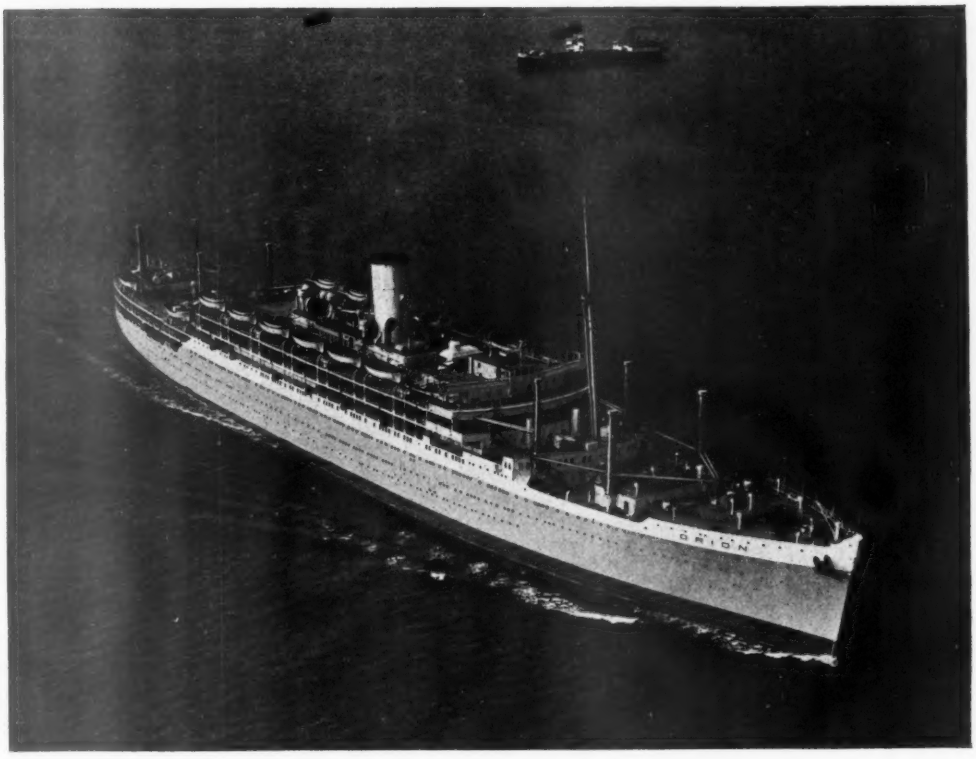
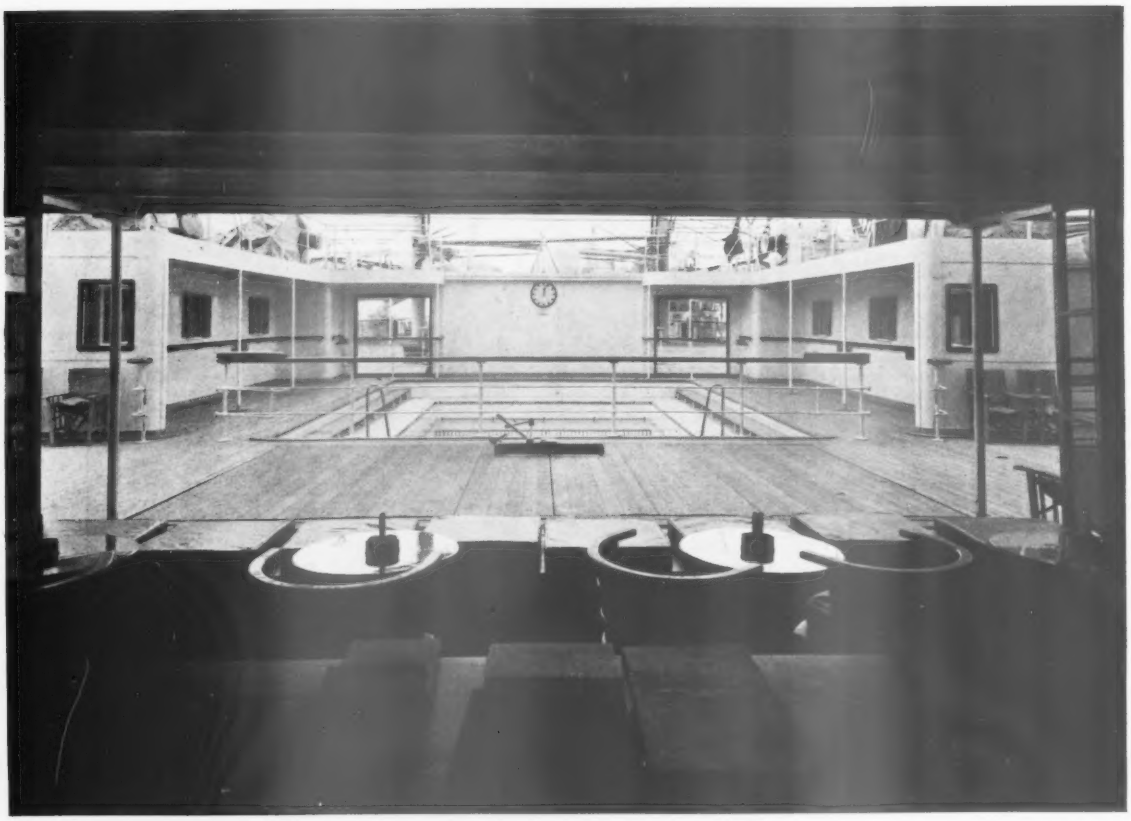
SHIPS AND THE ARCHITECT

THE S.S. ORION

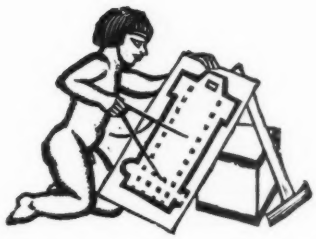


THE Orient liner "Orion" which was commissioned for its maiden voyage last week. The vessel is 630 ft. long, 84 ft. in breadth, has a displacement of 28,400 tons, and is built to carry 486 first-class and 653 tourist-class passengers. The passenger accommodation and the general scheme of internal decoration were carried out to the designs of Mr. Brian O'Rorke, A.R.I.B.A.



THE S.S. ORION

ABOVE is the first-class swimming-pool seen from the Tavern, a combined bar and lounge which overlooks the pool. Left is one of the lounge galleries on either side of the smoke-stacks, showing the recesses for letter-writing and card-playing. The windows open on to the upper promenade deck. The decorative scheme was executed to the designs of Brian O'Rorke.



SHIPS

SHIPS are very much in the news just now. During the past year we have heard much of the *Queen Mary* and of its predecessor and popularly supposed rival the *Normandie*. Both of these possess, or will possess, a great measure of that irresistible double claim to the interest of a modern public—the headline distinction of " the largest and fastest ever." Moreover, it is natural that a people with great seafaring traditions should be additionally enthralled when it is a ship in which these qualities are to find expression.

And last week British ship design was again much mentioned in the Press when the *Orion*, the largest vessel on the Australian service, was commissioned for its maiden voyage, and what is to be the largest ship on the South African route was launched at Belfast.

As members of the public, architects will be pleased that shipbuilding has shown these signs of recovery from a long and desperate depression. But the interest of architects in a form of design and workmanship in which Britain has excelled for a century does not end here. Architects have frequently collaborated in the design and decoration of ships, as Mr. Brian O'Rorke has done so successfully in the case of the *Orion*. Nor is this all.

The most superficial study of recent developments in the planning and construction of ships and of buildings makes plain the increasing similarity between the problems which architects and naval architects are now required to solve. Materials, equipment, and methods of workmanship proved successful by their use in the one form of design have often been adopted and become standard practice in the other. Until, at the present time, it may be truly said that there is not a single building material which does not also find a place in the construction or decoration of some vessel now afloat. And the same is the case, to an almost equal extent, with service equipment.

In circumstances such as these, architects may well wonder whether knowledge of value to their profession is not to be gained from the methods employed in the design of passenger vessels. There would seem in this questioning much that is worth serious thought.

Many problems which have only become of importance to the architect in the years since the war have been of vital moment to the designers of ships during a whole century. To pass over smaller matters (such as steel construction, sound and vibration insulation, centralized heating and mechanical ventilation) there are large problems of building practice concerning which lessons may be learnt from the solutions provided for their equivalents in the construction of ships.

Since the war the speed of building has greatly increased. And it is significant that two of the chief contributions to this faster pace—the progress chart and prefabrication—were long ago anticipated in naval architecture. As this pace increases still more, as building becomes still " drier," so must architects follow their naval fellows still more closely in large-scale prefabrication.

Again, in the neat, compact and accessible stowage of complicated equipment, ship designers had already had long experience when the first few bulbous service pipes of buildings were still winding their way along skirtings and up walls. Not all of the maritime solutions arrived at in these matters seem wholly satisfactory, but all deserve study by those who arrived later in the field.

And there are other and wider lessons which ship design offers to architects. Each ship is in a sense a building—a warehouse or an hotel, or both—designed for an intensely specialized purpose ; as time passes each building upon land becomes more and more the same. In every ship the full utilization of each small space, and often the achievement of an effect of greater space, is of the first importance ; as population densities increase and site values become greater in our large cities, the chief problem of the architect becomes one exactly the same.

In the future it is inevitable that buildings will become more and more intensely specialized, and the function of the architect must, in consequence, become one of even greater responsibility. From the point of view of the public in general the value of that function will be judged almost entirely by the skill with which all the cubic contents of buildings are organized to ensure their greatest usefulness for their several purposes. As time goes on those cubic contents will get smaller, and the equipment and services which must be planned within them ever larger. A study of the solutions arrived at in a field of design in which those conditions have always been present in a most intense form might well be repaying.

It would seem that the architects of sea and land might learn much by the interchange of ideas. And we offer this suggestion to the R.I.B.A. in the hope that some joint meetings may be arranged next session. Solving problems twice over is an expensive form of progress.

The Architects' Journal
Westminster, S.W.1
Telephones: Whitehall
9212-7
Telegrams
Buildable
Parl
London

NOTES & TOPICS

OBITUARY TO THE L.B. ACT ?

FOR over 40 years, since 1894 to be precise, London has attempted to build under the restrictions of a Building Act instead of under, as every other district in England, the more fluid control of building bye-laws.

*

For these 40 years, too, architects have been bombarding the L.C.C. with applications for waivers from the out-of-date clauses of the Act and its amending Acts.

*

And the L.C.C., to be fair, has struggled heroically with this increasing load of routine imposed by Parliament. It has been a losing battle and now the factor of safety of the Act (a term thrice blessed of our regulation makers) is dangerously near the point of inadequacy.

*

Happily, the recent London Building Act (Amendment) Bill, 1935, which has just received the Royal Assent, gives London a magnificent opportunity to initiate bye-laws to replace its Building Acts.

*

Governed by intelligent bye-laws, capable quickly of being brought up to date, I feel that building in London should develop on the most rational, advanced and practical lines.

*

More than that—the L.C.C., if it drafts its building bye-laws with care, with essential technical knowledge, and above all with considered foresight, will earn the gratitude, even the admiration, of the entire building world.

*

It is an opportunity, I must repeat, which has taken over 40 years to mature.

EXHIBITION RECORD BREAKING

Mr. R. A. Duncan, whose work on the Exhibitions Committee of the R.I.B.A. is prodigious, gives me some interesting figures about the International Architecture Exhibition which is going round the country.

*

These thousand photographs of contemporary work, you will remember, formed the first exhibition held at No. 66 Portland Place. They attracted in London about 10,000 visitors.

*

In Manchester over 17,000 people saw the photographs, and at Liverpool they had just short of 20,000 visitors, nearly twice the London figure. Even at Hull, where the show has just closed, the attendance figures, judging from the number of catalogues sold, will be over 15,000.

*

But this is not all, for the figures represent something like local records. Manchester tells us that their attendance figures for exhibitions are seldom over 8,000—yet 1,000 photographs of architecture—architecture, mind you—attracted more than double that figure.

*

And now the photographs are hurrying across England to their next appearance, at Bristol, on the 26th. And then, Leicester, and then . . . but the list is too long; suffice to say that Art Gallery and Museum directors all over the country have booked this record-breaking exhibition already up to the end of June, 1936.

*

Sunderland is sad : they wanted the exhibition and then found they had no place large enough to take it.

FUNNEL-WORSHIP

I believe that pre-war statistics could be made to prove definitely that emigrants preferred a multi-funnelled ship on the grounds of safety.

*

In the very early days, when boilers were fairly inefficient, two or more funnels were genuinely necessary from the engineer's point of view, and so the superstition has survived to these days of superheaters, forced draught, and other improvements which tend to reduce the number of funnels.

*

All credit then to the Orient line, which has had the courage to give the new *Orion* one funnel where only one was needed. In the words of the official booklet " the only sop to purely æsthetic considerations is the rake of the mast and funnel. This is supposed to give an appearance of speed, *though its practical effect is to introduce a slight complication in design.*" (My italics.)

*

So let us have no more dummies containing water tanks, store rooms and such-like. Will other lines please note ?

LEIPZIG FAIR . . .

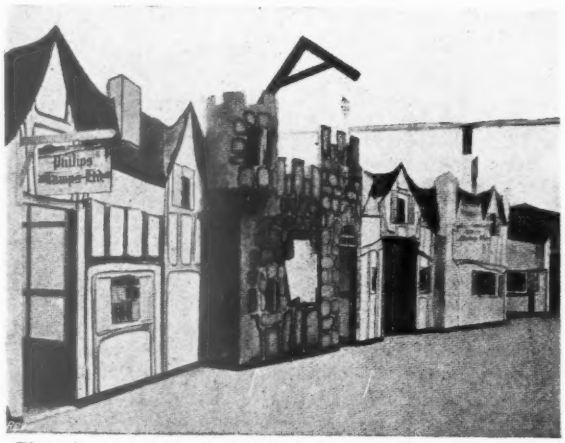
Of all the International Industries Fairs that held twice a year at Leipzig is to us perhaps the most famous—principally on account of its well-organized building section.

*

The Leipzig Fair, beginning next week, concentrates in the lecture room on problems connected with the " Shifting of Industrial Centres " and its subsidary points of " What must the Industrialist know about the shifting of Industrial Centres ? " " The Process of shifting Industrial Centres " and " The Industrialists' View on the shifting of Industrial Centres."

*

All the lecturers, I see, are to be German, which does



Two views of the Radio Exhibition at Olympia: top, a general view; bottom, a group of exhibitors' offices. (Photographs: "Electrical Review.")

not seem to me to be making the most of an *international* gathering.

. . . AND LONDON'S FACTORIES

By the same post I received the Board of Trade figures for 1934, and learn that nearly 500 new factories opened in England last year, as well as many factory extensions.

*

Almost one-half of these new factories have appeared in the Greater London area. The figures reveal, too, that London has claimed more than two-thirds of the new factories established here by foreign concerns.

*

We must, I think, organize an International Industries Fair ourselves and, seriously, we can do worse than discuss the problem of "How to put back the shifted Industrial Centres."

SCALE

No, nothing to do with Art, but maps—for the Ordnance Survey wants to know if there is anything wrong. Are the scales the most useful?—can you find what you want?—are the colours all that they should be? Any suggestion, no matter how stupid, will at least be considered.

*

But *don't* write and say that the maps are out of date. Some of them are, of course; but this is a matter of presentation, not of accuracy. Personally I've few complaints, but I *should* like a map that I could unfold in a breeze without its being torn in half.

A REINSPECTION

Some five years ago I inspected a modern building—not a "moderne" building, but an honest attempt to solve the contemporary building problem. This week I revisited it for the first time and was much interested to see how it had worn.

*

The plan, I found, had stood the test. The flush woodwork on the whole had mellowed and improved, though in one room, where sufficient care had not been given to backing—timbers, some plywood had twisted, received damaged edges, and looked shoddy. Some smooth, sleek, painted plaster surfaces which looked exciting five years ago now looked dull and ordinary—they were too austere to stand the strain of office life.

*

The metal work had not fared so well. Some white-metal edges to doors had scored some pretty arcs across a marble floor. A chromium dado head blinked dully through innumerable dints. A bevy of ink blots on some pale grey linoleum competed with the greasy finger-marks on the plate glass desk tops.

*

A painted deal skirting had been kicked to pieces—a small teak skirting, only half the size of the deal one, had undoubtedly been soundly kicked, but obviously liked it. It seemed even to understand that such was its purpose in life.

STUDY AND TRAVEL

I met a Hertfordshire builder last week. He described, with justifiable pride, his speculative houses. They are, of course, modern; he had studied the problem for some years. The plan is labour-saving; the windows are labour-saving; the taps are labour-saving.

*

The elevations he said are new—cement, steel, glass; none of this half timber stuff. He talked so well that I began to think of his study travels in England and abroad—Vienna, Berlin, Stuttgart, Frankfort, Lyons, and so forth.

*

And then he disillusioned me. He had just returned from holiday. . . . "No sir. . . . Margate this year, ... Always been on a farm before, but this year thought I'd like to have a look at the sea. . . . You see, sir, I'd never seen the sea before. . . . Funny world, this?"

EMBLEMS AND PROBLEMS

Alliteration once again has been my undoing, when last week I referred to the recent competition organized by the National Trust.

*

The printer, with a proper sense of the inappropriate, set up the statement that 109 designs had been submitted "for a National Trust *Problem*."

*

The truth, of course, is that the National Trust has already more problems than most active organizations, and not the least of its problems is to hold a successful competition to find a new emblem.

ASTRAGAL

NEWS

POINTS FROM THIS ISSUE

GUIDES TO HISTORIC BUILDINGS

In collaboration with H.M. Office of Works, the Automobile Association is publishing a series of booklet guides to historic buildings in Great Britain. The first booklet, now available to A.A. members free on application to any office of the Association, deals with the South Central portion of England and part of South Wales. Twelve booklets will complete the series.

BUILDING SOCIETIES' CONGRESS

Two hundred representatives of English building societies are going to Austria for the fifth International Congress of Building Societies, to be held from September 1 to 6. The president is Sir Harold Bellman, chairman of the National Association of Building Societies of Great Britain, who will speak on the world-wide aspects of the societies at the opening session at Salzburg.

TOWN HALL, STOKE NEWINGTON

The Stoke Newington Borough Council has applied to the London County Council for sanction to the borrowing of £73,925 for the erection of municipal offices in Church Street, Stoke Newington. The architect is Mr. J. Reginald Truelove, A.R.I.B.A., whose design was placed first in a competition held some eighteen months ago.

SOUTH KENSINGTON FLATS

Work is shortly to commence on the erection of a large block of flats on the site of Roland House, Roland Gardens, South Kensington, S.W. The architects are Messrs. Wimperis. Simpson and Guthrie.

LEIPZIG FAIR

Following is the programme of the conference of representatives of the building industry, which is to be held at the Leipzig Fair (Building Section) next week.

Monday, August 26, 10.15 a.m.–12.30 p.m. Subject: "The Shifting of Industrial Centres." Opening speech by Dr. Raimund Köhler, President of the Fair; "What must the industrialist know about the shifting of industrial centres?" by Stadtrat Schmidt; "The process of shifting industrial centres," by Dipl.-Ing. Bader; "The industrialist's view on the shifting of industrial centres," by Dr. Ing. E. H. Hermann Röchling. 3 p.m. Conducted tour of the special exhibit: "Housing schemes of German towns."

Tuesday, August 27, 10.15 a.m.–12.30 p.m. Subject: "Financing Housing Schemes." "Industrial measures to expedite the development of housing schemes," by Otto Sack; "Industrial and individual assistance for working-class housing," by M. Müller; "Finance for general housing," by August Schmitt. 2.30 to 7 p.m.: Conducted tour of housing estates in Leipzig and surrounding districts.

THE ARCHITECTS' DIARY

Thursday, August 22

LONDON MUSEUM, *St James's, S.W.1. Exhibition of photographs, "New London from the Air." Open until further notice.* 10 *a.m. to* 6 *p.m.*

LONDON SOCIETY. *Visit to the Guildhall, Kingston-upon-Thames (Conductor, Maurice E. Webb, F.R.I.B.A.).* 3.30 *p.m.*

Monday, August 26

R.I.B.A., INTERNATIONAL EXHIBITION OF ARCHITECTURE. *At the Royal West of England Academy, Bristol. The exhibition will be opened by Sir Fabian Ware at* 3.30 *p.m.*

Wednesday, August 28

LONDON SOCIETY. *Visit to Harrow School, and the Parish Church of St. Mary, Harrow-on-the-Hill (Conductor, Arthur Gardner, F.S.A.).* 3 *p.m.*

NEW BLOCK, ST. BARTHOLOMEW'S HOSPITAL

The Governors of St. Bartholomew's Hospital have decided to build, at an estimated cost of £140,000, a special block for paying patients. The site is in Bartholomew Close.

ARCHITECTS' REGISTRATION COUNCIL

The fourteenth ordinary council meeting of the Architects' Registration Council of the United Kingdom is to be held at the R.I.B.A. building, 66 Portland Place, W., on Friday, September 27, at 5 p.m.

INSTITUTION OF STRUCTURAL ENGINEERS

Following are the results of the Graduateship and Associate-Membership Examinations of the above Institution, which took place last month. The number of candidates who entered for the examination was 85. Of these, 24 were successful in the Graduateship Examination and 33 in the Associate-Membership Examination.

The names of the successful candidates are:—

GRADUATESHIP EXAMINATION: G. D. Bisset, W. A. Burgess, S. M. Cleator, B. G. Combridge, J. C. Coutts, G. W. Davis, E. Dickin, S. R. Grace, A. Hammerton, C. W. F. Hann, J. D. Hinchcliff, N. E. Hough, J. H. Jackson, G. G. Kelley, C. J. Kimber, L. A. Macer, C. Maidstone, C. R. Nicholls, A. E. Parry, B. Scruby, F. W. Slatter, S. Sukhyanga, G. A. Webster, H. E. D. Willmott.

ASSOCIATE - MEMBERSHIP EXAMINATION: R. Agar, L. B. P. Arthur, E. L. Axtell, F. M. Bowen, R. R. Cambridge, E. L. Campbell, J. F. Davies, E. R. Deeley, E. Dickin, J. G. Dowdeswell, T. W. Eydes, L. J. Griffiths, E. C. Hall, L. Hammond, J. M. P. Hooley, J. P. G. Horton, C. Jackson, W. H. Lintill, E. H. MacMillen, J. B. McEwan, I. Naguib, F. Pugh, A. I. G. S. Robertson, R. Robson, H. T. Silverton, H. J. Stantan, J. P. H. Stein, J. Swindells, J. W. Tubb, A. W. Wall, M. Ward, F. P. Weild, H. Worrell.

WEST YORKSHIRE SOCIETY OF ARCHITECTS

We are informed by the above Society that the Sir William Nicholson Travelling Scholarships for 1935 have been awarded as follows:—

Two scholarships to the value of £25 (under 21 years of age): A. Lumb, of Sowerby Bridge; and H. B. Morris, of Brighouse.

Two Scholarships to the value of £50 (under 25 years of age): H. W. Scatchard, of Leeds; and K. Warman, of Bradford.

One Scholarship to the value of £50 (over 21 and under 30 years of age): H. H. Castle, of Ilkley.

INTERNATIONAL CONGRESS OF ARCHITECTS

We understand that, so far, over 50 architects from this country have intimated their intention of going to Rome on September 22, to participate in the thirteenth International Congress of Architects.

THE LATE HENRY ADAMS

We regret to record the death, at the age of 89, of Professor Henry Adams, F.R.I.B.A., M.INST.C.E., F.S.I., M.I.MECH.E., of Brockley View, London, S.E.

Born in March, 1846, he was educated at King's College, London, and at the City of London College. During his college career he received the Queen's Medal, nine prizes and 29 certificates, including two first places in first-class honours in the Science and Art Department.

In 1877 he commenced private practice as a consulting engineer and architect, since when he has been responsible for numerous buildings, including factories, workshops, offices and subsidiary buildings; and for the structural steelwork of several cinemas, theatres, hotels, warehouses, factories and mills.

Professor Adams was for 35 years Professor of Engineering at the City of London College, and during that time he estimated that he gave over 10,000 lectures. In addition he was a Chief Examiner (Engineering) for the Board of Education from 1905 to 1910, and he had been a member of the council and chairman of the examiners for the Society of Architects. He was a member of the council and ex-chairman of the examiners for the Royal Sanitary Institute, superintending examiner for the

Society of Engineers, and an arbitrator, London Court of Arbitration.

He was the author of many books on building construction and structural design and of numerous articles in the technical press, including THE ARCHITECTS' JOURNAL.

R. I. B. A.

THE CENTENARY EXHIBITION TOUR

The International Exhibition of Architecture, which was assembled for the Centenary of the R.I.B.A., is having a most successful tour of the provinces. It has so far been shown at Manchester—where it was opened by Sir Josiah Stamp—Liverpool and Hull. The attendances at these three cities totalled more than 60,000.

From August 26 to September 28 the Exhibition will be on show in Bristol at the Royal West of England Academy. The Director of the Museum and Art Gallery, Mr. H. W. Maxwell, is responsible for bringing it to Bristol, and he has received much assistance from the Bristol Society of Architects. The opening ceremony will be performed on August 26, at 3.30 p.m., by General Sir Fabian Ware, the chair being taken by Mr. Mowbray A. Green, President of the Bristol Society of Architects.

After Bristol, the Exhibition is to go to Leicester from the middle of October to the middle of November. Further bookings have been fixed or are being arranged. Numerous requests have been received by the Directors of Art Galleries and others for parts of the Exhibition where galleries are too small to accommodate the whole. Accordingly, in the spring of next year, the Exhibition will be returned to the R.I.B.A. to be split up into smaller sections, in which form it will start once more on its travels.

Competitions Open

August 31.—Sending-in Day. Municipal offices, Swindon, for the Swindon Corporation. (Open to architects of British nationality, practising in the British Isles.) Assessor: Professor A. B. Knapp-Fisher, F.R.I.B.A. Premiums: £350, £250, and £150. May 25 was the last day for questions, and August 31 is the closing date.

September 2.—Sending-in Day. The Liverpool Building Trades Exhibition, in conjunction with the Liverpool Architectural Society, has organized a competition to improve the amenities of suburban building estates, and is offering eight prizes of £10 for drawings of the lay-out or planning of 20 pairs of semi-detached villas at a "T" junction of two roads. Assessors: Lt.-Col. Ernest Gee, F.R.I.B.A., Professor L. P. Abercrombie, F.R.I.B.A., Leonard Barnish, F.R.I.B.A. Premiums: eight awards of £10 each and £30 to be distributed at the discretion of the assessors. Conditions from the Competition Manager, Provincial Exhibitions Ltd., Renshaw Hall, Liverpool, 1. No deposit. The latest date for the submission of designs is September 2.

October 1.—Sending-in Day. Central county buildings, Hertford, for the Hertfordshire County Council. Assessor: Robert Atkinson, F.R.I.B.A. Premiums: £350, £250 and £150. Designs must not be submitted later than October 1. Particulars of the competition are obtainable from the Clerk of the County Council, Clerk of the Peace Office, Hertford. (Deposit £2 2s.)

October 5.—Sending-in Day. New Fire Station, Brighton, for the County Borough of Brighton. (Open to architects of British nationality resident in the British Isles.) Assessor: Stanley O. Livock, F.R.I.B.A. Premiums of £200, £125 and £75. Conditions of the competition may be obtained from J. G. Drew. Clerk, Town Hall, Brighton. (Deposit £1 1s.)

