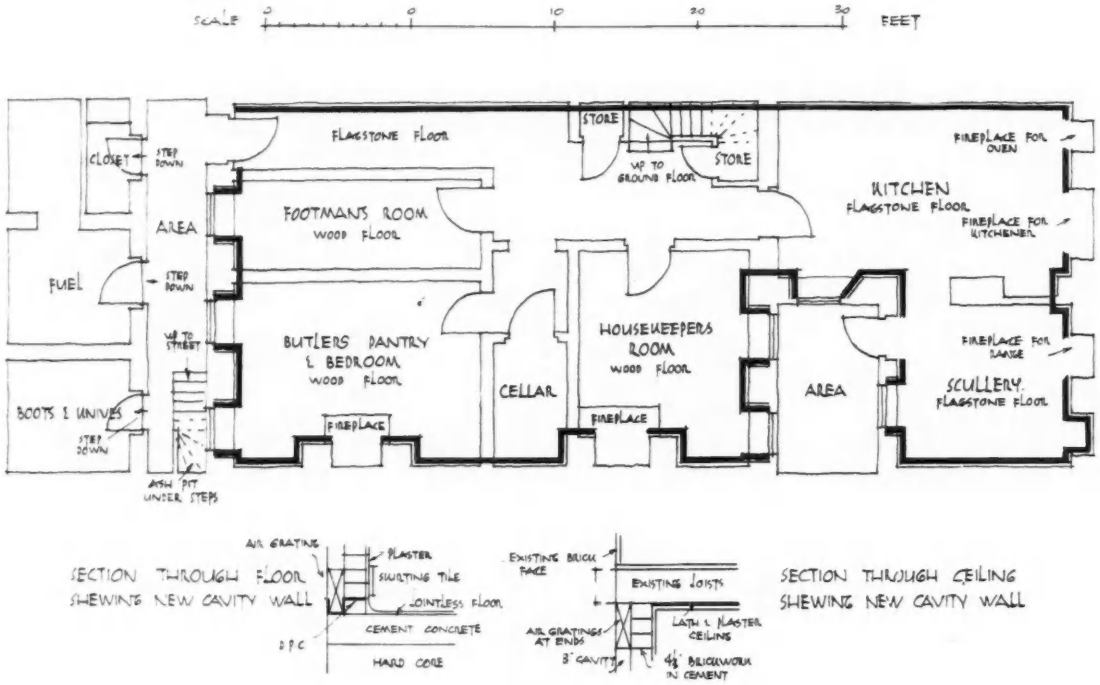
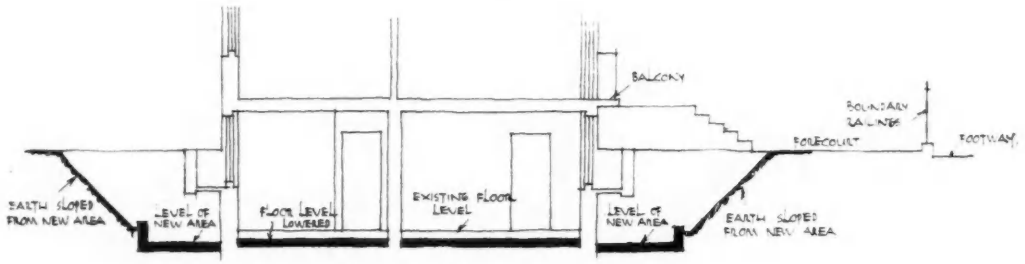
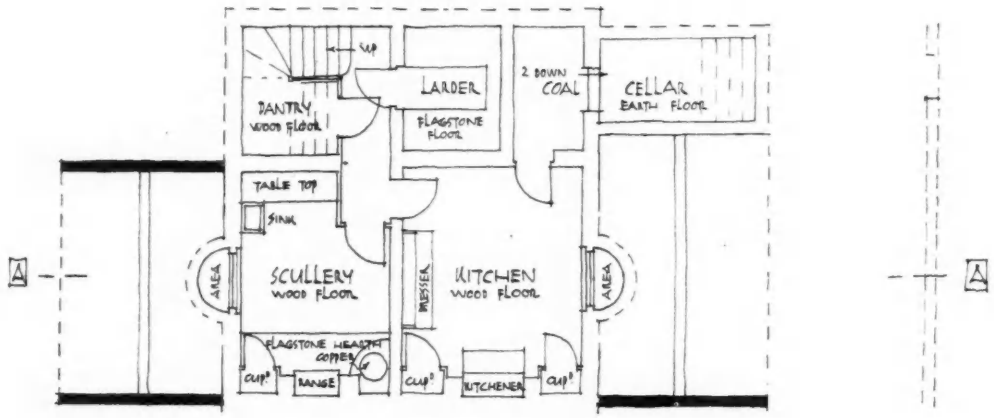


