EINE ARTS

ARCHITECT



glossary of abbreviations of Government Departments and Societies and Committees of all kinds, together with their full address and telephone numbers. The glossary is published in two parts—A to Ig one week, Ih to Z the next. In all cases where the town is not mentioned the word LONDON is implicit in the address.

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contents

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ABS ABT ACGB

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every issue does not necessarily contain all these contents, but they are the regular features which continually recur

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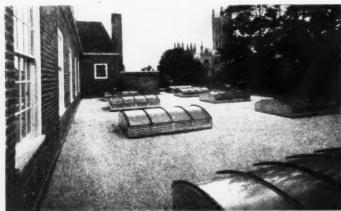
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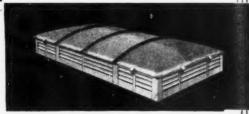
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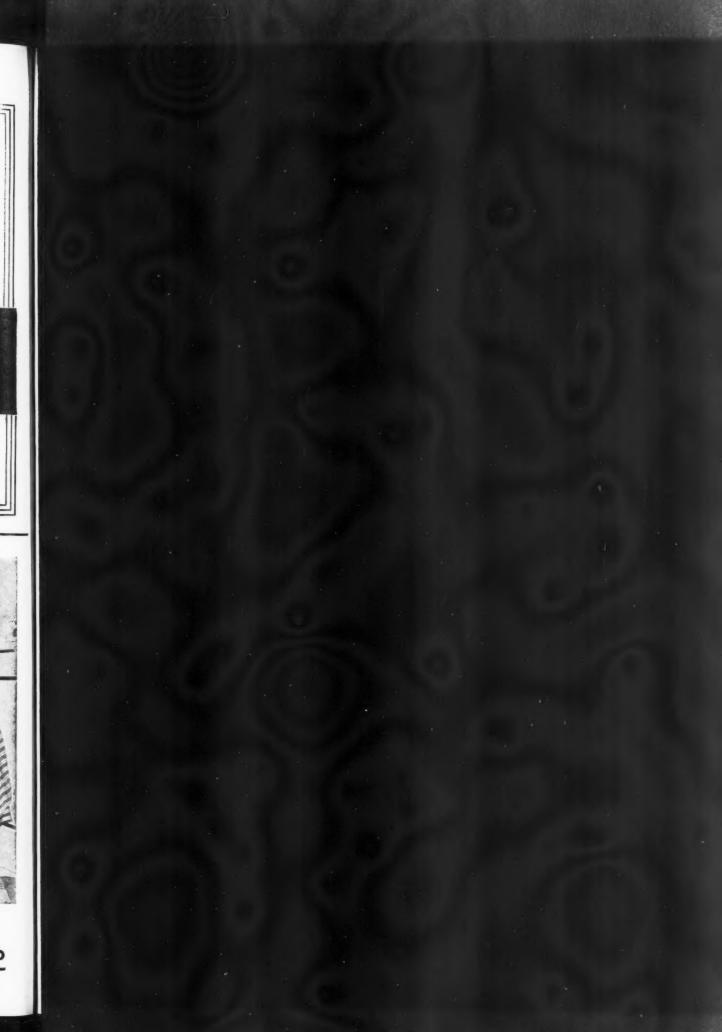


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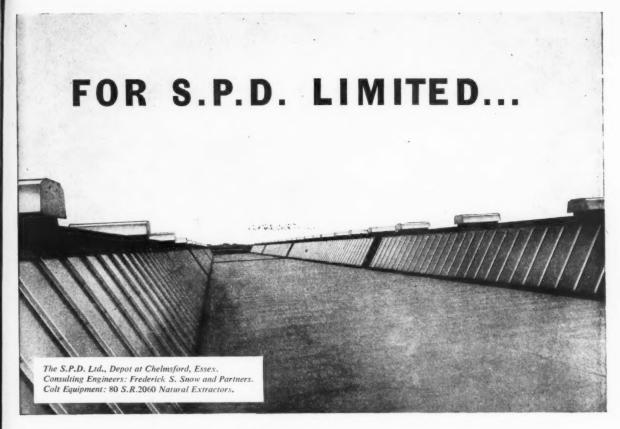
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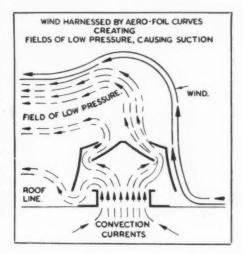


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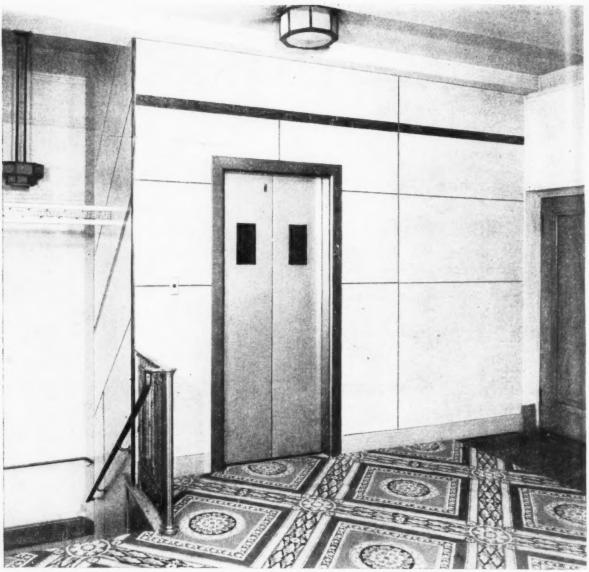
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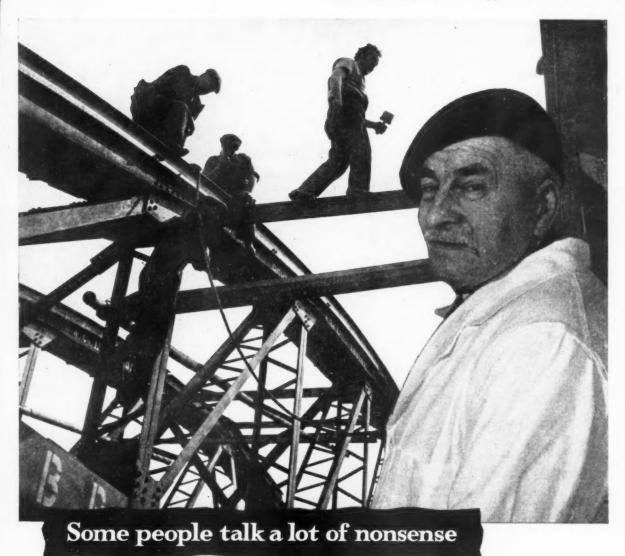
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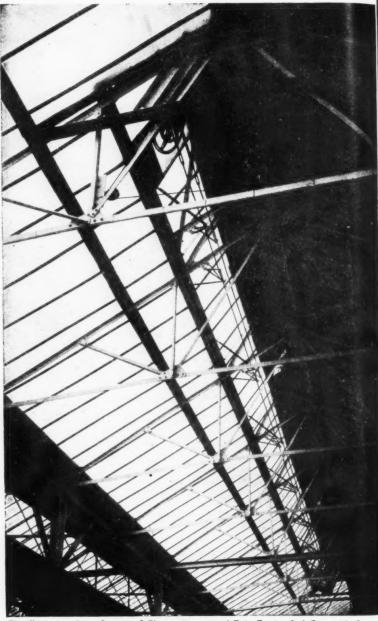
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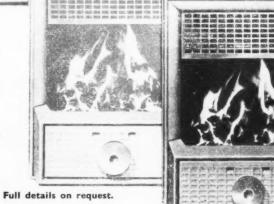
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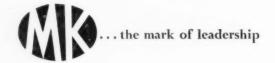
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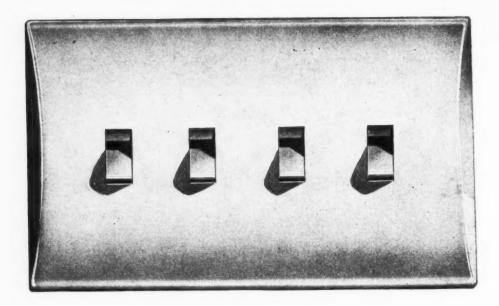




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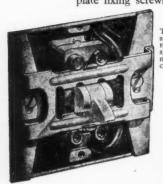
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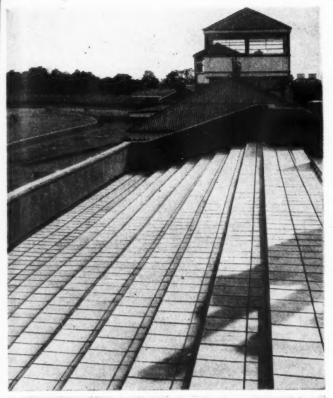
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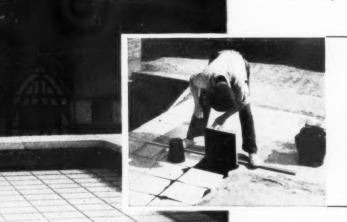
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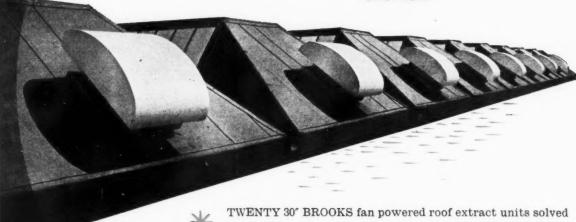
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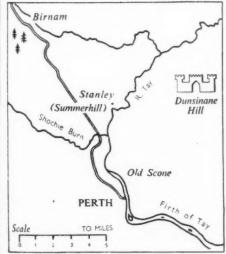
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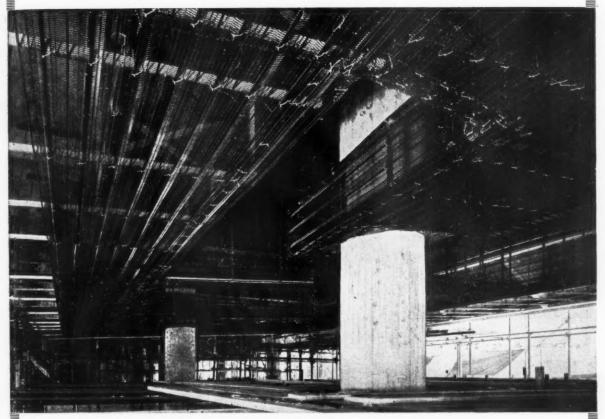
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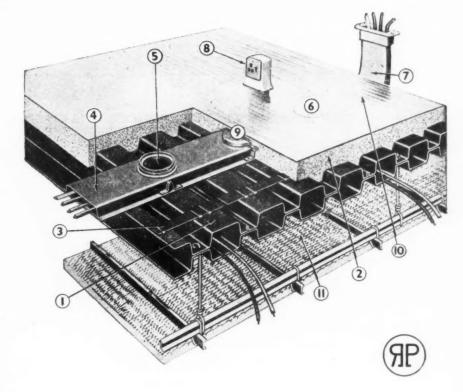
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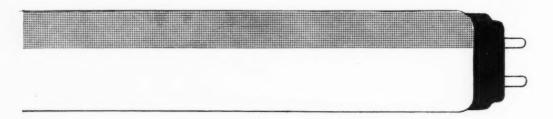
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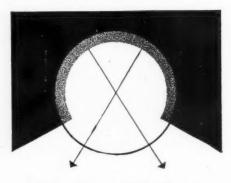
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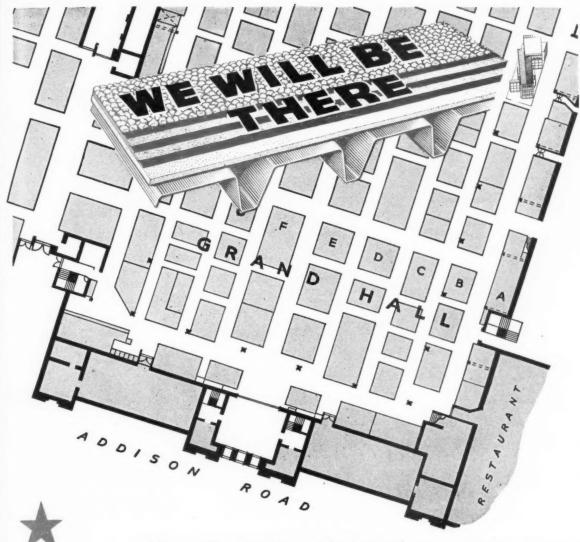
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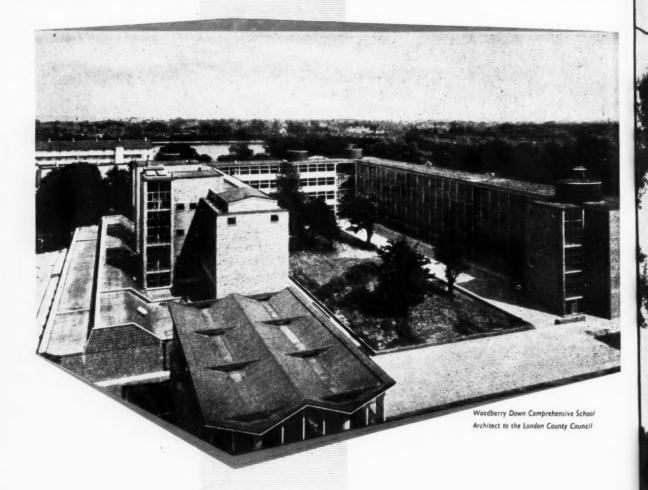
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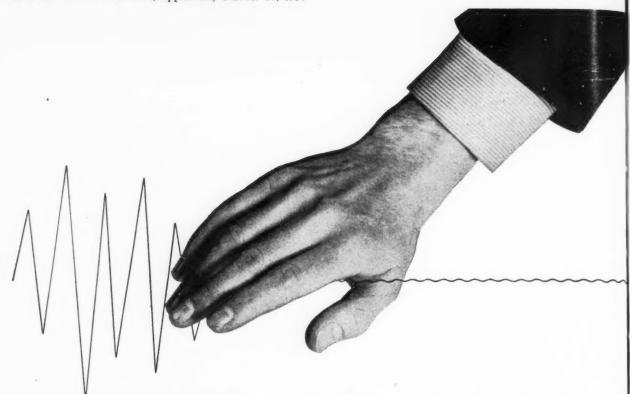
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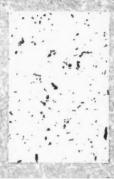
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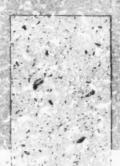


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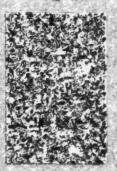
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To ensure complete watertightness, the Asphalt must be continuous over the whole surface of the underground structure; any openings for the passage of service pipes, cables, drains, etc., will cause weakness and liability to defects since such openings are not easily made watertight. Should it be necessary to include such items in the design, the Asphalt Contractor should be consulted at the design stage for his recommendations as to the method of treatment.

All Asphalt, whether horizontal or vertical, should be applied in three coats with double angle fillets.

The first stage of building construction will be the provision of a horizontal concrete sub-base on which the Asphalt is to be laid As soon as possible after the Asphalt has been applied, it should be covered with a 2-inch layer of concrete, to protect it from damage due to traffic and handling of other materials on the site. A loading coat of concrete is then applied, strong enough to withstand the calculated water pressure.

The vertical Asphalt should be placed, if possible, on the outside of main structural walls, so that the wall itself takes the pressure of the water (Fig. 1). If circumstances do not permit external application, the Asphalt may be applied to the inside of the wall. In such cases, however, a loading coat of concrete or brickwork must be applied immediately the Asphalt is laid, and such loading coat must be strong enough to resist the water pressure expected.

While asphalting is in progress the foundations of the building must be kept dry by a carefully arranged system of sumps and drainage channels. Pumping must be carried out continuously until the Asphalt is applied and loading coats completely set; water must not be allowed to rise above the level of the ground on which the horizontal concrete sub-base for the Asphalt has been placed.

Success in underground waterproofing depends very largely on co-operation between Main Contractor and Asphalter. To this end, the Association issues Information Leaflets to Main Contractors setting out the principal considerations to be borne in mind during the actual carrying out of the work.

SPECIFICATION

It is recommended that the following be inserted in any Bills of Quantities for Asphalt Tanking work:—

"All Asphalt to be used for Tanking on this contract shall be manufactured to the Standard Specification of the NATIONAL ASSOCIATION OF MASTER ASPHALTERS by a licensed manufacturer and the blocks shall be branded 'NAMASTIC D.' The Asphalt shall be laid by a Member of the Association.

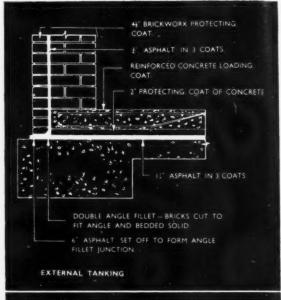
Horizontal Asphalt shall be laid in three coats to a total thickness of 1\frac{1}{2}in. Vertical Asphalt shall be applied in three coats to a total thickness of not less than \frac{3}{2}in. All Horizontal Asphalt shall be laid breaking joint at least 6in. and all vertical Asphalt shall be laid breaking joint at least 3in.

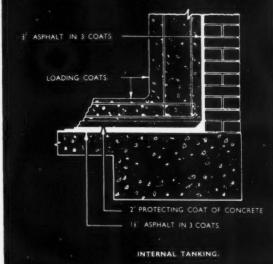
Angle fillets shall be formed at all junctions of horizontal sloping and vertical surfaces in two coats.

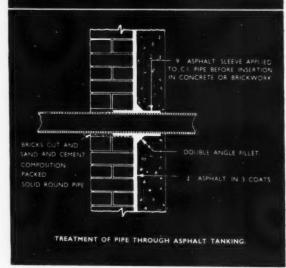
All pipes passing through the Asphalt work shall receive a sleeve of Asphalt in three coats before fixing in position to enable the Asphalt to be made good all round with a double angle fillet.

All external angles of concrete or brickwork shall be rounded off to allow full thickness of Asphalt to be applied."

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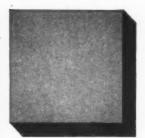
Architect: E. V. Collins, A.R.I.B.A., Chief Staff Architect.