October 16.—Sending-in Day. Lay-out competition for Lump Fort site, for Portsmouth T.C. Assessor: E. Prentice Mawson, F.R.I.B.A. Premiums: £350 and further £200 divisible. Conditions are obtainable from the Town Clerk, Guildhall, Portsmouth. (Deposit £1 1s.)

October 28.—Sending-in Day. Competition for timber houses organized by the Timber Development Association. Assessors: Robert Atkinson, F.R.I.B.A., G. Grey Wornum, F.R.I.B.A. and E. Maxwell Fry, A.R.I.B.A. The competition is divided into two sections and competitors may enter for one or both. In each section there will be the following awards: first premium, £100; second premium, £30; third premium, £25.

SECTION 1:—Designs to be submitted for a timber house suitable for a small family, the total cost to be £800. SECTION 2:—Designs to be submitted for a week-end timber cottage, the total cost to be £350. Conditions, etc., are obtainable from the Manager, Timber Development Association, 69-73, Cannon Street, London, E.C.4. The latest date for submission of designs is Monday, October 28.

October 31.—Sending-in Day. New technical college, Manchester Road, Bolton, for the Bolton Corporation. (Open to architects of British nationality.) Assessors: John Bradshaw Gass, F.R.I.B.A., and Arthur J. Hope, F.R.I.B.A. Premiums: £500, £250 and £100. Conditions, etc., are obtainable from Mr. John A. Cox, M.A., Director of Education, Education Offices, Bolton. (Deposit £2 2s.) The designs must be submitted to the Director of Education before October 31.

December 31.—Sending-in Day. Proposed town hall, Bury, for the Corporation of Bury. Assessor: J. Hubert Worthington, O.B.E., M.A., F.R.I.B.A. Premiums: £500, £300 and £150. Conditions etc., are obtainable from Richard Moore, Town Clerk, Municipal Offices, Bank Street, Bury. Deposit, £2.

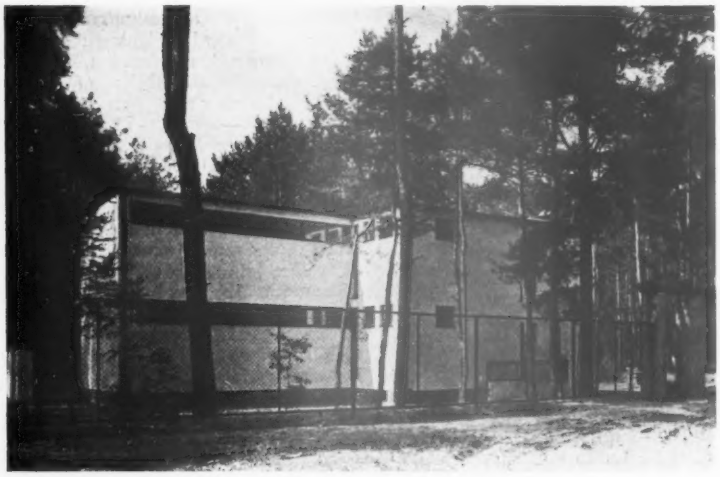
January 31, 1936.—Sending-in Day. Proposed Parliament House, Salisbury, Southern Rhodesia, for the Government of Southern Rhodesia. (Open to architects of British citizenship.) Assessor: James R. Adamson, F.R.I.B.A. Premiums: £500, £300, £200, and £100. Conditions, etc., obtainable from the High Commissioner for Southern Rhodesia, Crown House, Aldwych, W.C.2. (Deposit £2 2s.) Any questions which competitors desire to ask should be addressed to the High Commissioner so as to reach him not later than August 26. The designs must be sent to the Assessor at 19, Silverwell Street, Bolton, not later than January 31.

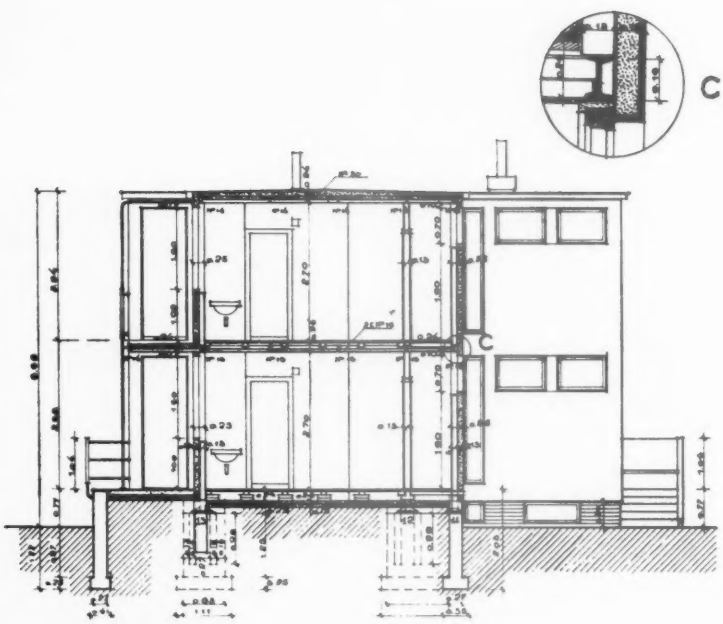
THIS ARSHETECTURE

This new double-deck hoarding erected by Mills and Rockleys in Northampton adjoins a church and cinema and has been designed accordingly—a nice problem in conforming to the amenities. It is one of several new types of hoarding with which the company is experimenting

From "The Advertiser's Weekly."

A PRIVATE SANATORIUM





CROSS SECTION

DESIGNED BY

HELENA AND

SZYMON SYRKUS

PLAN

The sanatorium is steel-framed both in order to allow of free planning and, more importantly, to allow of the external walls being entirely utilized for thermal insulation. The building was largely designed as the culminating practical experiment after a long period of research concerning heat-retention.

CONSTRUCTION

The walls are 15 ins. in thickness, and consist of cellular bricks as an inner lining and cellular concrete outside; cellular concrete slabs being found most satisfactory. The insulation resulting was found most successful during the extreme temperatures of a Polish summer and winter.

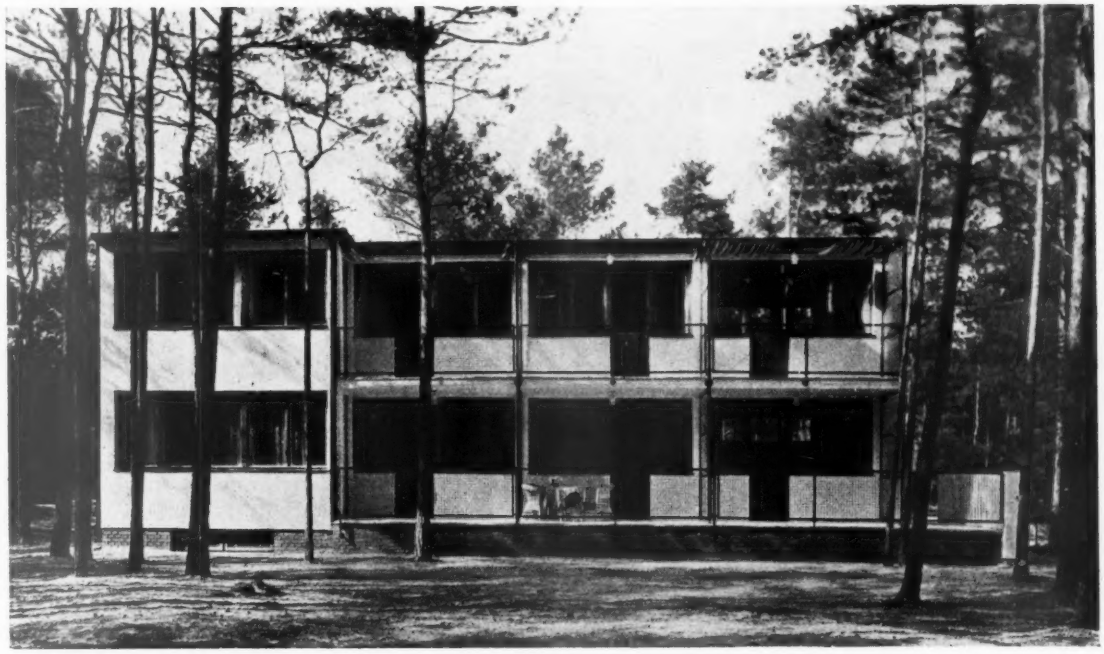
The architects have obtained the best results from stratified walling built up as follows: natural sandstone outer surface, in the form of tiles, 1 in. thick, cast with the cellular concrete in a waterproofed cement to a total thickness of about 6 ins. Within this cellular fireclay slabs give additional insulation and make up the remaining wall thickness.

By this method the architect shave succeeded in obtaining adequate insulation with a wall thickness of only 10½ ins. and outside temperatures as low as minus 35° Centigrade.

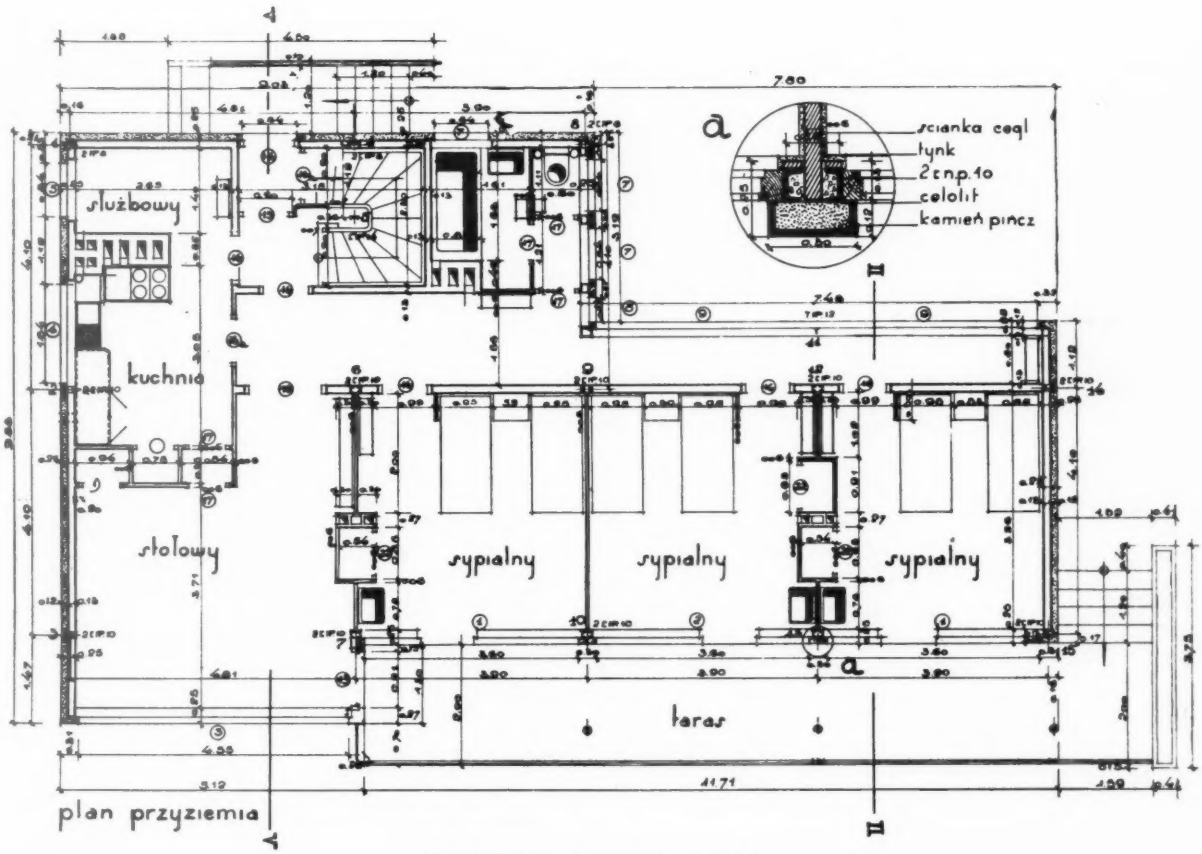
The sanatorium has a brick-built basement containing the heating furnaces, and hot-water risers are brought up in ducts adjoining the furnace flues to offset any danger from frost. Windows are double, and in the case of the wards are also folding. The roof is of asphalt. Heating is by hot air by ducts from basement plant.

Above is a photograph of the north elevation from the north-east.

N E A R W A R S A W , P O L A N D



The south elevation.



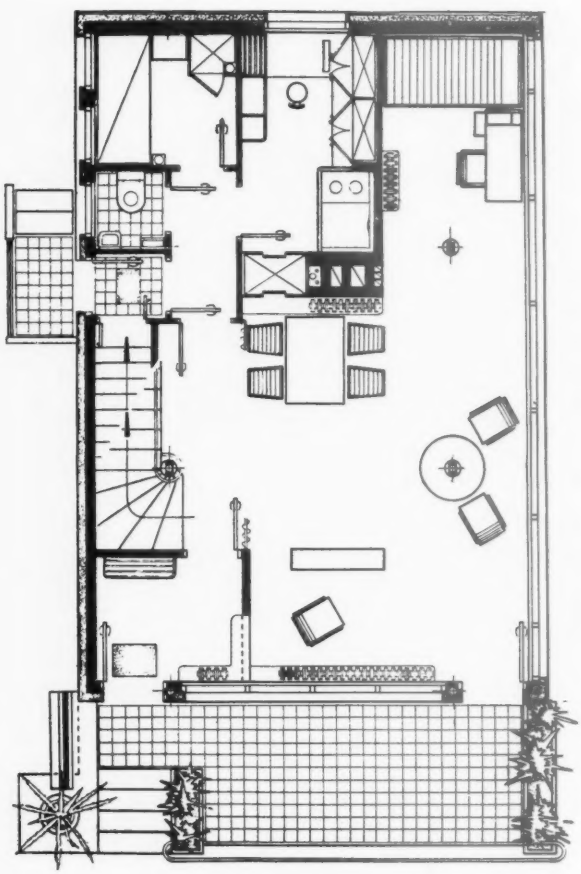
GROUND FLOOR PLAN

A HOUSE NEAR WARSAW: DESIGNED BY

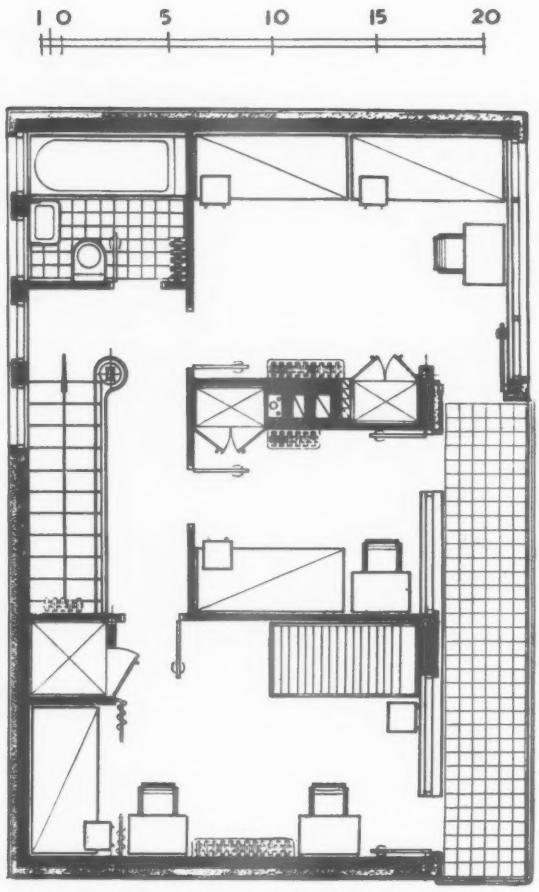
The client's request for a plan as unobstructed and well-lighted as possible dictated the use of light steel framing and non-structural walls. The walls, as in the sanatorium illustrated overleaf, are of sandstone slabs, cellular concrete and cellular brickwork.

The floors are of concrete, finished with tiles on hardwood strip, and the roof is of asphalt.

The photograph is of the living-room, showing one of the cased stanchions, encircled by a lighting fitting at ceiling level and by a sheet-metal table below.

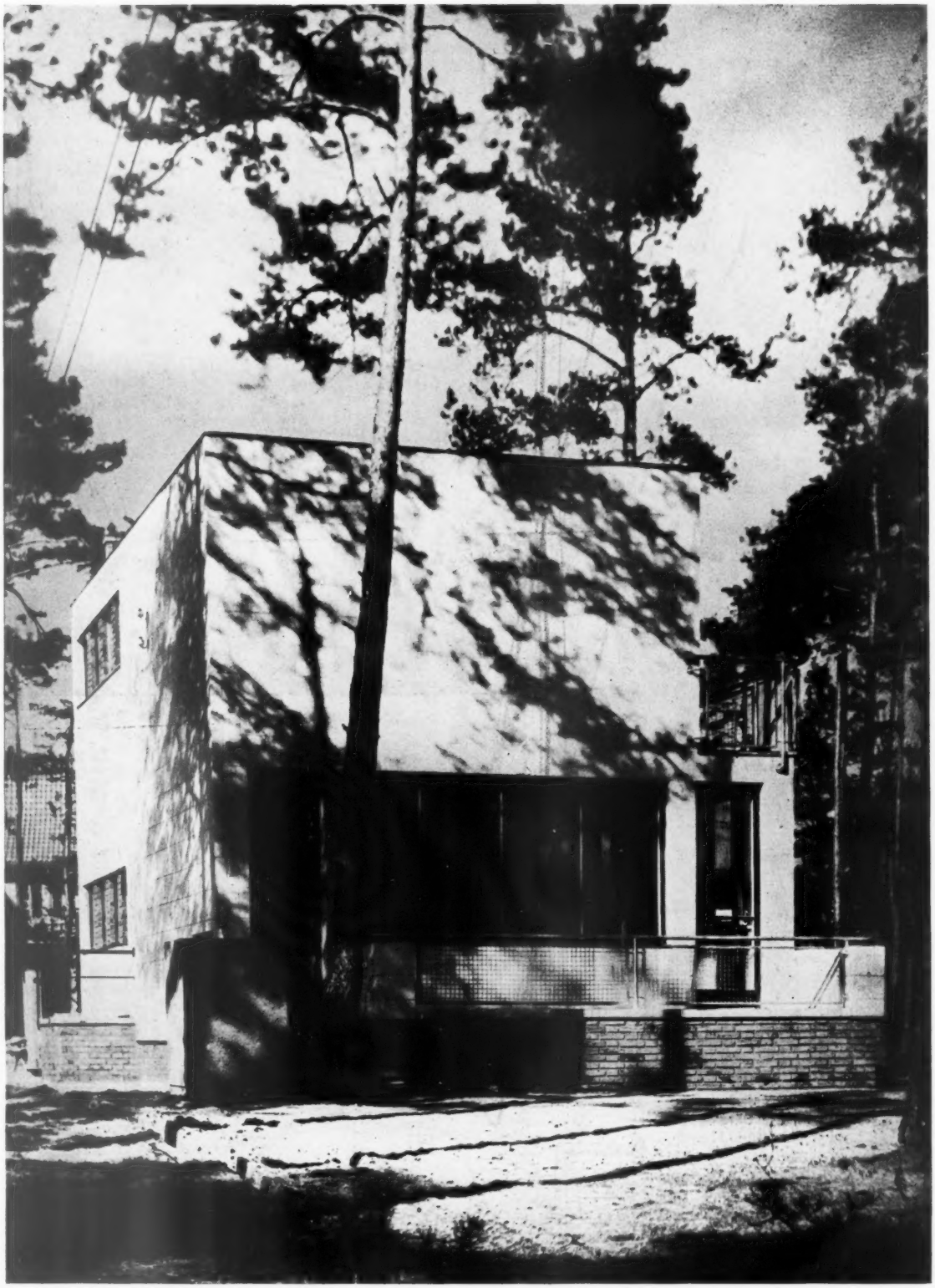


GROUND FLOOR PLAN



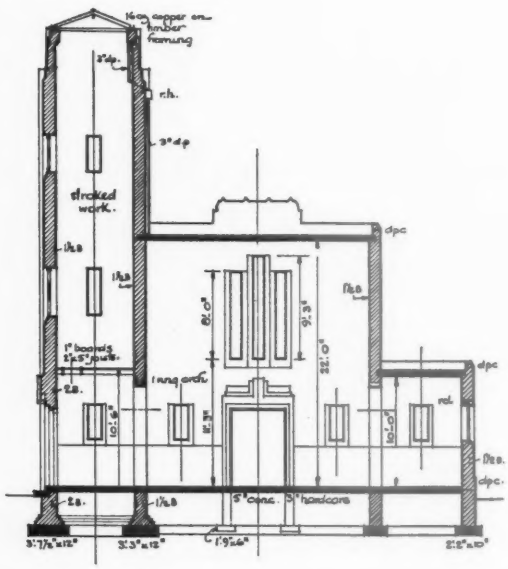
FIRST FLOOR PLAN

HELENA AND SZYMON SYRKUS



A detail photograph of the west elevation, in brick and 1½ in. natural sandstone slabbing.

CHURCH AT NORTH WALSHAM:



CROSS SECTION

SITE.—*This new parish church is situated in the Norfolk Fens.*

PLAN AND CONSTRUCTION.—*The necessity for small expenditure, combined with the clients' desire for the maximum seating accommodation, resulted in a plan form as nearly square as was practicable. The body of the church was then subdivided into nave and aisles by means of two continuous R.C. beams, running from west to east. This method of construction allowed the greater height in the nave required for clerestory lighting, whilst leaving the whole floor space unobstructed.*

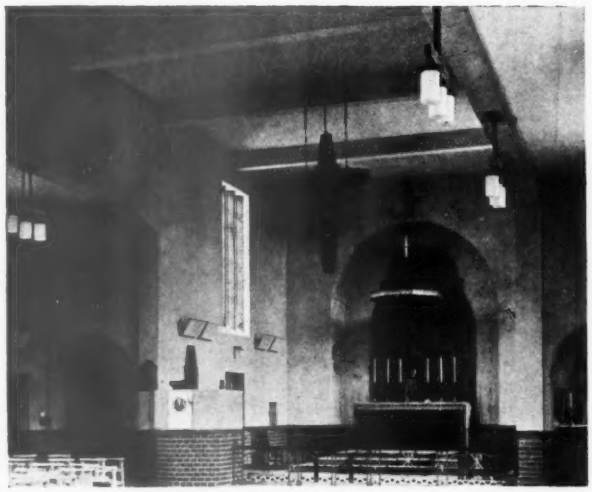
The church is reinforced-concrete framed with local sand-faced brick walls in lime mortars and dressings of Clipsham stone. The internal decorative finish is in plaster with a brick dado, and the floor of cork composition blocks.

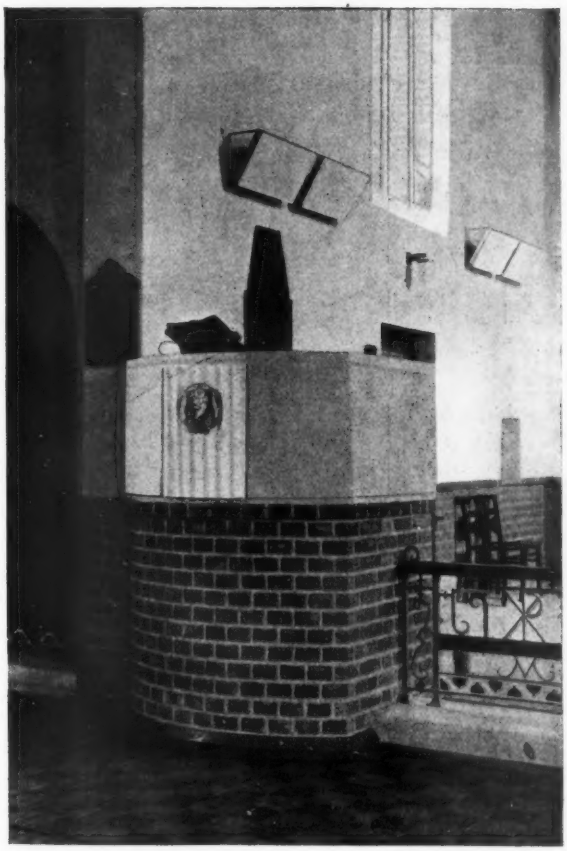
CONTRACT.—*The church was executed in seven months at a total price of £3,700.*

Above is a general elevational view from the south.

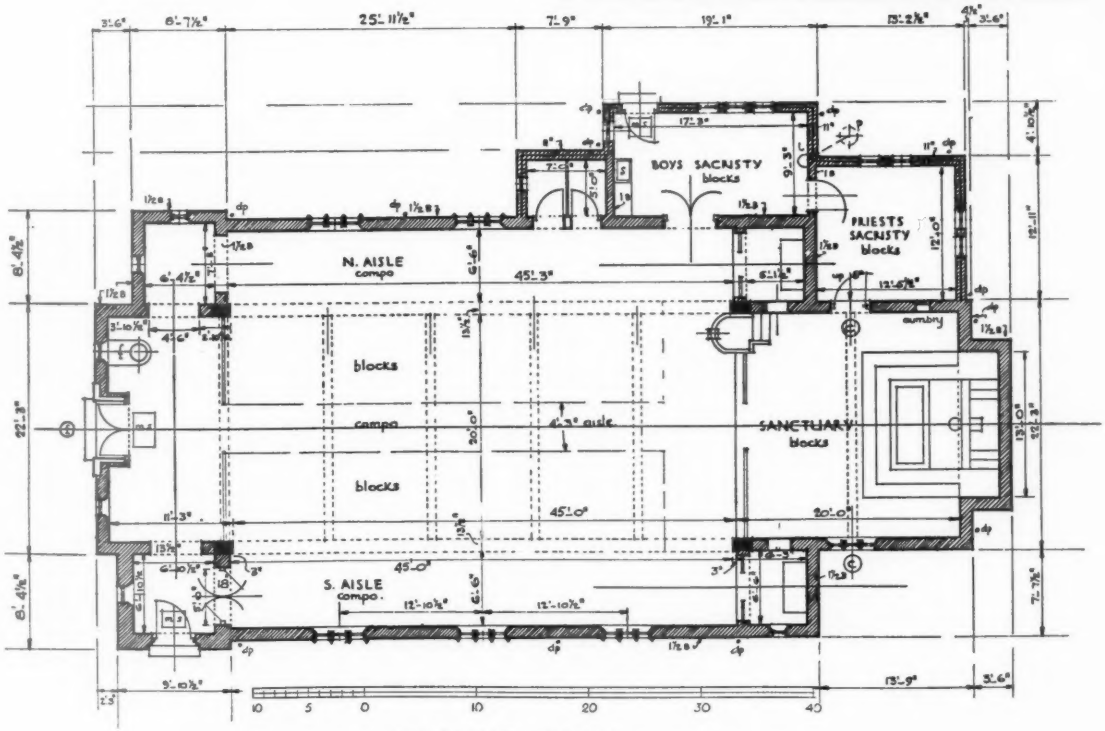
For list of general and sub-contractors, see page 285.

DESIGNED BY E. BOWER NORRIS





Above, a general view of the nave. Right, the pulpit; in brick and hard plaster with a bronze lectern.



GROUND PLAN

The Red House, Bexley Heath. From "Philip Webb."

LITERATURE

THE VICTORIAN MASTER-BUILDER

[*BY P. MORTON SHAND*]

Philip Webb and His Work. By W. R. Lethaby. Oxford University Press. 6s. net.