FIG. 1.



SECTION A-A



BASEMENT PLAN OF A VICTORIAN SEMI-DETACHED TOWN HOUSE

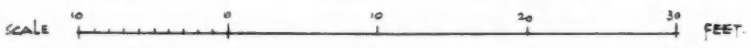


FIG. 2.

the thickness of the finishings to the new partition walls. The substitution of brick on edge partitions built in cement would result in a loss of only $5\frac{3}{4}$ in. run, and would prove efficient subject to the use either of wire-cut bricks or of bricks with the frogs turned inwards to form a key for the plaster, in which case a smooth brick face would still be presented to the cavity.

There is only one type of flooring really suitable for the habitable rooms of any underground premises. It is manufactured by various firms and sold under such names as Magnesite, Decolite, Doloment, and Ebnerite. It is jointless, impervious, and clean. It improves when polished with preparations containing beeswax, and is obtainable in several pleasing tints. It can be turned up against walls and partitions in a small cove, and is laid to finish $\frac{1}{2}$ in. thick on a cement screed floated direct on the surface concrete.

The use of wood-boarded or block floors in underground premises is merely an incentive to dry-rot. The use of cement finished floors is unfair to the people who are expected to stand on them without complaining of cold feet, and as departmental stores have discovered that the dust worked up from cement finished floors damages their merchandise, it is surely reasonable to assume that it also damages the lungs of human beings. The custom of sticking linoleum to floors still persists in many quarters, and is one of the main causes of dry-rot in the wood floors of underground rooms. Anyone who wishes to stick linoleum to a jointless floor may do so without impairing either the efficiency of the structure or of the linoleum. Jointless floors are not subject to dry-rot, and their smooth surfaces do not cause linoleum to wear unevenly. Wood skirtings to coved jointless floors are neither necessary nor desirable, but a 6 in. Adamantine tile skirting covers the joint between floor and wall plaster, and will protect the latter from damage, especially when floors are being washed.