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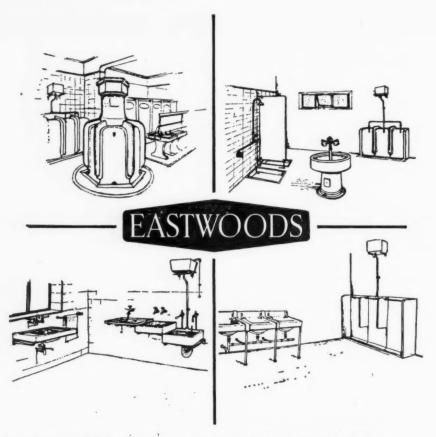
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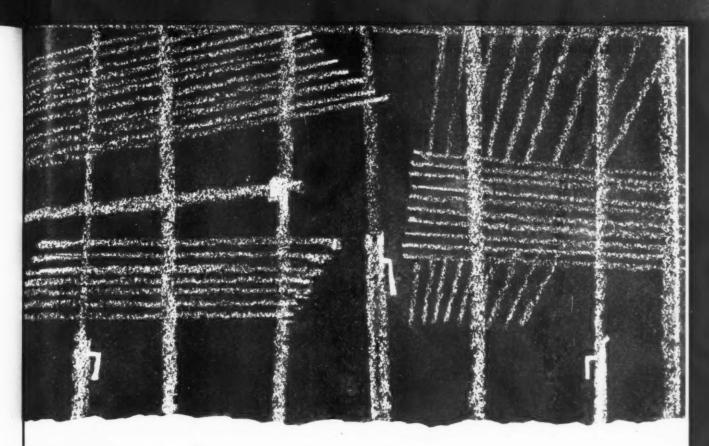
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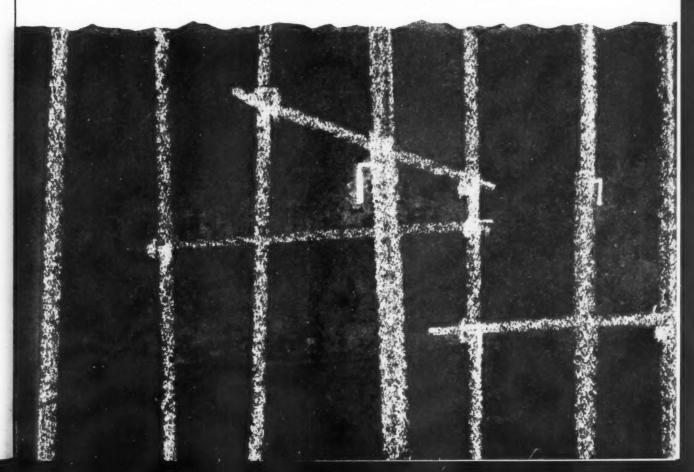
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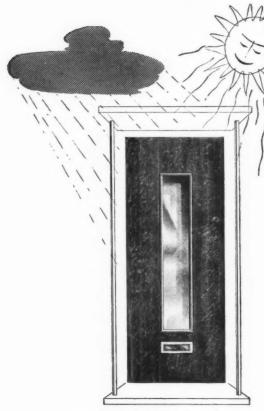
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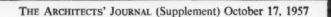
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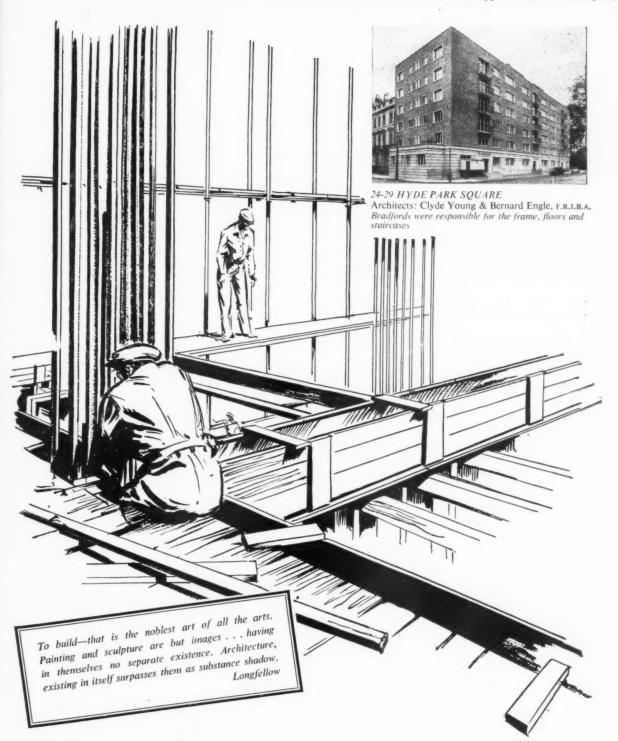
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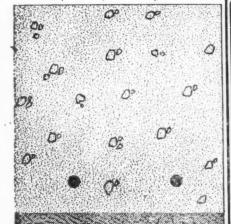


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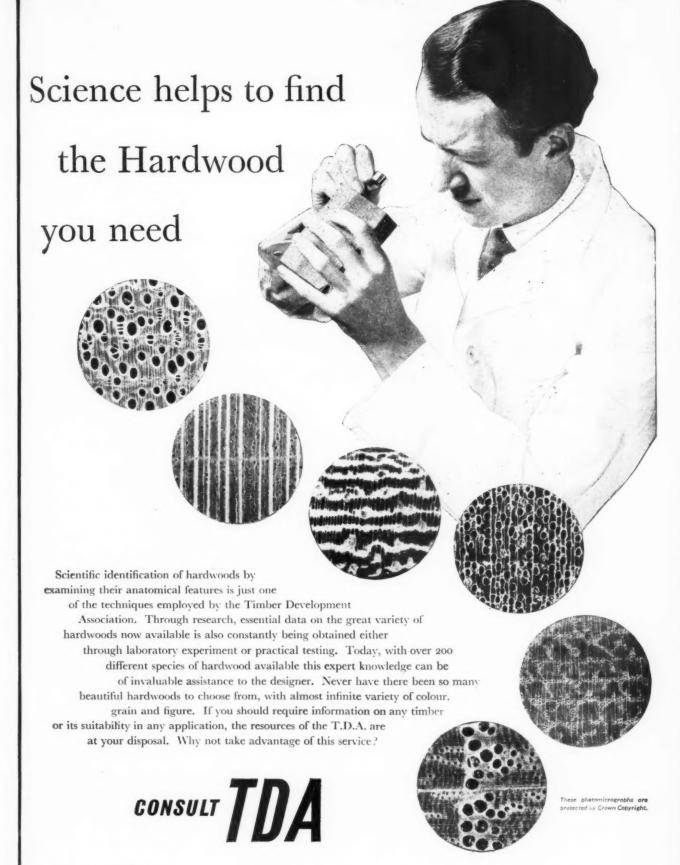
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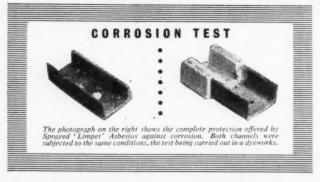
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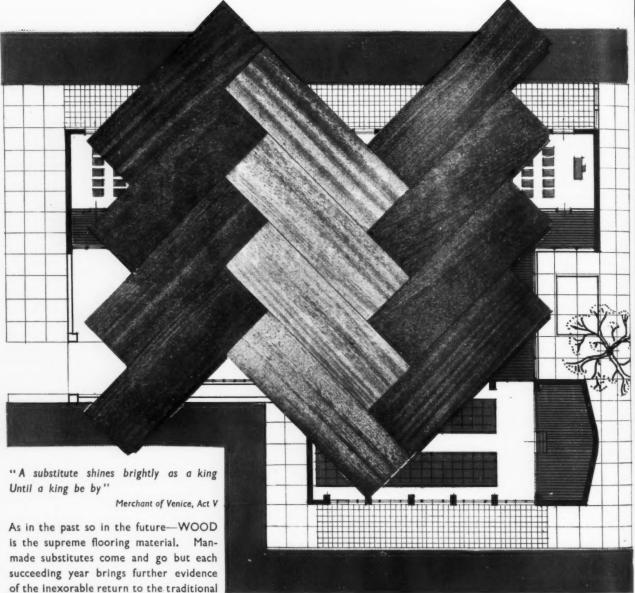
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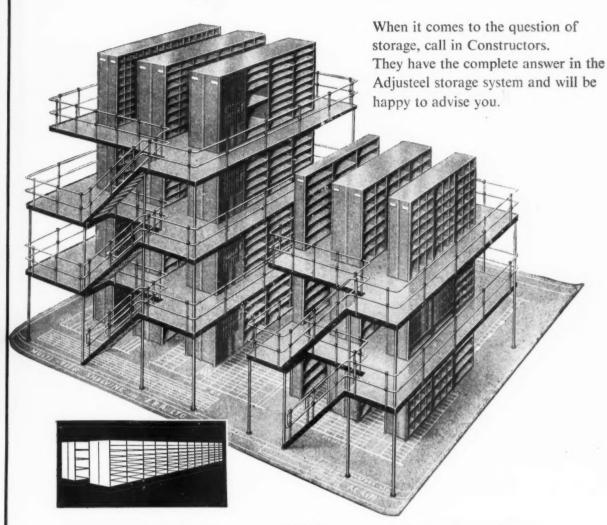


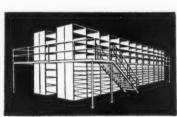
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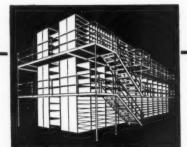
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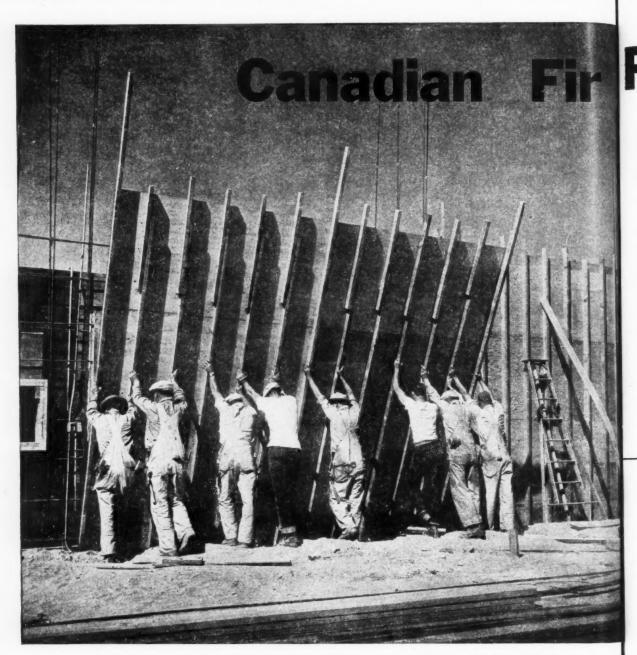


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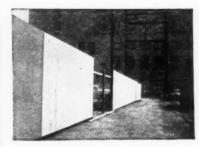
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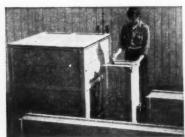


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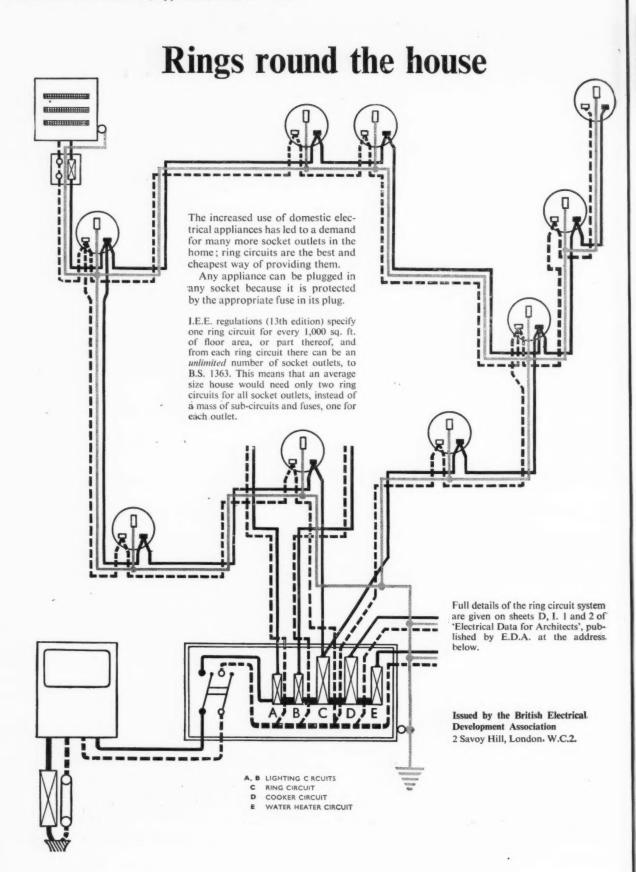
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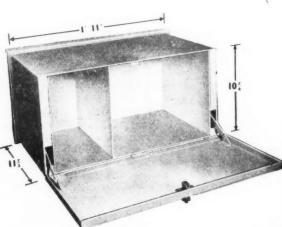


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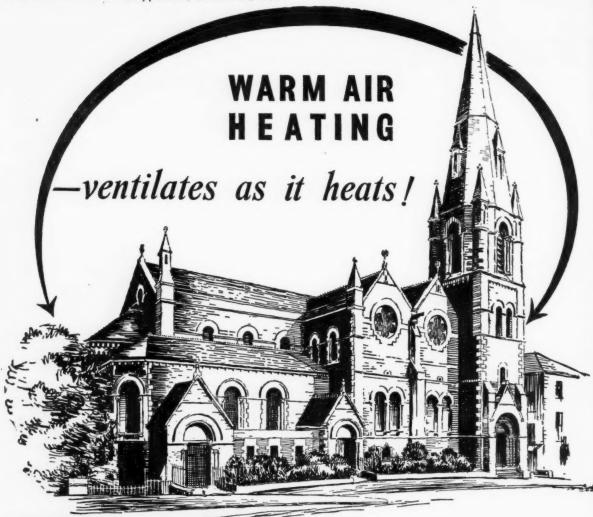
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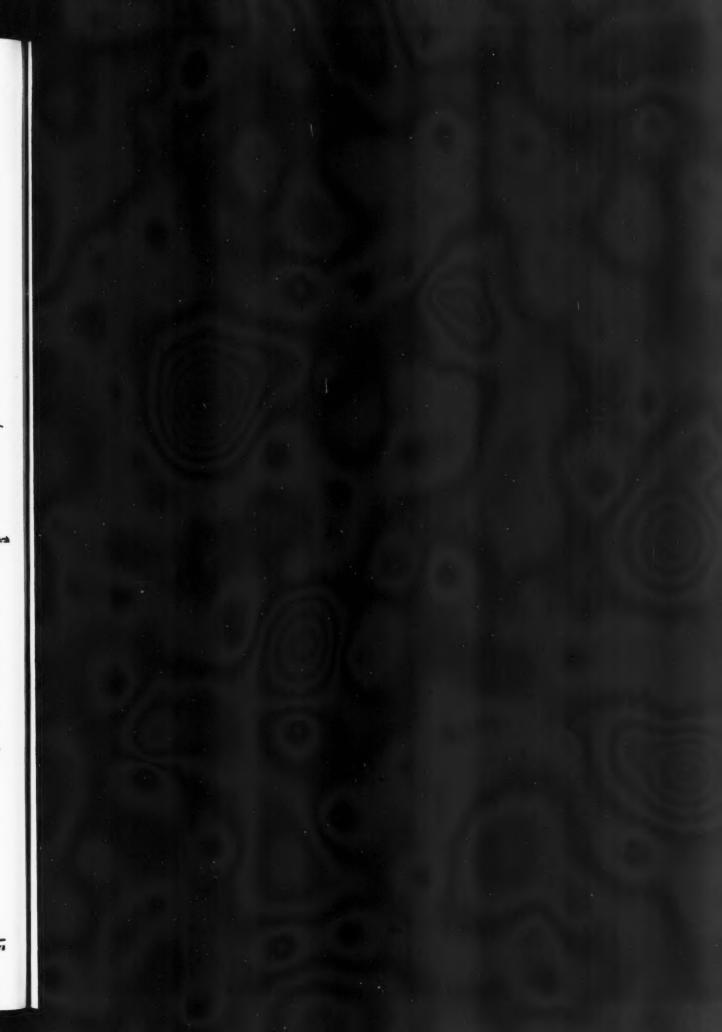


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Birkbeck College, Malet Street, London, W.C.1 Architects: Adams, Holden & Pearson, IF.R.I.B.A.

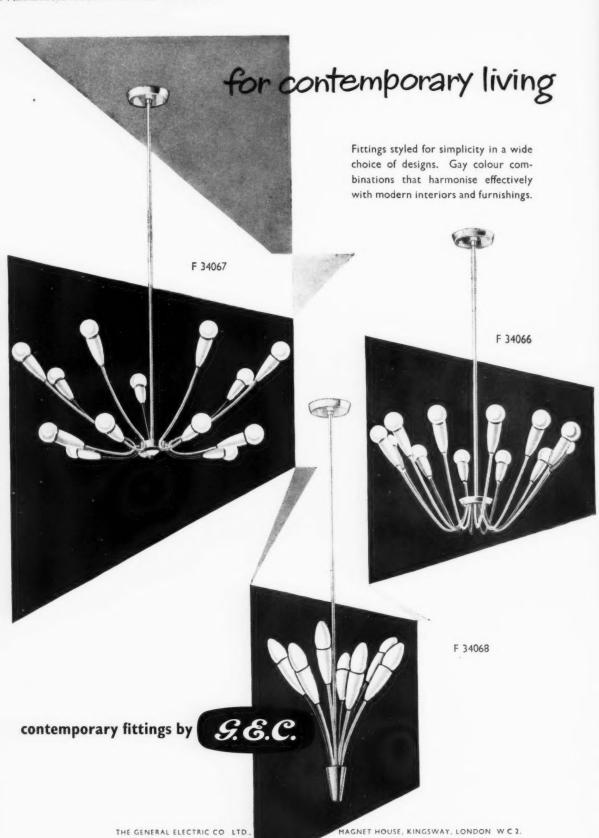
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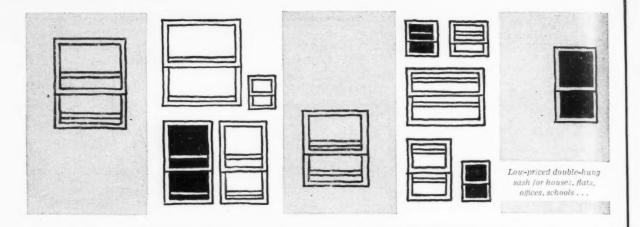
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- 3. Next-to-no building-in: windows are completely prefabricated and assembled at the works; mounting is by woodscrews in Rawlplugs set direct into the masonry: no sub-frame.

Maintenance costs are almost abolished. The only repair ever likely to be necessary would be the replacement of a broken pane of glass. This is no trouble. One rail of the sash is just unscrewed and a new pane slid into place.

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ALOMEGA Windows are available for inspection at any Williams & Williams Area Office or merchant stockist, and are made in the following standard sizes:

Туре	14,	3'83"	×	1'21"	Туре	24,	3'83"	x 1'11}"
Type	34,	3'83"	×	2'81"	Type	44,	3'83"	x 3'5}"
Туро	15,	4'83"	×	1'21"	Type	25,	4'88"	x 1'11}"
Type	35,	4'83"	×	2'81"	Type	45	4'83"	x 3'51"
Type	16,	5'83"	×	1'21"	Type	26,	5'88"	x 1'111
Type	36.	5'83"	×	2'81"	Type	46.	5'83"	x 3'51"

Owing to the method of construction, purpose-made sizes present no difficulty and are available up to a maximum of 19' perimeter, at approximately pro rata prices—although, of course, there will be a certain delay.



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the channel so that they carry the weight of the sash. When the sash is moved the wedge assembly tends to move with it, but is held back by lugs protruding from the wedges which engage in slots cut in the fixed jamb of the window. The lugs are given a small amount of vertical play in the slots, and these are so placed that, whichever way the sash is moved. the hinder wedge (relative to direction of travel) is stopped first. The effect of this is a fractional separation of the wedges permitting free movement of the sash for as long as pressure is applied to it. As soon as the pressure is removed the two retaining springs push the wedges together once again, binding them firmly in the channel and locking the sash in its new position,

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with EKCO trunking

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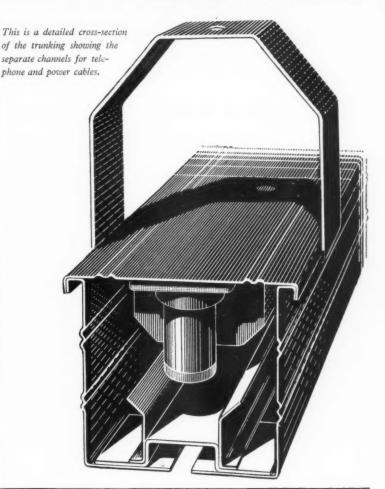
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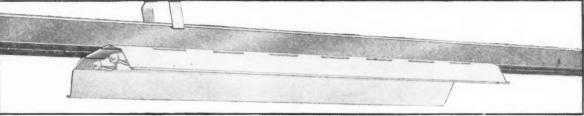
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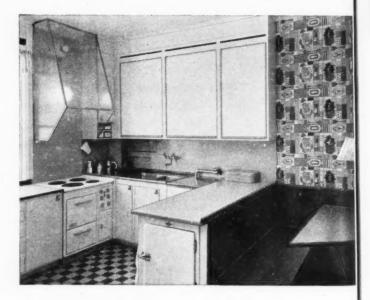
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Above An outside view, showing Corrugated 'Perspex' in position.

Left Corrugated 'Perspex' used as roof lighting in the shipyard of Alexander Stephen & Sons, Ltd., Linthouse, Glasgow. Photograph by arrangement with Newton, Robertson & Co. Ltd., Glasgow.