IT is not easy to appreciate the importance of Webb's part in the evolution of modern architecture, because the age in which he worked is at once too close to our own in point of time, and too remote from it in sympathy, for complete critical detachment. Burne-Jones strikes the pitch of its dominant repression when he speaks of "the perfect hunger for romance that was spread abroad when Rossetti came into the world"; and from Rossetti's description of the Red House—"more of a poem than a house . . . but an admirable place to live in, too"—we may safely assume that in the eyes of his generation, Webb provided plenty of architectural romanticism skilfully combined with a hitherto unprecedented degree of comfort and practical convenience. And that, I think, is on the whole a not unjust estimate of his achievement; since Webb was far too sane to dream of subordinating the material essentials of a more modern way of living to wild flights of fancy. But such an estimate overlooks the man's magnificent moral fibre, and his revolutionary influence on European domestic architecture.

Amidst all that mid-nineteenth-century welter of heady romance for its own sweet sake, Norman Shaw's favourite maxim, "Keep it quiet!" should be recalled with gratitude—if only because Webb was the one contemporary architect who really tried to live up to it.. True, a house like Joldwynds echoes a good deal of the arty-craftiness of its name; but against Joldwynds can be set the severe aristocratic reticence of Rownton Grange, which is traditional in the proper (Adolf Loos) sense of that much misused word. In the interiors of Coneyhurst and Puttenham, "quietness" is already becoming second nature and no longer has to be remembered in New Year resolutions. Here we have direct anticipations of Voysey's culminating Pride's Purge of staircases and landings in 1899 ("The Orchard"). Webb built about 60 houses in all, but some of the most characteristic have been crowded out of the present volume to make room for mawkish drawings of animals. It seems hardly fair to the memory of the man who wished the brick vaulting of Westminster Cathedral could be left bare and whitewashed to include that passing surrender to the ornamental itch, the silver mace for Birmingham University. (These criticisms of the choice of illustrations would have little point had we not had to wait ten years for the publication of this very important book.)

Towards the end of his life, Morris wrote: "I cannot think that I ever consciously aimed at any particular style. By nature I turn to romance rather than classicalism. . . by romantic I mean looking as if something was going in."

If this definition of romance fits any kind of buildings, it must surely be that of the New Architecture, where the stripping of structure to the bone mirrors the beginnings of an unparalleled social upheaval. Reminiscence of the past, whether of the letter (as with the academicians) or the spirit (as with Morris and his followers), inevitably suggests that putting back the clock to Greek, Roman or mediæval time has automatically annulled all the economic and technical progress of the intervening centuries. Do Morris's tapestries and wall-papers, Burne-Jones's or Rossetti's somnolent pictures, prompt the feeling that anything more dynamic is afoot than the rustling of a leaf, the flickering of a candle? Morris's ideal of romance and his expression of that ideal were clearly two very different—even mutually antagonistic—things. In the architecture of men like Webb and Lethaby, Norman Shaw and Nesfield, this fatal discrepancy becomes still more apparent. Though they often saw clearly, they were unable to see clearly all the time, because they did not know what they wanted their age to be, beyond not being what it was. How disastrous the effect of their total lack of constructive prevision, plan or programme has been on architects, designers, critics and societies that need not be named is too patent to call for chapter and verse. There were apparently no Pink Pills for Pale People in those days, or the Blessed Damozel might have stepped over the bar of heaven and helped to clear up the sorry static mess below, instead of leaning over it and sighing to see people just keeping on keeping on. As it was, either the will never found the way, or the way the will.

Mindful of Carlyle's advice, Morris "shrank from rhetoric (which was, of course, synonymous with 'classicalism') naturally and without effort." When Webb, who was Morris's architectural self, had to build a new wing on to a modern house, he muttered fiercely, "I'll take the Renaissance out of it!" At Vicenza he was "made miserable by the dismal skill of the great Palladio," and "turned to the beautiful bits of mediæval work." Yet Mr. Jack tells us "his criticisms of Wren were generous, in them he lost all thought of style.

"It was inspiring to see his heart-felt enthusiasm for the work of a man whose form of expression was so much opposed to his own."

The all-compelling reason is duly recorded (for a moment the reader may refuse to accept the evidence of his own eyes) "he enjoyed the *romantic abandon* of Wren's compositions."

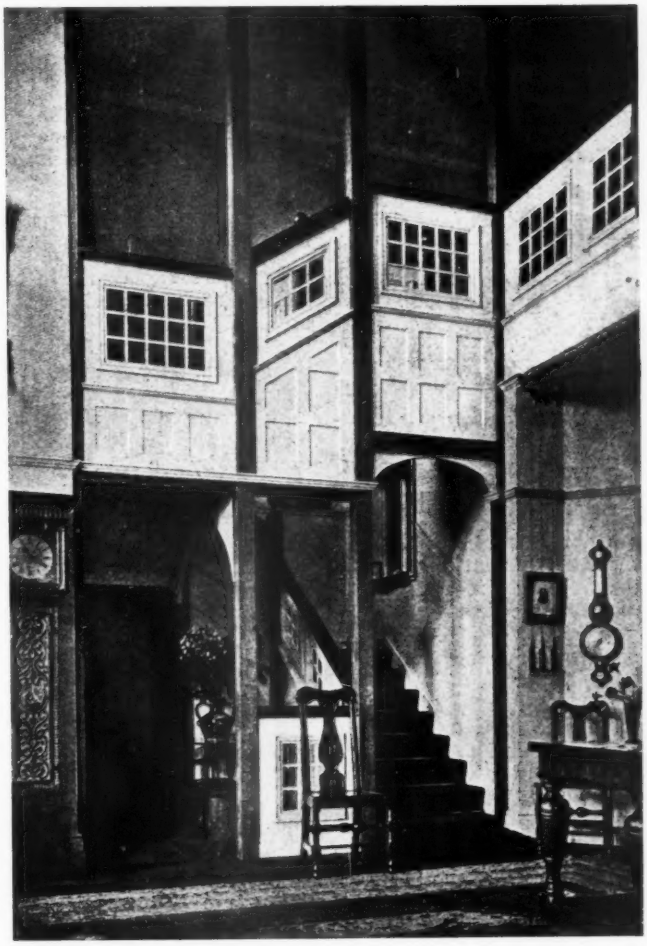
"Old buildings are wonderful treasures all the more priceless in this age of the

world when the newly invented story of living history is the chief joy of so many lives."

The words are Morris's, and it was Morris who unwittingly popularized that skin game of Cold-Storage History, or Pretending by Periods. But to the Brotherhood, "old" always meant pre-Inigo Jones. Speaking of the rapidity with which those "vernacular" treasures were being rased to the ground, Webb said "Nature will soon cover up the scars, *but I can't think the land will ever be grey with old buildings again.*" Grey stone buildings were romantic and Gothic, red brick ones rational and Georgian ("classical and rhetorical.") So no "Anti-Scrape" efforts need be wasted on trying to save eighteenth-century architecture, which had yet more against it. It was the embodiment of an essentially urban civilization, and the town was anathema, something to be fled from rather than reformed. Lethaby lived longer than Webb, but fine teacher as he was, he saw very little further:

"The root of architecture is in the land, and without love of the land you can do nothing. We owe it to England and the landscape to build in a reverent way."

Now "reverent" in this context can only mean archæolatry, basing design not on the needs of our own day, but on the ghosts of the vanished needs of the past. Was any single past age "reverent" to any earlier one? Lethaby himself supplies the answer when he observes "there is one beauty of homogeneity and another of complex accretion." That beauty of accretion for which he evinces such a marked bias, owes its very existence to past generations' consistent refusal to build "reverently," or otherwise than for themselves alone.



Coneyhurst, Ewhurst. From "Philip Webb."

HOUSING

Interim Report of Departmental Committee on the Construction of Flats for the Working Classes. London: H.M. Stationery Office. Price 9d. net.

THIS is an important document as being the first published report of a government committee charged to investigate the "materials and methods of construction suitable for the building of flats for the working classes." This Committee is set up late in the day, but its terms of reference are wide enough to allow it to guide the direction of housing throughout the country, or at least to stimulate effort along healthy channels.

It is emphasized that the report is in the nature of a preliminary survey of the field of enquiry, and much of the information gathered appears either in a condensed form or is withheld for closer examination. But the field is as wide as possible and is being considered from the points of view of efficiency, cost and maintenance. Certain of its recommendations are of very great importance, none more than that emphasizing the need for greater flexibility in the administration of the laws relating to building. As we know too well, it is with the utmost difficulty that an authority can be induced to allow the use of a material not falling strictly within the reading of a building act or bye-law, or, allowing it, to concede its use in a manner, or of a thickness, proper to its economy in building structure. In these and in many other ways building is fettered by out-of-date regulations and inflexible administration, and the Committee in urging such re-arrangements as will ensure that materials or processes reported upon favourably by the Building Research Station shall be adopted for current use by local authorities everywhere, is clearing the ground of much that impedes us all.

Similarly, it finds itself unable to proceed far in its examination of new methods and processes for reducing costs in large constructions while it is faced with fire regulations that make steel-frame building prohibitive in cost and add many petty annoyances which, in the light of ascertained fire risks for this type of building, are seen to be unnecessary. It says, in fact, that "with blocks of flats not more than five storeys in height we feel, on the evidence we have obtained, that the risks that have to be faced are negligible in ordinary areas covered by permanently manned fire brigades." A fire resistance of one hour's duration is recommended as adequate for the purposes of flat construction, and under these circumstances the view is expressed that the "concrete or other casing insisted upon in normal practice may be omitted if the steel members are built into the walls, floors or partitions, or the exposed portions covered with carefully specified plaster or other approved coating spaced away from the steel." It should be noted that this applies to buildings of four or five storeys in height, where steelwork is less useful than in high buildings. It will obviously be necessary to re-assess the fire risk for high buildings in conjunction with the lighter casing recommended, and for this purpose it may be necessary to carry out investigations abroad.

The references to comparative costs stress the unreliability of the normally adopted cube foot basis of measurement, and even of the safer basis of the superficial foot within walls, and suggest a more detailed analysis covering the different elements of building. In order to arrive at a comparison of costs the Committee are inviting from builders estimates of costs for any method of building a five-storey block of 60 flats that will give the accommodation

shown in a basic plan drawn up by the Committee. Complete freedom as to materials and construction is allowed to estimators and it is hoped that new methods and systems will be submitted. My own feeling is that the estimates, being non-competitive, will be of small value and that the basic plan issued will prohibit the free and imaginative adoption of any new system of building. That, further than this, new systems will be bound to be more expensive than old, or, that the estimates for them will be too sanguine; and if the final results show a margin in favour of habitual methods of building, then still nothing of great value can be adduced from this.

The notes on the use of hydraulic mortars and the superiority of German and Swiss stucco renderings over those employed here will raise much questioning among architects who have searched vainly for a non-crazing covering for brickwork. Hydraulic lime, like sand-lime, bricks are barely recognized by building regulations and, owing to the general ignorance upon the subject, no effective substitute for hard cements has yet been circulated. The Committee proposes further research on this subject.

Enough has been said to show that this report indicates a very healthy attitude on the part of the Committee towards the highly involved question of flat building. What recommendations it makes concern matters upon which there has been considerable agitation, and in the main the subjects for further immediate research are those for which solutions are most urgently required. Besides these there is a mass of information derived from detailed inspection of actual buildings, a sketch design, as it were, for the scientific manual on building which the Committee would wish to see written. In the meantime this slighter work will prove indispensable for those engaged in building for the working classes whether they be lower or middle.

E. M. F.

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British Standards Institution

The British Standards Institution has just issued its half-yearly handbook, which includes the annual report for 1934-35, presented at the last annual general meeting, as well as the indexed list of current British Standard Specifications. The report on the activities of the three divisions—engineering, building and chemical—provides interesting reading and shows the enormous amount of valuable work voluntarily carried out by the Institution's 700 technical committees.

Copies of the new handbook are obtainable from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1, price 1s. 4d. (post free).

LETTERS FROM READERS

Whither the Whipsnade Zoo?

THOMAS W. BAGSHAWE, F.S.A., F.R.Hist.S.

SIR,—I had been waiting for someone to attempt to explain the reason for the style of the new addition to the restaurant at Whipsnade Zoo but in vain until a friend showed me a copy of your JOURNAL for May 23. Now I am no wiser.

For many years as almost a native I have known the land which is now occupied by the Zoo, and loved it for the charm it had and which only England can give. I swallowed painfully the pill of the Zoo coming and the disappearance of lanes where as a child I had wandered in search of wild flowers.

On my first visit to the Hall Farm restaurant I felt that the architect, whoever he may have been, had to the very best of his ability retained as much of the charm of the old farmhouse as he could, whilst still evolving a pleasant and comfortable restaurant. The garden in front and the cloisters and kitchens were a happy blending of the past with the pounds, shillings and pence necessities of the present. The cottages by the entrance, too, had a feeling of the country. But now a new regime has set it, for I feel it must be a new one which caused me to put my hand in my pocket instinctively for a penny for a ticket as I neared the new "Underground"-like cloakrooms. To think that my dilapidated coat should be submitted to the gaze of all and sundry as it hung in the peculiar recess in the middle made me shudder. This recess reminds me of an old well my parents used to take me to see in a park. Everyone felt some sort of bounden duty to look down it, but why, I never discovered. I progressed towards the restaurant where the food at least is an invitation to visit it. (Perhaps one day even the restaurant will go "all modern" and have tabloid food!) On the way I saw to the right a building such as I had never seen before. Was it a gas generating station or a row of petroleum tanks or some ultra-modern sculptor's conception of a woman's chest? Nay, I found it was the new elephant house, blending, goodness knows how, with the beautiful wood at the back

I had not seen the restaurant since its alteration but I had been a frequent visitor before. In front of me loomed up something reminiscent of a glass manufacturer's stand at the B.I.F. It was the new addition. Where was the mellow tiled roof pitched so charmingly that I had imagined would be there? Gone, to be replaced by a flat one. The whole thing reminded me of a body with an unsightly birthmark.

A row of those truly English plants—the cacti—greeted my entry into the restaurant and for a moment there was the treat of a sunbath. I looked for a row of stately aspidistras, of geraniums, or some indication that this was England, but there was none.

Time and again I have looked at this addition and can only conclude that the education of a public school and a university had been insufficient—I must lack feeling. Perhaps if I grow "arty" and cultivate side whiskers, a fiery red beard, a sombrero and wear a yellow shirt, the inspiration will come. Somehow or other I still like old England best.

The epidemic has spread. Close by on the downs two bungalows have caught it.

When I have saved enough money I am migrating to the Antarctic. There is no architecture there and nature is kind enough not to produce anything which spoils its charm. Mortals are not like that.

I might add that I am not an architect nor have I any axe to grind by condemning ultra-modern architecture.

THOMAS W. BAGSHAWE,
Berkhamsted

The Architectural Sculptor

W. AUMONIER

SIR,—Just now when the main architectural activities are mostly devoted to the erection of enormous blocks of flats, tenements and housing schemes, I should like to put in a word for the architectural sculptor.

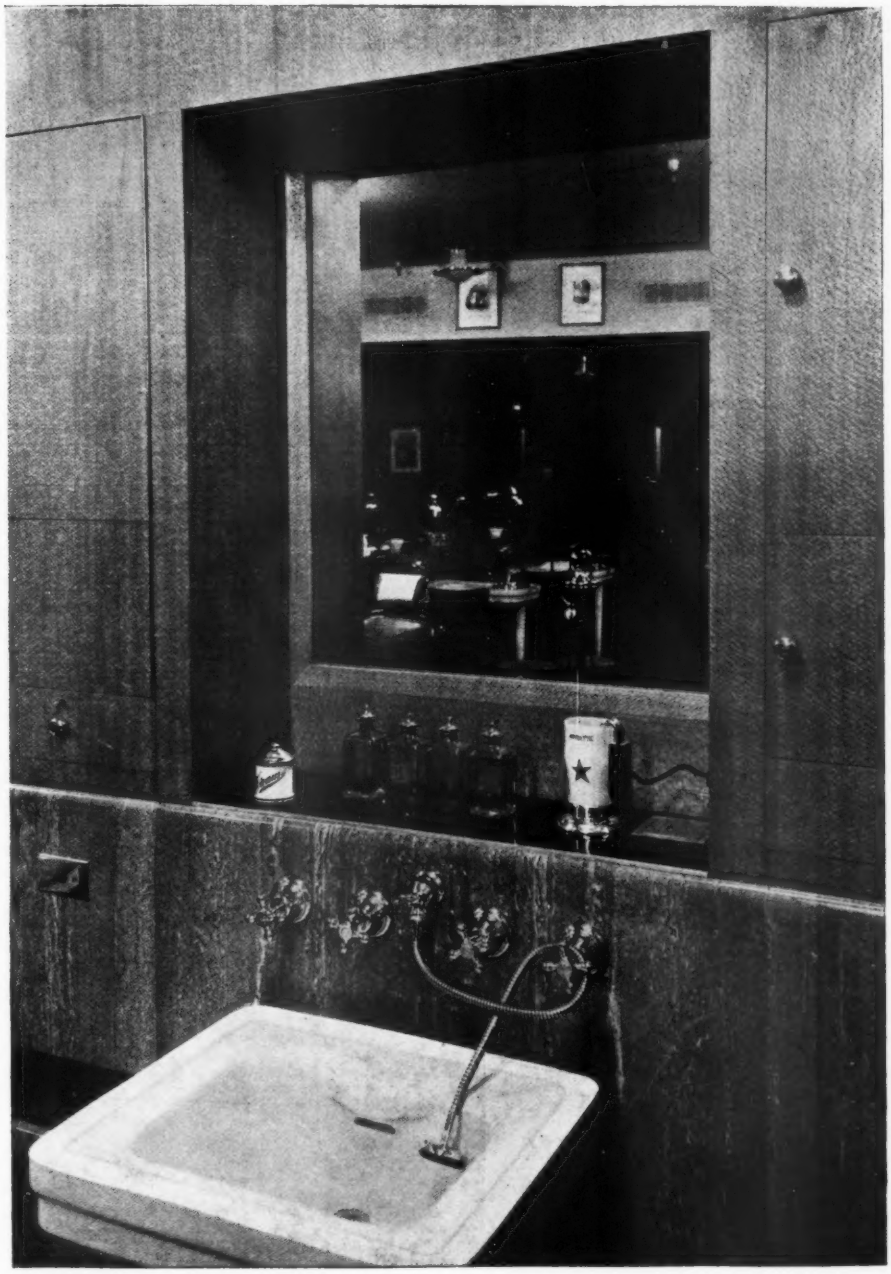
In Vienna and other European cities, no matter how simple the building, there is nearly always one little spot of sculpture introduced, mostly of a very interesting and pleasing individuality; expressing the locality or purpose of the building. The cost is only fractional in comparison with the main cost and yet it raises the whole tone and personality of the building.

We realize the day of voluptuous decoration is past, but even in a modern block of flats there is still the courtyard, the doorway or the entrance hall, where some simple form of sculptural decoration might be introduced.

W. AUMONIER,
London

WORKING DETAILS : 311

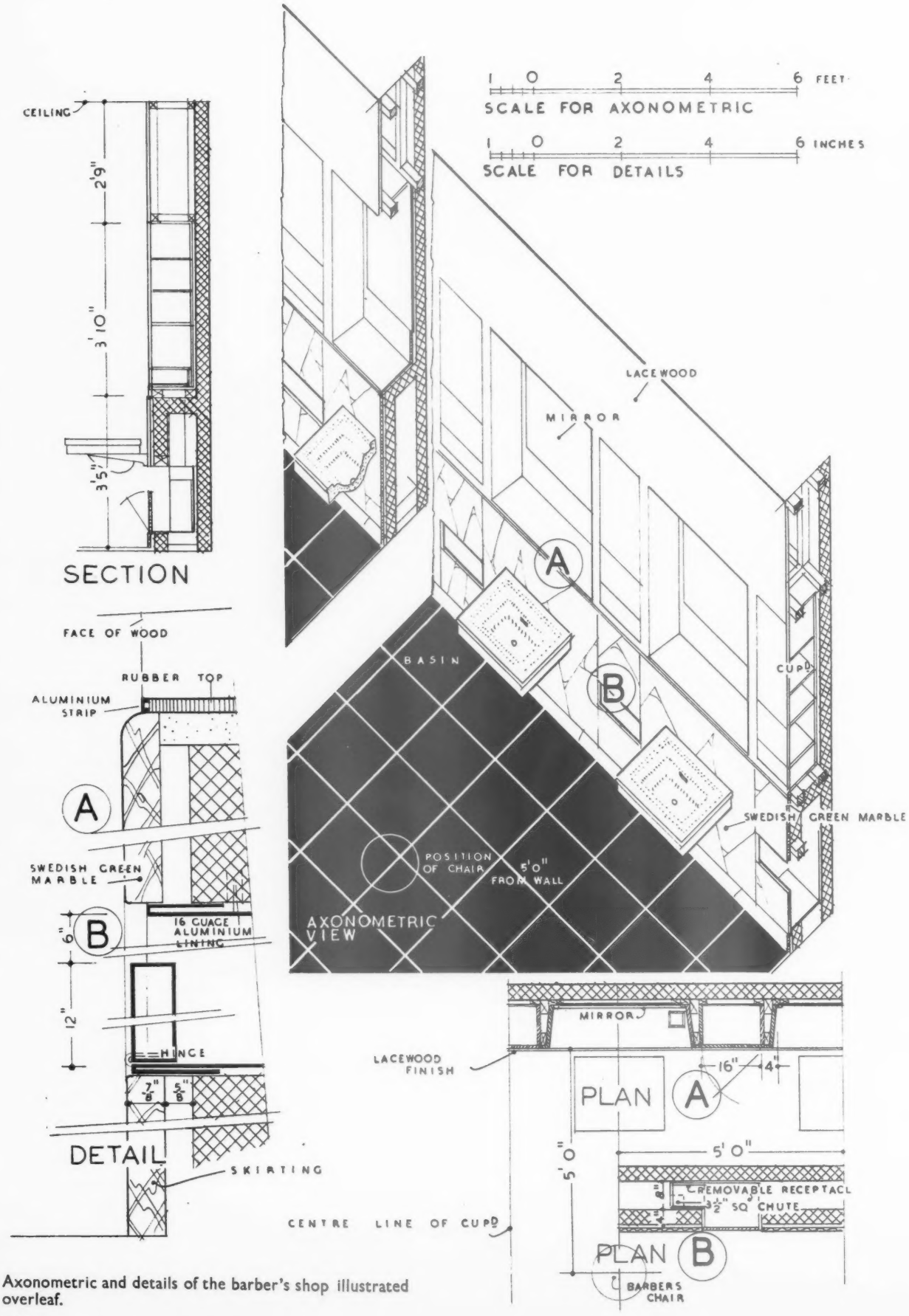
BARBER'S UNIT • BARBER SHOP, ROCKEFELLER CENTRE, NEW YORK • A GROUP OF ARCHITECTS



A detail of one of the basins and surrounding fittings in the barber's shop of the Rockefeller Centre. The shop contains seats for twenty clients, and all service pipes, toilet requisite cupboards and soiled towel bins are concealed behind flush panelling of green marble and lace wood. An axonometric and details appear overleaf. The architects for the shop are as follows : Reinhard and Hofmeister, Corbett, Harrison and Macmurray, Hood and Fouilhoux.

WORKING DETAILS : 312

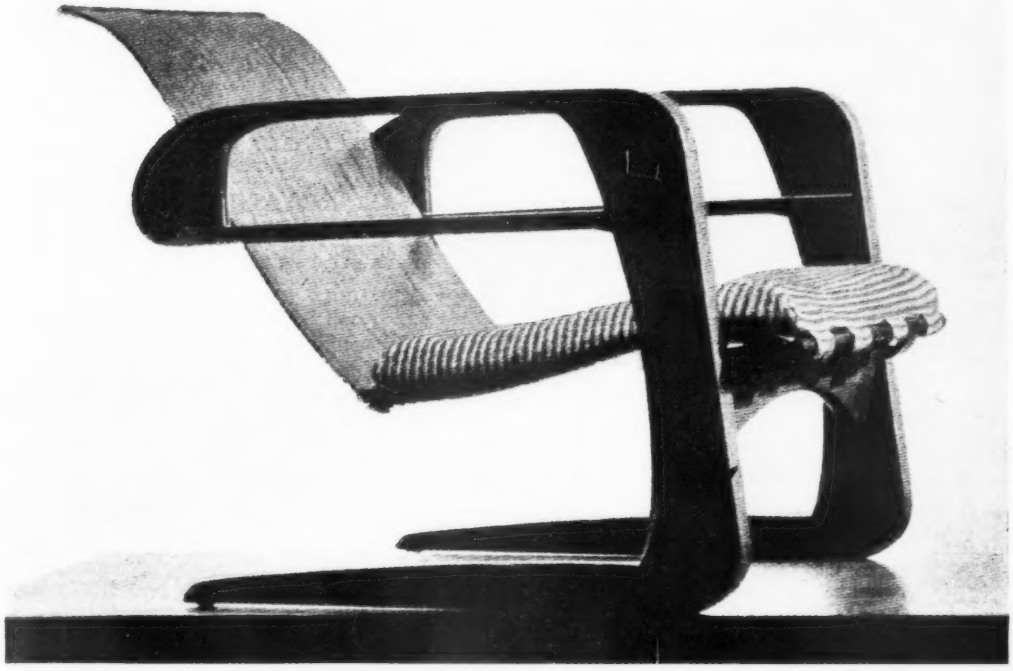
BARBER'S UNIT • BARBER SHOP, ROCKEFELLER CENTRE, NEW YORK • A GROUP OF ARCHITECTS



Axonometric and details of the barber's shop illustrated overleaf.