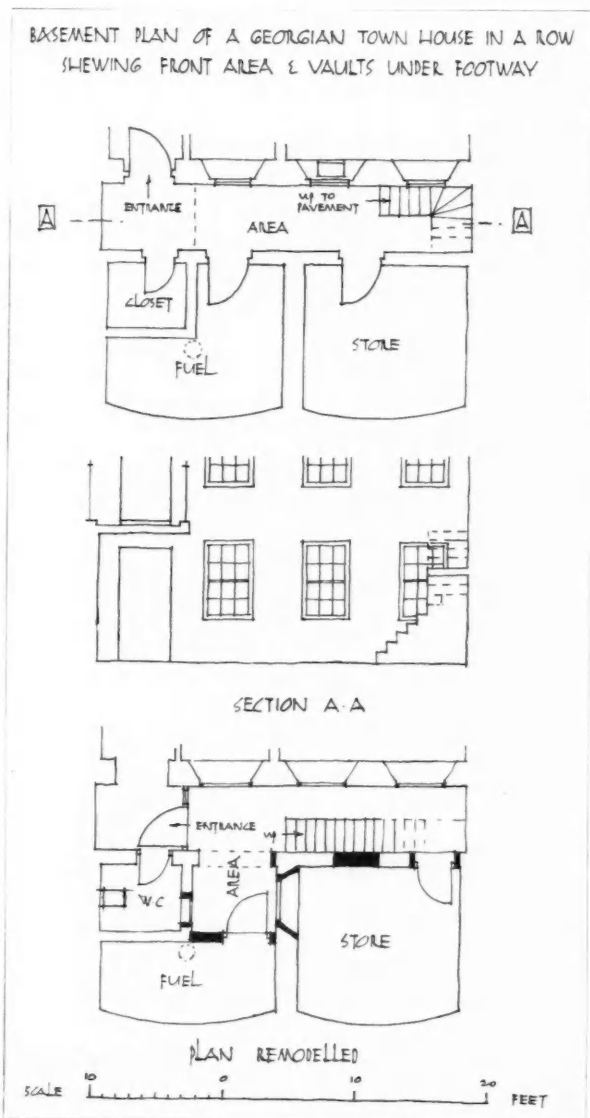


Fig 3.

In the adaptation of an existing basement one of the most essential improvements is the removal of all superfluous woodwork. Sound old doors should be retained wherever possible, but the deep linings to which they are hung should be replaced by solid wood frames, which need no grounds and cover no cavities. Sash windows should be substituted by horizontal pivot-hung steel casements and fanlights, fixed in solid wood frames. Window curtain and shutter-boxes and boards should be removed and replaced by plastered jamb and soffit linings and tiled window-boards. Wood dadoes and window-backs, mantelpieces, and sink cupboards, casings to closets, flushing tanks, and pipes, and other Victorian embellishments may be dispensed with, and as many unbroken surfaces as possible should be left for the plasterer.

When underground premises are converted into workshops the practice of bricking up the old fireplace openings is quite common, and cannot be too strongly deprecated. In the adaptation of any basement for use either as a home or workshop it is essential that every existing chimney-flue shall be fully utilized. The flues from the basement of a building of the Georgian period were constructed of size sufficient to allow a boy to crawl up them, and are a valuable asset. Any flue that does not happen to be required for a fireplace should be swept and pierced at a point as near the ceiling as possible. If the basement is damp, and has been enclosed by a cavity wall, a mica flap ventilator can be inserted in the brick partition opposite the hole in the flue, and with a similar ventilator fixed at the same height over the doorway to the room, efficient natural ventilation will be obtained. Should it have been found impossible to obtain through ventilation of the cavity from front to back between the new brick partition and the old wall, the same object will then be achieved by the piercing of the flue.

The lowering of the level of a basement floor internally will necessitate an alteration in the level of the paving of its external area or areas. This is a very desirable improvement, as it will be found that vaults under the public footway are usually floored at a lower level than the front area, and in the absence of raised thresholds to the doorways, or of an efficient fall to the area gulley, will naturally receive a certain amount of surface water drainage from the area. The absence of a raised threshold to the top step of a front area staircase above the pavement level is one of the commonest causes of dampness internally, for in case of heavy rain or an uneven pavement, water simply finds its way down the area steps, and in its course soaks the external walls against which they abut.

In any underground premises the elimination of dirt can never be satisfactorily achieved without the sympathetic co-operation of the urban authorities. Very efficient slow combustion stoves of the Ideal, Glow-worm, Sentry, and Esse types are now fitted in many small flats and workshops, and are admitted to be capable of consuming household refuse.

The dust caused by the shooting of fuel through pavement plates cannot be entirely prevented, but it may be minimized. It will be found that the door to any coal store (and especially the old door to a basement coal store in a vault under the pavement) is usually a poor specimen, whereas it should be an exceptionally close-fitting door hung to a felted and splay-rebated solid frame. The coal-

plate in the pavement should be glazed, but not perforated, and the common practice of fitting any perforations whatever, in either pavement lights or plates, should be discountenanced. In premises where no external area separates the frontage from the public footway it is customary to insert a row of perforations in the pavement lights abutting against the building. These perforations do not ventilate the basement to any appreciable extent. They are placed in positions most suitable for reception of the filth that always accumulates in the angle between the front of a building and the pavement. The metal trays that are sometimes suspended beneath them to catch water and refuse obstruct a certain amount of light, and are rarely cleaned out. And instances are on record where burning cigarette ends or matches have been dropped through the apertures and caused fires.