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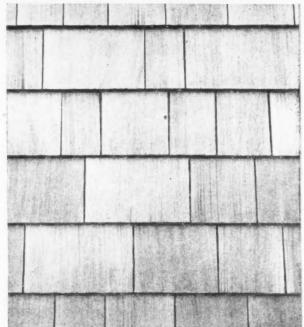
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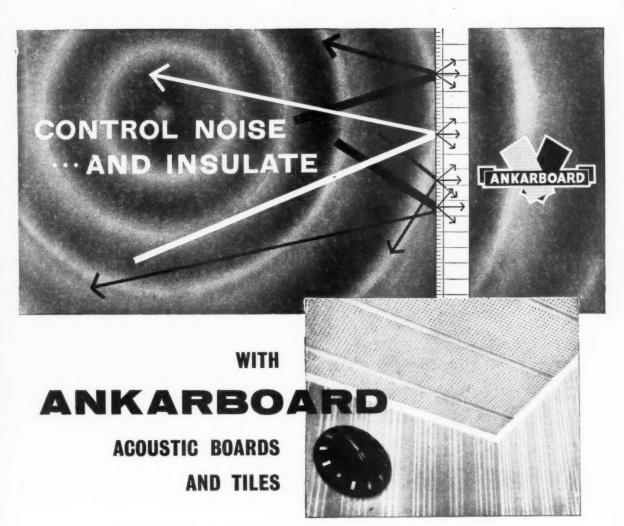


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NOT QUITE ARCHITECTURE

VOUS AUSSI?

Or, See You Later, Emigrator!

So you're thinking of emigrating to Australia! You've read the blurbs put out about social services and jobs for the migrant with lower taxation and higher salaries. You've seen several glossy picture books showing bronzed surf-bathers, fruit orchards and sheep and you've made up your mind. But pause before madly rushing off to deposit your application form at Australia House—pause long enough to do some serious reading. It's well worth while and, if you are a good potential migrant, it will convince you of the rightness of your decision.

Read the history of the development of the Eastern States, particularly about convict Greenway, the architect, who, under the patronage of Governor Macquarie, produced so many examples of good Georgian architecture. Read about Governor Stirling and the founding of the Swan River Settlement at Perth and try, by looking at a good atlas, to realize that the British Isles can be superimposed quite easily over the two smallest States of Victoria and Tasmania and that the journey from Perth to Sydney is equivalent to that from London to Moscow. Read about the geography and learn that one-third of this vast continent is desert and another third is semi-arid. Read Dorothea Mackellar when she writes:

I loves a sunburnt country,

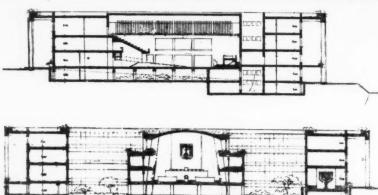
A land of sweeping plains,

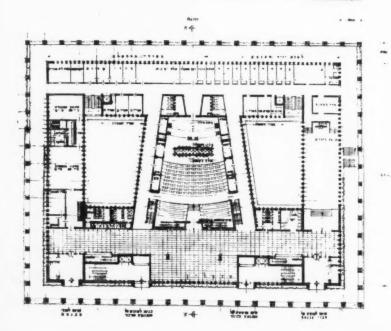
Of ragged mountain ranges,

Of droughts and flooding rains:

Read politics by all means, but remember the underlying fear beneath the policies of all parties—fear of the menace from what they call the Near North—fear that those people in the over-populated countries across the Indian Ocean and the China Sea will one day do more than just cast envious eyes on the enormous land area of Australia and its tiny population—fear that







Prize-winning Design for Israel Parliament Building

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These exclusive pictures show the design which won J. Klarwein the first prize in a competition for the Israel House of Parliament, Jerusalem. Mr. Klarwein, who was born in Poland and educated in Germany, has won many prizes in architectural competitions. In designing this building—for which he will do the detailed work in collaboration with a consultative committee—he set out "to create a building expressing the dignity of its purpose." It will be surrounded by concrete columns of Jerusalem stone, supporting a screened roof. There will be roof gardens to match the green surroundings of the Jerusalem landscape.

natural increases in population will be insufficient to provide an ample deterrent—
fear that makes them plan to build up their
population and industrial productivity as
quickly as possible by encouraging up to
150,000 white immigrants each year.

Read about sheep and wool, drought and bush fires, the gold of the 1850's and the uranium and oil of the 1950's. Read about the trots, the licensing laws, "swy," Australian football as opposed to soccer, the Great Barrier Reef, the aboriginals, the Golden Mile, Broken Hill, erosion, the Flying Doctor, the Gropers of Western Australia and the Crow Eaters of South Australia. All these will help you to understand the Australians and their problems and make you a better Australia when you arrive, even though your speech may label you immediately as a Pommie.

The main problem to be faced in emigrating is one of housing. In fact, the only guarantee that a sponsor has to give to the Immigration Authorities is that of being prepared to provide living accommodation for the prospective migrants. In many cases the migrant finds accommodation first and then searches for employment in the same locality. There are vacancies for architects in both government and private offices and more detailed advice on prospects may be sought from The Director, Higher Appointments Branch, Century Buildings, Swanston Street, Melbourne. Application forms for an assisted passage may be obtained from any Employment Exchange and these should be submitted, together with two references as to character, to Australia House.

There are two important factors to bear in mind in seeking employment as an architect in Australia. The first is that architects are registered there as in the United Kingdom and the architect from Home cannot be employed there as an "Architect" until he has gone through the formalities of registration. Don't expect any help in this matter from ARCUK: they will merely refer you to the registrar of the board of architects in the State in which you intend to take up employment. A full list of the registrars in the various states can be obtained from Australia House.

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The second factor is that of the time lag between arranging employment and actually starting work. There is the problem of the month's notice to be served in the UK, the time to arrange for an assisted passage or the time taken to obtain a berth if it should be decided to travel at one's own expense and the three to five weeks for the voyage. Putting oneself in the place of the prospective employer it is easy to see his reluctance to employ someone who will not arrive for so long. It is perhaps an advantage, therefore, for an applicant from this country to state that he would be prepared to fly out if suitable employment were offered.

M. SHENTON WILLIAMS

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* To preserve freedom of criticism these editors, as leaders in their respective fields, remain anonymous

The Editors

GOOD YEAR FOR LANDSCAPERS

THIS has been an important year for landscape architecture. Apart from the anti-subtopia campaign and the formation of the Civic Trust, there have been four exhibitions on landscape; the Chelsea exhibition (seen later at the York Institute annual summer school on Landscape Design); an exhibition to illustrate the ILA's very successful annual conference at Newcastle on the landscape of industry; an international exhibition staged by the Civic Trust, the largest and finest exhibition of its kind, ever assembled, and an exhibition at the Building Centre of the work of the four universities and college which have courses on landscape.

All this indicates an awareness of the need for more and better landscape work. Why is the general standard of landscaping in this country so low? The best work is good, as some of the work in the British section of the Civic Trust's international exhibition showed, but there is not nearly enough of it. Of course money is short for this work, but good landscape design is essential in this densely-populated island with increasing demands on land use. Industrial sites need it, large schools need it, housing estates need it, and yet so little is done. We are a long way from having a high standard of landscape design as a normal thing as it is in Denmark, Sweden and Switzerland. Often too little money is budgeted for landscape work on building (cost planning and timely landscape advice can help) and then this minimum may be cut again at a late stage (cost control is needed).

Lack of money is not the only snag or even the most difficult one. The right design skill is needed at the right time in the right place. The undoubted ability in the upper ranks of the profession has not been used to the full extent, and there is a

shortage of younger landscape architects.

There are signs that things are changing. Cumbernauld new town appointed a landscape architect right at the beginning of the work there (the first time this has happened); several local architects, notably in Coventry—have recently started a landscape section; and spec housing is now to be seen with a high standard of landscaping at Richmond and Blackheath. The exhibition at the Building Centre is designed to show the scope of the landscape architect's work, and this may surprise many people, and to show the progress of the schools of landscape design at the Universities of London, Reading, and Durham

and the Leeds College of Art. (London runs a two-year post-graduate evening course, up to intermediate; Reading has a three-year full-time course up to final.) The exhibition is well illustrated and mounted, the size is just right, and the exhibition should be visited by anyone who is interested in getting a higher standard of landscape design in this country. It is also worth visiting to make a note of a few names for future work. This should be done quickly as these students will be sure to be much in demand.



THE TELEKINEMA'S SUCCESSOR

Last week ASTRAGAL joined early viewers of the new National Film Theatre under Waterloo Bridge. The planning device of putting an acoustic canopy under the arch, and the projection booth up between the main beams of the bridge, is something we all know about from what had already been published about the project, and what one wanted to know was how the LCC General Division had detailed it.

They have, in fact, sailed perilously close to a sort of municipalized espresso style on occasions, but have mostly managed to be bright without ceasing to be forthright and plushy without becoming tatty. The most controversial feature is obviously going to be the movable screen of interlocking abstract forms that acts as a curtain, and also trims the width of the "proscenium" to suit varying screen-

formats. This was undoubtedly a brainwave, but why did the forms have to be textured up with gesso (or something) and then painted with what is inaccurately but descriptively known as "aluminium gold paint?"

One feels, also, that the meaner kind of police department might take a dim view of an exterior public staircase that is so brutally honest about its construction that a bright Teddy Boy with a pair of pliers and a three-quarter/ seven-eighths spanner could have it in bits in no time. Otherwise good—and particularly so (when they have tidied up the light-shades) the sequence of catacomb-bars down the side of the auditorium-in one of which ASTRA-GAL observed an editor of Contract Furnishing glaring at the bar-counter for all the world as if he had known it when it was a tree.

CHEAPER CEMENT?

It would, no doubt, be rash to look for a fall in cement prices as a result of the successful operation of the new Staffordshire cement works of the Blue Circle group. On an average more than a fifth of the cost of producing cement is the cost of the fuel, and the new plant is said by the Economist to use about 40 per cent less fuel than any other plant in Britain. It is still an experiment, although it has been running for six months, but if it is as successful as claimed the new process will presumably be widely adopted. The capital cost of the new plant is substantially higher (over £31 million for a plant producing 200,000 tons a year, against £23 million), but the extra capital charges are said to be more than off-set by the saving in fuel. One of the unfortunate effects of having to borrow at 7 or 8 per cent. is, however, that the capital charges rise very steeply and discourage investment in more efficient plant.

NO COMPLAINTS

Incidentally, there has been little response to ASTRAGAL'S invitation to architects to tell him how they have been affected by the increased bank rate, probably because it is still too early to tell. The building employers and operatives have both uttered their usual cries of "wolf," but since that animal has regularly failed to appear when similar cries have been uttered in the past nobody takes them very seriously. A survey made by the Daily Telegraph, reporting that many local authorities are postponing or cutting building work, and suspending loans to private borrowers, does suggest that at least a wolf cub may be approaching the door.

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A BIT MUCH

The symposium on Family Life in High Density Housing, with particular reference to the Design of Space About Buildings, held at the RIBA on May 24, 1957, is now available at a price of 10s. (by post 10s. 6d.) from the Secretary, RIBA, 66, Portland Place, W.1. It contains the papers prepared in advance, together with other papers given and a report of the discussion. It is a well illustrated and a most valuable document, but its appearance does prompt two questions: why should it take more than four months to produce a report of this kind, and why should it cost as much as 10s. for 40 pages? Quicker publication and a lower price would surely have brought about a wider circulation, and made the symposium even more useful than it was. There seems to be something here for the RIBA to look into.

ABOUT WHICH

For years and years we have all been hearing about the American Consumers' Union and for an equal length of time people have been wanting the same sort of thing to help shoppers in this country. Do you remember the efforts in the early 30's to start something like this for building trade products? That was in the days when BRS could never bring itself to mention trade names and when there were nothing like as many building trade British Standards. Now there are two organizations here, BSI's Consumers' Advisory Council and the Association for Consumer Research, to each of which you pay 10s. a year for monthly or quarterly reports.

BSI's Shopper's Guide is adequate, but it could be a good deal more outspoken, though it is probably difficult for a semi-government department to be as tough as it would like to be. The CR publication, which is Which (all right, have your fun and then pay attention), is really quite tough and I suspect will run into libel trouble before long, though the sponsors seem quite happy about it and admittedly no manufacturers can officially disapprove of independent comment, much as they hate it. Anyway, it seems to me that both these publications are well worth the money and I hope that at least Which (all right, the joke's over) will survive.

EXPRESS PURPOSE?

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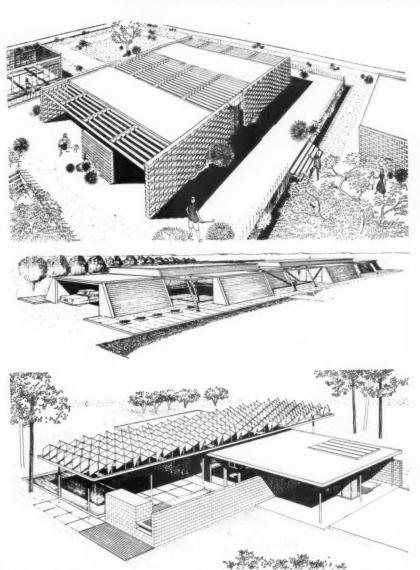
thly

Apart from the praiseworthy intention of turning an honest penny, it is difficult to see just what the Beaverbrook organization thinks it is up to with its new monthly, Books and Art. This magazine enters a field already thickly populated with other badlylaid-out magazines, printed on equally unpleasant paper, all equally-if less blatantly-busy trying to cash in on the personality angles of the entertainment-end of the arts, and unless the nation-wide publicity services of the Daily Express can beat down the opposition for it, one would say its chances of survival were slim.

And that might be a pity-in spite of the fact that most of this first issue is devoted either to wringing every drop of sensationalism out of the Angry Young Man caper before it dies, or getting marginal celebrities like Edward Hyams and Wolf Mankowitz to perform small party pieces. There are three contributions that read as if they were written straight—a calm tribute by Basil Taylor to Ben Nicholson, a sensible piece by Alexander (Sweet Smell of Success) McKendrick on what television ought to be doing to the British cinema, and an equally sensible piece by Kingsley Amis on what's good and what isn't in science fiction.

DONE IT THEMSELVES

If you want to make an isotope store, or a double action cattle gate or a revolving clothrack and many other useful or beautiful things besides, you have only to turn—for do-it-yourself inspiration, not for cold cribbing we hope—to Architects' Working Details



The first three winning designs in America's international solar house competition. Top: by Peter R. Lee, affiliated with R. L. Bliss (America). Centre: by Anna C. Bliss (America). Bottom: by John N. Morphett (South Australia) and Hanford Yang (of China). More details on page 579.

(Volume 4)*, which is just out. There are of course some architects who have no use for this kind of literary, graphic and photographic performance: but are they really wise? Is it always a good thing to start *every* investigation from scratch and to ignore what the other clever chaps have found out?

ASTRAGAL has some inside know-ledge of the travail which goes into the compilation of this kind of thing: how important it is for the photographer to go along before something sags or gets bashed and how difficult it is to make sure that the drawing tallies with photograph when architects' drawings nowadays are so rarely revised as the *Edited by D. A. C. A. Boyne and Lance Wright. Architectural Press.

job progresses. Nevertheless, most of the snags get smoothed out, and the result is a worth-while and meticulous record of today's know-how.

FROM THE MOUTHS OF BABES . . .

One of ASTRAGAL'S nephews has sent him a brief, but vivid, description of the opening of the new science labs at the Duke of Edinburgh's old school, Gordonston: "The school had an 'At Home' yesterday," he writes, "on the occasion of the opening of our new laboratories. The Beak waffled on about the excitement and opportunity of the new scientific age, while behind him stood this awful building belonging to an age gone by."

ASTRAGAL.



G. H. Wigglesworth, A.R.I.B.A. W. D. Lacey, A.R.I.B.A. Walter Segal, Reg. Arch. Secretary, Coal Utilisation Council Richard Patterson, A.R.I.B.A.

Notts And Costs

SIR,-In the description in your issue of September 26 of the reorganization of Notts. County Architect's Office, the chart entitled "working drawing programme" and the text do not seem to agree. If, as the authors describe, cost checks are made while draft working drawings are being prepared, why are these draft working drawings not given space on the W.D. programme chart?

The real sequence of producing drawings was well described in one of a series on control of costs about two years ago in your columns. In that article the drawing sequence was separated into its two phases: design period and working drawings. Any architect examining the work in his own office will know that working drawings (i.e., the drawings by means of which the contractor with the drawings with the contractor. tractor builds) should wait until all design points are settled. The deliberate separation of these two sequences will not only allow cost checks to be made, where they are most useful but will encourage an office to think out its problems before committing itself to final drawings. To do this will occupy no more time than designing on the working drawing in the manner so often seen in architects' offices.

Finally, it appears that the authors do not understand the purpose of cost checks if they are in the habit, as stated, of adjusting their cost targets to meet the design, rather than modifying the design to meet the cost

G. H. WIGGLESWORTH.

London

We showed the above letter to one of the authors referred to. His reply is

SIR.—We are very pleased that Mr. Wig-glesworth is a staunch advocate of cost planning, but there are one or two com-ments which I should like to make on his

Firstly, I agree that the working drawing chart in our article on the reorganization of the County Architect's Department, Not-tingham, could have been elaborated and a separate period for the preparation of draft working drawings set out. In fact, this process was adopted but the period of time not specifically defined.

Secondly, in dealing with a large subject like Cost Control in one paragraph, generalizations were inevitable. When the individual cost targets were altered they like Cost were altered by modifying the design of the element, substituting an alternative material, or by modifying another element to which changes could more easily be made. only in this way that cost planning makes sense and the best distribution of the money available is achieved for the client.

W. D. LACEY.

Nottingham.

Sir—I Am Amused

SIR,-I am amused. I have just read Mr. Sir,—I am amused. I have just read Mr. Banham on Le Corbusier and been introduced to Mr. Stirling's discovery of the "erudite" rather than "inventive" architect. We must all be very grateful to Mr. Stirling; and no less to Mr. Banham for praising Mr. Stirling for this discovery. For, as Mr. Banham says, nobody thought of it before. Le Corpusier almost received. before Le Corbusier almost reached a biblical age.

Oh, those adjectives! How important they are, "erudite" in particular. A very suggestive adjective too, though this is not Mr. Stirling's fault; and so, in fairness, I stifled another adjective also beginning with an " which is less kind and can be suspected of expressing even more clearly an implied trend of thought.

I also looked at Mr. Stirling's CIAM village project. Now if one stands on a pedestal for so many years one must expect those that are dancing around it to indulge in some nibbling; if only as a sign of affection and as a protestation of a possibly otherwise unnoticed existence. Le Corbusier in installing himself on his pedestal had the clearest of perceptions about this and said so, quite free from any illusions, in the introduction to the first volume of Oeuvre Complete. .

But this clever stuff, while amusing, is clearly all nonsense, is it not? We all can trust Mr. Banham to give things an upside-down twist and to take up the unusual twists of others. He looks, I sometimes think, at the world like Father William and I enjoy always reading him because
I like the sophistry of innocents and because he affords me such excellent interpretations.

The picture of Le Corbusier as a travelling collector of goods that are convertible into architecture seems to me, who has no axe and is completely outside this Looking-Glass-World of architectural inversion, uproarious good fun. Eventually somebody will discover that Le Corbusier, has never existed at all and that his work must be ascribed to Jeanneret and I am sure that this discovery will be made in England. . . . They do nibble at the pedestal land. . . . They do invoice the "young ones," don't they?

However, if L.C. is now deprived of any However, if L.C. is now deprived of any claim to real originality—and I cannot see what that matters but, obviously, others think it better to be original—if Messrs. Stirling and Banham have now exposed him as, to use the horrid soul-chilling word, an eccentric "eclectic," what about his followers? What about those that mill around his pedestal and catch the leaves that drop from it? What about the image-priests What about the image-priests, from it? Modulor-dancers, the beton-brutamortists?

Perhaps Mr. Banham and his friends will delight us one day by introspection and auto-analysis; and because they are so clever they are bound to make yet the stern discovery of self-criticism. In the mean time we read their opinion (with a capital O), look at the village projects and the other shrines of the no-longer-so-young post-avant-guardists and gardistes and practice benevolence.