WORKING DETAILS : 313

HICKORY AND PLYWOOD CHAIR • DESIGNED BY KEM WEBER

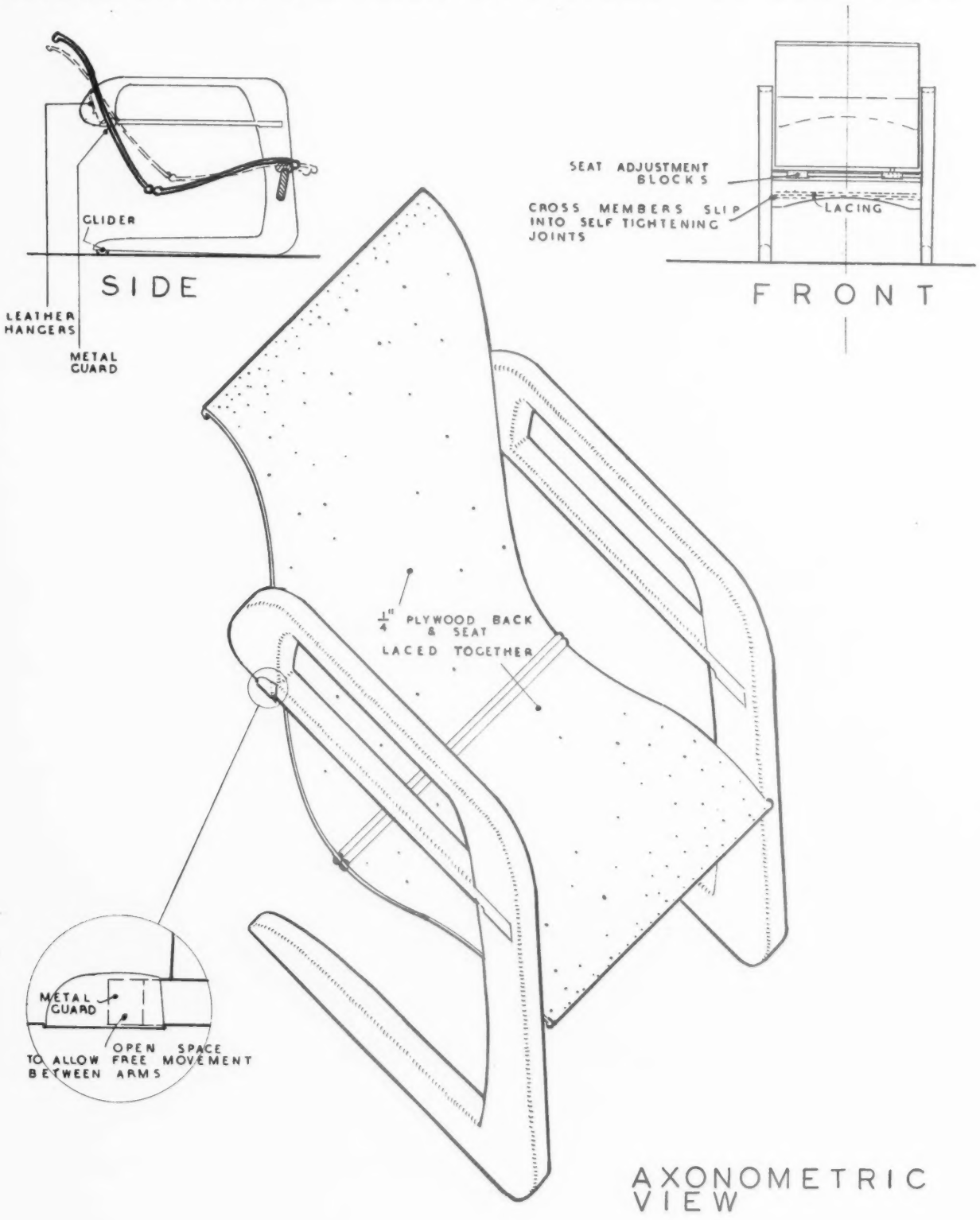


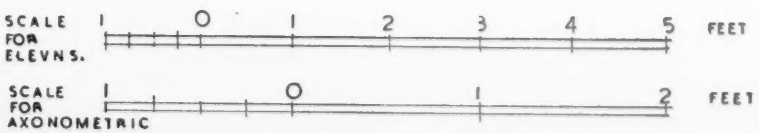
This chair, in hickory and plywood, was designed to achieve strength and resilience in a constructional form as light as possible. The chair is built on the bow principle. The two upper horizontal members are not housed solid, but obtain resilience and an ultimate strength by the transference of stresses. The rear block of the upper rail is structurally one with that rail and, as it bends under pressure, the distance between its lower end and the front of the chair is decreased. Between this block and the rear end of the lower rail there is a space left. Under a pressure of 300 lb. this space is closed, transforming the load into compressive and tensile stresses in the lower and upper rails. An axonometric and details of the chair appear overleaf.

FILING REFERENCE:

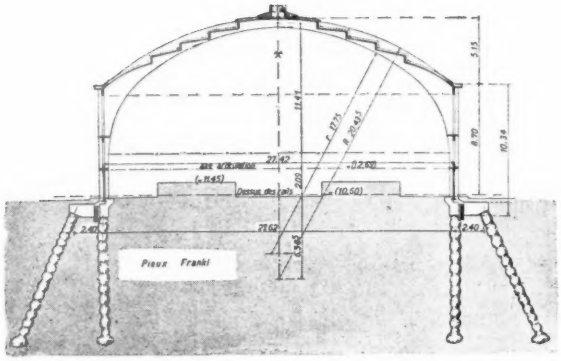
WORKING DETAILS : 314

HICKORY AND PLYWOOD CHAIR • DESIGNED BY KEM WEBER





Axonometric and details of the chair illustrated overleaf.



PERIODICALS

JUNE AND JULY ANTHOLOGY

AMERICA

Architectural Forum

(Monthly $1; 220 East 42nd Street, New York)

JUNE. An extremely interesting desert research hospital in Arizona by Leland W. King, constructed largely from prefabricated parts, the frame being site-welded and the whole building faced with 24 gauge galvanized sheet steel. A country house on the shore of Lake Michigan by John Lloyd Wright; access from the shore road is via a bridge to the second floor.

July. Result of the competition for the new Federal Reserve Board building, won by Paul Cret. The public-spirited survey of Historic American Buildings continues with three further examples.

Architectural Record

(Monthly, 50 cents. 115 West 40th Street, New York)

June. A number devoted to the design of hospitals and health centres, illustrated by numerous American examples and Sir Owen Williams' Pioneer Health centre.

July. The usual portfolio of current work, some of it in the worst "moderne" manner: the applied design section contains some very good and simple light fittings by Maurice Heaton, John Weber and others. Norman Bel Geddes, the industrial designer, has gone into partnership with George Howe (late of Howe and Lescaze), the new firm to do anything from engineering to stage direction.

Pencil Points

(Monthly, 35 cents. 330 West 42nd Street, New York)

June. Le Brun scholarship drawings for a planetarium; very symmetrical and heavily rendered. More measured drawings of some charming Rhode Island houses of about 1800.

The new station hall at Havre, see section above. (*From La Technique des Travaux*).

ARGENTINA

Revista de Arquitectura

(Monthly, $15 per annum. Lavalle 310, Buenos Aires)

May. A flat block by Nicolas B. Lastra, with good interiors but a less good plan: a good small house in Buenos Aires.

June. A number devoted largely to the illustration of small country houses in the modern manner. Plans are fairly normal but the window areas are kept small, presumably owing to the climate.

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CZECHOSLOVAKIA

Styl

(Monthly, 10 copeks. Bredovská Císto 3, Prague)

No. 10. A discussion between Le Corbusier and Batâ of shoe fame; two new flat blocks on fairly straightforward sites.

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FINLAND

Arkitekten

(Monthly, 15 fmk. Ainogatan 3, Helsingfors)

No. 5. Modern heating and ventilating systems; the town hall at Kotka by Erkki Huttunen, good plans and photographs.

No. 6. More about central heating, and an interesting standardized station design which may be extended to meet growing traffic demands.

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FRANCE

L'Architecture

(Monthly, 6 fr. 51 Rue des Ecoles, Paris 5e)

June. Architecture and interior decoration at the 1935 Salons. Schemes submitted in competition for various sections of the 1937 Exhibition. La Semaine de la Lumière, a dress rehearsal for the 1937 Exhibition floodlighting of public buildings and gardens.

July. An application of the work of the late P-H. Nénot. Three Paris restaurants by Charles Siclis, whose style seems to have become rather more florid since the Théâtre Pigalle.

Art et Industrie

(Monthly, 8 fr. 5 rue Montaigne, Paris 8e)

May-June. An open-air school at Suresnes by Beaudouin and Lods, and current interior work, including an excellent bedroom by Jacques Adnet.

July. The *Normandie*: some of the table glass and hardware is excellent; a few staterooms are restrained and good; the public rooms oppressive.

La Technique des Travaux

(Monthly, 10 fr. 54 rue de Clichy, Paris 9e)

June. A studio block in Amsterdam by Messrs. Zanstra Giesen and Sijmons, already illustrated elsewhere, but the accompanying article is good and the drawings are exceptionally full.

A new terminal station for boat trains at Havre. (See illustration.)

July. The Brussels Exhibition: a long article with plenty of illustrations, but little of the excellent constructional data which is usual in this magazine. A municipal casino in Algeria with some unpleasant fenestration. Repair shops for the Chemin de fer de l'Etat at Rennes-Baud: recent French railway architecture is full of interest.

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GERMANY

Baufilde

(Fortnightly, 1 m. 50. Grünstrasse 4, Berlin, S.W.19)

No. 11. Small houses in the half-timbered manner, all guaranteed Nordic.

No. 13. Church organs: layout and space occupied.

No. 14. Faience and mosaic work.

No. 15. The design of sanitary fittings and pipe runs.

No. 16. The "Thingplatz" in Rostock: a large open-air theatre for meetings and plays.

Baukunst und Städtebau

(Monthly, 1 m. 90. Bauwelt Verlag, Berlin, S.W.68)

June. Housing at Stüttgart, pitched roofs and traditional plans—very un-Weissenhof: competition designs for a new theatre in Dessau.

July. Recent country house work in North Germany, mostly traditional. The Apollo club in Amsterdam, five covered courts in a single large hall; a further instalment of dimension tables.

Baumeister

(Monthly, 3 m. Georg Callwey, Munich)

June. Reconstruction of the council chamber in the Rathaus at Wertheim, by Kindlberger and Schüssler: garden lay-outs for small houses.

July. Hospitals: useful data on planning, essential circulations and equipment: a country house near Stüttgart by Hans Schmol, a semi-modern elevation with the now inevitable pitched roof.

Bauwelt

(Weekly, 90 pf. Ullstein, Berlin, S.W.68)

June 6. Results of a competition for a new Crematorium at Cologne; recent Dutch work.

June 13. Interiors by Franz Jaud, Munich.

June. 20 Standard heating apparatus scheduled in tabular form.

June 27. More competition results: two houses by Rudolf Schwarz.

July 4. Country houses by Hans Köhler.

July 11. More work from the Atelier Poelzig, this time by Egon Eiermann.

July 18. Cracking in buildings, an article by Dr. Max Mayer: dimensions of garden buildings.

July 25. Hall dimensions; letter boxes, locks, stairs, etc.; more work by Poelzig students.

Deutsche Bauzeitung

(Weekly, 3 m. 40 per month. Seydelstrasse 6, Berlin, S.W.19)

June 5. A traditional Japanese house by Tetsuro Yoshida with a good and simple plan; current Japanese interiors by various architects.

Italy setting out to fly the Atlantic.
(From "Moderne Bauformen")

June 12. Town-planning in Berlin.

June 19. Designs submitted in competition for the Adolf Hitler Platz in Dresden.

June 26. A recent water-power scheme by Fritz Haas, faintly reminiscent of the Neckar buildings, but more traditional in feeling.

July 3. Current work in Hanover, including some good furniture.

July 10. Working-class housing near Berlin by various architects.

July 17. A new type of housing estate lay-out which seems to have some advantages from the point of view of traffic.

July 31. A school at Grausee and a police house in Kurmark by Sepp Scherer.

Innen Dekoration

(Monthly, 2 m. 50. Neckarstrasse 121, Stüttgart)

June. Two country houses of no particular merit; recent interiors by Ernest Lichtblau.

July. A good country house by Hans Lüttgen; English interior decoration, illustrated by the work of Arundell Clarke.

Moderne Bauformen

(Monthly, 2 m. 25. Julius Hoffmann, Stüttgart)

June. Sculpture in Germany and in Italy (see illustration). American country houses; recent Viennese furniture; student's work at Darmstadt University—very illuminating.

July. Houses in the Rhineland by Joseph op gen Oorth; alterations to a café in Cologne.

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HOLLAND

Bouwkundig Weekblad Architectura

(Weekly, 15 florins per annum. Weteringshaus 102, Amsterdam)

June 1. New council chamber for the town hall of Utrecht by F. Spanjaard; a new Zeiss planetarium in Stockholm by Ragnar Östberg.

June 15. Brussels Exhibition.

June 22. The Van Heutsz monument in Amsterdam, and a country house by J. Beckering Vinkers.

June 29. A visit to the *Normandie*, illustrated article.

July 6. The new "Boymans" museum at Rotterdam by A. van der Steur—a fairly typical courtyard plan.

July 13. Industrial School at Haarlem by Dick Greiner.

July 20. The jury's report in a competition for a Synagogue at Amsterdam: several schemes are illustrated.

July 27. A good new station approach and footbridge by S. van Ravesteijn.

de 8 en opbouw

(Fortnightly, 30 cents. Amstel 22, Amsterdam C.)

No. 14. Week-end houses in Switzerland, recent work by members of C.I.A.M.

No. 15. A town plan for the seaside resort of Bloemendaal.

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HUNGARY

Tér és Forma

(Monthly, 4 pengös. Teréz Körút 56, Budapest VI)

No. 6. A general review of recent European work; buildings at the current International Fair in Budapest.

No. 7. A working-class housing block in Budapest; open courtyards with a normal flat unit; Havlicek and Honzik's pensions office in Prague.

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ITALY

Architettura

(Monthly, 18 lire. via Palermo 10, Milan)

June. The replanning of Tokyo after the earthquake of 1923; buildings for the agricultural exhibition at Bologna.

July. Two flat blocks in Rome by Mario Luciano; competition results, and a well-illustrated article on broadcasting studios and buildings.

Rassegna di Architettura

(Monthly, 15 lire. via Podgora 9, Milan 105)

June. Recent housing in Milan; competition results.

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SPAIN

Arquitectura

(Monthly, 4 ptas. Calle de la Cruzada, Madrid)

June. Two new covered markets in Madrid; results of a competition for a new racecourse lay-out; alterations and additions to a large car showroom and garage.

July. Result of a competition for a new museum.

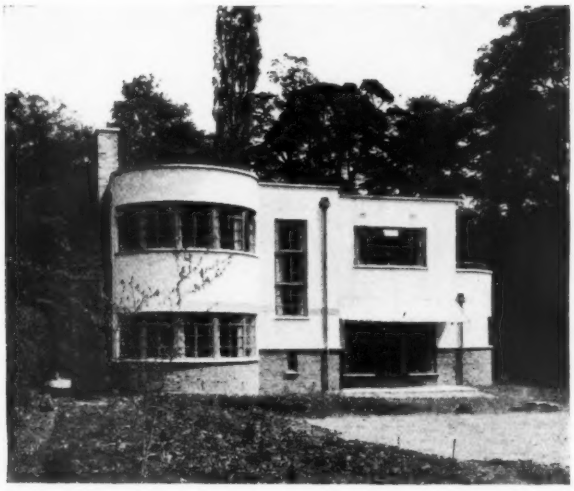
Viviendas

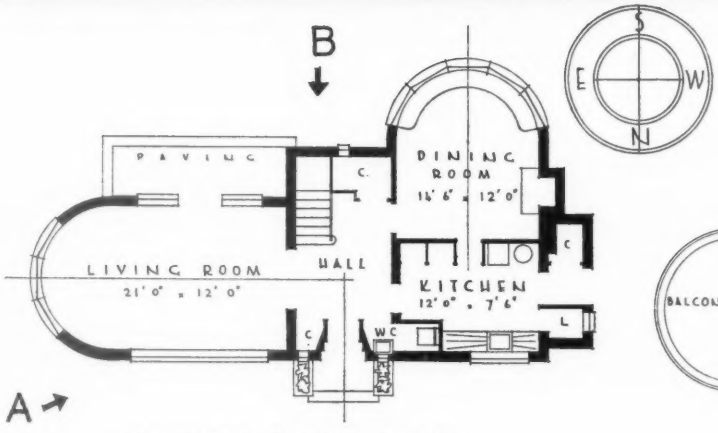
(Monthly, 32 ptas. per annum. Abascal 35, Madrid)

No. 35. Recent central European houses, no Spanish work.

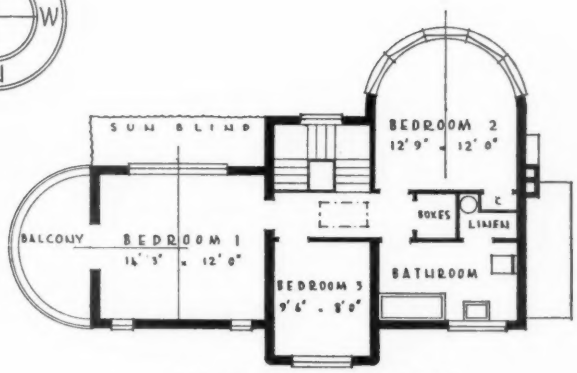
No. 36. Much the same, save for some interiors by J. Duncan Miller.

HOUSE AT ENFIELD, MIDDLESEX





GROUND FLOOR PLAN



FIRST FLOOR PLAN

PLAN.—*This house was built for a musician who particularly required a large living room with a circular end for his grand piano. The plan is arranged so that the living room can be thrown open to the hall by double doors for the holding of small private concerts.*

The walls are in orange facings (plinth) and flettons 9 ins. thick above, the latter rendered externally with a water-repellent tinted cement. The roof is of bituminous sheeting. The projection over the front door is cantilevered on R.S.J's which run the whole depth of the building.

FINISHES : EXTERNAL.—*Rendering is in cream tinted cement with a scraped finish. The paint is bright green. The paving is in 2 ft. by 1 ft. cast concrete slabs. The cills and coping, string course and canopy to side door are in cream precast concrete. The orange facing bricks are pointed in a buff mortar.*

INTERNAL.—*Walls are plastered and distempered, except in the hall, where they are finished with plastic paint. The kitchen floor is in buff jointless composition flooring. The bathroom floor is of wood composition, otherwise the floors are pine tongued and grooved wood blocks on ground floor and deal boards above. All ceilings are of insulating board with skim coat of plaster.*

Above, the elevations from **A** *and* **B.**

DESIGNED BY BATES AND BISHOP

SWEDEN

Boet

(Monthly, 1 kr. 50. Kristinelundsgatan 11, Gothenburg)

June. New wooden furniture ; current glassware.
July. Furnishing in a recent middle-class flat block.

Byggmästaren

(Weekly, 15 kr. per annum. Kungsgatan 32, Stockholm)

June 5. New types of flat block construction.
June 26. Small week-end houses, mostly of wood.
July 2. A new warehouse building at Malmö.

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SWITZERLAND

Schweizerische Bauzeitung

(Weekly, 1 fr. Dianastrasse 6, Zürich)

June 1. R.C. construction.
June 8. Gymnasium at Schaffhausen, by Scherrer and Meyer.
June 15. Electrical heating and some railway notes.
June 22. Results of a competition for a new school at Birmensdorf.
June 29. Mainly civil engineering projects.
July 6. Competition results : the *Normandie*.
July 20. The "Urban" cinema and hotel at Zürich, by M. Hauser.

Werk

(Monthly, 3 fr. 60. Muhlebachstrasse 59, Zurich)

June. Current Swiss work of varying merit.
July. The Swiss Pavilion at Brussels—a full description of the building.

BLOCK OF FLATS, NORTH

DESIGNED BY J. J. DE SEGRAIS

SITE.—*The site is rectangular, with a frontage of 66 ft. overlooking Clapham Common and a depth of 186 ft. The building replaces some of the last surviving houses of the manor of Okeover, an area of considerable historical interest.*

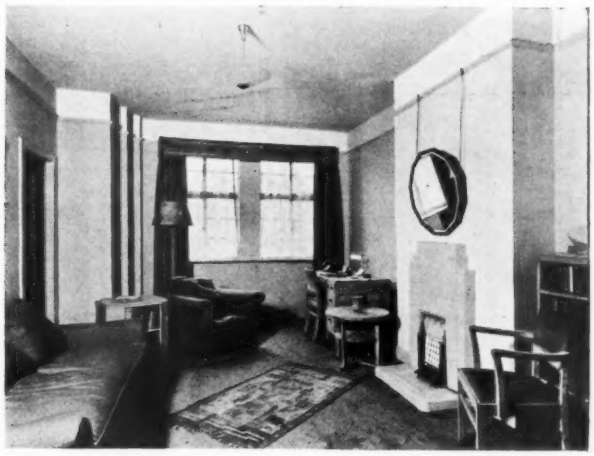
PLAN AND CONSTRUCTION.—*The plan form results from an attempt to secure natural lighting, and if possible sunlight, for every room in the building, including entrance halls and stairways. With this object the main staircase is flanked by two lighting areas and the rear of the building is orientated to take advantage of afternoon sunlight. The building is a four-storey structure with weight-carrying brick walls and hollow tile floors, and contains 20 flats at rents ranging from £86-£175 per annum, inclusive of service. The principal elevation is faced with multi-coloured hand-made bricks. The flats are soundproofed both in partitions and floors by patent insulating board. Windows are wide—flange metal throughout. On the lower ground floor is a covered loggia overlooking the garden behind the building.*

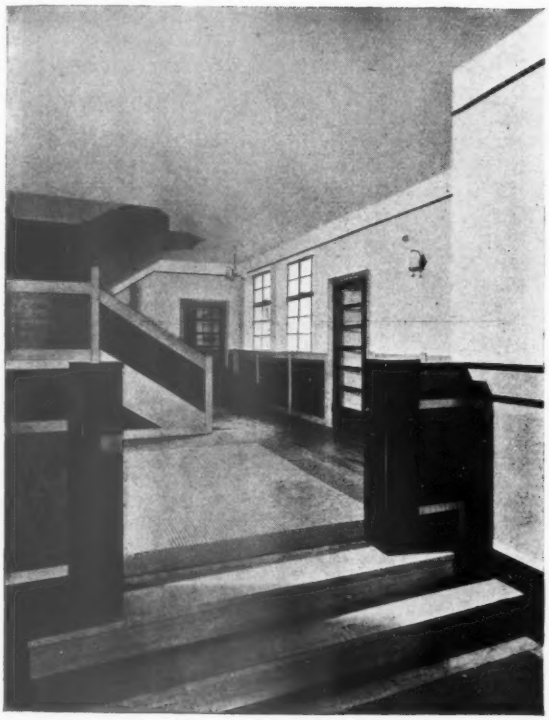
All reception rooms and the larger bedrooms are fitted with coal fires, but alternative heating by gas or electricity is also provided for.

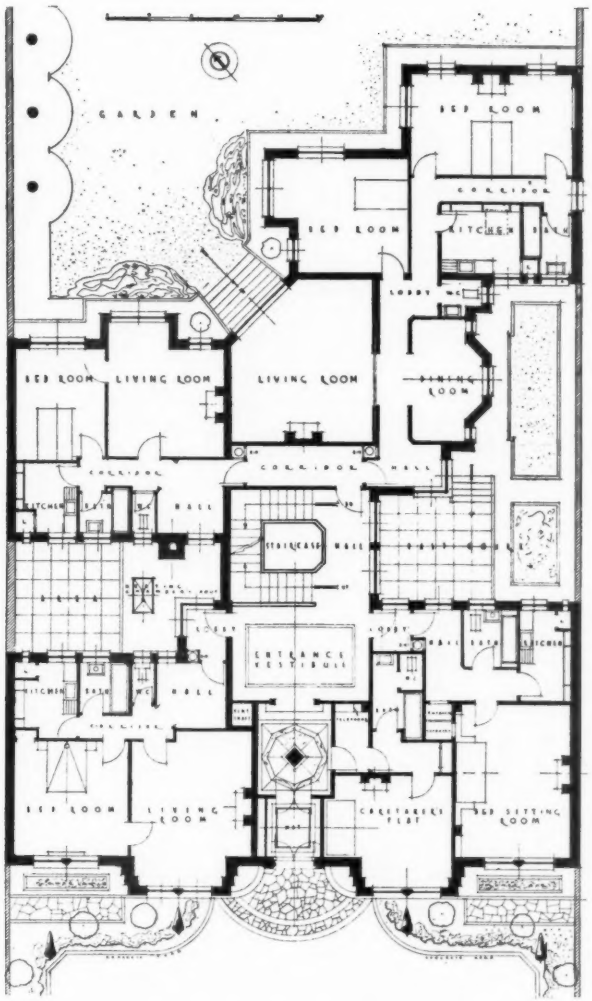
Above, the principal elevation; left, a detail of the main entrance.

For List of general and sub-contractors see page 285.

SIDE. CLAPHAM COMMON, S.W.







GROUND FLOOR PLAN

The photographs on this page show the main entrance hall from the entrance vestibule, and a typical living-room in one of the flats.

TECHNICAL SECTION: 27

HEATING, AIR CONDITIONING AND MECHANICAL EQUIPMENT

BY OSCAR FABER

O.B.E., D.C.L., D.Sc., M.Inst.C.E., Hon.A.R.I.B.A., A.M.I.E.E., F.C.G.I., M.I.H.V.E., M.Am.S.H.V.E.

AND J. R. KELL, M.I.H.V.E.

PIPE SIZING FOR HOT WATER SUPPLY SYSTEMS

(*a*) PRIMARY CIRCULATION (DIRECT SYSTEM)

THE sizing of the pipes connecting boiler and cylinder on the direct system should be ample, in order, first, to allow for the furring which will inevitably take place in them if the water is hard, and, secondly, so that the frictional resistance may be so low that a brisk circulation takes place.

The sizes may be calculated in exactly the same manner as already described for a heating system operating by gravity circulation, taking the circulating head as the difference of pressure between the hot rising and cold falling columns from centre of boiler to centre of cylinder, with a temperature drop of, say, 50 deg. This head, divided by the length of travel of flow and return, including bends, etc., will give the circulating pressure per foot of pipe, from which the pipe size necessary may be determined from Table XXXIX. Alternatively, the sizes based on return 50 deg., flow 100 deg., height from centre of boiler to centre of cylinder 4 ft., travel, including bends, etc., 30 ft., may be taken from the following table :—

TABLE XLIX

SIZE OF PRIMARY FLOW AND RETURN MAINS FOR "DIRECT" SYSTEM

Size	Maximum B.T.U.'s per hour transmitted
1¼ in.	40,000
1½ ,,	70,000
2 ,,	150,000
2½ ,,	275,000
3 ,,	450,000
4 ,,	975,000
5 ,,	1,640,000
6 ,,	2,700,000

A size of 1¼ in. should be considered a minimum even for the smallest boilers owing to the necessity of allowance for furring.

It must be remembered that the maximum output of a hot water supply boiler is required at periods of heavy draw-off—that is, when the bottom of the cylinder is certain to be cold.

As the heating of the water in the cylinder proceeds and the return to the boiler rises in temperature, the flow temperature will also rise, though not by the same amount, since the circulating head at higher temperatures will be increased and more water will be passed. Thus, when the water is returning to the boiler at 140 deg. F., an equal heat transmission will be taking place with the same pipe sizes with a flow at 174 deg. F.—that is to say, a 34 deg. rise as against 50 deg. F. At this point, however, the output from the boiler should be reduced so as to meet the radiation losses only, otherwise the temperature will continue to mount, which, in most cases, would be unnecessary and wasteful.

This adjustment of the boiler output is to a small extent automatic, since the efficiency at the higher temperatures will be less than at the lower. Similarly, as the temperature of the system as a whole rises, the radiation losses will increase, until with a system having long mains and a small boiler the output will be completely balanced by the emission, and no further temperature rise will be possible.

It will be seen from the above that the primary circulation is a constantly varying one, and as the maximum duty is required at the poorest circulating temperatures, great care should be exercised in seeing that the piping is kept as short as possible with easy radius bends to avoid undue resistance.

(*b*) PRIMARY CIRCULATION (INDIRECT SYSTEM)

With the indirect system, no allowance need be made in the sizing of the primary circulation for furring since the same water is constantly re-used.

A rapid circulation is essential as the transmission of heat from the primary to the secondary water, through the walls of the heating coils, depends on a difference of temperature being maintained right through to the outlet.

The flow and return temperatures may be taken at higher figures than with the direct system, since with a combined heating and hot water supply apparatus the primary water circulation will be the same as that supplied to the radiators at, say, 180 deg. flow and 140 deg. return in cold weather, or 160 deg. flow and 120 deg. return in milder weather. For the purpose of calculating the H.W.S. primary circulation, the latter temperatures should be assumed.

Where the indirect cylinder or calorifier is served from a boiler whose sole duty it is to provide hot water supply, it is of advantage to run this at as high a temperature as possible so as to make the heat exchanging surface of the coils as effective as possible.