In most underground premises the pavement light is a necessary evil, and it will be agreed that considerable improvements have been made in the reflective power of glazing prisms, and their resistance to corrosion by sulphuric acid and hydrogen sulphide. At the present time, however, the vulnerable point of the pavement light is at the junction of its metal frame with the stone surround in the footway. The abnormal increase in heavy motor traffic causes a continuous vibration to radiate from the earth beneath the roadway, and unless a rubber buffer embedded in waterproof mastic of a resilient nature is inserted between the frame of the pavement light and the stone surround, water will eventually find its way through the joint into the basement.

Devices for increasing the natural lighting of basements by means of stallboard lights, borrowed lights, external reflectors, prismatic glazing, and white glazed brick and Suffolk brick facings to area walls are too well known to need recapitulation, but in every case their effectiveness is entirely dependent on the frequency with which they are cleaned, and before installation their accessibility for this purpose should receive primary consideration.

In most existing premises with an open front area the external steps from the pavement to the basement are built against the main front wall and across the windows of the basement rooms. This arrangement restricts the lighting of the latter, but allows direct access to be gained from the area to the various compartments into which the vaults under the pavement are divided. As these compartments have now, to a large extent, outlived their former uses, a considerable improvement can be effected in lighting the basement from the front area and keeping it dry by transferring the steps to the side of the area nearest the pavement, and providing access to the vaults at the bottom of the steps and underneath the top ones (see Diagram 3).

It is a curious fact that in many existing structures possessing extensive forecourts the external areas to the basement windows are more restricted in size than the external areas to premises with narrow forecourts. A small semicircular area equal in diameter to the width of the basement window and no deeper than its sill is a common type. It is usually sealed over at the ground level by an iron grille, and is ineffectively drained by a short length of stoneware pipe, which merely passes through the retaining wall into the earth behind it.

Many of the old houses in the Pentonville, Pimlico, Camden Town, and Camberwell districts of London are suitable for conversion into self-contained flats, and possess forecourts of some extent. The lighting of the basements of these houses is, as usual, exceptionally poor, but it can easily be improved by the construction of paved and drained areas with low concrete retaining walls, from which the ground can be sloped up to its normal level (see Diagram 2).

The provision of adequate sanitary convenience in positions that will meet the requirements of existing by-laws is one of the chief obstacles to the conversion of many old basements into flats or workshops. With the improvements that have been, and are constantly being effected in the design of apparatus, it is questionable whether some revision of by-laws is not overdue. The retention and continued use of obsolete and insanitary fittings which have been surreptitiously installed at some remote period without the knowledge or acquiescence of the authorities would also be less common if the requirements with regard to the ventilation of new water-closets and lobbies were less stringent. The provision of an iron vent-pipe with a funnel end like a coalplate shaft, carried from the ceiling of a water-closet or lobby to a point above the highest window of the building, after the manner of a soil vent-pipe, would certainly be far more efficient than most of the ducts 2 ft. in area that are inserted to comply with the present requirements, and soon become mere receptacles for miscellaneous refuse.

It may be advanced, in conclusion, that if the department under the supervision of the medical officer of health were a State department and not, as at present, a civic department, greater co-ordination would result in the methods of dealing with the peculiar difficulties that arise in connection with the conversion of existing underground premises. It is not suggested that all by-laws should be standardized, for this would obviously be impracticable. But it is seriously suggested that construction that is accepted as compliance with the provisions of the Public Health Act, say, in Chelsea, should not be regarded as evasion of the provisions of the Public Health Act, say, in Paddington.