Of all the things that greeted me on my

return from holiday two stand out to cheer me up. Messrs. Stirling and Banham's un-frocking of Le Corbusier and my friend Betsy's exhibition at the ICA; and while I cannot, alas, thank the latter for the pleasure she gave me, I can certainly offer my appreciation of the clever things Messrs. Stirling and Banham manage to say and bring to print.

Ingens patientia papyri. . . .

WALTER SEGAL.

London.

Reyner Banham replies:

I would be grateful if Mr. Segal would grind his axe-before he tries to decapitate me again. This blunt-instrument stuff is not up to the standard of the Segal we know and love, who used to strop up his controversial armoury with a few facts before cutting me down to size. Inversion is a matter of viewpoint; can Father Walter prove he is the right way up?

The Ad Hoc Committee

SIR.-I am writing on behalf of 39 archiassistants, of the Co Department, Nottingham. County and tects Architects have in this office been following closely the work and progress of the RIBA's ad hoc committee, as outlined in its interim reports, and have noted with satisfaction the appointment of a secretary for professional relations.

The chairman of the ad hoc committee has now addressed an open letter to local authority architects (published in the JOURNAL of September 26), in which comments are invited on the proposed formation of a local government architects' society. With this as our subject, we have considered the implications of the proposed society, and at a meeting held in the office the following resolutions were passed:—

1. That this office supports the formation

of a society for assistant architects in local government, under the ægis of the RIBA.

2. That such a society should not attempt

to become a replacement, or an alternative organization to the existing negotiating machinery for architects in local govern-ment, but should be complementary to it.

3. That the RIBA should give every possible support to the formation of such a society.

That in view of the editorial comment in the JOURNAL of October 3, 1957, any proposed reduction in the financial support being given by the RIBA to the ad hoc committee can only be viewed with the greatest misgivings.

We feel that it is of the greatest impor-tance that in its work the ad hoc committee should know that it has the support of groups of architects throughout the country. It is our hope, therefore, that such groups will express their support by taking advantage of Mr. Sheppard's request. RICHARD PATTTERSON.

DIARY

George Frederick Bodley. Talk by H. V. Molesworth Roberts at an RIBA Library Group meeting. At the RIBA, 66 Portland Place, W.1. 6 p.m.

OCTOBER 21

Managing Building Projects. Four dis-cussions organized by the Brixton School of Building, 1, Architect and client: October 23. 2, Architect and Quantity Surveyor: October 30. 3, Architect and Specialist Consultant: November 6, 4, Architect and Conference of the Conference tractor: November 13 Street, W.C.1. 5 p.m. November 13. At the BC, 26 Store

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Report of Architectural Studies

The report of the Nuffield Foundation for the year ending March 31, 1957, includes an account of the work being done by the Division for Architectural Studies, of which R. Llewelyn Davies is the director. Studies in hospital provision for children have continued. One survey, in which 116 children's wards are taking part, will establish over a year the numbers of children who were isolated, confined to bed although not in isolation, and allowed to get up for all or part of the day. This data will give guidance on the accommodation needed in children's wards. wards.

wards.

A second survey will establish the number of children admitted to beds intended primarily for adults, and the Registrar General is tabulating for the Division the age, sex and illnesses of children treated annually in hospital. The Division has held most helpful discussion with nurses on the relationship between good nursing and the pranization of space and the provision of relationship between good nursing and the organization of space and the provision of facilities in children's wards, and has observed the day-to-day pattern of care in the Royal Liverpool Children's Hospital, where the new method of group nursing has been introduced. Two architectural Fellows have produced a report on children's hospitals and wards which they wisted in have produced a report on children's hospitals and wards which they visited in Holland, Denmark, Sweden and Finland. In the design field plans have been developed for a central sterilizing department to serve Musgrave Park Hospital, Belfast. The department will be housed in the experimental block designed by the team of the investigation into the functions and design of hospitals, and will be the first of its kind in the United Kingdom.

The team eneaged in the study of labora-

its kind in the United Kingdom.

The team engaged in the study of laboratories has completed its survey into the utilization of space and services. Studies of daylight conditions in laboratory rooms made jointly with the physics division of BRS have also been completed. As in the hospital studies it was found that colours used for walls, ceiling and furniture had a pronounced effect on the lighting characteristics of the room and colour was therea pronounced effect on the lighting charac-teristics of the room, and colour was there-fore studied as well as light. The Division is preparing plans for a small Agricultural Research Council laboratory at Cambridge which will give it the opportunity to demonstrate and test some of the conclusions of the study. of the study.

During the year two post-graduate fellows,

Peter Wixon, who was sent by the New Zealand Government, and Newton Watson, who was selected from applicants within the United Kingdom, have been working with the Division. The fellowships were

established to provide advanced training for promising young architects who had had some experience in practice after qualifying, and are probably the first experiments in advanced architectural training anywhere in the world. After participating on research work, the fellows worked together in the design of a small maternity unit to be attached to the Nuffield Diagnostic Centre attached to the Nuffield Diagnostic Centre at Corby.

SCOTLAND

National Building Regulations Wanted

Scotland should have a set of National Building regulations, instead of varying local bye-laws. This is the view of a committee* appointed in 1954, which has just made its report. At present, local bye-laws vary from district to district—apparently more so than in England, indeed some 25 per cent of authorities have not yet adopted the 1954 model bye-laws.

model bye-laws.

The new proposal is to take the making of bye-laws out of the hands of local authorities and to have instead a uniform national set of regulations. The committee thinks that the need for bye-laws to vary from district to district has diminished—that uniformity of building practice and the centralized manufacture of materials is more important. The most significant departure proposed by the committee is that the regulations should be in terms of performance standards—to a much greater extent than our present model bye-laws. This admirable move will depend for its effectiveness on the move will depend for its effectiveness on the competence of the technical officers of the local authorities. The committee is dissatisfied with the present situation in this respect and recommends to the Secretary of State that he should prescribe qualifications that technical officers should possess.

The most remarkable difference between Scottish and English practice is that there, applications for consent are considered in

scottish and English practice is that there, applications for consent are considered in open court—a "Dean of Guild Court" composed, usually, of local councillors and the technical officer, Applicants are free to defend their proposals and to ask questions. In other words, building standards are regarded as a judicial and not an administrative matter. tive matter.

ABT

Reply To RIBA

The following statement, signed by Mr. Shrosbee, the ABT secretary, has been issued by the Association:—

'The ABT, which can claim at least some success over the years in representing salaried architects, is naturally interested in Mr. Sheppard's statement which has recently appeared in the technical press† After all, any organization such as ours, which has been operating in this field for many years, with very little encouragement and far too often actual obstruction and hostility, can surely only welcome any move which is likely to bring about more effective rep-resentation for local government architects through the NJC.

through the NJC.

"However, there are many questions which architects must ask themselves in considering Mr. Sheppard's proposal. Firstly, why must 'any society seeking recognition as a negotiating body...be limited to local government officers,' when the National Union of General and Municipal Workers, the Transport and General Workers' Union and the Confederation of Health Service Employees all have seats on the NJC itself? Certainly these organizations are not confined to local government.

*Report of the Committee on Building Legislation in Scotland (Chairman: Lord Guest).

† See JOURNAL, Sept. 26.

"Secondly, what 'enough good works' could the proposed society undertake if it is not able to perform the function for which it is proposed to be set up? Surely, apart from purely trade union activities any 'good works' undertaken by an RIBA-inspired body would be better undertaken by the RIBA itself, which is why members pay their fees.

their fees.
"The main query must be, however, whether Mr. Sheppard and his associates can guarantee effective representation in the NJC by the formation of another society along the lines he has outlined? Only if he can do so can there be any justification for suggesting this further fragmentation of the profession.

COMPETITION

Solar House Winners

The winners of the International Solar House Architectural Competition have now been announced by Jan Oostermeyer, President of the Association for Applied Solar Energy, which sponsored the contest. The purpose of the competition was to obtain original designs for a residence especially adapted to "living with the sun" on an irrigated desert site north of Scottsdale, Arizona.

The first prize of \$2.500 was awarded to Peter R. Lee, a senior student in architecture at the University of Minnesota. He was affiliated with R. L. Bliss, senior partner in the Minneapolis architectural firm of Bliss and Campbell.

Bliss and Campbell.

In commenting on the choice of Lee's design for the first prize, the chairman of design for the first prize, the chairman of the jury, Dean Pietro Belluschi, of Massa-chusetts Institute of Technology, said: "Among the outstanding merits of the win-ning entry were its directness and sense of unity, and the logic of its solar equipment, which acts in the double capacity of shade louvres in the summer and heat collectors in the winter." in the winter.

in the winter."

The second prize of \$1,500 was awarded by the jury to Anna C. Bliss (Mrs. R. L. Bliss), who is the junior partner in Bliss and Campbell. Of her design, Dean Belluschi said: "The main appeal of this design lies in the fact that the solar collectors themselves produce the architectural quality of the house. The disposition of these collectors keeps the house from becoming too severe in appearance."

The international aspect of the competition was emphasized by the award of the third prize of \$1,000, for the design submitted by two former students of the Graduate School of Architecture at Massachusetts Institute of Technology. John N. Morphett of South Australia and Hanford Yang of China.

China.

China.

The fourth and fifth prizes of \$500 each were awarded to I. C. Christensen of Denmark, and R. J. Pelletier of Beverly, Mass. Honourable mentions were made for designs submitted by Enis Kortan of New York, R. B. Maides and G. J. Shaw of New York, and Morton Karp of California.

The winning designs were selected by a five-man jury consisting of Dean Belluschi; Carlos Contreras. Honorary Fellow of the

Rive-man jury consisting of Dean Belluschi; Carlos Contreras, Honorary Fellow of the American Institute of Architects, from Mexico City; Thomas Creighton, A.I.A., Editor of Progressive Architecture. New York; Nathaniel Owings, F.A.I.A., of Skidmore, Owings & Merrill, San Francisco; and James Elmore, A.I.A., of Phœnix. They considered 113 entries submitted by architects and designers from 13 nations.

considered 113 entries submitted by architects and designers from 13 nations.

The prize-winning house will be built as soon as the detailed plans can be completed. Its solar collectors will supply the heat needed to keep the residence comfortably warm during the winter, to heat the domestic water, and to warm the swimming pool which is an integral feature of the design. Auxiliary heat will be supplied by an electrically-operated heat pump, which will

also provide summer cooling. Storage of heated water in winter and chilled water in summer will be in a large buried tank. The engineering of the installation will be done by the Albuquerque firm of Bridgers and Paxton, who designed and built the world's first solar-heated office building.

first solar-heated office building.

The solar house will be put on public exhibition early in the spring of 1958. It will then be used as a living laboratory by the Association for Applied Solar Energy and will be the centre of interest at the first Solar House Symposium, which will be held in September of 1958 by the Association in co-operation with the University of Arizona and Arizona State College at Tempe.

OXFORD

Farmers Discuss Buildings

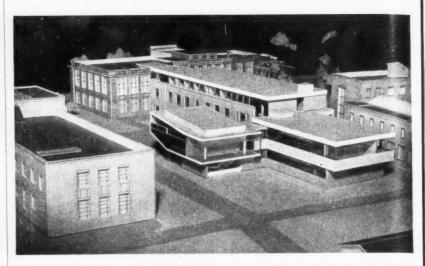
The second annual conference on farm buildings, organized by the Farmers' Weekly, was held recently at Oxford. Whereas the first meeting was concerned with farm buildings generally, the discussions this time were limited to "buildings and fixed equipment for dairying." Although attendance was by invitation only (writes a correspondent) the small number of architects in the list of conference members probably reflects the profession's lack of interest in this important work.

The three-day programme included papers and discussions under the headings of Basic Planning, Housing and Feeding, and Milking Layout and Equipment. There were visits to farms and a report by a working party on the replanning of a Northumberland dairy farm.

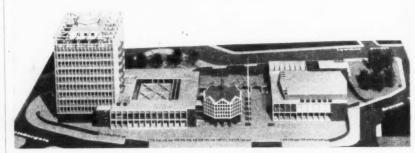
Farmers naturally view their problems subjectively in the light of experience with a widely varying range of buildings and widely varying range of buildings and regional conditions, and they are, of course, very much concerned with building costs. The papers and discussions at Oxford showed how numerous and diverse their problems are, and how urgent is the need for analysis and interpretation of them. Three papers by scientist members of agricultural research institutes pointed the way to objective study and experiment, but scientists can hardly be expected to interpret animal research work in terms of suitable housing for dairy stock on a commercial scale. In consequence discussion was much more heated on questions of method (e.g. the respective merits of cowshed versus yard-and-parlour systems) than on the fundamental questions of economic planning in relation to immediate function, flexibility (to cope with changing methods of husbandry), regional variations in climate, traditional versus non-traditional building methods, maintenance, etc. All these latter questions (as well as many other problems of detail) were mentioned at the Oxford meetings, but in an unco-ordinated way, whilst the interrelation between them and the unique aspects of building on the farm (unskilled building labour, transport, local drainage, etc.) seems to have been left to the farmer to deal with as best he can.

The balanced architectural viewpoint from which it would have been possible to sum up the problems posed at the conference and suggest solutions to them—(and possibly to give just a small mention to the appearance of farm buildings and their relationship to the rural landscape and village development)—was never expressed. An architect-listener was left with the firm conviction that only a broadly-based research and development group with an architect at its head could hope to produce a short-term solution to help the farmer and his advisers through the maze of immediate problems. Such a group would go on to produce a long-term plan to help the farmer towards the efficiency he so obviously wishes to achieve, without submerging the individualism upon which he insists

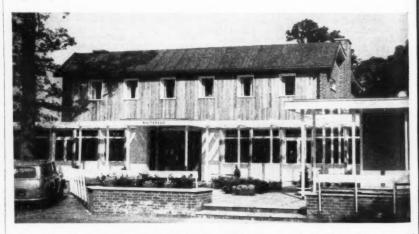
BUILDINGS IN THE NEWS



This photograph shows extensions (including a new top floor and a lecture theatre) to the Department of Organic Chemistry in Oxford. Architects: Ramsey, Murray, White and Ward.



This is a model of the design by C. E. Pearson and G. R. Lovell (of Charles B. Pearson and Son, Manchester and Lancaster) for an assembly hall and municipal offices, Carlisle. The design won first prize in a competition and was illustrated in the Journal on August 15.



This public house at Crawley, "The White Knight," was designed by Musman and Cousens, who were also responsible for the furnishing and the interior decoration. Timber is extensively used, both structurally and as a facing material, inside and out. The aim, in the architects' own words, has been "the creation, in this entirely new, mid-century town, of a building which could reflect the contemporary pattern of living without breaking its bond with tradition and the past."

23 HEATING AND VENTILATION: small pipe central heating 1

In the issue of the JOURNAL devoted to the Institute of Fuel's Conference on Domestic Heating (June 28, 1956) we published a summary of a paper on automatically controlled small-pipe central heating by S. A. Burke, D. V. Brook and G. H. Bye, three members of the staff of the British Coal Utilisation Research Association. The small pipe system is a method of heating using pipes of much smaller diameter than those usual with conventional systems and by circulating the water with a pump. It was developed by BCURA primarily for houses of up to 1,500 sq. ft. floor area. The main purpose of the Conference paper, which aroused the greatest interest in the Building Industry, was to describe the results of a research project on the use of different methods of automatic control with small pipe installations. Research on automatic control was then followed by a period of field work on the installation of small pipe systems with particular reference to cost. At the conclusion of the field work one of the original authors, D. V. Brook, compiled a second paper, the first instalment of which we print here. This paper has been written for the JOURNAL since it is the opinion of BCURA that the heating of the small house is the particular responsibility of the architect, as the size of the job will not usually justify the appointment of a heating consultant. For this reason—and though it also presents the results of research—the paper has been conceived as a handbook for the non-specialist who wishes to design and instal a small pipe system in a small house. In this first part the author, after setting forth the advantages of the system, proceeds systematically to explain how to determine room temperature and heat losses, how to design circuit layouts using circulators now on the market, and how to size boiler and radiators, providing all the necessary tables and graphs to enable an architect to do these things expeditiously. In the second part of his paper, which we will publish next week, he discusses the technique of installing a small pipe system and concludes with a review of the costs of twenty-five actual installations carried out in recent years as part of BCURA's field trials. (Published by permission of the Director General of BCURA.)

Small pipe central heating: design, installation and cost. By D. V. Brook. Part 1: design

The small-pipe system of central heating is the result of more than five years' research. The work was undertaken with the object of reducing the cost of installation of a full central heating system to a level within the reach of a much larger section of the population, and, at the same time, to produce a system with an improved efficiency of operation.

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Now that the development work on the small-pipe system is almost complete, its successful application is dependent on those who are concerned with the building and heating of private houses being fully conversant with the design procedure and installation techniques involved. These are described in this paper, but first, in order to appreciate the advantages of the small-pipe system, it is necessary to examine the conventional methods of central heating practised at present.

The installation in an existing house of a full central heating system is generally acknowledged to be a costly undertaking and beyond the means of most people. Moreover, there are fears that such a system may lead to large, unsightly pipes being exposed to view, and that the floors and walls may suffer damage as a result of installing the system. Furthermore, there is often the feeling that, after the expenditure of a considerable capital sum in having the system installed, the householder will be burdened with prohibitive fuel bills, and have as his reward only the discomfort of an overheated and "stuffy" house. Examination of the reasons for this attitude towards present methods of central heating reveals some justifications.

The usual practice is to run a header of 14 in. or larger bore pipe from the boiler up into the roof space, from where mains

of similar size branch out to suitable points above the intended radiator positions. These large pipes then drop down in the corners of the various rooms to the ground floor, with connecting pipes leading off to the radiators. The return mains, carrying the water from the several heating circuits back to the boiler, are buried in ducts constructed in the ground floor.

In installing such a system in an existing house, large holes must be cut in intermediate floors and ceilings, and knocked through partition walls. It is often necessary to take up the tongued and grooved boards of the first floor, and weaken the joists by "notching" to carry the heating pipes. Worst of all is the not infrequent compulsion to chase into solid ground floors having a covering of tongued and grooved hardwood blocks, to excavate ducts for the return pipes and their lagging.

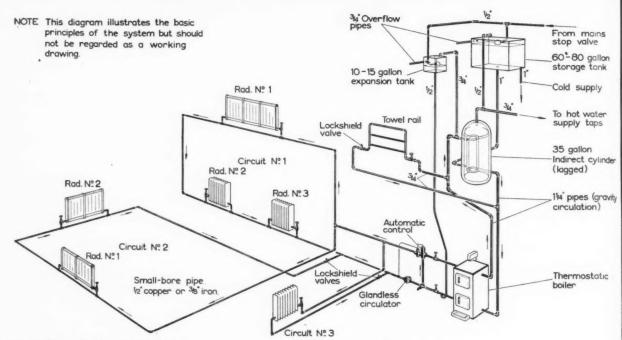


Fig. 1. The small-pipe central heating system.

The cost of carrying out this structural work is considerable, and permanent damage may be done to walls and wood block or tongued and grooved floors. The cost is often increased still further by the necessity for extensive redecoration.

In the case of new houses, where the heating mains are installed at the carcassing stage, the cost of structural work may not be so great. However, the undesirability of notching first floor joists for large pipes, and of laying heating mains beneath wood block floors remains.

The completed system often leaves much to be desired from appearance considerations, with large pipes dropping conspicuously in the corners of most rooms. These pipes are sometimes boxed in, but this usually does little to reduce their obtrusiveness.

Finally, in operation, a large proportion of the heat generated by the boiler is wasted in the roof space and under the ground floor, even when the pipes in these places are properly lagged. More heat is liberated unnecessarily by the large diameter mains in unoccupied rooms, and it is not uncommon, with this type of system, for more than 50 per cent. of the total heat generated by the boiler to be dissipated in distribution.

The gravity system, with its large pipes and consequent large water holding capacity, and with the rate of water circulation fluctuating according to the boiler temperature and the radiators in use, is unresponsive and inflexible. Control is difficult to achieve, the cost of really effective automatic devices being prohibitive for most people. Generally, the only means of reducing the heat output of the radiators in milder weather is to lower the setting of the boiler thermostat, but this can be done only to a very

limited extent if a satisfactory supply of domestic hot water is to be maintained, so that overheating is inevitable and fuel is wasted. Taking these numerous shortcomings in the performance of gravity systems into consideration, it will be seen that the complaints of uneconomic operation and conditions of discomfort are by no means unfounded.