The following temperatures may be assumed with buildings of various heads :

TABLE L

INDIRECT SYSTEM. Height of Feed and Expansion Tank above boiler	PRIMARY CIRCULATION Temperature Flow Deg. F.	Temperature Return Deg. F.
Up to 20 ft. ..	180	140
20 to 50 ft. ..	220	180
50 to 100 ft. ..	240	200
Over 100 ft. ..	260	220

The following table, based on a flow and return temperature of 160 deg. F. and 120 deg. F. respectively for a combined system, a height from centre of boiler to centre of calorifier coils of 4 ft., and a travel of 30 ft., plus resistance of indirect coil, say 10 ft. = 40 ft., gives the heat transmitted by the various pipe sizes :—

TABLE LI

SIZE OF PRIMARY FLOW AND RETURN MAINS FOR "INDIRECT" SYSTEM

Size	Maximum B.T.U.'s per hour transmitted
1 in.	20,000
1¼ in.	40,000
1½ in.	70,000
2 in.	145,000
2½ in.	265,000
3 in.	430,000
4 in.	940,000
5 in.	1,580,000
6 in.	2,620,000

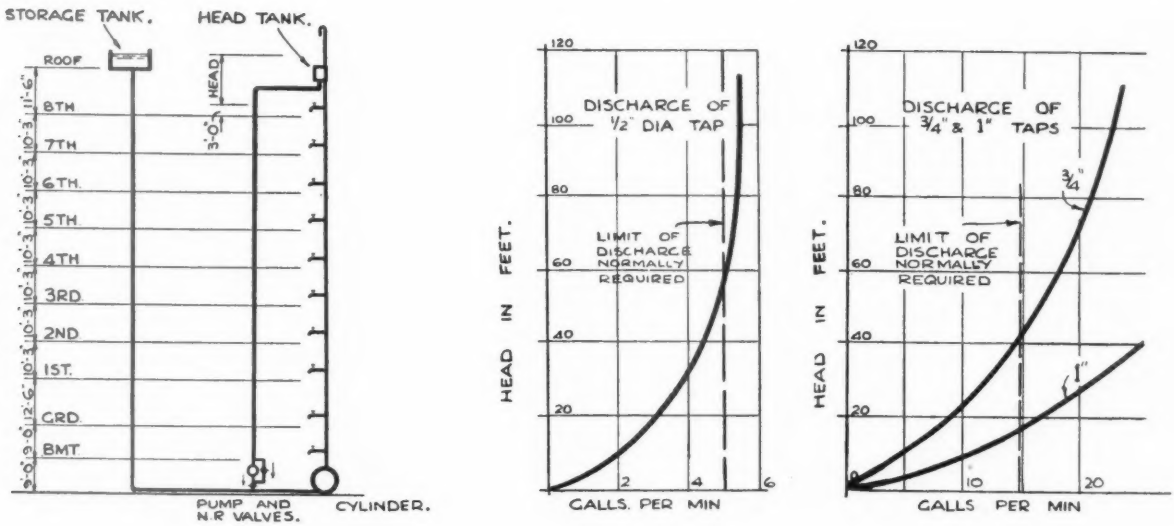
(*c*) OUTFLOW FROM TAPS

The sizes of the pipes from the tank to the cylinder and from the cylinder to the taps depend on the outflow from the latter, and not in any way on the boiler load.

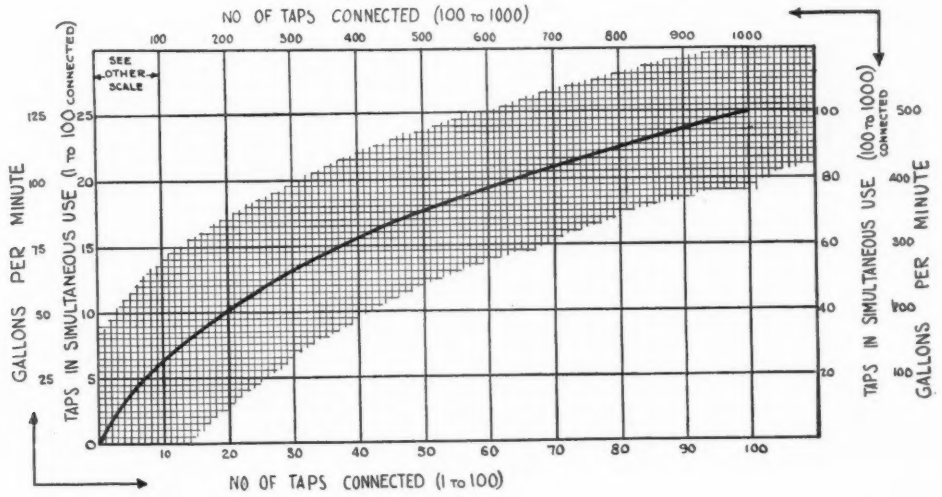
Information is in the first place required as to the number and positions of taps and their size.

From the curves of Fig. 156 may be taken the outflow from taps of the commonly used sizes for various heads from tank to tap level. These curves are the results of tests on an installation in which the taps were connected by short pipes to a relatively large riser at each floor, so that the discharge is greater than would be obtainable in the average case, but the shape of the curves is typical.

The practical limit of discharge



Above: Figure 156. *Discharge from hot-water taps (see text).*



Right: Figure 157. *Table showing probable simultaneous draw-off for varying number of taps connected.*

necessary may be taken at a maximum five galls. per minute for a ½ in. tap, and 15 galls. per minute for a ¾ in. tap. Though these discharges will not be obtainable at low heads, they may be assumed in all cases for simplicity.

The next stage is to determine the number of taps which will be open simultaneously. Obviously all the taps in a building would not be discharging water at the same instant. For example, it may take a ½ in. tap 12 seconds to deliver enough water mixed with cold for a hot wash, but it will be found that at least a further 30 seconds elapse before the washing is completed and probably a further 30 seconds before the next person turns on the same tap. This is a ratio of 12:60 or 1/5.

Similarly it may take two minutes to fill a bath but at least 20 minutes elapse before the next bather is opening the tap again. This gives a proportion of 2:20, or 1/10.

The proportion of taps open simultaneously must depend to a large extent on the number of taps installed, as in the case of two taps served by a single pipe, both might easily be open at once. On the other hand, if 50 taps are connected to the same main, the number in use at any moment could never conceivably be 50.

Fig. 157 shows the number of taps which may be assumed to be open simultaneously, plotted against the total number of taps connected. The same curve may be used for installation up to 100 taps, or from 100 to 1,000 by referring to the appropriate scales. This basis has been found to be quite safe in practice over a considerable number of different types of building, and its correct application may save considerably in the size of mains called for by the more rule of thumb methods often employed. Obviously the ratio of taps open simultaneously to taps connected will vary for different types of building and caution is required before applying the curve to special cases which must be considered on their merits.

Having established the number of taps open simultaneously, and hence the quantity of water flowing, the next stage in the sizing of the pipes is to determine the head available for delivering the water. This is the gravity head or distance between the lowest water level in the supply tank and the topmost tap. Obviously the topmost must be taken as this is bound to be the worst case with the up-feed system generally employed for hot water services.

This head must deliver the calculated quantity of water through the pipes, and as the length of the latter can be measured from the plans, making due allowance for bends, etc., as for a heating system, and for a small residual pressure of say 2 ft. for the final delivery pressure from the tap, the available head per foot run of pipe may be calculated. Knowing this figure, the sizes of pipes necessary for the estimated deliveries can be read from Table XXXIX, though it must be remembered that the latter is expressed in lbs. per hour for pressure losses expressed in inches of water column, whereas the calculations above described have been on the basis of gallons per minute

and feet head. For convenience Table LII gives this data over the range normally required, expressed in gallons delivered and resistance in feet of water column per 100 foot run.

The example given below will help to make the above methods clear.

EXAMPLE OF HOT WATER SUPPLY

Sizing secondary flows :

Considering the system shown in Fig. 158(*a*) supplying ½ in. and ¾ in. taps, and assuming the draw-off per tap to be 5 g.p.m. for ½ in., and 15 g.p.m. for ¾ in., we may arrive at the equivalent number of ½ in. taps (at 5 g.p.m.) on the basis of one ¾ in. tap being equivalent to 3—½ in. These equivalent totals are marked on the diagram (*a*) for each branch.

The total number of taps for each section of the risers and main may then be found by progressive addition, as shown, i.e., the water for 85 tap passes point X on riser A.

Referring to Fig. 157, which shows the number of taps which may be expected to be in simultaneous use, the diagram may now be marked with the number of taps to be catered for simultaneously at each point. (It will be noted that Fig. 157 also gives the gallons per minute direct, based on 5 g.p.m. per tap.) Thus for 85 taps connected at point X, 23 may be expected to be in simultaneous use, requiring 115 galls. per minute. The total quantity in g.p.m. for each point is added to the diagram, as in Fig. 158(b). The total draw-off from the cylinder is seen to be 180 g.p.m. This will also be the quantity to be delivered from the cold feed.

From the sizing of the pipes we require to know the head H and travel T for the worst case, i.e., for riser C. This is for the top floor taps where :

H = 18 ft.—2 ft. (residual head at tap) = 16 ft.

T = (say) 70 (drop) + 50 (rise) + 70 (horizontal) + R = 190 + R.

(Resistances R are estimated as for a heating system by totalling the number of bends, etc., and assuming an average size and velocity. Reading from the table at the bottom of Table LII an equivalent foot run for R = 1 may be

TABLE LII : FLOW IN PIPES FOR H.W.S. SYSTEMS.

a) "F" IS THE HEAD-LOSS IN FT. W.G. PER 100 FT. RUN OF PIPE FOR GIVEN QUANTITY (IN GALLONS PER MIN.) FLOWING IN VARIOUS SIZED PIPES:-

	HEAD LOSS "F"	DIAMETER OF PIPE ½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"
V = 1 FS	0·5	0·31	1·0	2·1	3·7	6·0	13·0	23	39	83	145	235
	1·0	0·47	1·4	3·0	5·4	8·7	19·0	34	57	122	210	345
	1·5	0·59	1·7	3·7	6·8	11·0	23·5	43	70	153	260	430
	2·0	0·68	2·0	4·3	7·8	12·8	27·5	50	82	175	305	500
	2·5	0·76	2·2	4·9	8·8	14·5	31	57	93	200	345	565
	3·0	0·83	2·4	5·3	9·7	15·8	34	64	102	220	380	620
	4·0	1·00	2·9	6·2	11·4	18·5	40	73	119	260	440	720
V = 3 FS	5·0	1·10	3·3	7·0	12·8	21	45	82	134	290	500	800
	7·5	1·35	4·0	8·7	15·9	26	56	103	167	365	620	960
	10·	1·6	4·7	10·3	18·8	30	66	121	197	430	700	1140
	15·	1·9	5·7	12·8	23	37	81	133	230	500	830	1310
	20·	2·3	6·7	14·9	27	43	93	163	265	565	940	1480
V = 6 FS	25·	2·6	7·5	16·8	31	47	103	179	295	610	1040	1600
	30·	3·0	8·3	18·0	34	51	112	190	320	660	1130	1730
	40·	3·5	9·5	20	39	59	126	213	375	740	1290	1910
V = 10 FS	50·	4·1	10·7	23	43	65	140	234	420	815	1440	2090
	60·	4·6	11·7	25	47	71	153	254	465	880	1570	2250
	70·	5·0	12·6	28	50	76	165	273	505	960	1690	2400
	80	5·4	13·5	30	54	81	175	288	540	1020	1800	—
	90·	5·7	14·3	32	57	86	185	305	575	1090	1900	—
	100·	6·0	15·0	34	60	90	195	320	605	1150	2000	—

THICK ZIGZAG LINES ARE FOR VELOCITIES OF 1 3 6 10 20 AND 30 F.SEC WATER AT 165°F
V = 20 F.S. → V = 30 F.S. →

b) RESISTANCE OF FITTINGS. TABLE SHOWS EQUIV. FOOT RUN OF STRAIGHT PIPE FOR R = 1 . FOR VARIOUS VELOCITIES:—

VEL. FEET /SEC.	DIAMETER OF PIPE ½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	5"	6"
1 0	1·4	2·0	3	4	5	7·5	10	13	18·5	22	28
3 0	1·6	2·5	3·5	4·5	6	9	12	15	21	27	33
6 0	1·8	2·5	4	5·5	7	9·5	13	16·5	23	30	36
10·	2·0	3·0	4·5	6	7	10	14	18	25	31	38
20	—	—	—	—	7·5	11	15	20	27	33	40
30·	—	—	—	—	—	—	—	22	29	35	42

GATE-VALVE OR PLUG-COCK	R = 0·5	TEE, STRAIGHTWAY	R = 1·0
BEND, SHORT RAD.	R = 2·0	TEE BRANCH	R = 1·5
BEND, LONG RAD.	R = 1·0	ENLARGEMENT	R = 1·0

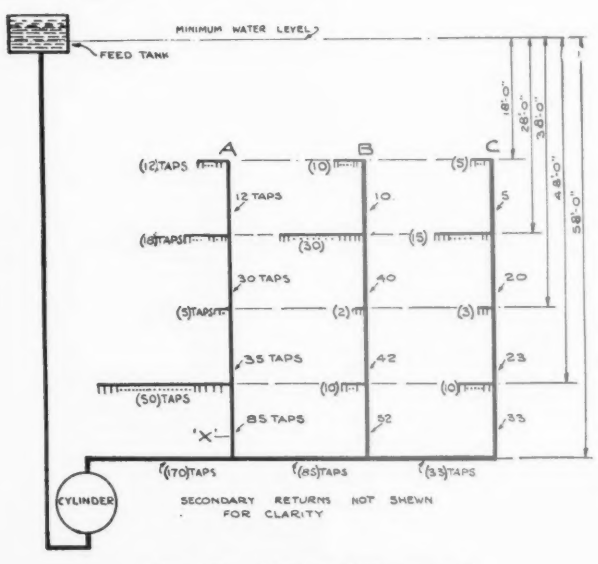


Figure 158a. *Number of taps connected.*

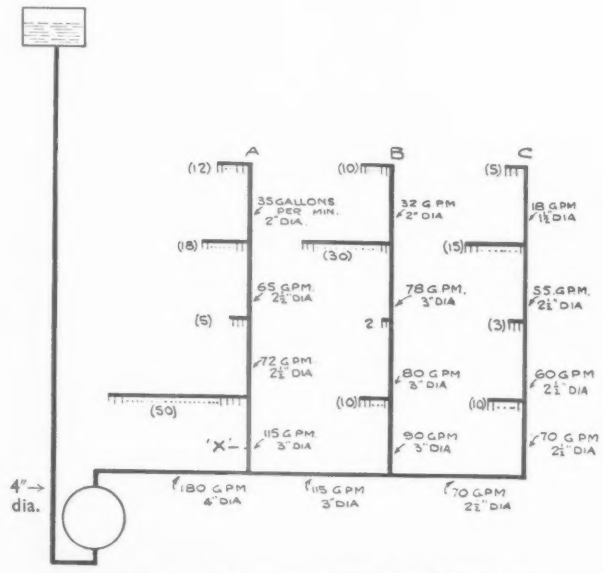


Figure 158b. *Simultaneous draw-off and pipe sizing.*

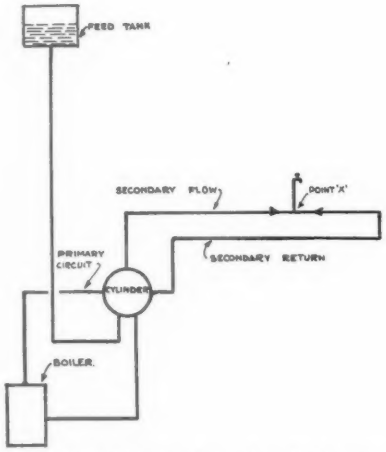


Figure 159. *Showing flow of water in secondary circulation when a tap is opened.*

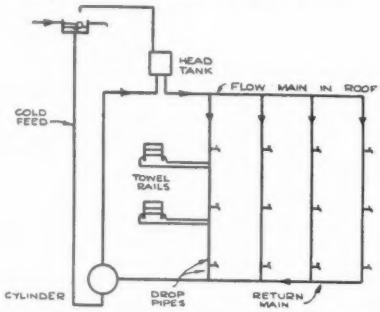


Figure 160. *Down feed hot water service system.*

obtained.) Assume 10 long bends of R = 1, size 4 in. and velocity 3 ft./sec. (i.e., 21 for R = 1).

Equivalent R = 10 × 1 × 21.
= 210 ft.

Therefore T = 190 + 210 = 400 ft.

Total T.

$$\frac{H}{T} \text{ per 100 ft.} = \frac{16}{4.0} = 4.0.$$

Reading from Table LII for F = 4·0, we may now construct a schedule of deliveries as follows :

Size. in.	G.p.m.
$\frac{1}{2}$	1·0
$\frac{3}{4}$	2·9
1	6·2
$1\frac{1}{4}$	11·4
$1\frac{1}{2}$	18·5
2	40
$2\frac{1}{2}$	73
3	119
4	260
5	440

from which the pipe sizes may be added, as shown, to the diagram.

In this example the following points should be noted :—

1. It is assumed that the system is of plain up-feed riser type. An alternative arrangement of this system is given on Fig. 160, which operates on the down-feed principle. This latter system is not favoured by the authors, who find the up-feed system meets all practical cases satisfactorily. The down-feed method involves much large piping at or near roof level which is often difficult to accommodate, and the single drop feeds through each lavatory or bathroom do not permit so easily of towel airers and linen cupboard coils being served as these branches operate by gravity circulation only from the single pipe, whereas with the up-feed system they are served in parallel, so gaining the circulating pressure due to their height above the cylinder, or due to the pump, if one is used. Furthermore all the drops are on the return side of the system so that full advantage of the higher temperature flow water is not made use of at the taps. A second alternative is shown in Fig. 161. This is an up-feed of a special type but will not work without a pump.

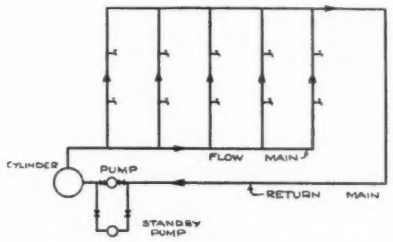


Figure 161. *Pump circulated up-feed hot water service system.*

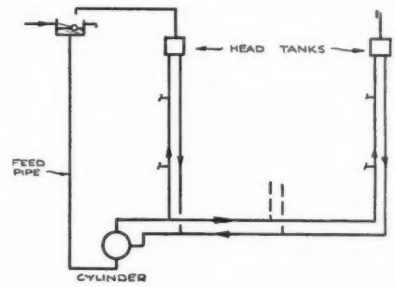


Figure 162. *Hot water service system with separate head-tanks.*

2. In order to assist the pressure on the topmost taps in buildings in which the supply tank is only a few feet above the highest draw-off points, it is possible to provide a circulating hot water head tank or cylinder of 30 or more gallons capacity at the top of each riser with a vent pipe carried above the supply tank level, as shown in Fig. 162. At periods of heavy draw-off on the lower floors of any particular riser when the supply to the top floor might tend to be reduced this tank will supply the riser downwards by drawing on its storage, so ensuring a good supply of all levels. As it is unlikely that the heavy draw-off continues for more than a minute or so the tank will not have emptied before the demand ceases, when the level in the system will balance up again by water flowing up the riser in the normal way.

3. It should be noted that the effect of head tanks has not been taken into account in the sizing of the pipes in the example given. Where such allowance is made for them it may take the form of ignoring the top floor altogether, in which case the head available for the system may be taken as that to the next floor down, on which taps are placed. If this is done it should be seen that the capacity of the tank or cylinder is adequate for say two minutes flow from the topmost taps.

4. No account has been taken in the example of water flowing to the taps from the return pipe which occurs where secondary circulation is used without a pump. In Fig. 159, when a tap is opened at X, water will obviously flow to it in both directions from the cylinder, the water in the return pipe flowing in the opposite direction from usual owing to the gravity circulation being completely overcome by the much greater head from the tank to the tap.

This effect is, however, difficult to allow for in all but the simplest of systems, as the reduced frictional resistance brought about in the out flowing system, due to the double pipe, will vary inversely as the distance of any tap from the cylinder. Whilst its effect should not be lost sight of in specific instances, in general it may be ignored, as the result will in any event be on the safe side. This reversal of the return water is undesirable, since the mixed water delivered from the tap is cooler than that from the flow. With gravity systems this difficulty cannot be satisfactorily overcome. This is a further argument for keeping the flows larger than the returns.

5. It is assumed in the example that the flows to the lowest taps are throttled so as to prevent an outflow greater than that given by the maximum line on Fig. 156.

6. Vent pipes from the top of each riser carried above the feed tank are necessary unless it can be so arranged that the topmost tap acts as a vent when it is opened. The only disadvantage with the latter method is a tendency to spluttering at the tap until the air is released.

7. It should be noted that the cold feed pipe has to furnish the whole supply and it is a great mistake to pinch it for size. Even in the smallest installation 1 in. diameter should be the minimum size for this pipe.

8. It should be remembered that meticulous accuracy in the sizing of these service pipes is neither possible nor desirable, since the whole of the calculations are based on assumptions which may or may not be correct in practice. The best that can be achieved is to design the system on a reasonable and consistent method, such as that outlined above, which has been found in practice to give satisfactory results, provided due care is exercised in allowing for any special cases, which must be treated on their merits.

IN THAT CONTINGENCY

The following abstracts of inquiries represent a number of those recently submitted to the Building Research Station. The information given in the replies quoted is based on available knowledge. It has to be borne in mind that further scientific investigations may in the course of time indicate directions in which the replies might be supplemented or modified. Moreover, the replies relate to the specific subject of each inquiry, and are not necessarily suitable for application to all similar problems. [Crown copyright is reserved.]

Prevention of Mould Growth on Plaster

¶ *AN architect required guidance in the treatment of the interior wall surfaces of a house which had been damaged by fire. The walls had suffered considerably from the effects of the water used in extinguishing the flames, and from subsequent penetration of rain due to the destruction of the roof. Mould was reported to be appearing on the soaked wallpapers, and there was some apprehension that the infection would remain permanently in the plaster and spread to the new wall-coverings.*

It is likely that, when the building referred to has been re-roofed and has dried out thoroughly, the conditions will once more become so unfavourable to mould growth that it will die out.

It would certainly be a wise precaution, however, to use a mild disinfectant in order to sterilize the affected wall surface. There are several possible alternatives. Methylated spirits or a weak solution of formalin (1 per cent. in water) would probably be effective, though objection might be raised to the risk of fire in the former case and to the irritating effects of the vapour in the latter. An equally effective treatment, which would be free from either of these defects, would be the application of a 3 or 4 per cent. solution of zinc magnesium silicofluoride in water.

Use of Magnesian Limes

¶ *A REQUEST was received for detailed information regarding the suitability of various limes for building purposes and the methods of using them. Particulars were requested of any Building Research Publications to which reference might be made in such cases and in particular information was required on magnesian limes.*

At the present time there is no Building Research Publication which would exactly meet these requirements. The Special Report on Lime and Lime Mortars, issued in 1927, is now being revised and brought into line with increased knowledge of British limes and with the Standard Specification for Building Limes, shortly to be issued by the British Standards Institution. It is possible, however, that the special report would be considered too comprehensive for this particular purpose.

The following notes on the use of magnesian limes may be useful.

In order to obtain a sound product, i.e., containing no particles which will cause trouble through "blowing" or general expansion in situ, special methods of slaking are required for magnesian limes. These methods are known and consistently practised, with good results, in the districts where such limes abound. It is when magnesian limes are used by operatives who have learnt their trade in other districts that difficulties may arise. In such cases the peculiarities of these limes may not be appreciated and they are apt to be slaked as if they were of the "hot" or rapid slaking type, such as chalk or "Buxton" limes.

Where a magnesian lime is required for plasterwork, it appears to be imperative to slake the quicklime some time in advance, using boiling water (or with some rapid slaking lime of the Buxton type admixed to give it a start), then to strain off the unslaked material and to store or age the resulting putty for three months, in place of the usual week or so with chalk and Buxton limes; otherwise there is a definite risk of slow slaking particles remaining in the finished plaster surface and causing one or other of the types of failure mentioned above.

For mortar only, however, the method of "dry" hydration may be employed and will result in considerable saving of time. In this method water is added to the quicklime to produce a mixture which is sufficiently stiff to be placed in piles. These are then covered with sand and left for some days to mature. The steam is thus conserved and advantage taken of its more rapid and thorough slaking action on the lime.

Corrosion of Steel Reinforcement

¶ *AN investigation of the cause of corrosion of steel reinforcement in concrete in a margarine factory was made at the request of the architects.*

The reinforcement in supporting the concrete floor of a cold store and an adjacent churn room was severely attacked and this had led to bursting and spalling of the concrete. The floor was washed daily with water and was sprinkled weekly with soda ash which was allowed to stand on the floor during the week-end. The floor subsequently received a thorough washing with water on the following Monday.

Initially, penetration of this water had occurred through cracks in the floor. Shortly after the first indications of corrosion the floor had been relaid and waterproofed by a firm specializing in this type of work, all cracks being carefully cut out and filled with a mastic. The damaged concrete on the beams had been removed, the rust scraped from the reinforcement and the beams subsequently re-concreted.

About five years later similar corrosion and spalling appeared again, chiefly in the beams previously affected. It was stated that since the floor had been relaid no penetration of moisture had been noted.

An inspection of the building was made by an officer of the station and samples of concrete were removed for examination.

In considering the information obtained several possible causes of the trouble have been examined, and each of these may be described briefly. In the first place, however, it must be stated that the soda used for cleaning the floor, so far from being a destructive agent, would rather tend to inhibit corrosion of the reinforcement.

With the possibility of electrolytic corrosion in view measurements were made of the potential between reinforcement and earth. A small potential was observed and since it was the same in both affected and unaffected beams it appeared improbable that electrical effects were fundamentally the cause of the trouble, although they might possibly be a secondary effect set up as a result of the corrosion.

Further, the fact that corrosion continued although penetration had practically ceased suggested the presence of a substance which had probably gained access to the concrete before the floor had been waterproofed. An examination of samples of concrete from the beams was, therefore, undertaken.

It is known that chlorides markedly enhance the corrosion of steel under certain conditions and in view of this fact attention was directed in the first place chiefly to the possibility of the presence of these salts. Negligible quantities of chloride were found in the samples of concrete from an undamaged beam but appreciable quantities in those from damaged portions. This is considered to point unmistakably to chlorides as the chief corrosive agents in this case.

Two possible sources of the salts required to be considered (a) drippings from margarine, containing salt (sodium chloride), and (b) the water used for washing the floor. Analyses of samples of fresh water and of water which had actually been on the floor both showed chloride content.

It must therefore be concluded that corrosion has been primarily due to the nature of the water supply, though access of slight quantities of salt from the manufacturing process carried out in the factory cannot be excluded. Contamination from the latter source would, however, probably not prove serious if water free from chloride had been used for washing.

It will be necessary to replace the defective beams, since complete removal of the salt from the concrete would be impossible, and it need hardly be pointed out that stringent precautions must be taken to prevent further access of salts to the reinforcement. In view of the impossibility of entirely preventing penetration at this or other places in the building, it appears advisable to change if possible to an alternative water supply.

Damp-proof Courses Over Window Heads

¶ *AN architect desired advice regarding materials for damp-proof courses over window heads and in other similar positions in a building.*

The materials available for use in positions such as that mentioned are metallic sheeting, generally lead or copper, and bituminous sheeting. While materials of the latter type are frequently used in this way with satisfactory results, it would be difficult to specify in exact terms the properties required in a bituminous sheet or to test the suitability of a particular variety for the purpose by means other than practical trial. It may be useful, however, to compare the two types of material from the points of view of (1) waterproofness, (2) durability and (3) flexibility.

1: Bituminous sheeting is probably satisfactory in this respect and metal sheeting leaves little to question.

2: The durability of bituminous sheeting is not easily judged, and difficult to specify. Further, it may suffer extrusion under load, and in positions such as over door and window heads any extrusion would be most unsightly. Metal sheet would not be subject to this defect. There may be some doubts as regards the durability of lead sheeting in contact with cement mortar, but in practice it is almost invariably used and seems to give little trouble. Copper should prove satisfactory.