"Nikko"

Mr. B. M. Ward, A.R.I.B.A., read a paper on "Nikko," before the Liverpool Architectural Society (Incorporated). He said that "Nikko" was the name of a little district in Japan, situate about 100 miles north of Tokio. It was somewhat mountainous, and was famous from the remotest ages for its great natural beauty. The highest and most beautiful mountain of the district, "Nantaizan," was sacred to the Japanese, and for many centuries throngs of pilgrims had climbed its sides throughout the long summer season. There was a Japanese proverb: "Do not use the word magnificent until you have seen Nikko." That proverb was justified even in the days before the great "Shogun" Ieyasu founded the Tokugawa dynasty, which became absolute rulers of Japan from about 1600 to 1868, always, however, in the name of the sacred "Mikado," who at last in the latter year, after seven centuries of guarded seclusion, was enabled to step forth to govern as well as to reign. Ieyasu was one of the greatest generals, and altogether one of the greatest rulers Japan has ever produced. While alive Ieyasu had decided on Nikko as a suitable district for his resting-place, and soon after his death his successor began the great series of temple buildings that marked the place of his tomb. The lecturer then spoke of the general arrangement of such buildings and of the two religions of Japan—Buddhism and Shinto—and said that probably few Japanese were able to say definitely whether they were Shinto or Buddhist. Some of their well-established customs were Shinto, and others, equally binding on all, were Buddhist. Many characteristics of Japanese Buddhist temples were modified Shinto ideas, and, on the other hand, Shinto temples were generally deeply affected by Buddhist principles.

He then showed a number of slides of typical Shinto and Buddhist temples, and in particular the most beautiful buildings that formed the mausoleum of Ieyasu. This mausoleum was rivalled by that of Iemitsu, the grandson of Ieyasu; some even preferred that of Iemitsu for its better planning and its restraint in ornamentation. Between and around the mausolea were many other temples and sacred buildings, some of great beauty, and all of interest. Yet to the visitor Nikko meant much more than a series of temple buildings, however beautiful they might be.

Societies and Institutions

The R.I.B.A. Examinations.

The questions set at the intermediate and final (or special) examinations held in November and December, 1924, have been published, and are on sale at the Royal Institute, price 1s. 6d. (exclusive of postage).

Sculpture in Relation to Architecture.

In the sessional programme of the R.I.B.A. a lecture on "Sculpture in Relation to Architecture," on February 16, by Mr. D. S. MacColl had been arranged. Unfortunately, Mr. MacColl's health has made it necessary for him to abandon the lecture. Arrangements will be made as soon as possible for the reading of another paper.

R.I.B.A. New Members.

At a general meeting of the Royal Institute of British Architects held on January 5, the following members were elected :—

As Fellows (3).

Lay, Cecil Howard.] Lowry, Robert. Wratten, Edmund Livingstone

As Associates (9).

Dawson, James Stott.
Donaldson, Robert Weir, B.Arch., Liverpool.
Hiscock, Leslie Robert.
Norbury, William Alan, B.A.
Owen, Wilfred Herbert.
Shanks, George Ferguson.
Silcock, Hubert Spencer, B.Arch., Liverpool.
Turner, Ralph Henry, B.Arch., Liverpool.
Willis, Reginald John, M.A.

The R.I.B.A. Diploma in Town Planning.

The R.I.B.A. have sent us the following communication : "Applications for admission to the next examination for the R.I.B.A. Diploma in Town Planning, which has been arranged by the R.I.B.A. for its members and Licentiates, must be sent to No. 9 Conduit Street by March 1. Forms of application may be obtained on application to the Secretary, R.I.B.A. Architects may be reminded that this examination enables them to prepare for practice in a field where the demand for qualified men at present exceeds the supply; and where for some years there is likely to be an increasing demand. It is very important that architects should not neglect this branch of work or the allied though more limited work of municipal housing. Such work affords great interest and special opportunity for the application of trained imagination and the art of design to the direct benefit of human communities. If architects are to practice the art of town planning they must, however, make themselves masters in the science of the subject. This is not difficult in the sense of involving highly technical matters, but it is extensive, includes many subjects, and involves knowing something of the work of the surveyor, the municipal engineer, and the industrial economist. To plan a town, or part of a town, the physical, industrial, and commercial needs of communities must be understood, as well as the economic and legal limits within which it is practicable to work. This work calls for a rather different combination of faculties from those which may enable an architect to distinguish himself in the designing of individual buildings; consequently it offers success to men of slightly different make-up. The examination has been arranged to give some guidance as to the kind of knowledge needed, as well as to afford a test of competence in it."

The Incorporation of Architects of Scotland.