Most of the disadvantages of the gravity system apply also to accelerated central heating systems, where the circulation is assisted by an electric accelerator. Pipe sizes may be slightly reduced in these systems, but not sufficiently to make concealment unnecessary. They are designed to operate with accelerators developing low pressure heads, and are usually required to function overnight by gravity circulation, with the accelerator stopped to eliminate the disturbing noise emitted by many of these units.

An accelerator is also sometimes employed to facilitate the installation of a high level return system, wherein the return mains are taken back up into the roof space and thence down to the boiler. in order to avoid having to construct ducts in solid ground floors. Such systems usually involve appreciably more piping, which not only renders them even less acceptable from the point of view of appearance, but also increases the heat lost in distribution.

The conventional systems of household central heating thus leave much to be desired. The new system described in the following pages has been designed to eliminate, as far as possible, these objections, and enable full benefit to be obtained from the fact that modern solid fuel boilers provide heat at a cost with which no other means can compare.

More than twenty installations have now been fitted into private houses in the Leatherhead area for field test purposes. Experience gained in the design of these systems is reported here; Part 2 of this paper describes the new installation techniques evolved, together with the costs of installation. Operational data collected during the 1956/7 heating season will be published as a later paper.

gi

The advantages of small pipe central heating

The small-pipe system has been developed for houses and bungalows of up to 1,500 sq. ft. floor area. It is often possible to design small-pipe heating layouts for larger houses, particularly if the boiler is centrally situated so that a greater number of circuits, rather than longer pipe runs, can be employed.

The basic principles of the system are represented diagrammatically in Fig. 1. The radiators are connected to the boiler by circuits of ½ in. copper or ½ in. nominal bore black-iron pipe, through which the hot water is forced by a small electric circulator. The small-pipe mains offer a high resistance to the flow of water, but suitable circulators are now available which are capable of developing the required pressure heads. An automatic mixing-valve, controlled by

outside temperature and fitted in conjunction with a boiler by-pass, enables cooler water from the return main to be blended with the hot water flowing from the boiler to the radiator system. In this way, the heat emission from the radiators is reduced in milder weather without the necessity of lowering the boiler temperature.

The boiler may therefore be maintained at a high temperature throughout the heating season to ensure a constant supply of

domestic hot water. The indirect cylinder is connected to the boiler by an independent gravity flow circuit through 1½ in. pipes, and is unaffected by the circulator in the radiator system. The hot water supply circuit is an essential part of the small-pipe system; if the heating load is suddenly removed by the stopping of the circulator, the excess heat in the boiler must be dissipated by the gravity circulation to the cylinder during the time taken for the boiler thermostat to reduce the burning rate¹.

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The heating mains are of such a small diameter that it is unnecessary they should be concealed from view, provided they are disposed round the house in the manner described in this paper. The use of a circulator permits great flexibility in layout. installation is simplified, and expensive structural work eliminated. In the case of existing houses, there is no need for the renewal of interior decorations.

It is unnecessary to take pipes up into the roof space either for the purpose of concealment or in order to create a natural circulating head; nor need the return mains be buried in the ground floor. The pipe lengths involved are frequently much less, therefore, than those required for conventional systems, and in consequence the heat wasted in distribution is reduced to a minimum.

There is no necessity for the small mains to maintain a continuous rise or fall for air venting purposes; indeed, they may be arranged in the form of inverted loops without fear of air locks preventing circulation, provided key-operated air cocks are fitted to facilitate the initial filling of the system.

Single pipe circuits, serving two or more radiators consecutively, are normally used, with a temperature differential between the flow and return mains of 20 deg. F. or less, to ensure that the radiators are all at substantially the same temperature.

The number of pipe circuits required to connect all the radiators to the boiler varies with the size of the house or bungalow and the disposition of the rooms. In dwellings of average size, two or three major pipe circuits are generally required, with sometimes an additional shorter circuit supplying one radiator.

Design procedure

The design of small-pipe systems is conducted in four stages: Firstly, the temperatures to which the various rooms are to be heated are decided upon and the heat requirements calculated. Next, the positions for the radiators are chosen, and the pipe circuits arranged to connect the radiators to the boiler by the most direct routes, in keeping with the layout of the house. The pipe runs must be kept as short as possible to minimise their resistance to flow and heat emission in unoccupied rooms, but the best compromise is sought in choosing routes which also exclude internal doorways or other obstacles, and avoid situations in which the piping would be obtrusive.

Thirdly, the friction losses through the major circuits are checked to ensure that the available pump pressure is not exceeded.

Finally, the sizes of the radiators to be fitted in each room are determined, appropriate allowance being made for the heat emission from piping, and the types of radiators to be used are decided upon. A suitable boiler must also be selected.

Room temperature and heat losses

The temperatures which the householder desires to attain in the various rooms are largely a matter of individual preference. Many people, when asked, have very little idea however of what constitutes a comfortable room temperature, and need to be advised. In the absence of any decisive specification from the householder, livingroom temperatures of 65 deg.-70 deg. F., with hall and bedroom temperatures of 55 deg. F. usually prove to be satisfactory. Dining rooms which are used intermittently for comparatively short periods should have a nominal design temperature of 70 deg. F., since, although a temperature of 65 deg. F. is usually sufficiently high, the larger heating surface thus provided enables these rooms to be warmed more rapidly.

In most kitchens, there will be sufficient heat from the boiler casing, flue pipe, central heating mains and primary flow and return pipes to the cylinder, together with that from the many domestic activities which contribute to the heating, to maintain an adequate temperature. If the boiler is situated in an outhouse, however, it will be necessary to provide a radiator in the kitchen, and a design temperature of 60 deg.-65 deg. F. should be taken.

No heating is usually required in the bathroom, apart from that supplied by the towel

rail. This room often gains heat from the hot water cylinder, as the linen cupboard is frequently in close proximity to the bathroom. If additional heating is required, either a combined towel rail and radiator may be fitted or a radiator provided in addition to the towel rail. The linen cupboard will be warmed sufficiently for airing purposes by the heat emitted by the hot water cylinder, despite the fact that this should be well lagged.

The foregoing room temperatures are slightly higher than those recommended in the Egerton Report², but were found more acceptable by the majority of the house-holders who took part in the field trials of the small-pipe system after they had gained some experience of central heating.

If an auxiliary appliance is to be used to provide radiant heating whenever the living room is occupied, it is permissible to design the radiators to heat this room to a temperature of only 60 deg. F., on the assumption that the additional heat required for comfort will be supplied by the radiant source.

In most cases where it is intended to use supplementary appliances, however, it is desirable that, on occasions, the radiators alone should be capable of heating the room to comfort level. The ideal solution, therefore, is to provide sufficient radiator surface to heat the room to the desired temperature, but to install two radiators, so that one may be turned off when the radiant appliance is used. This is usually not difficult to arrange, since there are often two windows, sometimes on either side of one of the french type, under which the radiators may

Table 1: average heat transmittance coefficients for typical types of building construction

		" U" value
	Construction	B.t.u./sq. ft. h. deg. F.
External walls	11-in. unventilated cavity wall, brick, plastered one side	0.30
	11-in. ventilated cavity wall, brick, plastered one side	0.34
	11-in. unventilated cavity wall brick outer leaf,	
	4-in. clinker block inner leaf with plaster	0.23
	9-in. solid brick, plastered one side	0.43
Partition walls	4½-in. brick, plastered both sides	0.46
	4-in. breeze blocks plastered both sides	0.46
Windows	Single glazing	1.00
	Double glazing	0.50
Doors	1-in. wood	0.50
Ground floors*	Wood block on concrete	0.15
	Thermoplastic tiles on concrete	0-20
	Wood floor on joists	0.30
Intermediate floors	Wood floor on joists, plaster ceiling	0.30
Pitched roofs above	Tiles on battens	0.56
plaster ceiling	Tiles on battens and felt	0.43
	Tiles on boards and felt	0.30
	Tiles on battens and felt, ceiling overlaid with 1-in. mineral wool quilt or	
	2-in. loose insulation	0.15
	Tiles on battens and felt, ceiling overlaid with 4-in. mineral wool quilt	0.10

Take full inside-outside temperature difference.

Note.—For fuller information on this subject see Thermal Insulation of Buildings by Nash, Comrie and Broughton HMSO. 12s. 6d.

be placed in the sitting-room. If an open fire is used in the liying room to provide radiant heating, it is important that it should be of a type which does not cause excessive ventilation rates, as will be shown later in this section.

Having decided on the room temperatures the heat requirements can be ascertained. The system must be capable of heating each room to the desired temperature under the most severe winter weather conditions; an outside temperature of 30 deg. F. is taken for design purposes, as there are few occasions in this country when lower temperatures prevail for long periods. There is only one satisfactory way of computing the heat requirements and that is to calculate the heat losses through the window, wall, floor and ceiling areas of each room and add to the sum of these the heat loss due to ventilation.

The heat loss in B.t.u./h, through each of these parts is given by the product of the area, in sq. ft., the thermal transmittance coefficient ("U" value), in B.t.u./sq. ft. h. deg. F., and the difference in temperature in deg. F., between the air on the two sides of the area concerned. The "U" values for typical building constructions are given in Table I.

The difference in temperature between the air on the two sides of external walls and windows, and ground floors and roofs, which should be taken in calculating heat losses. is influenced by a number of considerations. It has been found that the average temperature in an unheated house is some 5 deg. F. above the outside temperature, due to solar heat and other gains.2 Furthermore, in a house containing a central heating boiler. the temperature of rooms in which there are no radiators or other heating appliances in use has been shown to be approximately 10 deg. F. higher than that of the outside air.3 This greater temperature difference is mainly due to the distribution throughout the house of the additional heat emitted by the boiler casing and flue pipe, and by the hot water cylinder, towel rail and connecting pipes; it applies only to houses having insulated first floor ceilings, which should always be the case where a central heating system is installed. A temperature difference of somewhat less than 10 deg. F. occurs when the boiler is placed in an outhouse. and of only 5 deg. F. in the case of larger bungalows

It might appear, therefore, that in calculating the heat required to be provided by the central heating system in the various rooms, the actual difference between the room design temperature and the 30 deg. F. outside temperature could be decreased by 5 to 10 deg. F. when computing the heat losses through the external boundaries. This, is, in fact, only the case in the unlikely event of the radiators being used continuously to heat rooms day and night. For normal usage, in which rooms are heated only when they are being occupied, so that radiators are turned on for periods of no longer than 10 hours, and usually consider-

ably less, the full inside-outside temperature difference should be taken. In this way, additional heat input is provided to bring the rooms up to the desired temperature after periods of cooling, and the heat requirements so calculated have been verified by the field trials of the small-pipe system.

The difference in temperature between the air on opposite sides of partition walls and intermediate floors, which should be taken in calculating internal heat transfers between neighbouring rooms, must also be determined. When neighbouring rooms are heated concurrently, the difference, if any, between their design temperatures is taken. Otherwise, living and dining rooms may be generally assumed to have an average temperature of 60 deg. F., and bedrooms and halls 50 deg. F., during periods of non-heating.

The heat loss calculation must be repeated for each part of the room boundary, but the procedure may be simplified for dwellings of normal construction by reference to Table 2. For example, an external 11 in. ventilated cavity brick wall is seen from Table 1 to have a "U" value of 0.34 B.t.u./sq. ft. h. deg. F. Assuming that such a wall has an area of 120 sq. ft., the heat loss is found directly from Table 2 to be 204 B.t.u./h. at 5 deg. F. temperature difference. If the room design temperature is 70 deg. F., the actual temperature difference will be 40 deg. F., so that the figure obtained from the Table must be multiplied by 8, to give the actual heat loss of 1,632 B.t.u./h. In this way the heat losses through all parts of the room, including the internal partition walls, floors and ceilings, may be quickly obtained.

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An allowance must also be made for the heat removed from the room by the passage of air. In living and dining rooms, a minimum ventilation rate of 2,400 cu. ft/h. of air is required and should be allowed for in halls, whilst half this amount is sufficient for bedrooms.² In practice, ventila-

Table 2: heat losses from windows, walls, floors and ceilings, B.th.u. hr. per 5 deg. F. temperature difference

Table	2: heat	losses	from	windows,	walls.	floors	and ceilings.	. B.th.u	./hr. per 5	deg. F.	temperature	difference
Area	" U "	value										
sq.ft	0.1	0.	15	0 - 20	0.23	0 - 30	0-34	0-43	0.46	0-	5 0.56	1.0
. 1	0.5	0.		1.0	1.2	1.5	1.7	2-2	2.3	2.	5 2-8	5.0
2	1.0	1.		2.0	2-3	3.0	3-4	4-3	4.6	5.		10-0
3	1.5	2.		3.0	3.5	4.5	5-1	6.5	6.9	7.	5 8.4	15.0
4	2.0	3.	0	4.0	4.6	6.0	6.8	8.6	9.2	10-	0 11-2	20.0
5	2.5	3.	8	5.0	5.8	7.5	8-5	10.8	11.5	12-	5 14.0	25-0
6	3.0	4	5	6.0	6.9	9.0	10.2	12.9	13.8	15-	0 16.8	30.0
7	3.5	5	. 3	7.0	8 - 1	10.5	11.9	15-1	16-1	17-	5 19-6	35-0
8	4-0	6	0	8.0	9.2	12.0	13-6	17.2	18-4	20-	0 22-4	40.0
9	4.5	6	-8	9.0	10.4	13-5	15.3	19.4	20.7	22		45-0
10	5.0	7	. 5	10.0	11.5	15.0	17.0	21.5	23.0	25		50.0
12	6.0	9	- ()	12.0	13-8	18-0	20.4	25-8	27-6	30	0 33.6	60-0
14	7-0	10	. 5	14.0	16-1	21-0	23-8	30 - 1	32-2	35	0 39-2	70-0
16	8.0	12	-0	16.0	18-4	24.0	27.2	34-4	36.8	40	0 44.8	80.0
18	9.0	13	. 5	18-0	20.7	27.0	30.6	38-7	41.4	45	0 50-4	90-0
20	10.0	15	.0	20.0	23.0	30.0	34.0	43.0	46.0	50-		100-0
24	12.0	18		24-0	27-6	36-0	40.8	51.6	55-2	60		120-0
28	14.0	21	.0	28.0	32-2	42.0	47.6	60.2	64-4	70		140.0
32	16.0	24		32.0	36-8	48.0	54-4	68.8	73.6	80		160-0
36	18-0	27		36.0	41-4	54-0	61.2	77-4	82.8	90		180-0
40	20.0	30		40.0	46.0	60.0	68.0	86.0	92.0	100		
44	22.0	33	.0	44-0	50-6	66-0		94-6	101-2	110		
48	24-0	36	.0	48.0	55-2	72.0	81-6	103-2	110-4	120		
50	25.0	37	. 5	50.0	57-5	75.0	85-0	107-5	115-0	125	-	
55	27-5	41		55-0	63.3	82.5	93.5	118-3	126-5	137		
60	30.0	45	.0	60.0	69.0	90.0		129.0	138-0	150		
65	32-5		-8	65.0	74-8	97.5		139-8	149.5	162		
70	35.0		.5	70.0	80-5	105.0		150-5	161-0	175	_	
75	37.5	56	. 3	75.0	86-3	112.5		161.3	172.5	187		
80	40.0		.0	80-0	92.0	120-0		172.0	184-0	200		
85	42-5	63	-8	85-0	97.8	127-5		182.8	195-5	212		
90	45.0	67	-5	90.0	103.5	135.0		193-5	207-0	225	-	
95	47.5		.3	95.0	109.3	142.5		204 - 3	218-5	237	-	
100	50.0		.0	100.0	115.0	150-0		215.0	230.0		-	
110	55-0		. 5	110.0	126-5	165-0		236-5	253-0			
120	60.0		0.0	120.0	138.0	180.0		258.0	276.0		-	
130	65-0		.5	130.0	149.5	195.0		279-5	299.0			
140	70.0	105		140.0	161.0	210-0		301.0	322.0			
150	75.0	112		150.0	172.5	225.0		322.5	345.0			
160	80.0	120	0.0	160-0	184-0	240.0		344-0	368-0			
170	85-0	127		170.0	195.5	255.0		365-5	391.0			
180	90.0	135		180.0	207-0	270-0		387.0	414.0			
190	95.0	142		190-0	218.5	285-0		408 - 5	437.0			
200	100-0	150		200.0	230.0	300-0		430-0	460-0	410		
220	110-0	165		220.0	253.0	330-0		473.0	506-0			
240	120.0	180		240.0	276.0	360-0		516.0	552.0			
260	130.0	195		260.0	299.0	390.0		559.0	598.0			
280	140.0	210		280.0	322.0	420.0		602.0	644-0			
300	150-0	225		300.0	345.0	450.0		645-0	690-0			
320	160.0	240		320-0	368.0	480-0		688.0	736-0			
340	170-0	255		340-0	391.0	510-0		731.0	782-0			
360	180-0	270		360-0	414.0	540-0		774.0	828-0			
380	190.0	285		380-0	437.0	570.0		817-0	874-0			
400	200-0	300		400-0	460.0	600-0		860-0	920-0			

fion rates far in excess of those required may occur if precautions are not taken to avoid hem. It has already been mentioned that open fires can cause excessive rates of venilation. The traditional open fire, with a large fireplace throat area, will normally withdraw air from the room and expel it up the chimney at a rate at least three times as great as that necessary for ventilation. It is possible, and not uncommon, for an open fire, even at low burning rates, to withdraw more than 12,000 cu. ft./h. of air from the room, when only a small fanlight window s open and the door closed. The great volume of air removed, in excess of that required for ventilation, could take over 5,000 B.t.u./h. with it when it is despatched up the chimney. This might well represent the major proportion of the heat emitted by the sitting room radiator, and so it is not surprising that the sitting room temperature has been known to drop by several degrees when the open fire has been lit.

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325·0 350·0

375-0

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125-0

450-0

500-0

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It is stressed that, if open fires are used in a centrally-heated house, they should not cause ventilation rates in excess of those required for health and comfort. The only types which fulfil this condition without danger of smoke emission into the room are certain of the free-standing convector fires with restricted throats.

Heat will also be lost from rooms by air movement if doors are continually left open. It is particularly important that this should be avoided in the case of downstairs rooms. such as the living room, which are heated to the higher temperatures. It will often be impossible to attain the desired temperatures if the doors are not kept closed, except when entering and leaving these rooms, as the warmer air will be drawn from them up the staircase to the landing.

A similar difficulty arises in the case of the "open-plan" design of house, which is becoming increasingly popular. Houses of this type, having sitting room and dining room combined, and sometimes undivided from the entrance hall, staircase and upper landing, are impossible to heat economically. If a temperature of 70 deg. F. is desired in the living room, practically the whole house must be maintained at a similar temperature.

It should also be noted that it may be expensive to heat large entrance halls, even to a temperature of only 55 deg. F., particularly if the radiator is left on day and night. The hall is normally entered only on passing from one room to another, and the principle of maintaining it at a high temperature on the assumption that the heat will infiltrate into the surrounding rooms, is extremely unsound and uneconomic. Even with a hall of moderate size and maintained at a temperature of 55 deg. F., some 25 per cent. of the total central heating fuel consumption may be used in keeping the radiator on day and night.

Work is now in progress to obtain more information on the movement of warm air within a centrally-heated house. Radioactive tracer techniques are being employed and further data will be published in a later

Table 3: ventilation heat losses, B.t.u./h. (for 30 deg. F. outside temperature)

Design temp., deg. F.	55	60	65	70
Bedrooms	560	670	780	890
Living rooms, dining rooms and halls	1120	1340	1560	1790

paper. Table 3 gives the heat losses due to the recommended rates of ventilation for living and dining rooms, halls and bedrooms designed to be heated to various temperatures.

There are, unfortunately, a number of unreliable "rule of thumb" methods which are used all too frequently for determining heat losses. One such method is to ascertain the volume of each room and allow 3 to 5 B.t.u./h. per cubic foot, according to the temperature required. It is quite evident that this method is likely to give very erroneous results when one considers that rooms of similar volume may have one, two or even three outside walls, with corresponding variations in window area, and that the heat losses for a given room temperature would vary widely in these three cases.