3: In fixing a damp-proof course over window heads in hollow walls the material must usually be bent in two sharp bends into its required position. The liability of the sheeting to crack during bending or after it has been

in position for some time is, therefore, an important factor ; it must also be capable of retaining the desired shape. The behaviour of bituminous materials in this respect probably varies considerably according to type and quality, and generalization is, therefore, not possible. The point would require to be settled by trial on an actual sample of any particular type of sheet. Metal sheets, either of lead or copper, appear to meet all requirements.

Condensation on Internal Plaster Surfaces

¶ *ADVICE was sought on suitable treatment for the apse wall of a church which, on certain days, became discoloured internally, the joints of the brickwork showing through the plaster finish as lines of dampness. No trouble was experienced during heavy and even continuous storms, but when a period of rain was followed by hot, damp weather the markings made their appearance and remained for about 24 hours. The walls were stated to be of brick, built in mortar consisting of lias lime and ground ashes and pointed externally with a "compo" mortar. The affected portion of the wall was finished internally with a calcium sulphate plaster of the retarded hemi-hydrate type, which had been chosen as providing a suitable surface for mural paintings.*

The appearance of markings on the wall on days when the humidity of the atmosphere is high suggests that the trouble is due to condensation of moisture on the internal surfaces.

The wall in question appears to have a somewhat severe exposure, and on this account a certain amount of moisture might be expected to penetrate during a heavy storm. Although the moisture entering the wall is apparently not sufficient to be noticeable, its presence would cool the wall and so encourage condensation under certain conditions.

The actual markings are probably attributable to the different absorptive capacities of the bricks and jointing mortar.

It is suggested that all possible precautions should be taken to prevent moisture penetration. Cornices and parapets are fruitful sources of trouble in this way and should be protected by flashings and damp-proof courses. Penetration of moisture through the brickwork might be arrested, at least temporarily, by the application of a transparent waterproofing liquid, though it must be emphasized that such treatment would probably require periodic renewal.

If this method were found to be insufficient, it would be necessary to re-plaster the affected area on lathing or plaster board (not fibrous wallboard) fixed to battens. In this way the finished surface would be out of contact with the main wall and the insulation provided by the air space should be of considerable assistance in preventing condensation on the face of the plaster. As a precaution against dry rot the battens should be treated with a preservative, preferably of the colourless type, in order to prevent staining of the plaster.

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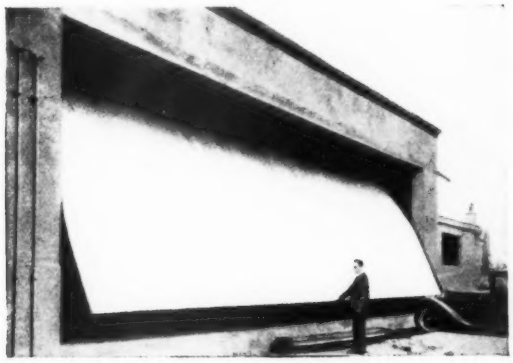
Shipping Exhibition

The Shipping, Engineering and Machinery Exhibition is to be held at Olympia from September 12 to 28.



TRADE NOTES

[*BY F. R. S. YORKE, A.R.I.B.A.*]

Garage Door

ILLUSTRATIONS reproduced on this page and overleaf, showing variations of the Eclair balanced door, should be self-explanatory. The door is a type evolved for garages, factories, warehouses, fire stations and similar buildings, where wide openings must be provided with doors that can be opened or closed easily, without causing obstruction inside or outside the building. The doors can be made to open entirely inside the building (Fig. 1), or with part of the door projecting, and forming a cover to the entrance (Fig. 2).

•

The door has only one counterweight, and this can be placed in any reasonable position—outside the building if necessary. The door is balanced in any position. It may be large—it appears a 40 ft. opening is commonplace—but it can still be operated by one hand. Electrical control is incor-

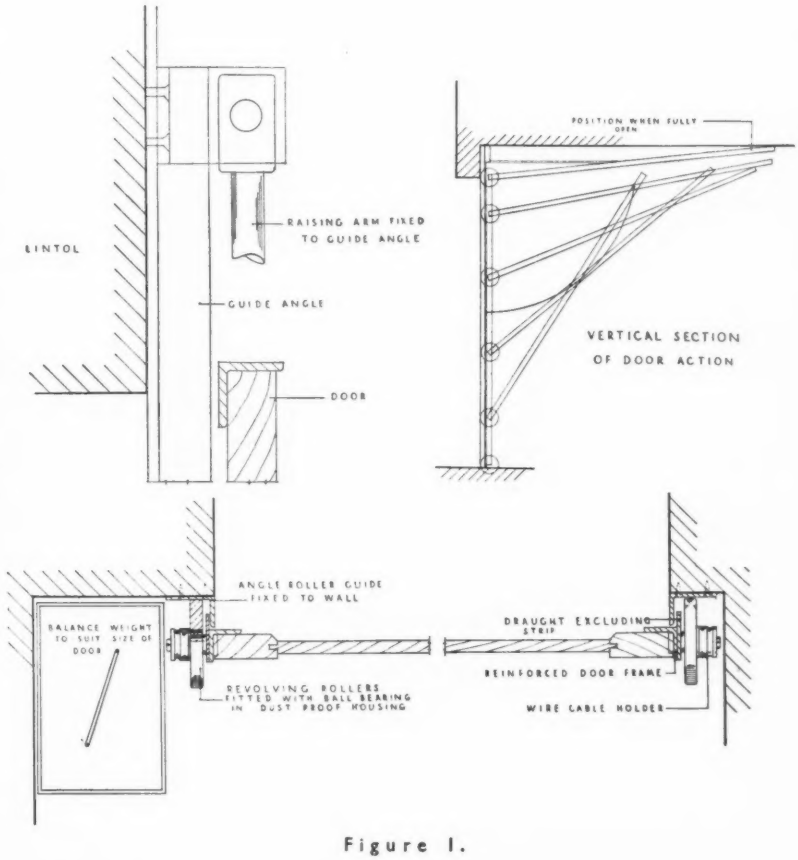


Figure 1.

porated easily, and the ray principle may be used to enable anything approaching the door to open it automatically, and again shut it upon entry.

Television in Flats

In view of the proposed London Television Transmission Service, with transmitter now in course of erection at the Alexandra Palace, it seems desirable that some provision be made in blocks of flats at present being planned or constructed for the incorporation of means to make available to prospective tenants facilities for receiving television programmes when they commence.

•

In order that satisfactory reception may be ensured, and in order to avoid later disturbance to a completed building, early co-operation between architect and television specialist is essential. Certain firms are now equipped to instal television receivers in flats, with a separate lead-in to each flat, so that reception is optional. I have just seen a specification and estimate for such a system. It incorporates reception of vision, and its complementary sound, as a supplement to common aerial and earth system for normal broadcast reception, so that, where it is required, the two installations can be erected at the same time. This means that although facilities for the reception of television may not be required immediately, economies in installation costs may be gained by specifying at the outset cable suitable for carrying all the frequencies involved in normal broadcast and television.

•

The cable used for present-day standard aerial and earth systems is suitable only for broadcast frequencies, and is not suitable for television, so that if the inception of television is not anticipated it appears it may be necessary, within a few months, to replace existing cable in blocks of flats at present being constructed by cable capable of handling television frequencies.

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The cost of the combined system—which incidentally enables listeners to receive either television or normal broadcasting, or to use a radiogram — appears to work out at about £10 per flat, excluding receiving apparatus and speaker, etc.

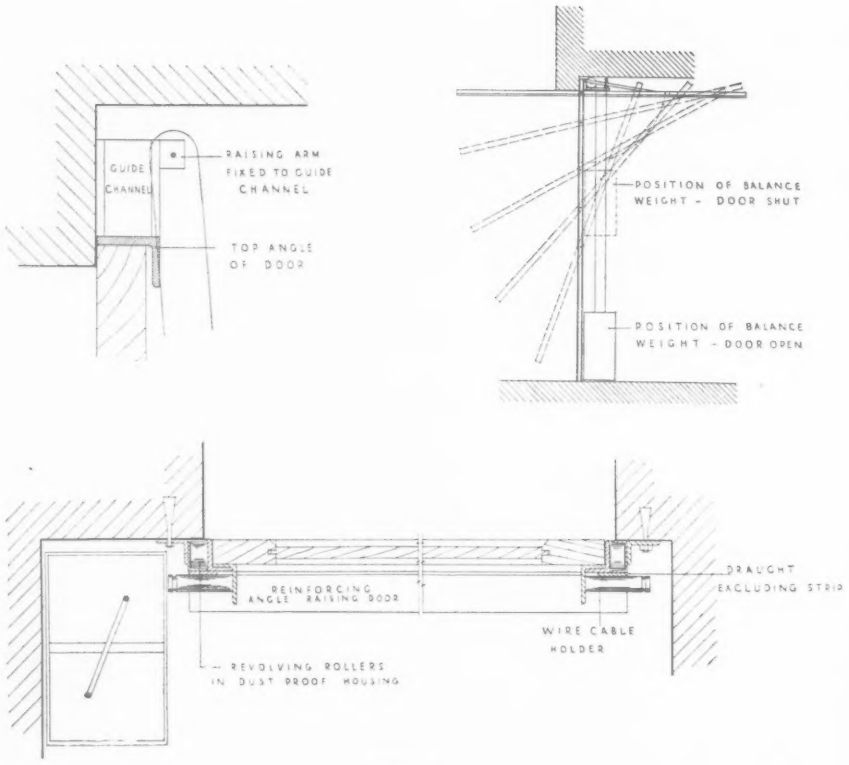


Figure 2.

LAW REPORT

OPEN SPACE AT THE REAR OF HOUSES—CONSTRUCTION OF BYE-LAWS

Andrews v. Fournier.—King's Bench Divisional Court. Before the Lord Chief Justice and two other Justices.

THIS appeal, by Mr. Frank Andrews, a building inspector under the Weymouth Corporation, raised a curious point as to the open space to be left at the rear of houses under the bye-laws of the Weymouth Corporation.

Mr. Montgomery, K.C., for the inspector, said the appeal was against a decision of the Weymouth Justices on an information he laid against Mr. R. V. Fournier, a builder, of Weymouth, alleging that Mr. Fournier had contravened a bye-law of the Corporation, in failing to provide at the rear of certain houses in Abbotsbury Terrace, Weymouth, an open space free for any erection and exclusively belonging to such houses throughout the entire width of the houses, and having a depth from the rear wall to the boundary of not less than 15 ft.

There was another bye-law, continued counsel, which stipulated for open space to be not less than 225 sq. ft., and one of its sections dealt with the question of an exceptional shape of the building site, and said in case the minimum distance across the open space could not be obtained throughout the entire width of the building, it should suffice if the mean distance across should not be less than the minimum distance so required. In this case Mr. Fournier had admitted before the Justices that the space at the rear of one of the houses had only a depth of 14 ft. 7 ins. Whilst the Corporation were disposed to waive that case, they did object to a fence which restricted the open space to 9 ft. The Inspector, before the Justices, argued that the erection of that fence was a breach of the bye-law on the ground that the space between the fence and the real boundary, which was the railing of an embankment, could not be said to be exclusive to the house.

The builder, in reply, contended that the words in the section which dealt with the exceptional shape of the site meant the site as a whole, and not that of the house alone, and that as the Corporation had waived the 5 ins. the section came into operation, as the open space left was more than the 225 sq. ft. provided for under the section.

After a lengthy hearing the Justices upheld the contention of the builder, stating that they were of opinion that even with the erection of the fence the mean distance across the open space was more than the bye-law required, the minimum air space of 300 sq. ft., being in excess of the Corporation's requirements. They, therefore, dismissed the information.

Counsel submitted that the Justices had arrived at a wrong decision, having regard to the construction he put upon the bye-law and its section. The facts were plain that the bye-law intended to give each house adequate open space irrespective of the site upon which the house stood.

Sir Robert Aske, K.C., for the builder, supported the findings of the Justices.

After legal arguments, the Court allowed the appeal, with costs, adding that the case would be remitted to the Justices for the question to be decided whether the fence on the land was an erection on an open space, if the respondent desired to take that point.

In giving judgment the Lord Chief Justice said the case was a curious one, but the fundamental point which emerged for the consideration of the Court was the meaning of "site of such building"—did it mean the land on which the house stood or the whole plot? Having heard the facts of the case detailed to the Court, they were of opinion that the Corporation were right about the measurements of the site and that the Justices arrived at a wrong con-

clusion when they decided that "site of such building" was the whole plot, which, being of exceptional shape, came within the provisions set out in section 4 of the bye-law. His lordship held the view that the decision would render the bye-law inoperative. His opinion was that the words, "site of a building," meant the land immediately over which the building stood and not the land which comprised the plot. To hold otherwise would, in his view, be a misconstruction of the words. Therefore, he was of opinion that the Justices, on the facts before their lordships, arrived at a wrong decision.

The other Justices concurred.

THE BUILDINGS ILLUSTRATED

Following are names of the general contractors and some of the sub-contractors for the buildings illustrated in this issue :—

Church at North Walsham (pages 264-265). General contractors, Cornish and Gaymer, who were also responsible for art stone, dossal, baldachino, drive and gate. Sub-contractors : Couzens and Akers, electric heating and light ; Gibbons, steel windows ; Pearce and Cutler, leaded lights ; Trussed Concrete Steel Co., Ltd., reinforced concrete ; Parker Winder and Achurch, sanitary goods and door furniture : Ebner, wood block floors ; B.R.C., reinforcement ; Braby & Co., Ltd., copper roof lighting and conductor ; Durose, wrought iron grilles and brackets ; Gordon-Evans, sanctuary lamp ; Granwood, Ltd., compo floors ; Geo. Jacksons, fibre enrichment ; Patteson, Ltd., rood cross : Perkins, altar cloth ; East Anglian Cement Co., Ltd., lime mortar.

Flats at Clapham Common (pages 276-277). General contractors, Lansdowne Building Co. Sub-contractors : G. R. Powell, Ltd., electrical work ; the Sussex Brick Co., facing bricks ; W. G. Cannon and Sons, heating ; Thomson Beacon Windows, Ltd., steel casements and lantern lights ; Joseph Stone & Co., metal railings and gates ; J. Whitehead and Sons, marble flooring and panelling.

THE WEEK'S BUILDING NEWS

LONDON & DISTRICTS (15-MILES RADIUS)

COLESHILL. *Bungalows.* Messrs. Tregallas and Sandilands are to erect 35 bungalows in Cook's Lane, Tile Cross, Coleshill.

COULSDON. *Municipal Offices.* The U.D.C. is to prepare a scheme for extensions at the municipal offices in Brighton Road.

COULSDON. *Swimming Pool, etc.* Firmus Constructions, Ltd., have prepared a scheme for the development of a site in Coulsdon Road, Coulsdon, for the construction of a hall, swimming pool and shops.

GRAVESEND. *Library.* Gravesend Corporation is to obtain a site in the Denton area for a branch library.

RICHMOND. *Flats.* The T.C. has approved plans submitted by Mr. W. J. Gregory for the proposed erection of a block of flats at the junction of Broomfield Road and Sandycombe Road.

RICHMOND. *Flats.* The T.C. has now approved plans submitted for the proposed erection of 104 flats and 46 garages on a site fronting Sheen Road. The plans have been approved.

RICHMOND. *Nurses' Home.* Messrs. Brewer, Smith and Brewer, architects, Richmond, have prepared plans for extensions at the Royal Hospital, and a nurses' home. The T.C. has now approved the plans.

RICHMOND. *Church.* It is proposed to erect a Methodist Church at Sheen Road. The architects are Messrs. Pothecary and Barratt.

SUNBURY. *Studios, etc.* The Sound City (Films), Ltd., are to erect further studios workshops, dressing rooms, offices, etc., at Sunbury, plans for which have been approved by the U.D.C.

MIDLAND COUNTIES

ASHBY-DE-LA-ZOUCHE. *Children's Home.* Leicestershire C.C. is to acquire premises at Ashby-de-la-Zouche for conversion into a children's home.

BOURNHEATH. *Housing Scheme.* Bromsgrove U.D.C. is negotiating for 1½ acres on the Hill Farm Estate, Bournheath, for a housing scheme.

CHURCH LANGTON. *School.* The Church of England authorities of Church Langton, Leicestershire, are to convert the elementary school to a central school.

CHURCH LANGTON. *School.* The governors of Hanbury's Charity are to erect a primary school at Church Langton, Leicestershire.

EARL SHALTON. *School.* Leicestershire Education Committee has approved plans for the erection of a modern mixed school at Earl Shalton.

LOUGHBOROUGH. *Cinemas.* Leicestershire C.C. has approved plans for the following cinemas at Loughborough : New Empire, Devonshire Square, with seating accommodation for 1,663 ; Odeon Cinema, Baxter Gate, with seating for 1,600.

LOUGHBOROUGH. *School Extension.* The governors of the Loughborough Endowed Schools are to enlarge the Loughborough Girls' High School.

OXFORD. *Micklem Hall Reconstruction.* Sir Edwin Lutyens has prepared plans for the reconstruction of Micklem Hall, Brewer Street, Oxford.

OXFORD. *School Extensions.* The Education Committee has approved plans for extensions at St. John's Church School, Cowley.

RUGBY. *Store.* Boots Pure Drug Co., Ltd., is to reconstruct its premises in Sheep Street, Rugby.

WOLSTON. *Estate.* Messrs. Holdham and Sons are to develop an estate at Stretton Lane, Wolston, Warwickshire.

WESTERN COUNTIES

HEREFORD. *Bridge.* The Corporation has asked the city engineer to prepare a scheme for the provision of open-air baths in the vicinity of Victoria Bridge.

HEREFORD. *Houses.* The Corporation is to erect a further 125 houses on the Hinton Court estate.

HEREFORD. *Staff House.* The Corporation has approved plans for the erection of a staff house at the mental hospital at a cost of £1,300.

READING. *Church.* The T.C. has agreed to an application on behalf of the Vicar and Churchwardens of Christ Church to sell a site in Northumberland Avenue for the erection of a temporary church and hall, provided that the permanent building will be erected as soon as possible.

READING. *Extensions.* The Bucks, Oxon and Reading Joint Board is to provide additional accommodation at the Borocourt Certified Institution for 61 additional male patients and 51 women patients, at an estimated cost of £20,880.

READING. *School.* The Education Committee of the T.C. propose to erect a school on the Whitley housing estate.

NORTHERN COUNTIES

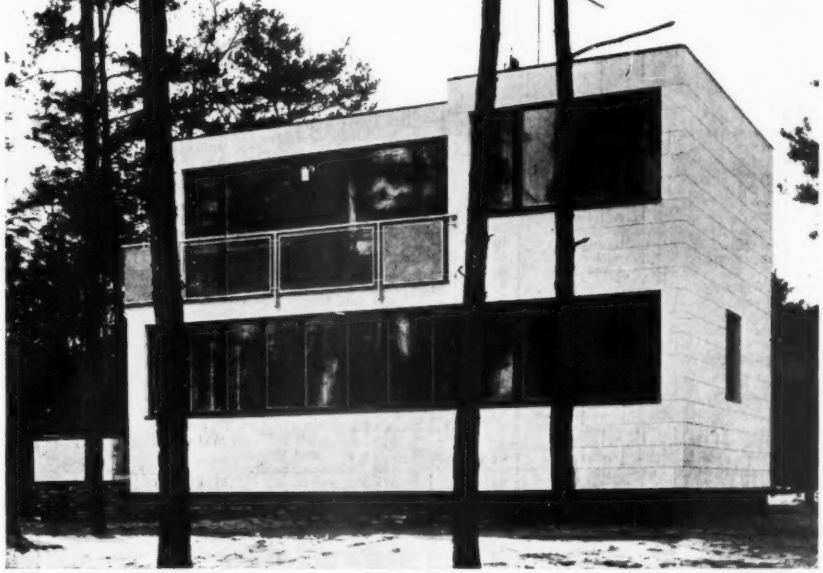
ALNWICK. *Conversion.* The R.D.C. is to convert old police buildings at Alnwick into council offices.

BIRKENHEAD. *Houses.* The Corporation is to develop a further section of the Woodchurch estate by the erection of 198 houses at a cost of £122,640.

BLACKPOOL. *Bus Garage.* The Corporation Transport Committee has asked the borough engineer and the transport manager to prepare plans for the erection of a bus garage in Talbot Road.

BLACKPOOL. *Maternity Hospital.* The Corporation has interviewed the Ministry of Health regarding the provision of a maternity hospital and decided to co-operate with the governors of the Victoria Hospital, who are about to erect such an institution.

BLACKPOOL. *Underground Garage.* The Corporation Transport Committee is urging the Corporation to proceed without delay with the scheme for the construction of an underground garage on the Promenade.



House near Warsaw, Poland, designed by Helena and Szymon Syrkus. *See pages 262-263.*