The monthly meeting of the Council of the Incorporation of Architects of Scotland was held in Edinburgh, with Mr. John Keppie, the president, in the chair. There were elected one Fellow, one Associate, and six students. Suggestions were made regarding the annual convention to be held in Aberdeen during the month of June. A letter from the R.I.B.A. suggesting the obtaining of photographs of old buildings before demolition was carefully considered, and instructions were given to recommend such a course being carried out by the various chapters.

The Royal Sanitary Institute Lectures.

The spring term of the Royal Sanitary Institute course of lectures and demonstrations for sanitary officers begins on January 28 at 6 p.m. The course comprises the subjects scheduled for the examinations of the Institute and the Sanitary Inspectors' Examination Board (formed by the Royal Sanitary Institute and other bodies). Inspections and demonstrations are arranged and include visits to public and private works illustrative of sanitary practice and administration, with demonstration of the routine of an inspector's office, work, and duties. Further particulars can be obtained from Mr. E. White Wallis, F.S.S., 90 Buckingham Palace Road, S.W.1.

The Association of Architects, Surveyors, and Technical Assistants.

The Architects' and Surveyors' Assistants' Professional Union is now known as the Association of Architects, Surveyors, and Technical Assistants. Mr. John Mitchell, the general secretary, states that the change "was decided upon at a special national convention of delegates in 1924, to meet the insistent demands of our members. On no account must it be held to imply any change in our policy, which is to protect and advance the interests of the salaried architect, surveyor, civil engineer, and the draughtsman, surveyor, estimator, etc., employed by commercial firms and contractors." The address of the Association is 26 Buckingham Gate, London, S.W.1 ; telephone Victoria 9300.

The Polytechnic.

Following is a list of the principal awards to students of the plumbing classes of the Polytechnic, Regent Street, London. The awards were made at the annual prize-giving held under the chairmanship of Major Robert Mitchell, C.B.E., J.P., vice-president :—

City and Guilds of London Institute Exams.—Major Course Final : Wilfred Washbrook, first class certificate and silver medal.
First Class Certificates : W. G. Hitchcock, Alfred Webb, and William Henry Lee.
Second Class Certificates : L. Handover and G. R. Judkins.
Minor Course Final.—First Class Certificates : A. S. Cornwell, E. C. Fromhold, W. C. Deane, and J. T. Palmer.
Second Class Certificate : O. Neville.

SPECIAL PRIZES.

Silver Medal, awarded by the editor of "The Plumber," E. C. Fromhold.
The Chatterton Prize (Ivory Rule), presented by Mr. Fredk. Chatterton, F.R.I.B.A., to perpetuate the memory of the late G. J. Chatterton, the well-known lead manufacturer : Herbert F. Ashford.
The Associated Master Plumbers' Prize, value £1 1s : W. C. Deane.
Messrs. Stitson, White & Co.'s Prize, value £5, divided as follows :—
Class Note Books, £1, Alfred Webb.
Acetylene Welding Prize, £1, S. H. Handover and J. Gascoigne (equal).
Honours Grade, best aggregate marks, £1, J. T. Palmer.
Second Year, best aggregate marks, £1, J. Hubbard.
First Year, best aggregate marks, £1, F. Beisiegel.

The Art-Lovers' League

The newly-formed Art-Lovers' League, to which reference is made in our Notes and Comments, will endeavour, by means of expert lectures and other propaganda, to promote public interest in capable and healthy art of every description entirely irrespective of the identity of its exponents. It will endeavour to secure in the National Gallery of British Art and other public institutions the adequate representation of all schools of pictorial and plastic art according to their merits and without bias and favouritism. It will endeavour to promote impartial and well-informed criticism, founded on logical and veracious standards. It is intended that the league shall form an advisory committee for the purpose of obtaining offers of gifts and purchases of exceptional quality for eventual incorporation in the national collections. Efforts will be made to secure the loan of wall space in suitable buildings in London or elsewhere on which to show such examples of British and foreign art as may be collected in this manner. Where necessary, the league will take steps to secure public inquiries into any apparent abuses that may exist in the guiding administration of national art collections, or of any matter adversely affecting the public weal in regard to art. Donations and subscriptions (minimum 5s. per annum) should be sent to the hon. treasurer, Mrs. Da Fano, 61 Ladbroke Grove, W.11. The chairman of the league is Mr. Frank L. Emanuel, and the secretary, Mr. F. Marston, 19 Harleyford Street, S.E.11.