Table 4 gives the heat losses computed in three different ways for rooms of typical construction, chosen at random from some of the field-trial houses. The heat losses shown in column 1 were calculated in the way recommended above, and have been proved correct during the last three heating seasons. The figures given in column 2 were arrived at by the "rule of thumb" method mentioned. The number of B.t.u./h per cu. ft. allowed for the various desired room temperatures was 3 for 55 deg. F., 33 for 60 deg. F., and 41 for 65 deg. F., and 5 for 70 deg. F. These are figures sometimes used, though others have been employed. It will be seen that this method rarely gives a reasonable approximation to the true heat losses, the errors ranging in these examples from +80 per cent. to -38 per cent. Different values of B.t.u./h. per cu. ft. may be allowed for the various design temperatures, but, although these may give better results in the case of some rooms, when generally applied the errors will be just as great.

The heat loss figures given in column 3 of Table 4 were obtained by calculating the losses through the external walls and win-

dows, roof and ground floor, but neglecting the heat transfer to or from neighbouring rooms in the house. The appropriate allowance was also made for the heat loss due to ventilation. This is a method which is also sometimes practised, and although, comparing the results with the correct figures in column 1, it is evident that this method is more satisfactory, it is preferable to take the heat transfer between rooms into account. The range of error in this case was from -17 per cent. to -3 per cent.

Circuit layouts

Having calculated the heat requirements for each room, the next step is to select the sites for the radiators and design the pipe circuits. The radiators should be sited under windows whenever possible. In this position they "fit in" better from the appearance point of view, are not occupying otherwise useful wall space, and do not cause discoloration due to convection staining They also effectively combat the downdraughts of cold air which originate at the windows, and promote a better temperature distribution throughout the room. If radiators have to be mounted in some alternative position, as may be the case in halls or rooms with glass-to-floor windows. a shelf should be fitted above them to prevent staining of the wall coverings.

In connecting the radiators to the boiler, the objective is to keep the heating circuits as short as possible, whilst ensuring that none of the exposed small-pipe mains will be obtrusive. The mains are fitted on the skirting boards of the various rooms and the layout is arranged to avoid any obstacles which would present difficulties. In houses, the piping may run either on the ground or first floor skirtings and change from one level to the other to avoid internal doorways and certain fireplaces, which are the main obstructions encountered.

In bungalows, where the two levels do not

Table 4: comparison of room heat losses calculated by accurate and approximate methods

				Heat losses, B.t.u. h.			
Design temp.	Outside wall area, sq. ft.	Window area, sq. ft	Volume of room, cu. ft.	1 Recommended method	Room volume method	3 Heat losses to outside only	
701 5	ſ 197	50	1250	10,078	6250	8337	
70° F.	274	128	2110	13,865	10,550	12,775	
65 F.	£ 175	45	1350	7303	5850	6340	
03 F.	198	40	1380	7714	5980	6225	
60° F.	∫ 290	90	1820	7239	6674	7002	
00 F.	69	10	1200	2454	4400	2098	
55 F.	∫414	34	2768	6335	8304	5795	
	1114	14	1440	2975	4320	2355	

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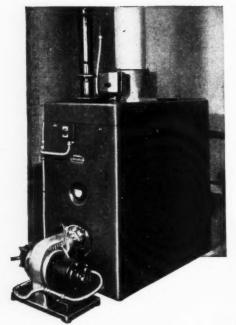
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'Potterton' Boilers achieve a maximum efficiency of 80%. More important, they maintain maximum efficiency for long periods.

During a one year test* in a Bendix Launderette, two 'Potterton' Oil-Fired Boilers delivered 1 million gallons of water for 41,000 washes. At the end of the test period, examination showed that the efficiency was still close to 80%.

The total service and examination time for the two boilers amounted to 18 hours for the whole year — an important factor to bear in mind when boiler plant is being specified or recommended.

Designed specifically for the fuel they use, 'Potterton' Boilers are the result of over 50 years experience in boiler design and construction. It's this "know-how" that makes them such a good investment.



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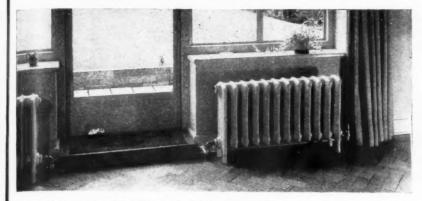


Fig. 2. Piping hidden by curtains and extension to doorstep.

exist, it is occasionally necessary to rise to picture-rail level to negotiate inside doorways, or, in exceptional circumstances, to run a short length of well-lagged small diameter piping in the roof space or under the ground floor.

In larger houses (of more than 1,500 sq. ft. floor area) it may also sometimes facilitate installation to run short lengths of piping under the first floor. This is preferable to taking pipes up into the roof space, particularly when the floor boards are not tongued and grooved. If the joints have to be notched, it is for very small pipes only, and they will not be appreciably weakened. It is not difficult to pass most of the obstructions encountered in the various rooms when running the small-pipe heating mains round the skirtings. Outside doorways are often met with, but the mains may be easily run across the face of the sill, and can be encased within a simple extension to the doorstep (Fig. 2). It is possible to take a twin run of small pipes across most outside doorways in this way. Fireplaces are sometimes encountered and, although it is usually possible to devise pipe layouts which avoid these, in the case of brick fireplaces the small pipes can be concealed beneath the first course of bricks of the hearth.

Whilst small pipes running horizontally on the skirtings and painted to match are unobtrusive, this is not the case with exposed pipes running vertically down the wall. Since the heating mains are not normally taken into the roof-space, there is rarely any necessity for "drop" pipes to be fitted on bedroom walls. In the case of downstairs rooms, however, the radiators are not infrequently supplied by mains dropping from the first floor skirting.

If there are cupboards in suitable positions, the vertical pipes will be fitted inside them, but in the majority of rooms there are no such convenient means of concealment. The small pipes can, however, usually be brought down beside the windows, where the greater part of their length is concealed by the curtains. This position is particularly suitable when full-length curtains are fitted, as can be seen from Fig. 2, where a small pipe drops from the bedroom skirting behind the full-length curtain on the right of the picture. Where the window curtains

do not extend to the floor, the connections should be made to the top of the radiator, to avoid having exposed piping dropping to the skirting. If curtains are fitted inside the window reveal, they will afford no cover to the small-pipe mains, for which alternative positions must be found.

The designing of 25 field-trial installations for various types of houses and bungalows has led to a series of basic configurations of small-pipe heating circuits being evolved. These are shown diagrammatically in the diagrams which follow. Fig. 3 shows a simple and compact circuit, often used in

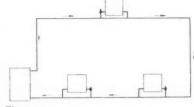


Fig. 9

houses, in which the flow main rises from the boiler to the first floor skirting, runs through bedrooms, feeding the radiators there, and then drops to the ground floor skirting to supply downstairs radiators before returning to the boiler. This type of circuit is employed in the installation shown in Fig. 10.* serving the radiators in

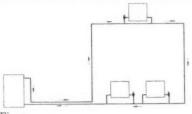


Fig. 4

bedroom 1 and the sitting room. The drop to the sitting room is concealed behind the full-length curtain of the french window, and the heating main then passes under the extended outside doorstep before returning to the boiler.

*The drawings in Figs. 10-13 relate to actual buildings in which the field trials were carried out. The convention used (cut-away three point perspective) was chosen by BCURA to show realistically the relationship of the pipes within each building.

Fig. 4 shows a form of circuit similar in some respects to that shown in Fig. 3, but in this case both flow and return mains run for some distance on the ground floor skirting before the flow pipe rises to first floor level.

The system shown in Fig. 11 has a circuit of this type serving the radiators in bedroom 1 and the living room. The flow and return mains run one above the other through the W.C. at skirting level, and continue at the same level under the stairs before entering the sitting room. Here, the flow main rises to the skirting of bedroom 1, running up behind a full-length curtain by the side of the french window, and, having served the bedroom radiator, drops back to the living room skirting on the opposite side of the french window, where it is again concealed by a full-length curtain. The small-pipe main then crosses beneath the sill of the outside door-step and continues back to the boiler.

Fig. 5 illustrates a form of circuit which

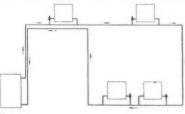


Fig. 5.

again serves rooms on both floors of a house, but differs from those shown in Figs. 3 and 4 in that, after serving the ground floor radiators, the return main rises to first floor level in order to avoid internal doorways or other obstructions *en route* back to the boiler.

An example of this type of circuit is also to be seen in the installation, Fig. 11, supplying radiators in bedrooms 2 and 3 and the dining room. The flow main rises from the boiler and crosses the kitchen door at ceiling level. It then rises through the ceiling in the corner of the kitchen to emerge on the landing skirting, and immediately passes through the wall into bedroom 2. The small-pipe main continues along the skirting of bedroom 2 to the front of the house, where it passes through the partition wall into bedroom 3 and serves the radiator there. The small pipe then returns along the skirting to bedroom 2 to supply the radiator under the bay window, before dropping to the radiator sited in the corresponding position in the dining room. The dropping flow main is concealed in a grooved cover fitted on the mullion on the side of the outer span of the bay window, and the return main is similarly hidden by a matching cover on the mullion on the opposite side of the window as it rises again to the skirting of bedroom 2. From this point, the return runs parallel to the flow main through bedroom 2 back to the boiler.

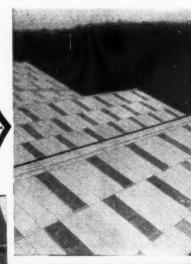
It is interesting to note that the twin run of pipes on the skirting along the partition wall of bedroom 2 is concealed for most of its length by the beds and other fur-

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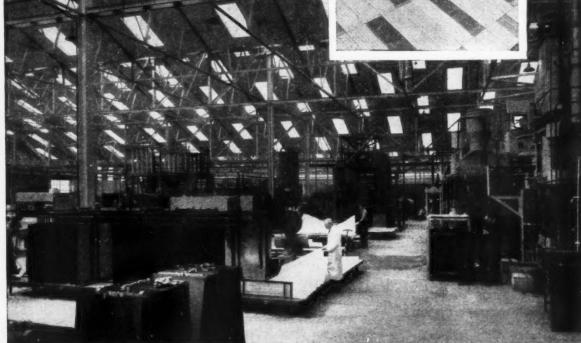
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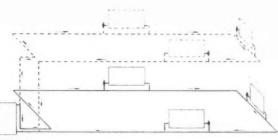


Fig. 7.

Fig. 6.

nishings. It often happens that the smallpipe mains, although inconspicuous when exposed on the skirting, are hidden from view in this way.

The characteristic feature of the type of circuit shown in Fig. 6 is a twin run of pipe on the skirting, the flow and return mains being fitted one above the other, with a return bend connecting the two at the extremity of the circuit. Circuits of this type are frequently located entirely at ground floor level, and are often employed in bungalows; they are also used in houses where it is impracticable to link ground and first floor radiators as described above.

The bungalow installation, Fig. 12, consists of three circuits of this type. The first supplies the three radiators in the loungedining room. In this case, the twin mains are taken across the corner fireplace in the dining room, concealed under the first course of bricks of the hearth. The two bedroom radiators are served by a second twin-pipe circuit on the skirting, whilst a third supplies the hall radiator positioned on the wall adjoining the kitchen.

Further minor examples of this type of circuit are those feeding the hall radiators in the house, Fig. 11, and the bungalow, Fig. 14. The system shown in Fig. 10 also has such a circuit, this time at first floor level, supplying the radiator in bedroom 2. The twin pipes rise from the boiler in the corner of the kitchen; to emerge in the cupboard of bedroom 1. They then pass through the bathroom, running for some distance behind the bath, before reaching the radiator in bedroom 2.

The ring-main circuit shown in Fig. 7 is occasionally employed, either at ground or first floor level. It is rarely possible to run a small-pipe circuit of this form round the entire outside wall of a house, as the resistance to flow would be excessive. It is sometimes practicable, however, to use this type of circuit, with the mains running partly on outside and partly on inside walls, to feed some of the radiators on one floor, although inside doorways usually present difficulties.

Examples of this circuit arrangement are those supplying the radiators in the loungedining room, and bedrooms 1 and 2 of the bungalow, Fig. 13, which is of identical construction to that in Fig. 12. The single flow main supplying the sitting-dining room radiators follows the same route as that taken by the twin mains, Fig. 12, but continues across the extended step of the front door to the opposite side of the entrance hall. Here it links up with the second circuit, which feeds the bedroom radiators, the piping also following the same route as in Fig. 12, but again continuing into the hall. The return main for both circuits runs through the hall at skirting level, serving the radiator there before entering the kitchen. It was necessary, however, to place the small pipe in ducts in the floor across the two doorways encountered in the hall. The heat emission from the two short lengths of small and well-lagged piping in the floor ducts is negligible, but this method of crossing the internal doorways can be considered only where new buildings are concerned, as was the case here. Internal doorways on the first floors of houses may be negotiated more easily by this method. particularly if, in existing houses, the floor boards are not tongued and grooved, but it must be emphasised that it is rarely necessary to resort to the practice of burying pipes under the floors.

An alternative method of crossing internal doorways is to run the small-pipe main over them in the form of an inverted loop. Although this obviates the need to bury pipes in the floor, and there is no fear of air locks forming in the small pipes, the arrangement cannot generally be recommended on the grounds of appearance. This objection might be overcome by concealing the pipes in a specially constructed architrave round the door, but in the great majority of cases the problem can be resolved by choosing an alternative pipe scheme

Fig. 8 shows a further arrangement, sometimes used in bungalows, in which the flow main, on leaving the boiler, divides in opposite directions, the pipes travelling round the outside walls on the skirting to serve the radiators under the windows. The two circuits meet on the opposite side of the bungalow, from where a common return main rises to picture-rail or ceiling height. and runs at this level along the internal walls, in order to negotiate doorways, back to the boiler. This arrangement avoids the use of double runs of piping on the skirting. and often enables the common return main to take a shorter route back to the boiler. It may happen that there is no direct route within the bungalow, from the point at which the two circuits meet back to the boiler, along which the return pipe can be taken, and that the only alternative is to run the main across in the roof space. In these cases the merits of this layout, as compared with those of other possible schemes. must be carefully considered. Should it then be decided to adopt the roof space route. the pipes must be properly lagged to ensure the minimum heat loss. It should be noted that the direction of flow in this circuit layout is against the natural circulating head. the flow main being at floor level and the

This circuit arrangement is shown in Fig. 14 as an alternative scheme for the bungalows. Figs. 12 and 13. The flow main divides in two directions on leaving the boiler, one circuit supplying the living-dining room radiators and the other those in bedrooms 1 and 2, with the piping following the same routes as those taken by the mains in Fig. 13. In this case, however, the return main for both circuits rises inconspicuously in the acute angle at the side of the front entrance and runs through the hall, encased at picture-rail level, back to the boiler.

cooler return at ceiling level. This arrange-

ment causes the heat emitted by the pipes

encased at ceiling level, or lagged in the roof space, to be reduced by some 20 per

cent., and is permissible since the natural

circulating head is negligible compared with

that of the pump.

This circuit arrangement often has the advantage of requiring less piping than the scheme shown in Fig. 12 and again obviates

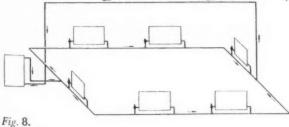




Fig. 9.

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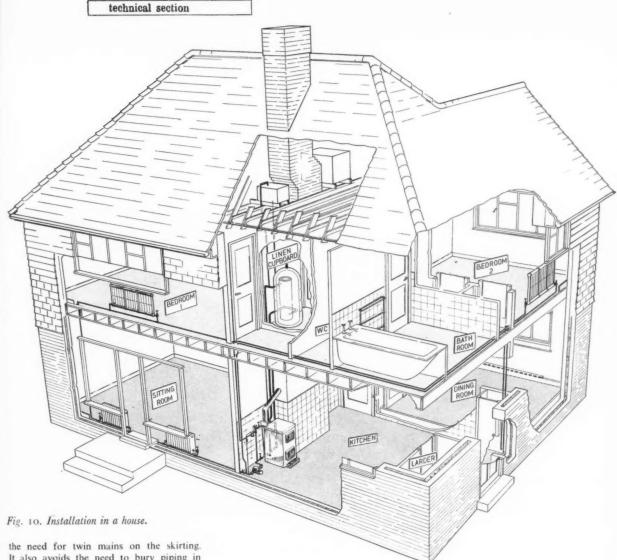
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It also avoids the need to bury piping in floor ducts across internal doorways and, as the common return main is sometimes necessarily of slightly larger diameter pipe than that used for the heating circuits generally, this is an additional reason for encasing it at high level, rather than fitting it on the skirting, as in Fig. 13.

Where skirting-heating panels are used as shown in Fig. 9, a two-pipe system of connection must sometimes be employed, i.e. the panels in each room must be connected separately to the flow and return mains from the boiler, rather than be linked in series with the heating units in other rooms. This is because it is impracticable to provide a by-pass pipe beneath certain types of skirting panels, as in the case of radiators, so that if the one-pipe system were used, it would be impossible to turn off the skirting heating in one room without also preventing the flow of hot water to the heating units in others.

The dining room of the house, Fig. 10, is equipped with skirting-heating panels on all four walls, the sections on either side of the doorway being linked by an inverted loop of small pipe concealed in the architrave. The skirting panels and the radiator in bed-

room 2 are connected on the two-pipe principle, each being joined separately to the flow and return mains from the boiler in the cupboard of the bedroom. The smallpipe connections to the skirting panels drop in the corner of the kitchen, where they are concealed within a cupboard.

The basic configurations of small-pipe heating circuits have been described, and there are many possible combinations and variations of these, which, in practice, will enable small-pipe layouts to be devised for most dwellings of medium size.

Circuit resistance and circulator head

When the piping has been arranged to connect all the radiators to the boiler, the friction loss through each major circuit must be estimated to ensure that it does not exceed the pressure head developed by suitable circulators.

Circulators recommended for small-pipe systems are described in a later paragraph. They develop heads of up to 6 ft. w.g. at deliveries of up to 400 gal./h.; a total rate of circulation through all circuits of 400 gal./h. would satisfy a system of 80,000 B.t.u./h. output, working at a 20 deg. F. temperature differential. The total rate of circulation in gal./h. required by any system designed to operate at a temperature differential of 20 deg. F. is obtained by dividing the total central heating output (including heat emission from pipes) by a factor of 200.

The friction loss through the circuits is influenced to a considerable degree by the type of piping used. Either ½ in. copper or 3 in. nominal bore class "B" blackiron pipe may be employed. The internal diameter of ½ in. copper tube is slightly larger than that of 3 in. class "B" ungalvanized-iron pipe, and the copper has an appreciably lower friction factor. Consequently, the pressure drop per foot run of ½ in. copper tube is approximately 40 per cent. less than that of & in. iron pipe for a given rate of circulation. For this reason, the copper tube is to be preferred, particularly in larger installations. Moreover, the manufacturer's tolerances on & in, iron pipe are much greater than for copper tube, so that the friction loss for a given flow rate cannot be ascertained with the same degree



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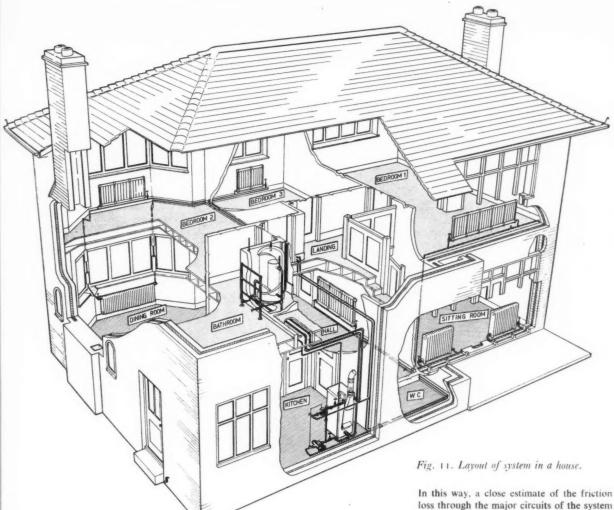
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ines)

In addition, the copper tube has a slightly maller outside diameter than the iron pipe, and so is neater and less obtrusive when fitted on the skirting. The comparative costs of installation using copper and iron piping are, at the present time, much the same. The cost aspect is discussed further in Part 2 of this paper.