RATES OF WAGES

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

			I s. d.	II s. d.
A_1	ABERDARE ..	S. Wales & M.	1 5	1 0½
A	Aberdeen ..	Scotland	1 6	1 1½
A_1	Abergavenny ..	S. Wales & M.	1 5	1 0½
A	Abingdon ..	S. Counties	1 4	1 0
A	Accrington ..	N.W. Counties	1 5½	1 1½
A	Addlestone ..	S. Counties	1 4	1 0
A	Adlington ..	N.W. Counties	1 5½	1 1½
A	Airdrie	Scotland	*1 5½	1 1½
C	Aldeburgh ..	E. Counties	1 1½	10½
A	Altrincham ..	N.W. Counties	1 5½	1 1½
B	Appleby ..	N.W. Counties	1 2	10½
A	Ashton-under-Lyne	N.W. Counties	1 5½	1 1½
B_1	Aylesbury ..	S. Counties	1 3	11½
B_1	BANBURY ..	S. Counties	1 3	11½
B_1	Banger ..	N.W. Counties	1 3	11½
A_2	Barnard Castle	N.E. Coast	1 4	1 0
A	Barnsley ..	Yorkshire	1 5½	1 1½
B	Barnstaple ..	S.W. Counties	1 3½	11½
A	Barrow ..	N.W. Counties	1 5½	1 1½
A	Barry	S. Wales & M.	1 5½	1 1½
B_2	Basingstoke ..	S.W. Counties	1 3	11½
A_2	Bath	S.W. Counties	1 4½	1 0½
A	Batley ..	Yorkshire	1 5½	1 1½
A_2	Bedford ..	E. Counties	1 4½	1 0½
A_2	Berwick-on-Tweed	N.E. Coast	1 4½	1 0½
A_2	Bewdley ..	Mid. Counties	1 4½	1 0½
B	Bicester ..	S. Counties	1 2	10½
	Birkenhead ..	N.W. Counties	*1 7	1 2½
A	Birmingham ..	Mid Counties	1 5½	1 1½
A_1	Bishop Auckland	N.E. Coast	1 5	1 0½
A	Blackburn ..	N.W. Counties	1 5½	1 1½
A	Blackpool ..	N.W. Counties	1 5½	1 1½
A	Blyth	N.E. Coast	1 5½	1 1½
B_2	Bognor ..	S. Counties	1 3	11½
A	Bolton ..	N.W. Counties	1 5½	1 1½
A	Boston	Mid. Counties	1 4	1 0
A_2	Bournemouth ..	S. Counties	1 4½	1 0½
B_2	Bovey Tracey	S.W. Counties	1 2½	11
A	Bradford ..	Yorkshire	1 5½	1 1½
A_1	Brentwood ..	E. Counties	1 5	1 0½
A	Bridgend ..	S. Wales & M.	1 5½	1 1½
B	Bridgwater ..	S.W. Counties	1 3½	11½
A_1	Bridlington ..	Yorkshire	1 5	1 0½
A	Brighouse ..	Yorkshire	1 5½	1 1½
A_2	Brighton ..	S. Counties	1 4½	1 0½
A	Bristol	S.W. Counties	1 5½	1 1½
B	Brixham ..	S.W. Counties	1 2½	11
A	Bromsgrove ..	Mid. Counties	1 4½	1 0½
B	Bromyard ..	Mid. Counties	1 2	10½
A	Burnley ..	N.W. Counties	1 5½	1 1½
A	Burslem ..	Mid. Counties	1 5½	1 1½
A	Burton-on-Trent	Mid. Counties	1 5½	1 1½
A	Bury	N.W. Counties	1 5½	1 1½
A	Buxton ..	N.W. Counties	1 5	1 0½
A_1	CAMBRIDGE ..	E. Counties	1 5	1 0½
B_1	Canterbury ..	S. Counties	1 3	11½
A	Cardiff	S. Wales & M.	1 5½	1 1½
A	Carlisle ..	N.W. Counties	1 5½	1 1½
B	Carmarthen ..	S. Wales & M.	1 3½	11½
B	Carnarvon ..	N.W. Counties	1 3½	11½
A	Carnforth ..	N.W. Counties	1 5½	1 1½
A	Castleford ..	Yorkshire	1 5½	1 1½
A_2	Chatham ..	S. Counties	1 4	1 0
A	Chelmsford ..	E. Counties	1 4	1 0
A	Cheltenham ..	S.W. Counties	1 4	1 0
A	Chester	N.W. Counties	1 5½	1 1½
A	Chesterfield ..	Mid. Counties	1 5½	1 1½
B_1	Chichester ..	S. Counties	1 3	11½
A	Chorley ..	N.W. Counties	1 5½	1 1½
B_1	Cirencester ..	S. Counties	1 3	11½
A	Clitheroe ..	N.W. Counties	1 5½	1 1½
A	Clydebank ..	Scotland	1 5½	1 1½
A	Coalville ..	Mid. Counties	1 5½	1 1½
A_2	Colchester ..	E. Counties	1 4½	1 0½
A	Colne	N.W. Counties	1 5½	1 1½
A_2	Colwyn Bay ..	N.W. Counties	1 4½	1 0½
A_2	Consett ..	N.E. Coast	1 5	1 0½
A_2	Conway ..	N.W. Counties	1 4½	1 0½
A	Coventry ..	Mid. Counties	1 5½	1 1½
A_2	Crewe	N.W. Counties	1 4½	1 0½
A	Cumberland ..	N.W. Counties	1 4	1 0
A	DARLINGTON ..	N.E. Coast	1 5½	1 1½
A	Darwen ..	N.W. Counties	1 5½	1 1½
B_2	Deal	S. Counties	1 3	11½
A_2	Denbigh ..	N.W. Counties	1 4	1 0
A	Derby	Mid. Counties	1 5½	1 1½
A	Dewsbury ..	Yorkshire	1 5½	1 1½
B	Didcot ..	S. Counties	1 3½	11½
A	Doncaster ..	Yorkshire	1 5½	1 1½
B_1	Dorchester ..	S.W. Counties	1 3	11½
A	Driffield ..	Yorkshire	1 4	1 0
A_2	Droitwich ..	Mid. Counties	1 4½	1 0½
A	Dudley ..	Mid. Counties	1 5½	1 1½
A_1	Dumfries ..	Scotland	1 5	1 0½
A	Dundee ..	Scotland	1 5½	1 1½
A	Durham	N.E. Coast	1 5½	1 1½
A_2	EASTBOURNE ..	S. Counties	1 4½	1 0½
A_1	Ebbw Vale ..	S. Wales & M.	1 5	1 0½
A	Edinburgh ..	Scotland	1 5½	1 1½
A_1	E. Glamorgan-shire, Rhondda Valley District	S. Wales & M.	1 5	1 0½
A_2	Exeter	S.W. Counties	*1 4½	1 0½
B	Exmouth ..	S.W. Counties	1 3½	11½
A_3	FELIXSTOWE	E. Counties	1 4	1 0
A	Filey	Yorkshire	1 4	1 0
A	Fleetwood ..	N.W. Counties	1 5½	1 1½
B_1	Folkestone ..	S. Counties	1 3	11½
A	Frodsham ..	N.W. Counties	1 5½	1 1½
B_2	Frome	S.W. Counties	1 2½	11
A	GATESHEAD	N.E. Coast	1 5½	1 1½
B	Gillingham ..	S. Counties	1 3½	11½
A	Glasgow ..	Scotland	1 6	1 1½
A_2	Gloucester ..	S.W. Counties	1 4½	1 0½
A_2	Goole	Yorkshire	1 4½	1 0½
A_2	Gosport ..	S. Counties	1 4½	1 0½
A_2	Grantham ..	Mid. Counties	1 4	1 0
A_1	Gravesend ..	S. Counties	1 5	1 0½
A	Greenock ..	Scotland	*1 5½	1 1½
A	Grimsby ..	Yorkshire	1 5½	1 1½
B	Guildford ..	S. Counties	1 3½	11½
A	HALIFAX ..	Yorkshire	1 5½	1 1½
A	Hanley ..	Mid. Counties	1 5½	1 1½
A	Harrogate ..	Yorkshire	1 5½	1 1½
A	Hartlepools ..	N.E. Coast	1 5½	1 1½
B	Harwich ..	E. Counties	1 3½	11½
B_1	Hastings ..	S. Counties	1 3	11½
A_2	Hatfield ..	S. Counties	1 4½	1 0½
B	Hereford ..	S.W. Counties	1 3½	11½
A_2	Hertford ..	E. Counties	1 4½	1 0½
A	Heysham ..	N.W. Counties	1 5½	1 1½
A	Howden ..	N.E. Coast	1 5½	1 1½
A	Huddersfield ..	Yorkshire	1 5½	1 1½
A	Hull	Yorkshire	1 5½	1 1½
A	ILKLEY ..	Yorkshire	1 5½	1 1½
A	Immingham ..	Mid. Counties	1 5½	1 1½
A_2	Ipswich ..	E. Counties	1 4½	1 0½
B_2	Isle of Wight ..	S. Counties	1 2½	11
A	JARROW ..	N.E. Coast	1 5½	1 1½
A	KEIGHLEY ..	Yorkshire	1 5½	1 1½
A_2	Kendal ..	N.W. Counties	1 4	1 0
A_2	Keswick ..	N.W. Counties	1 4	1 0
A_1	Kettering ..	Mid. Counties	1 5	1 0½
A_2	Kidderminster	Mid. Counties	1 4½	1 0½
B_1	King's Lynn ..	E. Counties	1 3	11½
A	LANCASTER ..	N.W. Counties	1 5½	1 1½
A_1	Leamington ..	Mid. Counties	1 5	1 0½
A	Leeds	Yorkshire	1 5½	1 1½
A	Leek	Mid. Counties	1 5½	1 1½
A	Leicester ..	Mid. Counties	1 5½	1 1½
A	Leigh	N.W. Counties	1 5½	1 1½
B	Lewes	S. Counties	1 2	10½
A_2	Lichfield ..	Mid. Counties	1 4½	1 0½
A	Lincoln ..	Mid. Counties	1 5½	1 1½
	Liverpool ..	N.W. Counties	*1 7	1 2½
A_2	Llandudno ..	N.W. Counties	1 4½	1 0½
A	Llanelly ..	S. Wales & M.	1 5½	1 1½
	London (12-miles radius)		1 7½	1 2½
	Do. (12-15 miles radius)		1 7	1 2½
A	Long Eaton ..	Mid. Counties	1 5½	1 1½
A	Loughborough	Mid. Counties	1 5½	1 1½
A_1	Luton	E. Counties	1 5	1 0½
A	Lytham ..	N.W. Counties	1 5½	1 1½
A_1	MACCLES-FIELD	N.W. Counties	1 5	1 0½
A_2	Maidstone ..	S. Counties	1 4	1 0
A_2	Malvern ..	Mid. Counties	1 4	1 0
A	Manchester ..	N.W. Counties	1 5½	1 1½
A	Mansfield ..	Mid. Counties	1 5½	1 1½
B_1	Margate ..	S. Counties	1 3	11½
A	Matlock ..	Mid. Counties	1 4	1 0
A_1	Merthyr ..	S. Wales & M.	1 5	1 0½
A	Middlesbrough	N. E. Coast	1 5½	1 1½
A_2	Middlewich ..	N. W. Counties	1 4½	1 0½
B_2	Minehead ..	S.W. Counties	1 2½	11
B_2	Monmouth & S. and E. Glamorganshire	S. Wales & M.	1 2½	11
A	Morecambe ..	N.W. Counties	1 5½	1 1½
A_2	NANTWICH ..	N.W. Counties	1 4½	1 0½
A	Neath	S. Wales & M.	1 5½	1 1½
A	Nelson	N.W. Counties	1 5½	1 1½
A	Newcastle ..	N.E. Coast	1 5½	1 1½
A	Newport ..	S. Wales & M.	1 5½	1 1½
A	Normanton ..	Yorkshire	1 5½	1 1½
A	Northampton	Mid. Counties	1 5½	1 1½
A	North Staffs ..	Mid. Counties	1 5½	1 1½
A	North Shields ..	N.E. Coast	1 5½	1 1½
A_1	Norwich ..	E. Counties	1 5	1 0½
A	Nottingham ..	Mid. Counties	1 5½	1 1½
A	Nuneaton ..	Mid. Counties	1 5½	1 1½
A	OAKHAM ..	Mid. Counties	1 4	1 0
A	Oldham ..	N.W. Counties	1 5½	1 1½
A_2	Oswestry ..	N.W. Counties	1 4	1 0
A_1	Oxford ..	S. Counties	1 5	1 0½
A	PAISLEY ..	Scotland	*1 5½	1 1½
B_2	Pembroke ..	S. Wales & M.	1 2	10½
A	Perth	Scotland	*1 5½	1 1½
A_1	Peterborough ..	E. Counties	1 5	1 0½
A	Plymouth ..	S.W. Counties	*1 5½	1 1½
A	Pontefract ..	Yorkshire	1 5½	1 1½
A_1	Pontypridd ..	S. Wales & M.	1 5	1 0½
A_2	Portsmouth ..	S. Counties	1 4½	1 0½
A	Preston ..	N.W. Counties	1 5½	1 1½
A	QUEENSFERRY	N.W. Counties	1 5½	1 1½
A_2	READING ..	S. Counties	1 4½	1 0½
B	Reigate ..	S. Counties	1 3½	11½
A	Retford ..	Mid. Counties	1 4	1 0
A_1	Rhondda Valley	S. Wales & M.	1 5	1 0½
A	Ripon	Yorkshire	1 4	1 0
A	Rochdale ..	N.W. Counties	1 5½	1 1½
B	Rochester ..	S. Counties	1 3½	11½
A_1	Ruabon ..	N.W. Counties	1 5	1 0½
A	Rugby	Mid. Counties	1 5½	1 1½
A_2	Rugeley ..	Mid. Counties	1 4½	1 0½
A	Runcorn ..	N.W. Counties	1 5½	1 1½
A_1	ST. ALBANS ..	E. Counties	1 5	1 0½
A	St. Helens ..	N.W. Counties	1 5½	1 1½
B_2	Salisbury ..	S.W. Counties	1 2½	11
A_1	Scarborough ..	Yorkshire	1 5	1 0½
A	Scunthorpe ..	Mid. Counties	1 5½	1 1½
A	Sheffield ..	Yorkshire	1 5½	1 1½
A	Shipley ..	Yorkshire	1 5½	1 1½
A_2	Shrewsbury ..	Mid. Counties	1 4½	1 0½
A_2	Skipton ..	Yorkshire	1 4½	1 0½
A_2	Slough ..	S. Counties	1 4½	1 0½
A_1	Solihull ..	Mid. Counties	1 5	1 0½
A_2	Southampton	S. Counties	1 4½	1 0½
A_1	Southend-on-Sea	E. Counties	1 5	1 0½
A	Southport ..	N.W. Counties	1 5½	1 1½
A	S. Shields ..	N.E. Coast	1 5½	1 1½
A_1	Stafford ..	Mid. Counties	1 5	1 0½
A	Stirling ..	Scotland	1 6	1 1½
A	Stockport ..	N.W. Counties	1 5½	1 1½
A	Stockton-on-Tees	N.E. Coast	1 5½	1 1½
A	Stoke-on-Trent	Mid. Counties	1 5½	1 1½
B	Stroud	S.W. Counties	1 3½	11½
A	Sunderland ..	N.E. Coast	1 5½	1 1½
A	Swansea ..	S. Wales & M.	1 5½	1 1½
A	Swindon ..	S.W. Counties	1 4	1 0
A_1	TAMWORTH ..	N.W. Counties	1 5	1 0½
B	Taunton ..	S.W. Counties	1 3½	11½
A	Teesside Dist. ..	N.E. Counties	1 5½	1 1½
A_2	Teignmouth	S.W. Coast	1 4½	1 0½
A	Todmorden ..	Yorkshire	1 5½	1 1½
A_1	Torquay ..	S.W. Counties	1 5	1 0½
B_2	Truro	S.W. Counties	1 2½	11
A_2	Tunbridge Wells	S. Counties	1 4	1 0
A	Tunstall ..	Mid. Counties	1 5½	1 1½
A	Tyne District ..	N.E. Coast	1 5½	1 1½
A	WAKEFIELD	Yorkshire	1 5½	1 1½
A	Walsall ..	Mid. Counties	1 5½	1 1½
A	Warrington ..	N.W. Counties	1 5½	1 1½
A_1	Warwick ..	Mid. Counties	1 5	1 0½
A_1	Wellingborough	Mid. Counties	1 5	1 0½
A	West Bromwich	Mid. Counties	1 5½	1 1½
A_2	Weston-s.-Mare	W. Counties	1 4½	1 0½
A_2	Whitby ..	Yorkshire	1 4½	1 0½
A	Widnes ..	N.W. Counties	1 5½	1 1½
A	Wigan	N.W. Counties	1 5½	1 1½
B	Winchester ..	S. Counties	1 3½	11½
A_2	Windsor ..	S. Counties	1 4½	1 0½
A	Wolverhampton	Mid. Counties	1 5½	1 1½
A_2	Worcester ..	Mid. Counties	1 4½	1 0½
A_2	Worksop ..	Yorkshire	1 4	1 0
A_1	Wrexham ..	N.W. Counties	1 5	1 0½
A	Wycombe ..	S. Counties	1 4	1 0
B	YARMOUTH ..	E. Counties	1 3½	11½
B	Yeovil	S.W. Counties	1 3½	11½
A	York	Yorkshire	1 5½	1 1½

* In these areas the rates of wages for certain trades (usually painters and plasterers) vary slightly from those given.

The rates for every trade in any given area will be sent on request.

CURRENT PRICES

The wages are the standard Union rates of wages payable in London at the time of publication. The prices given below are for materials of good quality and include delivery to site in Central London area, unless otherwise stated. For delivery outside this area, adjustment should be made for the cost of transport. Though every care has been taken in its compilation, it is impossible to guarantee the accuracy of the list, and readers are advised to have the figures confirmed by trade inquiry. The whole of the information given is copyright.

WAGES

		s.	d.
Bricklayer	per hour	1	7½
Carpenter	,,	1	7½
Joiner	,,	1	7½
Machinist	,,	1	8½
Mason (Banker)	,,	1	7½
,, (Fixer)	,,	1	8½
Plumber	,,	1	7½
Painter	,,	1	6½
Paperhanger	,,	1	6½
Glazier	,,	1	7½
Slater	,,	1	7½
Scaffolder	,,	1	3½
Timberman	,,	1	3½
Navvy	,,	1	2½
General Labourer	,,	1	2½
Lorryman	,,	1	5½
Crane Driver	,,	1	6½
Watchman	per week	2	10	0

MATERIALS

EXCAVATOR AND CONCRETOR

		£	s.	d.
Grey Stone Lime	per ton	2	2	0
Blue Lias Lime	,,	1	16	6
Hydrated Lime	,,	3	0	9
Portland Cement, in 4 ton lots (d/d site, including Paper Bags)	,,	2	0	0
Rapid Hardening Cement, in 4-ton lots (d/d site, including Paper Bags)	,,	2	6	0
White Portland Cement, in 1-ton lots	,,	8	15	0
Thames Ballast	per Y.C.		6	3
¾" Crushed Ballast	,,		6	9
Building Sand	,,		7	3
Washed Sand	,,		8	3
2" Broken Brick	,,		8	0
¾" ,, ,,	,,		10	3
Pan Breeze	,,		6	6
Coke Breeze	,,		8	9

DRAINLAYER

BEST STONEWARE DRAIN PIPES AND FITTINGS

		4" s.	4" d.	5" s.	5" d.
Straight Pipes	per F.R.	0	9	1	1
Bends	each	1	9	2	6
Taper Bends	,,	3	6	5	3
Rest Bends	,,	4	3	6	3
Single Junctions	,,	3	6	5	3
Double ,,	,,	4	9	6	6
Straight channels	per F.R.	1	6	2	6
¾" Channel bends	each	2	9	4	0
Channel junctions	,,	4	6	6	6
Channel tapers	,,	2	9	4	0
Yard gullies	,,	6	9	8	9
Interceptors	,,	16	0	19	6
IRON DRAINS:					
Iron drain pipe	per F.R.	1	6	2	6
Bends	each	5	0	10	6
Inspection bends	,,	9	0	15	0
Single junctions	,,	8	9	18	0
Double junctions	,,	13	6	30	0
Lead Wool	lb.		6		—
Gaskin	,,		5		—

BRICKLAYER

		£	s.	d.
Flettons	per M.	2	15	0
Grooved do.	,,	2	17	0
Phorpres bricks	,,	2	15	0
,, Cellular bricks	,,	2	15	0
Stocks, 1st quality	,,	4	11	0
,, 2nd ,,	,,	4	2	6
Blue Bricks, Pressed	,,	8	17	6
,, Wirecuts	,,	7	17	6
,, Brindles	,,	7	0	0
,, Bullnose	,,	9	0	0
Red Sand-faced Facings	,,	6	18	6
Red Rubbers for Arches	,,	11	0	0
Multicoloured Facings	,,	7	10	0
Luton Facings	,,	7	10	0
Phorpres White Facings	,,	3	17	3
,, Rustic Facings	,,	3	12	3
Midhurst White Facings	,,	5	0	0
Glazed Bricks, Ivory, White or Salt glazed, 1st quality:				
Stretchers	,,	21	0	0
Headers	,,	20	10	0
Bullnose	,,	27	10	0
Double Stretchers	,,	29	10	0
Double Headers	,,	26	10	0
Glazed Second Quality, *Less*	,,	1	0	0
,, Buffs and Creams, *Add*	,,	2	0	0
,, Other Colours	,,	5	10	0
2" Breeze Partition Blocks	per Y.S.	1	7	
2½" ,, ,, ,,	,,	1	10	
3" ,, ,, ,,	,,	2	1	
4" ,, ,, ,,	,,	2	6	

MASON

The following d/d F.O.R. at Nine Elms:

		s.	d.
Portland stone, Whitbed	F.C.	4	4½
,, ,, Basebed	,,	4	7½
Bath stone	,,	2	10
York stone	,,	6	6
,, ,, Sawn templates	,,	7	6
,, ,, Paving, 2"	F.S.	1	8
,, ,, ,, 3"	,,	2	6

SLATER AND TILER

First quality Bangor or Portmadoc slates d/d F.O.R. London station

		£	s.	d.
24" × 12" Duchesses	per M.	28	17	6
22" × 12" Marchionesses	,,	24	10	0
20" × 10" Countesses	,,	19	5	0
18" × 10" Viscountesses	,,	15	10	0
18" × 9" Ladies	,,	13	17	6
Westmorland green (random sizes)	per ton	8	10	0
Old Delabole slates d/d in full truck loads to Nine Elms Station:				
20" × 10" medium grey per 1,000 (actual)		21	11	6
,, ,, green ,, ,,		24	7	4
Best machine roofing tiles	,,	4	10	0
Best hand-made do.	,,	5	0	0
Hips and valleys	each			9½
,, hand-made	,,			10
Nails, compo	lb.		1	4
,, copper	,,		1	6

CARPENTER AND JOINER

		s.	d.
Good carcassing timber	F.C.	2	2
Birch	as 1" F.S.		9
Deal, Joiner's	,, ,,		5
,, 2nds	,, ,,		4
Mahogany, Honduras	,, ,,	1	3
,, African	,, ,,	1	1
,, Cuban	,, ,,	2	6
Oak, plain American	,, ,,	1	0
,, Figured ,,	,, ,,	1	3
,, plain Japanese	,, ,,	1	2
,, Figured ,,	,, ,,	1	5
,, Austrian wainscot	,, ,,	1	6
,, English	,, ,,	1	11
Pine, Yellow	,, ,,	1	0
,, Oregon	,, ,,		4
,, British Columbian	,, ,,		4
Teak, Moulmein	,, ,,	1	3
,, Burma	,, ,,	1	2
Walnut, American	,, ,,	2	3
,, French	,, ,,	2	3
Whitewood, American	,, ,,	1	1
Deal floorings, ¾"	Sq.	18	6
,, 1"	,,	1	1	6
,, 1¼"	,,	1	2	0
,, 1½"	,,	1	5	0
,, 2"	,,	1	10	0
Deal matchings ¾"	,,		14	0
,, ¾"	,,		15	6
,, 1"	,,	1	4	0
Rough boarding ¾"	,,		16	0
,, 1"	,,		18	0
,, 1¼"	,,	1	6	0

Plywood, per ft. sup.

Thickness	¼" d.	½" A d.	½" B d.	½" BB d.	¾" A d.	¾" B d.	¾" BB d.	1" A d.	1" B d.	1" BB d.
Qualities										
Birch 60 × 48	4	2½	2	5	3	2⅞	7	5	4	8	6	5
Cheap Alder	–	2	1½	–	3½	2	–	–	–	–	–	–
Oregon Pine	–	2½	–	3	2¾	–	4	3½	–	5	4½	–
Gaboon Mahogany	4	3½	–	5	4½	–	7	6½	–	8	7	–
Figured Oak	6½	5	–	7½	5¾	–	10	8	0	11/–	9	–

		d.
Scotch glue	lb.	8

SMITH AND FOUNDER

Tubes and Fittings:
(The following are the standard list prices, from which should be deducted the various percentages as set forth below.)

	½"	¾"	1"	1¼"	2"
Tubes, 2'-14' long, per ft. run	4	5½	9½	1/1	1/10
Pieces, 12"-23" long each	10	1/1	1/11	2/8	4/9
,, 3"-11½" long ,,	7	9	1/3	1/8	3/–
Long screws, 12"-23½" long ,,	11	1/3	2/2	2/10	5/3
,, ,, 3"M-½" long ,,	8	10	1/5	1/11	3/6
Bends ,,	8	11	1/7½	2/7½	5/2
Springs not socketed ,,	5	7	1/1½	1/11½	3/11
Socket unions ,,	2/–	3/–	5/6	6/9	10/–
Elbows, square ,,	10	1/1	1/6	2/2	4/3
Tees ,,	1/–	1/3	1/10	2/6	5/1
Crosses ,,	2/2	2/9	4/1	5/6	10/6
Plain sockets and nipples ,,	3	4	6	8	1/3
Diminished sockets ,,	4	6	9	1/–	2/–
Flanges ,,	9	1/–	1/4	1/9	2/9
Caps ,,	3½	5	8	1/–	2/–
Backnuts ,,	2	3	5	6	1/1
Iron main cocks ,,	1/6	2/3	4/2	5/4	11/6
,, with brass plugs ,,	—	4/–	7/6	10/–	21/–

Discounts:

TUBES.

	Per cent.		Per cent.
Gas	65	Galvanized gas	52½
Water	61½	,, water	47½
Steam	57½	,, steam	42½

FITTINGS.

Gas	57½	Galvanized gas	47½
Water	52½	,, water	42½
Steam	47½	,, steam	37½

SMITH AND FOUNDER—*continued.*

		s.	d.
Rolled steel joists cut to length	cwt.	12	9
Mild steel reinforcing rods, ¼"	,,	10	6
,, ,, ⅜"	,,	10	3
,, ,, ½"	,,	10	0
,, ,, ⅝"	,,	9	6
,, ,, ¾"	,,	9	6
,, ,, 1"	,,	9	6
,, ,, 1¼"	,,	9	6
,, ,, 1½"	,,	9	6
,, ,, 2"	,,	9	6

		s.	d.	s.	d.
Cast-iron rain-water pipes of ordinary thickness metal	F.R.		8		10
Shoes	each	2	0	3	0
Anti-splash shoes	,,	4	6	8	0
Boots	,,	3	0	4	0
Bends	,,	2	7	3	9
,, with access door	,,		—	6	3
Heads	,,	4	0	5	0
Swan-necks up to 9" offsets	,,	3	9	6	0
Plinth bends, 4½" to 6"	,,	3	9	5	3
Half-round rain-water gutters of ordinary thickness metal	F.R.		5		6
Stop ends	each		6		6
Angles	,,	1	7	1	11
Obtuse angles	,,	2	0	2	6
Outlets	,,	1	9	2	3

PLUMBER

		s.	d.
Lead, milled sheets	cwt.	22	0
,, drawn pipes	,,	21	6
,, soil pipe	,,	24	6
,, scrap	,,	13	0
Solder, plumbers'	lb.		9½
,, fine do.	,,	1	0
Copper, sheet	,,		8½
,, tubes	,,		11

L.C.C. soil and waste pipes:	3"	4"	6"
Plain cast F.R.	1 0	1 2	2 6
Coated ,,	1 1	1 3	2 8
Galvanized ,,	2 0	2 6	4 6
Holderbats each	3 10	4 0	4 9
Bends ,,	3 9	5 3	10 3
Shoes ,,	3 10	4 4	9 6
Heads ,,	4 8	8 5	12 9

PLASTERER

		£	s.	d.
Lime, chalk	per ton	2	5	0
Plaster, coarse	,,	2	10	0
,, fine	,,	4	15	0
Hydrated lime	,,	3	0	9
Sirapite	,,	3	6	0
Keene's cement	,,	5	0	0
Gothite Plaster	,,	3	6	0
Pioneer Plaster	,,	3	6	8
Thistle plaster	,,	3	6	0
Sand, washed	Y.C.		11	6
Hair	lb.			6
Laths, sawn	bundle		2	4
,, rent	,,		3	9
Lath nails	lb.			3

GLAZIER

	s.	d.	s.	d.
Sheet glass, 21 oz., squares n/e 2 ft.			s. F.S.	2½
,, ,, 26 oz. ,, ,,			,,	3
Flemish, Arctic, Figures (white)*			,,	7
Blazoned glasses			,,	2 6
Reeded; Cross Reeded			,,	11
Cathedral glass, white, double-rolled, plain, hammered, rimpled, waterwite			,,	6
Crown sheet glass (n/e 12 in. x 10 in.)			,,	2 0
Flashed opals (white and coloured)	1 0 and		2 0	
¼" rough cast; rolled plate			,,	5½
¼" wired cast; wired rolled			,,	9½
¼" Georgian wired cast			,,	11
¼" Polished plate, n/e 1 ft.			,, †10 to ‡1	1
,, ,, 2			,, †1 2 ,, ‡1	4
,, ,, 4			,, †2 3 ,, ‡2	6
,, ,, 8			,, †2 9 ,, ‡3	2
,, ,, 20			,, †3 7 ,, ‡4	2
,, ,, 45			,, †3 11 ,, ‡4	7
,, ,, 100			,, †5 0 ,, ‡5	7
Vita glass, sheet, n/e 1 ft.			,,	1 0
,, ,, ,, 2 ft.			,,	1 3
,, ,, ,, over 2 ft.			,,	1 9
,, ,, plate, n/e 1 ft.			,,	1 6
,, ,, ,, 2 ft.			,,	3 0
,, ,, ,, 5 ft.			,,	4 0
,, ,, ,, 7 ft.			,,	5 0
,, ,, ,, 15 ft.			,,	6 0
,, ,, ,, over 15 ft.			,,	7 6
"Calorex" sheet 21 oz., and 32 oz.	,, 2	6	and 3	5
,, rough cast ¼" and ¼"	,,	8½	,, 1	0
Putty, linseed oil	lb.			3

* *Colours, 1d. F.S. extra.*
† *Ordinary glazing quality.* ‡ *Selected glazing quality.*

PAINTER

		£	s.	d.
White lead in 1 cwt. casks	cwt.	2	8	6
Linseed oil	gall.		2	3
Boiled oil	,,		2	9
Turpentine	,,		4	1½
Patent knotting	,,		14	0
Distemper, washable	cwt.	2	6	0
,, ordinary	,,	2	0	0
Whitening	,,		4	0
Size, double	firkin		3	0
Copal varnish	gall.		13	0
Flat varnish	,,		14	0
Outside varnish	,,		16	0
White enamel	,,	1	15	0
Ready mixed paint	,,		13	6
Brunswick black	,,		7	6

CURRENT PRICES FOR MEASURED WORK

The following prices are for work to new buildings of average size, executed under normal conditions in the London area. They include establishment charges and profit. While every care has been taken in its compilation, no responsibility can be accepted for the accuracy of the list. The whole of the information given is copyright.