The Architects' Benevolent Society Scheme of Insurance

In view of the interest shown by architects in the scheme of insurance, the Council of the Architects' Benevolent Society have recently secured the help of an advisory committee of insurance experts. The Architects' Benevolent Society is now in a position to answer inquiries on every class of insurance business, whether concerning existing or contemplated policies, and is ready to give considered advice upon all such questions.

List of Competitions Open

Date of Delivery.	COMPETITION.
1925 Feb. 16	Designs are invited for a library to be erected at the Compton Road estate, Leeds. Assessor, Mr. Percy S. Worthington, F.R.I.B.A. Premiums of £35, £20, and £15. Apply Town Clerk, Leeds.
*Feb. 28	Art gallery and museum of art for the City of Manchester. Assessors, Professor C. H. Reilly, and Mr. Percy S. Worthington. Premiums £500, £300, £200, £100. Apply with payment of 5s., which is not returnable, to Mr. P. M. Heath, Town Clerk.
Mar. 28	Competitive designs are invited from qualified architects, being British subjects, for proposed New Railway Offices to be erected in Nairobi, Kenya Colony. Assessor, Mr. William Dunn, F.R.I.B.A. Premiums £200 and £100. Designs must be received at the Offices of the General Manager, Uganda Railway, Nairobi, Kenya Colony, not later than February 28, 1925. Apply, with deposit of £1 1s., to The Crown Agents for the Colonies, 4 Millbank, Westminster, S.W.1, not later than February 1.
*Mar. 31	Bethune War Memorial. Assessor, Sir Aston Webb, P.R.A.
*May 1	The United Grand Lodge of England invite designs for rebuilding the Freemasons' Hall in Great Queen Street, Kingsway, London.
*May 15	Technical College for the Middleshrough Education Committee. Assessor, Mr. Percy Thomas, F.R.I.B.A. Premiums £200, £100 and £50.
*June 30	Lay-out of open spaces and fortifications between Valletta and Floriana and those encircling Floriana. Premiums £1,000 and £500. An indemnity of £100 will be awarded to three other designs showing conspicuous merit. Assessors, Mr. E. P. Warren, F.S.A., and Professor Patrick Abercrombie, A.R.I.B.A.
Dec. 31	The Argentine Government offer prizes of 10,000, 5,000, 4,000, 3,000, and 2,000 Argentine gold pesos for the best architectural designs for a National Institute for the Blind. Apply Enquiry Room, Department of Overseas Trade, 35 Old Queen Street, Westminster, S.W.1.

* Date of application passed.

Competition News

Mold Housing Scheme.

The following notice has been issued by the R.I.B.A.: "Members and Licentiates of the R.I.B.A. must not take part in the above competition because the conditions are not in accordance with the published Regulations of the Royal Institute for Architectural Competitions."

Uganda Railway New Offices, Nairobi.

The following telegram has been received from the general manager of the Uganda Railway, Kenya, by the Crown Agents, dated December 31, 1924: "Reference new railway offices. Many requests received from competitors for extension of competition. Agree to one month extension. Please advertise this. Lists of questions and answers being sent by first mail for distribution."

Competition for a New Institute for the Blind, Buenos Aires, Argentine Republic.

An international competition has been promoted for the Argentine Institution for the Blind, Buenos Aires, Argentine Republic, and the following is a translation of some of the principal conditions governing the competition:—

Competitors resident abroad must submit their designs to the Argentine Legation in London by December 31, 1925, for transmission to Buenos Aires.

Competitors must limit themselves to presenting the following:—

(a) General plan on a scale of 0·0025 per metre (2½ millimetres per metre).

(b) Frontages and sections showing the more important parts of the buildings at a scale of 0·006 per metre (six millimetres per metre).

(c) Partial or total plans of the pavilions on a scale of 0·005 per metre, where the competitor thinks it of interest to give details of distribution.