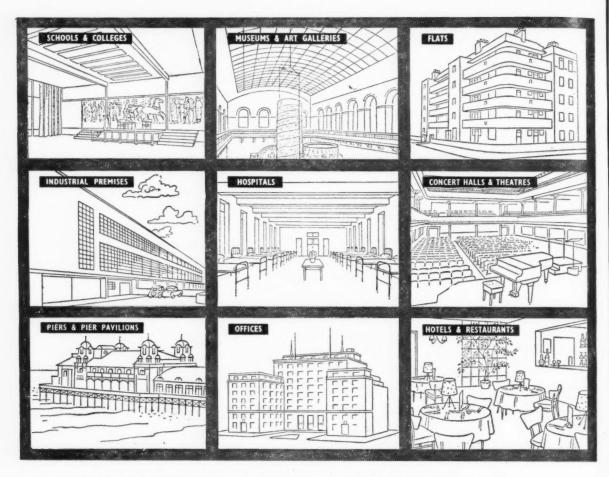
In systems in which a galvanized-iron indirect cylinder is fitted copper tube should not be used, as this may lead to trouble from bimetallic corrosion. If iron pipe is used for the heating circuits, neither the pipe nor the fittings should be galvanized, since this further reduces the internal diameter and is unnecessary in a closed circuit. To check that the friction loss through a particular circuit does not exceed the available 6 ft. w.g. circulating pressure, the total equivalent length of the circuit, i.e., the length of actual pipe, plus the pipe-length equivalent of the resistance of bends and fittings, is required. For practical purposes, it is sufficient to allow a length of pipe equal to one-third of that of the circuit for the resistance of bends, fittings, boiler and controls, and to check the friction loss as explained below; it is thus necessary only to measure the length of actual piping.

The total heating load carried by the circuit must next be calculated. This is simply a matter of totalling the heat requirements of the various rooms served, and adding the heat emitted by any of the circuit piping which passes through other parts of the building. The heat emission from the smallpipe mains, with flow and return temperatures of 180 deg. F. and 160 deg. F. respectively, may be taken as 55 B.t.u./h. per foot run. This assumes a mean temperature difference between the water in the pipe and the surrounding air of 110 deg. F., but no serious error will result if this figure is applied generally. The friction loss through the circuit may now be obtained from the graphs, Fig. 15, which have been specially prepared for small-pipe heating circuits. For example, suppose that the circuit contains 75 ft. of ½ in. copper pipe and supports a total heating load of 15,000 B.t.u./h. Reference to Fig. 15 shows that the friction loss is between 4 and 5 ft. w.g. and so is well within the available circulating head

loss through the major circuits of the system can be quickly established. If the resistance to flow offered by any circuit is greater than 6 ft. w.g. the piping must be re-routed to give a reduced total length. If this is impracticable, the radiators must be regrouped on to a greater number of circuits in order to decrease the heating load carried by the one through which the greatest friction loss occurs.

Occasionally, neither of the above rearrangements is practicable, and the only way of reducing the resistance to flow is to use piping of a slightly larger diameter for part of the major circuit. This may be necessary in larger houses and in some bungalows and in these cases the larger diameter mains must be placed in positions where they are concealed from view.

If lengths of \{\frac{1}{2}} in. bore pipe are used, the friction loss through the circuit is obtained in two stages. The total heating load supported by the circuit is calculated as before, except that in this case the heat emission of 3 in. pipes running through parts of the house which are not included in the rooms served by the circuit, should be taken as 70 B.t.u./h. per foot run, and the respective lengths of ½-in. and ¾-in. bore pipe measured. The friction loss through each part of the circuit may now be read off from the appropriate curves in Fig. 15.



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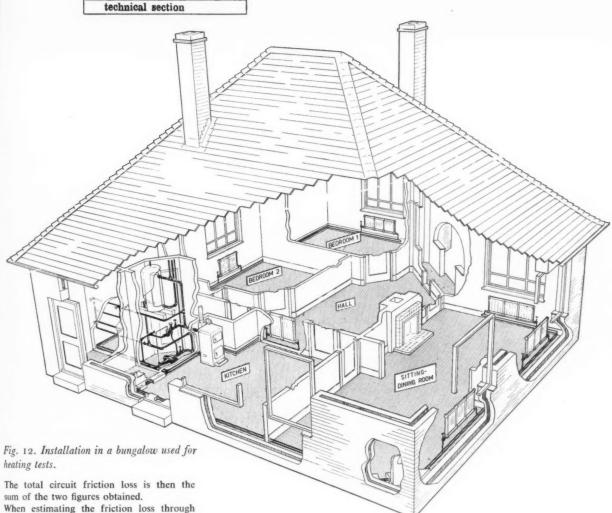
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flow or return mains common to two or more circuits, the heating load carried by all circuits served must be calculated and used in obtaining the resistance to flow of the common mains from Fig. 15. For example, in the bungalow installations Figs. 13 and 14, the major circuits are obviously those serving the sitting-dining room radiators, but in estimating the friction loss through these circuits, account must be taken of the fact that the return mains are also carrying the heating load of the bedroom circuit, and, in Fig. 13, that of the hall radiator.

The heating load due to the emission from the common mains and any radiators they may be supplying, such as the hall radiator in Fig. 13, should be divided among the circuits served in the ratio of the circuit heating loads. For instance, in Figs. 13 and 14, the heating load on the loungedining room circuit is approximately twice as great as that on the circuit serving the bedrooms, therefore two-thirds of the heating load due to the emission from the common return main and, in Fig. 13, the hall radiator should be added to the sittingdining room circuit, and the remaining onethird to the bedrooms circuit. Other examples may be seen in the house installations, Figs. 10 and 11.

In the case of larger houses, the use of

larger pipes for the heating circuits may be avoided if the system is designed to have a 30 deg. F. temperature differential between the flow and return mains at the boiler, instead of the normal 20 deg. F. This has the effect of reducing the rate of water circulation required in the system, and so leads to a lesser friction loss through the major circuits.

If the 30 deg. F. differential is adopted, the graphs, Fig. 15, may still be used to ascertain the friction losses through the major circuits, provided the total heating load carried by each circuit is first multiplied by two-thirds. The figures so obtained must be used, instead of the actual circuit heating loads, when referring to Fig. 15. Also, in order to determine the rate of circulation required, for the purpose of selecting a suitable circulator, the total central heating output, including pipe emissions, must be divided by a factor of 300, and not 200.

It is not desirable to design small-pipe systems for a 30 deg. F. differential generally, as the heat emission from the radiators is reduced, particularly in the case of those which are last to be supplied by the heating mains; consequently, larger radiators are reguired in some rooms.

After the friction losses through the major

circuits have been obtained, it will be apparent, if it was not so before, which one offers the greatest resistance to flow. Every other circuit must be provided with a lock-shield valve, usually fitted at a convenient position in the return main, to enable the circulation to be restricted to the required rate, and so prevent the "shortcircuiting" of the major circuit. The lockshield valves are adjusted on first commissioning the system, so that, with all radiators in use, the water is at the same temperature in the return mains from all circuits.

The short flow and return mains linking the various radiator circuits through the controller and circulator to the boiler, are of 3-in. nominal bore iron or 3-in. copper pipe, except in the case of larger installations, having four or more separate heating circuits, when the connecting mains should be of 1-in. diameter pipes. As these are in the kitchen their appearance is less important. Fig. 15 contains data for circuit friction losses up to 15 ft. w.g., but it is emphasized that the resistance of the major circuit of any system should not exceed 6 ft. w.g. The curves for higher friction losses have been included because there is a possibility that suitable circulators, capable of developing greater pressure heads without excessive

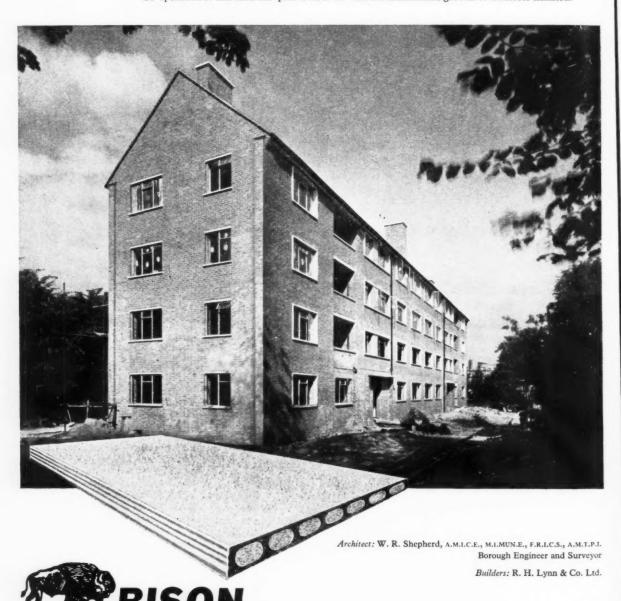
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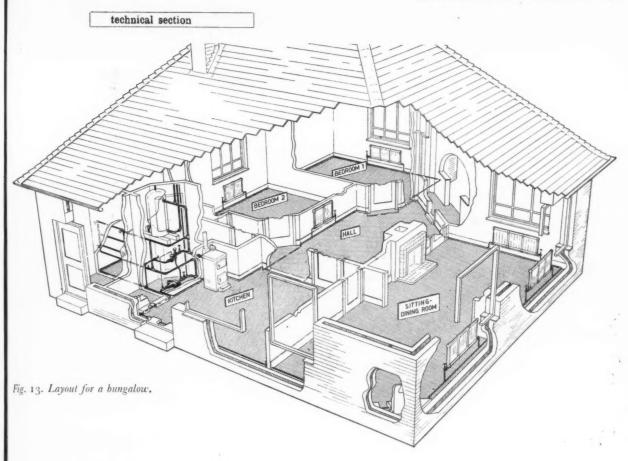
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To estimate the amount of radiator surface to be installed in any particular room, the total length of piping in the room is first measured, and multiplied by 55 B.t.u./h. to obtain its heat emission. The pipe emission is subtracted from the heat requirements of the room, which have already been calculated, and the remainder divided by the surface transmission factor, based on 100 deg. F. mean temperature difference between the water in the radiator and the ambient air, appropriate to the type of radiator to be used. This gives the surface required in sq. ft. of this type of radiator, since, with the small-pipe system, having flow and return temperatures of 180 deg. F. and 160 deg. F. respectively, it may be assumed that the difference between the mean temperature of the water in the radiators and the ambient temperature is 100 deg. F.

The usual cast-iron or steel radiators are suitable, but convector heaters or skirting-heating units may be preferred in some cases. Where conventional cast-iron or steel radiators are to be used, the average heat transmission factor of the radiator surface

may usually be taken as 165 B.t.u./h. sq. ft. It is then necessary only to measure the length of piping in the room and, using this figure together with that for the total heat requirements of the room, the radiator area to be installed may be obtained directly from Fig. 15. For example, a room containing 15 ft. of piping (emitting 825 B.t.u./h.) and having a heat loss of 7,000 B.t.u./h. is seen from Fig. 15 to require 37 sq. ft. of radiator surface.

Cast-iron 2-column and 3-in. hospital radiators, and pressed-steel wall radiators (single panel) have transmission factors which are considerably greater than the 165 B.t.u./h. sq. ft. assumed in Fig. 15, and the figures given by this graph for the heating surface required in any particular room should be reduced by 10 per cent. when these types of radiators are used. Similarly, cast-iron 71-in. hospital radiators have a smaller heat emission per sq. ft. of surface, and figures obtained from Fig. 15 should be increased by 10 per cent, when this type of radiator is used. If the heating system is designed for a temperature differential of 30 deg. F., Fig. 15 must not be used to ascertain the radiator surface required.

The manufacturers' catalogues can now be consulted and suitable radiators chosen. Ideally, the length of the radiator should be equal to the span of the window under which it is placed, and this should be the objective in making the selection. Panel type wall radiators are the popular preference, wherever there is a sufficient

length of window for them to be accommodated, and they usually fit well in the bedrooms or other rooms having moderate heat requirements.

In the living and dining room, where the heat losses are greater, it is often impossible to fit a sufficient length of wall radiator in the space available under the windows, and here cast-iron hospital radiators of appropriate width, or pressed-steel column radiators, should be used. Cast-iron column radiators give a higher heat output where space is very limited, but are of less pleasing appearance than other types, and more difficult to keep free of dust. Each radiator is fitted with a valve to enable it to be turned on and off as required.

If convector heaters, skirting-heating, or other heating units are employed, heat emission data must be obtained from the manufacturers, and the graphs in Fig. 15 clearly cannot be used to ascertain the heating surface required.

The boiler selected must be of adequate rating to satisfy the maximum demand that could be made of the central heating system, with a sufficient margin for the hot water supply. The total central heating requirements have been calculated, and the boiler should have a central heating rating which exceeds these by at least 12,000 B.t.u./h. to allow for domestic hot water.

Either cast-iron sectional or welded-steel magazine type solid fuel boilers are suitable, provided they are fitted with a reliable thermostat for controlling the burning rate











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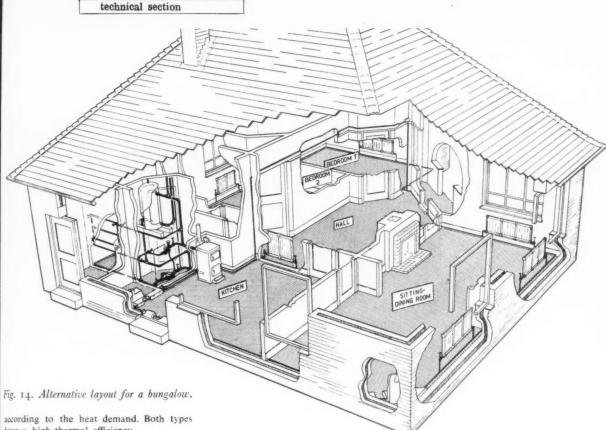
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have a high thermal efficiency.

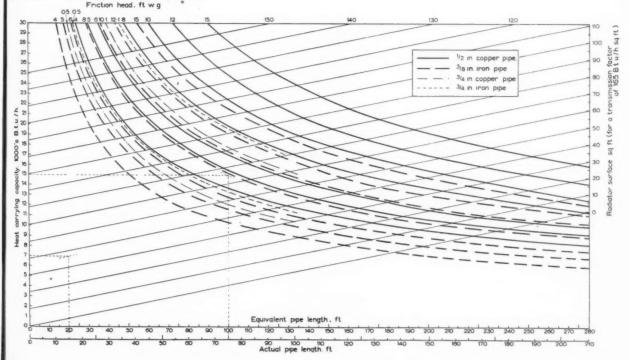
The sectional boilers are more often used, since they are considerably less expensive than the magazine type, but they have the disadvantage of requiring more frequent refuelling. The limitations imposed by the

firebox capacity of this type of boiler become particularly important if it is required to keep two or three radiators on overnight. In these cases, it is often desirable to install a larger boiler than that needed from the

rating aspect alone, in order to obtain a greater fuel-holding capacity.

The small-pipe system can, of course, be served by an oil-fired boiler, if the increased capital and running costs are acceptable. In

Fig. 15. Heat carrying capacity of \(\frac{3}{4}\)-in. and \(\frac{1}{4}\)-in. and \(\frac{1}{4}\)-in. copper pipes of various lengths for a 20 deg. F. temperature differential at friction heads up to 15 ft.w.g.



technical section

these cases it is essential that the boiler should be installed in an outside boiler house, on account of the noise and smell produced and increased fire risk, and the heat from the boiler casing and connecting pipes is therefore lost.

Circulators

There are now three different makes of circulator available which are eminently suitable for use in small-pipe heating systems. These units are all of the "canned rotor" type, having no gland between the motor and impeller. With this design there is no possibility of water leakage, and no oiling or greasing is required since the bearings are water lubricated. No maintenance has so far been found necessary after the unit is installed in the system, but after some years of operation, renewal of the bearings may be required.

The circulators are powered by squirrelcage induction motors which have power consumptions of only about 70 watts, and cost less to run, therefore, than the average electric light bulb. Furthermore, they are virtually silent in operation, which is an essential requirement of units which are to be employed in domestic heating systems, particularly if they may be required to operate at night, when the slightest sound tends to be audible. Sound emitted by the circulator may be transmitted through the water, pipes and wooden structure to all parts of the house.

The three circulators have been extensively tested in the laboratory to determine the duties of which they are capable, their power consumptions and noise emissions. In addition, circulators of type "A" have been employed in small-pipe field trial systems over the last three heating seasons, those of type "B" for two winters, and type "C' during the last heating season. All have proved satisfactory from the noise emission aspect, and none has required any attention since it was installed. The duties of which the three units are capable are shown in Fig. 16. For systems having a total central heating output, including the emission from pipes, of up to 40.000 B.t.u./h., rates of water circulation of up to 200 gal./h. are required, and any one of the three circulators will develop pressure heads of some 5 ft. w.g. or more at these rates of flow. Circulator "B" will deliver water at the rate of 200 gal./h. against a friction head of more than 6 ft. w.g.

For larger systems, requiring faster rates of circulation against friction heads of 5 to 6 ft. w.g., the choice of circulators is more restricted. Circulator "B" would satisfy a system of 80,000 B.t.u./h. heat output, requiring a flow of 400 gal./h., and having a friction loss of almost 6 ft. w.g. through the major circuit, whereas circulators "A" or "C" could not be used.

When the total heat output from the radiators and pipes, and hence the rate of water circulation required for a 20° F, temperature difference, has been determined, and the friction loss through the major loop of the small-pipe system

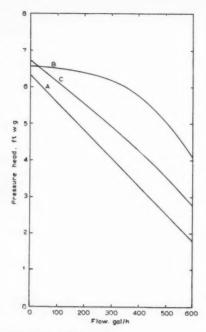


Fig. 16. Circulator duties.

ascertained as previously described, reference to Fig. 16 will show which circulators are capable of the duty required, and a suitable choice can be made.

Circulator "A" is the Sigmund "Thermo-Pak" CRI-A, and is manufactured by Sigmund Pumps Ltd. of Gateshead. Circulator "B" is the 1½ in. Duty H "Bush-Perfecta," made by Turney Turbines Ltd. of Harrow. Circulator "C" is the Rovi H.P. 02, manufactured in Germany and marketed in this country by the K.S.B. Manufacturing Co. Ltd., of London.

It is essential that the electrical connections to any of the three circulators should be made through the push-button starter supplied with it. The starter contains current overload releases to protect the motor field coils from overheating and possible burningout, should the rotor become jammed. The position in which the circulator is fitted in the system is dealt with in Part 2 of this paper.

It is emphasized that, at present, there are no circulators available other than those given above, which are suitable for use in small-pipe systems. Each of the above makes is manufactured in a range of sizes and duties, but only the particular models specified fulfil all the requirements of the small-pipe system. The larger units which are produced, capable of developing higher pressure heads, are unsatisfactory from noise emission considerations, although it is possible that this difficulty will be overcome in the future, with the advent of new high-pressure circulators.

Controls

The small-pipe heating system, due to its small water-holding capacity and forced circulation, is extremely flexible and responsive in operation. Radiators may be turned on and off as required, since there is no long waiting period before they attain maximum temperature. Some means of control must be provided, however, to enable the heat emission from the radiators to be reduced in milder weather.

It is not sufficient merely to lower the setting of the boiler thermostat, since if the boiler temperature is reduced below 150° F., the hot water supply to the taps will be at a temperature of less than the minimum 140° F. required. A recent publication, moreover, shows that the emission from the central heating system cannot be regulated satisfactorily by manual adjustment of either the radiator control valves or a gate valve fitted in the boiler by-pass.

Field trials of various methods of control have demonstrated that the automatic mixing-valve, specially devised for the small-pipe system, gives the best results. The two possible alternative forms of automatic control both have serious disadvantages, which became evident during extensive field trials³.

The use of room thermostats to switch the circulator on and off, and so regulate the heat emission from the radiator circuits, is unsatisfactory mainly due to the difficulty of finding suitable locations for the thermostats². Even if two thermostats are employed, this method of control has many failings, and the cost of installing the thermostats, together with a 2-way switch and mainsvoltage wiring to the rooms concerned, would be of the same order as that of the automatic mixing-valve for control by outside-air-temperature.