EXCAVATOR AND CONCRETOR		£ s. d.
Digging over surface n/e 12″ deep and cart away	Y.S.	2 9
,, to reduce levels n/e 5′ 0″ deep and cart away	Y.C.	8 6
,, to form basement n/e 5′ 0″ and cart away	,,	9 0
,, ,, 10′ 0″ deep and cart away	,,	9 6
,, ,, 15′ 0″ deep and cart away	,,	10 0
If in stiff clay	add ,,	6
If in underpinning	,, ,,	4 0
Planking and strutting to sides of excavation	F.S.	1 0
,, ,, to pier holes	,,	5
,, ,, to trenches	,,	5
,, ,, extra, only if left in	,,	3
Hardcore, filled in and rammed	Y.C.	10 0
Portland cement concrete in foundations (6-1)	,,	1 6 0
,, ,, (4-2-1)	,,	1 12 6
,, ,, underpinning	,,	1 16 0
Finishing surface of concrete, space face	Y.S.	7

DRAINLAYER		4″ s. d.	6″ s. d.
Stoneware drains, laid complete (digging and concrete to be priced separately)	F.R.	1 6	2 3
Extra, only for bends	Each	2 8	3 9
,, junctions	,,	3 9	4 6
Gullies and gratings	,,	16 6	18 0
Cast iron drains, and laying and jointing	F.R.	4 9	6 9
Extra, only for bends	Each	10 6	15 6

BRICKLAYER		£ s. d.
Brickwork, Flettons in lime mortar	Per Rod	26 10 0
,, ,, in cement	,,	27 12 6
,, Stocks in cement	,,	34 0 0
,, Blues in cement	,,	50 0 0
Extra only for circular on plan	,,	2 0 0
,, backing to masonry	,,	1 10 0
,, raising on old walls	,,	2 0 0
,, underpinning	,,	5 10 0
Fair Face and pointing internally	F.S.	1½
Extra over fletton brickwork for picked stock facings and pointing	,,	8
,, ,, ,, red brick facings and pointing	,,	11
,, ,, ,, blue brick facings and pointing	,,	1 4
,, ,, ,, glazed brick facings and pointing	,,	3 6
Tuck pointing	,,	7½
Weather pointing in cement	,,	3
Slate dampcourse	,,	10
Vertical dampcourse	,,	1 1

ASPHALTER		s. d.
½″ Horizontal dampcourse	Y.S.	4 6
½″ Vertical dampcourse	,,	6 9
½″ paving or flat	,,	4 0
1″ paving or flat	,,	5 6
1″ × 6″ skirting	F.R.	1 0
Angle fillet	,,	2
Rounded angle	,,	2
Cesspools	Each	5 0

MASON		s. d.
Portland stone, including all labours, hoisting, fixing and cleaning down, complete	F.C.	17 9
Bath stone and do., all as last	,,	13 6
Artificial stone and do	,,	13 0
York stone templates, fixed complete	,,	10 6
,, thresholds	,,	13 6
,, sills	,,	1 0 6

SLATER AND TILER		£ s. d.
Slating, Bangor or equal, laid to a 3″ lap, and fixing with compo nails, 20″ × 10″	Sqr.	3 10 0
Do., 18″ × 9″	,,	3 7 0
Do., 24″ × 12″	,,	3 17 0
Westmorland slating, laid with diminished courses	,,	6 0 0
Tiling, best hand-made sand-faced, laid to a 4″ gauge, nailed every fourth course	,,	3 0 0
Do., all as last, but of machine-made tiles	,,	2 16 0
20″ × 10″ medium Old Delabole slating, laid to a 3″ lap (grey)	,,	2 16 0
,, ,, ,, ,, ,, (green)	,,	4 15 0

CARPENTER AND JOINER		£ s. d.
Flat boarded centering to concrete floors, including all strutting	Sqr.	2 2 6
Shuttering to sides and soffits of beams	F.S.	7
,, to stanchions	,,	7
,, to staircases	,,	1 6
Fir and fixing in wall plates, lintols, etc.	F.C.	3 9
Fir framed in floors	,,	4 6
,, ,, roofs	,,	6 6
,, ,, trusses	,,	7 6
,, ,, partitions	,,	8 6
½″ deal sawn boarding and fixing to joists	Sqr.	1 14 6
1″ ,, ,, ,, ,,	,,	1 17 6
1½″ ,, ,, ,, ,,	,,	2 3 0
3″ × 2″ fir battening for Countess slating	,,	9 0
Do. for 4″ gauge tiling	,,	12 0
Stout feather-edged tilting fillet	F.R.	4½
Patent inodorous felt, 1 ply	Y.S.	2 3
,, ,, ,, 2 ,,	,,	2 9
,, ,, ,, 3 ,,	,,	3 3
Stout herringbone strutting to 9″ joists	F.R.	10½
1″ deal gutter boards and bearers	F.S.	1 2
1½″ ,, ,, ,,	,,	1 6
2″ deal wrought rounded roll	F.R.	8
1″ deal grooved and tongued flooring, laid complete, including cleaning off	Sqr.	2 1 0
1½″ do.	,,	2 10 0
1¾″ do.	,,	2 17 0
1″ deal moulded skirting, fixed on, and including grounds plugged to wall	F.S.	1 6
,, do	,,	1 9

CARPENTER AND JOINER—*continued*		s. d.
1½″ deal moulded sashes of average size	F.S.	1 9½
2″ ,, ,, ,, ,,	,,	1 11½
1½″ deal cased frames double hung, of 6″ × 3″ oak sills, 1¼″ pulley stiles, 1¼″ heads, 1″ inside and outside linings, ½″ parting beads, and with brass faced axle pulleys, etc., fixed complete	,,	3 7
2″ ,, ,, ,, ,,	,,	3 10
Extra only for moulded horns	Each	6
1½″ deal four-panel square, both sides, door	F.S.	2 0
2″ ,, ,, ,, ,,	,,	2 8
1½″ ,, but moulded both sides	,,	2 4
2″ ,, ,, ,, ,,	,,	3 0
4″ × 3″ deal, rebated and moulded frames	F.R.	1 0
4½″ × 3½″ ,, ,, ,, ,,	,,	1 4
1½″ deal tongued and moulded window board, on and including deal bearers	F.S.	1 9
1½″ deal treads, 1″ risers in staircases, and tongued and grooved together on and including strong fir carriages	,,	2 6
1½″ deal moulded wall strings	,,	2 1
1½″ ,, outer strings	,,	2 4
Ends of treads and risers housed to string	Each	1 9
3″ × 2″ deal moulded handrail	F.R.	1 3
1″ × 1″ deal balusters and housing each end	Each	2 0
1½″ × 1½″ ,, ,, ,, ,,	,,	2 9
3″ × 3″ deal wrought framed newels	F.R.	1 3
Extra only for newel caps	Each	6 0
Do., pendants	,,	6 0

SMITH AND FOUNDER		£ s. d.
Rolled steel joists, cut to length, and hoisting and fixing in position	Per cwt.	16 6
Riveted plate or compound girders, and hoisting and fixing in position	,,	1 0 6
Do., stanchions with riveted caps and bases and do.	,,	19 0
Mild steel bar reinforcement, ½″ and up, bent and fixed complete	,,	17 6
Corrugated iron sheeting fixed to wood framing, including all bolts and nuts 20 g.	F.S.	11
Wrot-iron caulked and cambered chimney bars	Per cwt.	1 10 0

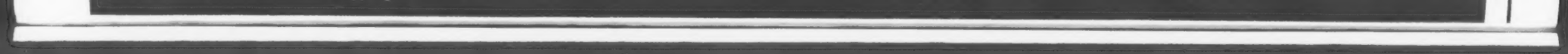
PLUMBER		£ s. d.
Milled lead and labour in flats	cwt.	1 15 6
Do. in flashings	,,	1 19 0
Do. in covering to turrets	,,	2 6 6
Do. in soakers	,,	1 11 0
Labour to welted edge	F.R.	3½
Open copper nailing	,,	3
Close ,, ,,	,,	4

Lead service pipe and fixing with pipe hooks	F.R.	½″ s. d. 10	¾″ s. d. 1 0	1″ s. d. 1 3	1¼″ s. d. 2 0	2″ s. d. 2 10	4″ s. d. —
Do. soil pipe and fixing with cast lead tacks	,,	—	—	—	—	—	5 6
Extra, only to bends	Each	—	—	—	—	2 0	6 9
Do. to stop ends	,,	6½	8	9	11	1 0	—
Boiler screws and unions	,,	3 3	3 9	5 0	8 0	—	—
Lead traps	,,	—	—	—	6 3	8 9	—
Screw down bib valves	,,	6 9	9 6	11 0	—	—	—
Do. stop cocks	,,	7 0	9 6	12 6	—	—	—
4″ cast-iron ½-rd. gutter and fixing	F.R.						1 0
Extra, only stop ends	Each						1 0
Do. angles	,,						1 6
Do. outlets	,,						2 9
4″ dia. cast-iron rain-water pipe and fixing with ears cast on	F.R.						1 2
Extra, only for shoes	Each						1 3
Do. for plain heads	,,						5 6

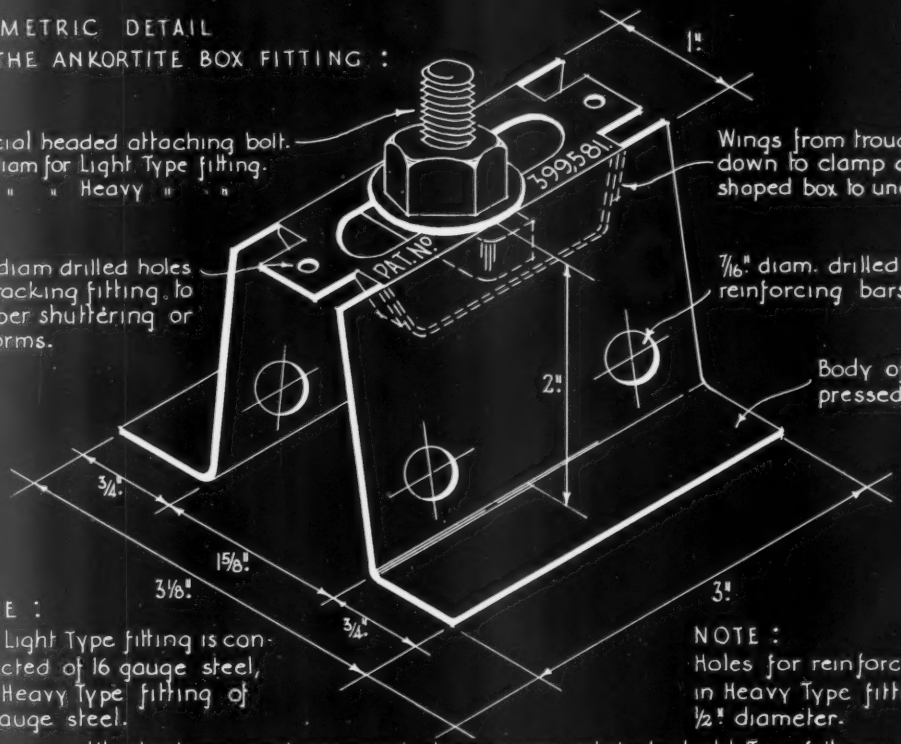
PLASTERER AND TILING		s. d.
Expanded metal lathing, small mesh	Y.S.	2 0
Do. in n/w to beams, stanchions, etc.	,,	2 9
Lathing with sawn laths to ceilings	,,	1 3
½″ screeding in Portland cement and sand or tiling, wood block floor, etc.	,,	1 5
Do. vertical	,,	1 7
Rough render on walls	,,	1 2½
Render, float and set in lime and hair	,,	1 9
Render and set in Sirapite	,,	1 11
Render, backing in cement and sand, and set in Keene's cement	,,	2 9
Extra, only if on lathing	,,	4
Keene's cement, angle and arris	F.R.	6
Arris	,,	
Rounded angle, small	,,	3
Plain cornices in plaster, including dubbing out, per 1″ girth	,,	1½
1″ granolithic pavings	Y.S.	3 6
1½″ ,, ,, ,,	,,	4 6
6″ × 6″ white glazed wall tiling and fixing on prepared screed	,,	17 6
9″ × 3″ ,, ,, ,, ,,	,,	1 2 6
Extra, only for small quadrant angle	F.R.	8

GLAZIER		s. d.
21 oz. sheet glass and glazing with putty	F.S.	6½
26 oz. do. and do.	,,	7½
Flemish, Arctic Figured (white) and glazing with putty	,,	1 1
Cathedral glass and do.	,,	1 2
Glazing only, British polished plate	,,	7
Extra, only if in beads	,,	2
Washleather	F.R.	4

PAINTER		s. d.
Clearcolle and whiten ceilings	Y.S.	6
Do. and distemper walls	,,	9
Do. with washable distemper	,,	1 1
Knot, stop, prime and paint four coats of oil colour on plain surfaces	,,	3 3
Do. on woodwork	,,	3 6
Do. on steelwork	,,	3 0
Do. and brush grain and twice varnish	,,	5 6
Stain and twice varnish woodwork	,,	1 11
Stain and wax-polish woodwork	,,	4 6
French polishing	F.S.	1 2
Stripping off old paper	Piece	2 0
Hanging ordinary paper	from ,,	2 9



ISOMETRIC DETAIL OF THE ANKORTITE BOX FITTING :



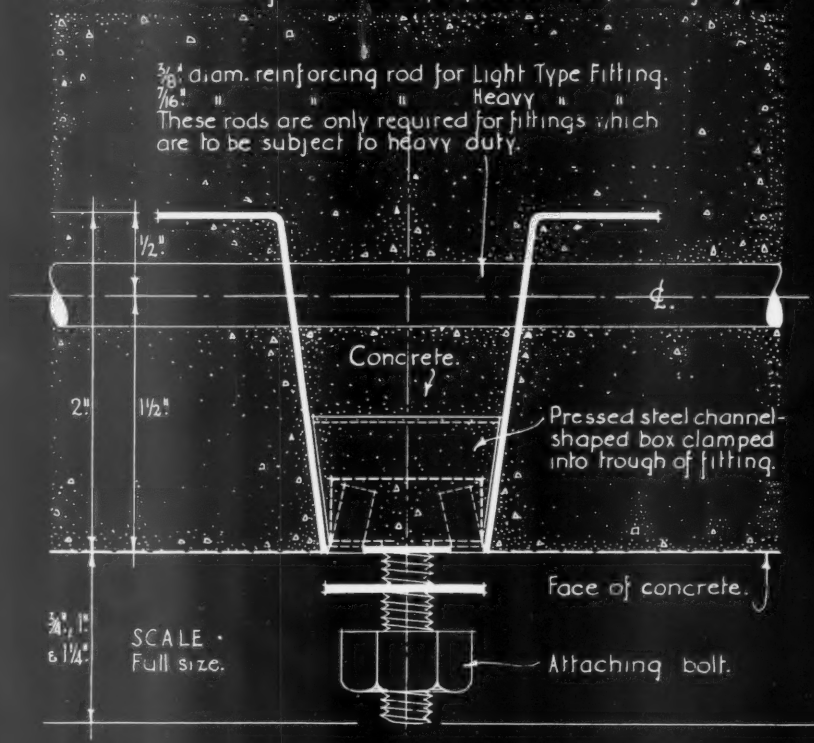
NOTE :
The Light Type fitting is constructed of 16 gauge steel, The Heavy Type fitting of 10 gauge steel.

NOTE :
Holes for reinforcing bars in Heavy Type fittings are 1/2" diameter.

Illustrations and arrowed dimensions relate to Light Type fittings.

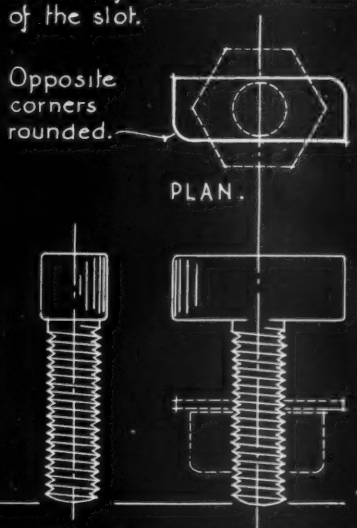
SECTIONAL END ELEVATION SHOWING THE BOX IN POSITION.

Note · The enclosing concrete may represent wall, ceiling or floor.



DETAILS OF THE SPECIAL T. ATTACHING BOLT.

Note : After the T. head is inserted into the box through the slotted hole in the trough face, the bolt is turned through a right angle, so that the arms of the tee bear on the bottom of the box at the sides of the slot.



Information from The Abbey Building Supplies Co.

INFORMATION SHEET : PRESSED STEEL WALL AND CEILING PLUG

SIR JOHN BURNET TAIT AND LORNE ARCHITECTS ONE MONTAGUE PLACE BEDFORD SQUARE LONDON W.C.1 · Oscar A. Bafna

THE ARCHITECTS' JOURNAL
LIBRARY OF PLANNED INFORMATION

INFORMATION SHEET

• 249 •

ANCHORAGES TO CONCRETE

Type of product : Ankortite Box Fittings

Ankortite Fittings are designed for embedding in concrete walls, ceilings or floors during the pouring of the concrete. The fitting is secured to the forming so that when the concrete has set the face of the fitting is flush with the face of the concrete.

The Fittings :

They consist of a trough-shaped pressing in mild steel with an additional channel-shaped member to form a hollow box in the trough. A slot is provided in the trough face in which a special-shaped tee-headed bolt can be inserted. The slot allows for considerable lateral movement, and the head of the bolt is so designed that it will not only afford a secure and rigid fixing, but will not twist round when the nut is being screwed on.

Sizes and Finish :

Fittings are supplied cadmium-plated after manufacture and in two strengths, the Light Type made from No. 16 gauge steel, and the Heavy Type from No. 10 gauge steel. A black bolt, complete with nut and round washer, is included with each fitting, $\frac{3}{8}$ in. diameter by either $\frac{3}{4}$ in., 1 in. or $1\frac{1}{4}$ in. in length for the Light Type, and $\frac{5}{8}$ in. diameter by either $1\frac{1}{2}$ in. or 2 in. in length for the Heavy Type.

Fixing :

The method of fixing the fittings is by lightly tacking them to the shuttering or forms through nail holes provided in the trough face, and although the general design will prevent the fitting from drawing out of the concrete under load, holes are further provided through which steel rods may be passed if considered desirable. The tacking holes are $\frac{3}{32}$ in. diameter, and the reinforcing rod holes are $\frac{7}{16}$ in. diameter in the Light Type and $\frac{1}{2}$ in. diameter in the Heavy Type.

Prices :

Ankortite Fittings bear the British Patent No. 399,581, and are retailed, complete with bolt, nut and washer, at £2 10s. per 100 for the Light Type and £3 15s. per 100 for the Heavy Type, carriage and packing free on orders of not less than £5 in value.

Loading Tests :

Loading tests on the fitting itself (i.e., not embedded in concrete) have been carried out by R. H. H. Stanger, Esq., A.M.Inst.C.E., and by the National Physical Laboratory, Engineering Department. The results are as follows :

Tests by R. H. H. Stanger, Esq., on a Light Type fitting.

Method of Test : The fitting was held by two $\frac{3}{8}$ in. rods passed through the holes in the body of the fitting and a pull was applied to the $\frac{3}{8}$ in. bolt with latter fastened in the centre of its slot.

Result : Load, 1,120 lb. (10 cwt.) : The metal yielded in the immediate vicinity of the bolt.

Load, 1,570 lb. (14 cwt. 2 lb.) : A crack appeared.

Load, 1,770 lb. (15 cwt. 90 lb.) : Failure occurred.

Tests by the National Physical Laboratory on a Heavy Type fitting.

Method of Test : Two $\frac{1}{2}$ in. diameter steel rods, 7 in. long, were passed through the holes in the side of the fitting. These rods rested on steel bars attached to the upper shackle of a testing machine. The Tee bolt was inserted into the fitting as above described, and was also attached through a suitable adapter to the lower shackle of the machine. Load was then applied to the fitting and gradually increased until fracture occurred.

Results : Load, 3·40 tons : The sides of the hole in the bottom of the fitting showed signs of pulling out.

Load, 3·65 tons : The Tee bolt pulled out of the hole, considerably distorting the bottom of the fitting.

Information from : Abbey Building Supplies Co. (Ernest J. T. Roe, Proprietor)

Address : 47 Victoria Street, London, S.W.1

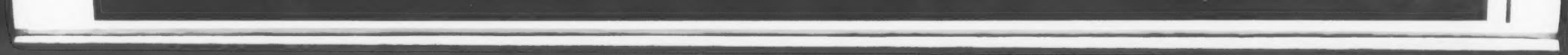
Telephone : Victoria 5790

Telegrams : Absobilda, Sowest, London

Cables : Absobilda London

Trade Mark : ABSO

Monomark : BCM/ABSO



WALL INSULATION ONLY :

COMPARATIVE EFFECTS ON FUEL CONSUMPTION & HEATING PLANT.

DATA USED IN THE CALCULATIONS :

Average EXTERNAL temperature ___ 43° F.
October 1st to April 30th
Minimum EXTERNAL temperature ___ 30° F.

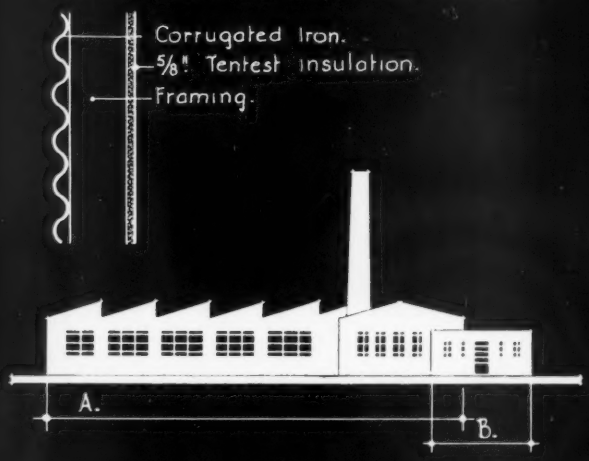
THERMAL CONDUCTIVITY :

(B. T. Us. per hour per sq. ft. per °F. for 1" of thickness.)
Tentest (N.P.L. test.) ___ 0·38

TRANSMISSION COEFFICIENTS :

Corrugated Iron. ___ 1·5
Corrugated Iron and 5/8" Tentest lining. ___ 0·31

Diagram showing the sections A and B and the wall construction considered in this analysis.



ANALYSIS OF TEMPERATURE REQUIREMENTS.

SECTION OF BUILDING	TYPE OF WALL.	SQUARE FEET OF WALL SURFACE.	HGT OF MIDDLE OF WALL ABOVE FLOOR.	DITTO ABOVE BREATHING LINE. (5' 0")	TEMPERATURE AT BREATHING LINE.	2% RISE FOR EACH FOOT OF HEIGHT ?	AVERAGE WALL TEMPERATURE	TEMP. DIFF. INTERNAL & EXTERNAL.	
								max.	av.
A.	G. I.	10,000	11' 0"	6' 0"	55° F.	6·6° F.	61·6° F.	31·6° F.	18·6° F.
B.	G. I.	1,800	5' 0"	0	62° F.	0.	62 °F.	32 °F.	19° F.

? Note - The 2% rise in temperature is taken for each foot of height between the Breathing line & the middle of the wall.

NOTE : An annual heating period of 5,000 hours has been assumed (October 1st to April 30th) with an effective heating capacity of 6,000 B.T.Us. per pound of fuel and a heat ouput from hotwater pipes and radiators of 160 B.T.Us. per hour per square foot.

ANALYSIS OF INSULATION :

SECTION A. UNLINED	SECTION A. 5/8" TENTEST.		SECTION B. 5/8" TENTEST.	SECTION B. UNLINED.
	£. s. d.	CAPITAL COST OF WALL INSULATION. Tentest at 1/8 d. per sq. yard for 10,000 sq. feet.	£. s. d.	
●	92 11 10.		16. 13. 4.	●
103·79	21·45	ANNUAL FUEL CONSUMPTION. In tons of coal.	3·94	19·08
£. s. d.	£. s. d.	VALUE OF FUEL CONSUMED.	£. s. d.	£. s. d.
129. 14. 9.	26. 16. 3.	at 25/- a ton.	4. 18. 6.	23. 17. 0.
	£. s. d.	SAVING IN COST OF FUEL PER YEAR	£. s. d.	
●	102. 18. 6.	over unlined wall.	18. 18. 6.	●
£. s. d.	£. s. d.	CAPITAL COST OF HEATING INSTALLATION	£. s. d.	£. s. d.
666. 11. 2.	137. 15. 1.	at 4/6 d. per sq. ft of heating surface.	25. 2. 2.	121. 10. 0.
	£. s. d.	SAVING IN CAPITAL COST OF ABOVE	£. s. d.	
●	528. 16. 1.	over unlined wall.	96. 7. 10.	●

Information from the Tentest Fibre Board Co. Ltd. (4.)

INFORMATION SHEET : COMPARATIVE THERMAL INSULATION OF BUILDING
SIR JOHN BURNET TAIT AND LORNE ARCHITECTS ONE MONTAGUE PLACE BEDFORD SQUARE LONDON W.C.1. Oscar A. Bayn

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INFORMATION SHEET

• 250 •

THERMAL INSULATION

Product : Tentest Fibre Board

General :

This is the fourth of a series of Sheets in which the insulating value of various forms of construction are being analysed.

For this purpose a common type of building has been taken ; a factory having a small office block and a larger workshop.

This typical building forms the basis on which all Sheets are calculated ; the analysis given on one Sheet is, therefore, comparable with those given on any other sheet.

As will be seen on this Sheet, only the walls of the buildings are dealt with, as various types of roofs have been analysed in previous Sheets. This method, by separating entirely the calculations for the roof from those for the walls, will allow the figures for any type of roof to be used in conjunction with the figures for any type of wall, in order to determine the combined effect.

Basis of Calculation :

The figures used as the basis of these calculations are set out on the face of this Sheet, and normal practice and figures have been followed throughout.

Area of Walls :

In determining an arbitrary but reasonable figure for the wall area of the factory the following method has been employed :—

In previous Sheets of this series a roof area of 20,000 sq. ft. has been used ; this area might represent a factory say 200 ft. long by 100 ft. wide.

Assuming that side walls contain windows, that end walls are solid, and that the average height of the walls throughout is 22ft., the wall area will be :—

End walls—100′ × 22′ × 2 = 4,400 sq. ft.

Side ,, including windows—200′ × 22′ × 2 = 8,800 sq. ft.

If the side walls are taken as 30% window and 70% wall the wall area will be—

$\frac{8,800}{100} \times 70 = 5,280$ sq. ft. and the total area of all walls—4,400 plus 5,280 = 9,680 sq. ft.

For the purposes of this analysis therefore, 10,000 sq. ft. has been taken as a reasonable figure for the wall area not including windows.

The wall area of the office block (section B) was determined in a similar manner.

Average Temperature of Walls :

In calculating the average temperature of the walls, 2 per cent. of the temperature at the breathing line (5 ft. 0 in.), is added for each foot that the mean height of the wall is above breathing line, i.e., in a wall 22 ft. 0 in. high the Mean Height is $\frac{22}{2}$ ft. = 11 ft. 0 in.

This is (11 ft. 0 in. − 5 ft. 0 in.) = 6 ft. 0 in. above the breathing line, so that the temperature rise to be added is 55° × 6 × 2 per cent. = 6·6° F.

As the office block is 10 ft. 0 in. high, there is no addition to be made.

Annual Fuel Consumption :

The fuel consumptions given are based on the calculations given in the tables above.

Lining :

It will be noticed that in giving the cost of insulation, variations in the cost of fixing have not been taken into account, the price given being the cost of the material itself.

Previous Sheets :

The previous Sheets of this series were Nos. 220, 230 and 236 revised.

Fuel Consumption for one Fuel-Year (calculated for the walls only)

$$\text{Fuel Consumption in tons} = \frac{\text{Area in sq. ft.} \times \text{Transmission Coeff.} \times \text{Average Temp. diff.} \times \text{hours per year}}{\text{B.T.U. per lb. of fuel} \times 2,240}$$

Section A.		
Corrugated iron walls uninsulated	$\frac{10,000 \times 1·5 \times 18·6 \times 5,000}{6,000 \times 2,240}$	= 103·79 tons
Ditto with $\frac{3}{8}$ in. Tentest lining	$\frac{10,000 \times 0·31 \times 18·6 \times 5,000}{6,000 \times 2,240}$	= 21·45 tons
Section B.		
Corrugated iron walls uninsulated	$\frac{1,800 \times 1·5 \times 19 \times 5,000}{6,000 \times 2,240}$	= 19·08 tons
Ditto with $\frac{3}{8}$ in. Tentest lining	$\frac{1,800 \times 0·31 \times 19 \times 5,000}{6,000 \times 2,240}$	= 3·94 tons

Capital Cost of Heating Installation (calculated for the walls only)

$$\text{Capital Cost ... ...} = \frac{\text{Area in sq. ft.} \times \text{Transmission Coeff.} \times \text{Max. Temp. Diff.} \times \text{Cost per sq. ft.}}{\text{Heat output per sq. ft. radiation.}}$$

Section A.		
Corrugated iron walls uninsulated	$\frac{10,000 \times 1·5 \times 31·6 \times 4·5}{160 \times 20}$	= £666 11 2
Ditto with $\frac{3}{8}$ in. Tentest lining	$\frac{10,000 \times 0·31 \times 31·6 \times 4·5}{160 \times 20}$	= £137 15 1
Section B.		
Corrugated iron walls uninsulated	$\frac{1,800 \times 1·5 \times 32 \times 4·5}{160 \times 20}$	= £121 10 0
Ditto with $\frac{3}{8}$ in. Tentest lining	$\frac{1,800 \times 0·31 \times 32 \times 4·5}{160 \times 20}$	= £25 2 2

Information from : The Tentest Fibre Board Co., Ltd.
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