(d) A descriptive report on such parts of the project as cannot be represented on the plans. This report is to give full details of the area to be occupied by the projected buildings.

Designs are to provide for: porters' lodge, director's house and offices, administration, library, workshop, children's section, kindergarten section, special section, cottages, printery, gymnasium, ward for blind workmen, ward for old and infirm, hygienic quarter, machinery house and water supply, laundry and ironing shops, bakery, small ice-making plant, building with quarters for staff, garage and stables, hospital sick ward, chicken run and vegetable garden, parks and sports grounds.

Competitors have liberty in including other special sections which they consider justified.

The total available area of the site is 187,435·77 square metres.

The address of the Argentine Legation in London is 30 Grosvenor Gardens, S.W.1.

A copy of the conditions can be obtained from the Department of Overseas Trade, 35 Old Queen Street, Westminster, S.W.1.

League of Nations Conference Hall.

The League of Nations will shortly hold a competition for the selection of a plan with a view to the construction of a conference hall at Geneva. The competition will be open to architects who are nationals of States members of the League of Nations.

An international jury consisting of well-known architects will examine the plans submitted and decide their order of merit.

A sum of 100,000 Swiss francs will be placed at the disposal of the jury to be divided among the architects submitting the best plans.

A programme of the competition will be ready in February, 1925, and will be dispatched from Geneva so that governments and competitors may receive copies at approximately the same date. Copies for distant countries will therefore be dispatched first.

The British Government will receive a certain number of free copies. These will be deposited at the Royal Institute of British Architects, and application should be made to the Secretary, R.I.B.A., 9 Conduit Street, W.1, by intending competitors.

Single copies can be procured direct from the secretary-general of the League of Nations at Geneva for the sum of twenty Swiss francs payable in advance, but will not be forwarded until after the Government copies have been dispatched.

On the nomination of the president of the R.I.B.A., Sir John Burnet, A.R.A., has been appointed as the British representative on the jury of assessors.

New Inventions

Latest Patent Applications.

29657.—Badams, I. M.—Building-bricks. December 10.
29981.—Boswell, M. A.—Construction of concrete structures. December 13.
29673.—Brown, E. J.—System of concrete building construction. December 10.
29621.—Brownlow, R. S.—Apparatus for spreading plaster, &c. December 10.
29776.—Ducker, D. F.—Bricks. December 11.
29523.—Galloway, H. L.—Metallic reinforcement for reinforced concrete structures. December 9.
29877.—Howett, F.—Concrete building-blocks, &c. December 12.
29871.—McDonald, J.—Construction of buildings. December 12.
29633.—Redford, A.—Building construction. December 10.
29520.—Vessey, W. A.—Construction of concrete buildings. December 9.
30960.—Cuming, A. J. Roach.—Construction of buildings, etc. December 24.
31033.—Cunningham, R.—Emergency doors. December 29.
31171.—Gates, J.—Fireproof ceilings. December 30.
30821.—Hiatt, H. J.—Bricks. December 23.
32159.—Lister, J. R.—Construction of buildings. December 30.
31095.—Pope, H. E.—Building construction. December 29.
30848.—Scheibe, W.—Buildings. December 23.
31092.—Scott, V. W.—Building construction. December 29.
31166.—Steven, H.—Construction of concrete houses, etc. December 29.
31196.—Wride, J.—Floor-scraping appliance. December 30.
Zeiss, C. (Firm of).—Reinforced concrete vaults. December 29.

Specification Published.

225910.—Hodgson, J. J.—Chimney-pot.

Abstracts Published.

223282.—Wilkins, A., 4 Church Vale, West Bromwich.—Walls for buildings.
224258.—Connolly, T. F., 45 Dryburgh Road, Putney, London.—Surveying instruments.

The above particulars are specially prepared by Messrs. Rayner & Co., registered patent agents, of 5 Chancery Lane, London, W.C.2, from whom readers of the JOURNAL may obtain all information free on matters relating to patents, trade marks, and designs. Messrs. Rayner & Co. will obtain printed copies of the published specifications and abstract only, and forward on post free for the price of 1/6 each.