The use of individual radiator thermostats is usually ruled out on grounds of cost, since one must be fitted on every radiator in the house. There are also other objections to this form of control, chief of which is the fact that the heat emission from the circuit mains is entirely uncontrolled. Apart from wasting fuel, this may even cause discomfort in milder weather.

The device for control by outside-air temperature, shown in Fig. 1, derives its motive power from the pressure differential across the circulator. A sufficient pressure head is developed by the circulators used in smallpipe systems for satisfactory operation of the controller, a minimum circulator head and circuit resistance of 4 ft. w.g. being required. Good control in all rooms is obtained by this method, and local disturbances in some rooms, which may be caused by windows and doors being left open, do not affect the control in others. This automatic control is shortly to be manufactured by The Rheostatic Company Limited of Slough.

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- Brook, D. V., Burke, S. A., and Bye, G. H. Automatically Controlled Small-pipe Central Heating. Special Study of Domestic Heating, Inst. Fuel, May, 1956.
- 4. British Standard Code of Practice, C.P. 403,101 (1952).

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HOUSING

at CLAREMONT ESTATE, WOODGRANGE ROAD, WEST HAM, LONDON, E.7, for the County Borough of West Ham designed by THOMAS E. NORTH, borough architect and planning officer; JACK WHITTLE, deputy borough architect and planning officer; v. G. BARTHOLOMEW, principal assistant architect; KENNETH G. JONES, chief assistant architect; NOEL J. HALL, assistant architect; consultants, 11-storey block only (structural), TWISTEEL LTD.; (heating and electrical) E. WINGFIELD-BOWLES and PARTNERS; quantity surveyor J. A. BURRELL

This is the first housing scheme which has been published in complete form with full elemental cost figures, and in which two dwelling types are analysed. Most housing schemes contain a number of different dwelling types of varying accommodation and it is difficult to analyse all of them. In this case the dwellings selected are the 11-storey point block which compares with the LCC Fitzhugh Estate 11-storey point block (AJ, November 29, 1956) and also the four-storey maisonettes which are a much used type at the present time. The relation of this scheme to the overall redevelopment of West Ham has been dealt with in the AJ for September 27, 1956.

Viewpoint: I from the west, looking down Claremont Road.





Typical upper floor plan, 11-storey flats [Scale: 24" = 1'0"]



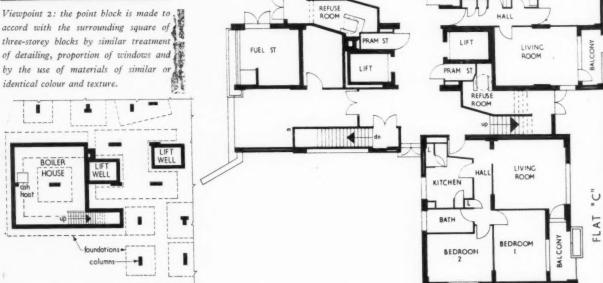
Roof plan, 11-storey flats [Scale: 3," = 1' 0"]

FLAT "B"

BEDROOM



Viewpoint 2: the point block is made to accord with the surrounding square of three-storey blocks by similar treatment of detailing, proportion of windows and by the use of materials of similar or



BEDROOM

BEDROOM

Basement plan, 11-storey flats [Scale: 14" = 1'0"] Ground floor plan, 11-storey flats [Scale: 16" = 1'0"]



Viewpoint 3: the cruciform plan imparts a strong verticality which has been further exploited by the alternating planes of brick and rendered surfaces and the recessing of the staircase windows at the junction of the two wings. Existing trees have been arefully retained and contribute greatly to the environment of the court.

analysis

CLIENT'S BRIEF: his stated requirements

The Housing Committee of the county borough of West Ham were anxious to develop the site at the relatively high density of 130 persons per acre. Previous housing developments have been at the lower density figure of 70 persons per acre and the effect has been to lower the labour potential available within the borough. The committee realised that if this continued, industry within the borough would be . affected and might in consequence move elsewhere. The borough is outside the LCC area and therefore itself responsible for determination of density.

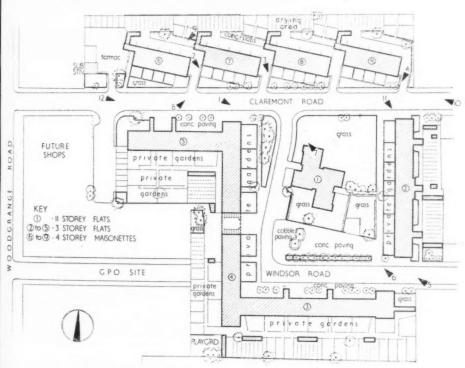
SITE: topography, surroundings, access, planting

The site is a flat area of 4.59 acres, and was originally occupied by large Victorian houses built on the north and south sides of Claremont and Windsor roads. These two straight roads run parallel for almost a mile and are built with small two-storey Victorian detached houses, with good-sized back gardens, backing on to one another and with a surprising number of mature trees, forming one of the better areas of a very highly industrial borough. The site is a square area at the end of these two roads, fronting on to Woodgrange Road, which was devastated during the war.

PLAN

The layout takes the form of a square, with Windsor Road leading into it and Claremont Road, which it was necessary to keep as a through road, passing through. The 11-storey block stands in the middle of the square

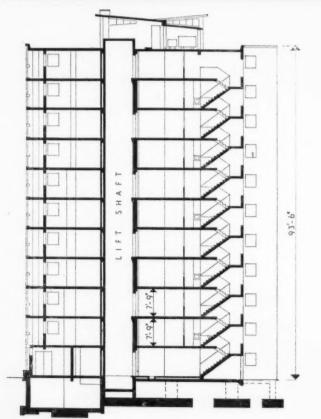
formed by 3-storey blocks of flats and 4-storey maisonettes. The use of 3-storey staircase access flats enables the blocks facing on to the square to be kept "clean" and free from access balconies. The majority of dwellings (excepting those in the 11-storey maisonette) have gardens-65 per cent. of the 3-storey flats and 90 per cent. of the maisonettes.



Site plan showing photographic viewpoints

FLAT





Section A-A 11-storey flats ; Scale: 4" = 1'0"]

Viewpoint 4 (left): viewed from the south and north at the point of intersection of the two wings without balcony recessions, the block appears less successful, particularly seen without the colour of the grey rendering and the dark brown brickwork. This problem occurs on all point blocks, but is less severe on the square type of point block with internal bathrooms, which has a lesser area of external wall surfaces on each of the "wings."



Viewpoint 5 (above): being symmetrical the block is identical in appearance from opposite sides. Private balconies face either east or west. The free-standing wall in front of the block is intended for ball games and stands in the centre of the uncompleted playground. Below: viewpoint 6, looking west down Windsor Road.





½/2nd floor plan, 4-storey maisonettes

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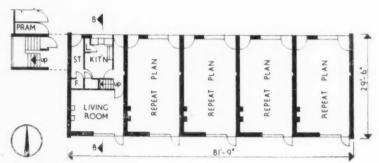
r Road.



½/1st and 3rd floor plan, 4-storey maisonettes



Viewpoint 7: the view from the top of the II-storey block, even in such a densely-developed area, is full of interest, but breeds a greater consciousness of the importance of roof treatment and superstructure. To reduce their obstructive height the 4-storey blocks have flat roofs with small tank rooms (one per tier), linked to the chimney stacks. All the other low blocks of three storeys have pitched roofs.



Ground floor plan, 4-storey maisonettes

[Scale: 1" = 1' 0"]

analysis

11-storey flats

PLAN

The cruciform plan for the II-storey block was necessary to meet the committee's requirement of natural ventilation for bathrooms and w.c.'s, and the verticality that this visually imparts has been emphasized by alternating planes of brick and rendered wall surfaces.

The block has four dwellings per floor, two 3-roomed flats and two 2-roomed flats, grouped axially round two staircases and two lifts.

Maximum accommodation, to reduce cost per dwelling, necessitated the "filling in" of the ground floor with dwellings, and only one is left out to give space for the entrance hall. For the same reason of maximum accommodation the central heating boiler house has been placed in a basement under the block.

Accommodation is to MOHLG standard. All living rooms and balconies face east or west and no living rooms have north external walls, although two bedrooms have windows on the north face to take advantage of the views across to Wanstead Flats.

MAIN CONSTRUCTION

The reinforced concrete frame construction deliberately avoids the use of pre-cast elements, in order to keep well within the scope of any contractor chosen to tender, without recourse to tower cranes or other special equipment. Similarly, traditional materials (brick alternating with rendered brickwork) have been selected for cladding. The columns and beams have not been absorbed within the fabric of the building and a reduction in column sizes occurs at the 3rd and 7th floor levels.

4-storey maisonettes

PLAN

Each block contains ten 3-bedroom, four-person maisonettes, with access gallery approach on the north side from a projecting end staircase unit. Unit maisonettes have a frontage of 16 ft. 1½ in. from centre to centre of separation walls with a staircase at right angles between kitchen and living room. The lower maisonettes have integral stores on the ground floor with access both from outside and from the kitchen, while the upper maisonettes have their stores in an ancillary block adjacent to the staircase. The use of a combined bathroom and w.c. greatly simplifies the plumbing problem with a block of this type, where the bedroom floor projects over the access gallery. Upper maisonettes have small projecting private balconies and remote gardens, and those on the lower floor have front gardens.

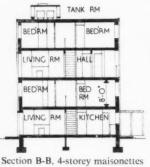
MAIN CONSTRUCTION

The separation walls are load-bearing and are $13\frac{1}{2}$ in. on the ground floor and 11 in. brick cavity above. The third floor projects over the access balcony below and is supported on upstand concrete spreader beams built into the cross walls at one end and supported on concrete columns on the face. The load of these concrete columns is supported on the cross walls below.

Separation floors and roof slab are in-situ hollow pot reinforced concrete and intermediate floors are of timber construction, spanning parallel to cross walls on to 4-in. class "C" clinker block wall between staircase and living room and on to concrete edge beams on external faces. The 4-in. clinker block wall is supported on the r.c. concrete floor slab.



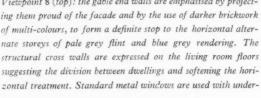




[Scale: 21" = 1' 0"]



Viewpoint 8 (top): the gable end walls are emphasised by projecting them proud of the facade and by the use of darker brickwork of multi-colours, to form a definite stop to the horizontal alternate storeys of pale grey flint and blue grey rendering. The structural cross walls are expressed on the living room floors suggesting the division between dwellings and softening the hori-





window panels to the living room faced with asbestos, painted alternatively maroon and citrous yellow, these colours being again repeated on the access doors to the small tank rooms on the roof. Viewpoint 9 (above left): throughout the scheme access galleries have been kept away from the street or square side, and this means that open air washing areas and back gardens can be provided without visual offence. On the ground floor where no access balcony is needed the plan is varied to give the amenity of a tenant store approached from without and within. Upper maisonettes have tenant stores adjacent to the staircase. The access gallery rendering is jasmine yellow, the gallery soffit white and the panels to the balustrading, which occur opposite each entrance door, are painted alternatively maroon and dark blue. Viewpoint 10 [(left):] end ground floor maisonettes have entrance doors on the gable end walls and these doors are linked with a rendered panel. Viewpoint II (above right): one of the most successful features of this estate is the bold treatment of front gardens which are seldom seen laid out in this open and unashamed way. Without exception the gardens are well cared for and have, in the main, been simply designed by the tenants with grass and flowered borders.

analysis

II-storey flats

cost per sq. ft. s d preliminaries and insurances 1 6 contingencies 4

4-storey maisonettes

STRUCTURAL ELEMENTS
Work below ground floor area

Strip foundations. External walls and cross walls

cost per sq. ft.	S	d
preliminaries and insurances		103
contingencies		3

STRUCTURAL ELEMENTS

Work below ground floor level

Column bases to depth of 9 ft. of reinforced concrete, $I:I\frac{1}{2}:3$. Subsoil 2 tons ft. to 4 tons ft. (2 tons taken for calculation purposes). Differential settlement of $\frac{1}{2}$ in. would have been I in. if foundations designed to 4 tons ft. Basement boiler house with retaining walls of reinforced concrete, $I:I\frac{1}{2}:3$. Asphalt tanking with $4\frac{1}{2}$ -in. semi-engineering brick protection. Fairfaced concrete internal finish to boiler house.

of 1:2:7 concrete.

External walls and facings 5 1½
The external walls of ground to first floor are 13½-in. brick facings and flettons with flint facings. 11-in. cavity external walls (4½-in. brick, 2-in. cavity, 4½-in. brick) with flint facings (above first floor). Both are load bearing.

Walls to access balconies, 6-in. hollow clay blocks (1:1:6 mortar) with ½-in. render 1:1:6 wood-float-finish and cement paint. Lightweight on cantilevered portion.

Gable end walls of solid and cavity brick, as above, facings and brickwork, red, sand-faced. Panels under L.R. windows, wood framing, 2-in. wood-wool infill. Fluted asbestos external face.

Ratio:
$$\frac{\text{solid wall}}{\text{floor area}} = \frac{0.923}{1}$$

External walls and facings

II-in. cavity walling of $4\frac{1}{2}$ -in. semi-rustic wirecuts and flettons, with 2-in. cavity and $4\frac{1}{4}$ -in. hollow clinker blocks. Finished fairface, flush-pointed, $\frac{1}{2}$ -in. render and set class "B," and grey proprietary $\frac{1}{2}$ -in. render and set class "B." Division walls, bedroom walls to balconies of $4\frac{1}{4}$ -in. hollow clinker block with $\frac{1}{2}$ -in. render. Facing slabs for entrance flank wall of terrazzo, and between staircase windows of blue black asbestos sheets.

Cost includes tank room walls.

Ratio:	solid wall	1 · 193		
Katio:	floor area	1		

Frame or load-bearing element

Columns and beams throughout of reinforced concrete I: I: 3, spans, averaging I2 ft. 6 in. to II ft. $3\frac{1}{2}$ in. column sizes being reduced at 3rd and 7th floors.

Walls of lift shafts in reinforced concrete, 1:1:3, designed to prevent structure-borne sound from lift spreading through building.

Cost includes roof and floor slabs, staircases and lift wells.

Upper floor construction

In-situ slab on all floors, of 5-in. reinforced concrete.

 $\frac{1}{2}$ -in. glass quilt, $1\frac{n}{4}$ -in. screed 1:2:4. $\frac{1}{4}$ -in. thermoplastic tile provides floor insulation to DSIR Grade I.

Staircases

R.c. cranked slab on all floors, 1:2, fairfaced soffits, \(\frac{3}{4}\)-in. granolithic.

In basement, precast concrete, grano finished. Height from floor to floor, 8 ft. 6 in. Width, 3 ft. 6 in. o/a.

Roof construction

In-situ slab, reinforced concrete, finished 3-in. vermiculite screed to falls and 2 layer asphalt on felt underlay, providing thermal insulation to slab and dwellings.

Tank and motor room, in-situ slab, 3-ply felt

Felt used to avoid asphalters "going back."
Cost includes insulating screed and finishes, but excludes slab.

17 0½ Frame or load-bearing element

Ground to first floor, 13½-in. solid fletton brick, party wall, 16-ft. 1½-in. centres first floor to roof. 11-in. cavity party wall (4½-in. brick, 2-in. cavity, 4½-in. brick) 16-ft. 1½-in. centres. Between L.R.s and staircase, 4-in. class "C" block wall, supporting timber intermediate floors in mid-span. External walls, edge beams of reinforced concrete. Span, 16-ft. 1½-in.

Supporting external walls and timber floor joists.

Upper floor construction

Second floor, slab in-situ r.c. hollow pot. 1-in. glass-wool insulation. Wood fillets and t. and g. boarding. First and third (intermediate) floors, hollow, t. and g. boarding, plaster board and skim. Cost of wood floors only.

Staircases Public staircases, one per block. Width: 3 ft. 9 in. Total rise: 14 ft. 3 in.

1 91

Internal staircases of softwood, 40 in number. Width: 2 ft. 9 in. Total rise: 8 ft. 3 in.

$5\tfrac{3}{4} \qquad \begin{array}{ll} \textbf{Roof construction} & 2 & 1\tfrac{1}{2} \\ \textbf{Flat roofs of slab r.c. hollow pot with 3-in.} \end{array}$

Flat roofs of slab r.c. hollow pot with 3-in.
lightweight concrete screed and 3-ply mineral
surface felt (finish only).

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analysis

II-storey flats

Balconies balustrades and flower boxes asphalt

In-situ r.c. slab fronting bedrooms, finished $\frac{3}{4}$ -in. screed, 2 layer $\frac{3}{4}$ -in. asphalt. Wrought iron balustrades with glazed asbestos panel and sheet metal flower boxes.

Windows

Vertical pivot hung in all flats; horizontal pivot hung on all staircases. Metal, prime and paint, two coats. (Cost includes metal doors leading off balconies).

	window area		0.217
Ratio:		=	
	floor area		T

External doors

Flat entrance doors flush, wood, ply-faced with obscured glass panel \(\frac{1}{2}\)-in. georgian wired cast glass. Glazed staircase screens.

Glazing

Windows of all flats, 24- and 32-oz. clear sheet, reeded for bathrooms. Doors and screen windows for staircases, georgian wired cast glass, I hour fire resistance.

PARTITIONING.

Internal partitions

Internal partitions between rooms in flats of 2-in. clinker block finished class "B" plaster.

In central halls from ground and 1st to 10th floors, to form tenant stores, 2-in. clinker block fairfaced inside.

Area of partitions: 19,190 sq. ft.

Screens

Fire resisting screens round stair enclosure, to accord with fire regulations, of glazed wood, painted 2 coats.

Internal doors

Flush, in all rooms and tenant stores, wood ply-faced.

No. of single doors: 452 No. of double doors: 23.

Metal doors leading off private and public balconies are included under windows.

Ironmongery to internal doors

Plastic lock and latch, self finish, on all doors.

FINISHINGS

Floors

Basement, fuel stores and refuse chamber: granolithic.

Entrance hall and ground floor: precast concrete slabs.

Stairs: granolithic with non-slip treads. All rooms, glass quilt, 13-in. screed finished 1-in. thermoplastic tiles.

4-storey maisonettes

Balconies

61

51

2 93

Access balconies to upper maisonettes of reinforced concrete. 1-in. glass-wool insulation screed and \(\frac{3}{2}\)-in. asphalt. Iron balustrades with asbestos panels. Private balconies of upper maisonettes, of r.c. with wrought-iron balustrading, screed and \(\frac{3}{2}\)-in. asphalt.

asphalte

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Windows

Side hung or top hung throughout, all standard "Z" range metal, painted, with easy-clean hinges to enable cleaning from inside dwelling. Large fixed panes adjacent to balcony to enable cleaning.

3 External doors

Similar to doors in 11-storey flats.

Ratio:
$$\frac{\text{external doors}}{\text{floor area}} = \frac{0.037}{\text{I}}$$

Glazing

Windows, opening lights of 24-oz. clear sheet, ½-in. polished plate to larger panes. Bathroom windows obscured. Entrance doors to dwellings, ½-in. georgian wired.

PARTITIONING

93 Internal partitions

Throughout block, 2-in. clinker, finished ½-in. plaster (1:1: 6 render coat, Class "B" finish).

Internal doors

All flush, 13-in. ply-faced, painted.

Ironmongery to internal doors

All-plastic latch sets.

FINISHINGS

3 44 Finishi

Ground floor of all dwellings on concrete slab.

Screed finished 1-in. thermoplastic tile. Second floor of all dwellings, insulation quilt, concrete slab, 1-in. wood fillets and joists, t. and g. boarding. First and third floors of all dwellings, wood joists, t. and g. boarding.

Access belonies of upper majornettes, glass sills.

Access balconies of upper maisonettes, glass silk quilt, cement and sand screed, finished asphalt. Private balconies of screed on concrete slab, finished asphalt.

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analysis

11-storey flats

Wall finishes

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Entrance hall, plaster finished, partly 2 coats emulsion, partly I coat cement glaze, and partly fairfaced brickwork.

Central halls on all floors: plaster, emulsion painted.

Stairs on all floors: fairfaced brickwork, emulsion

Inside walls of flats, plaster throughout finished primer 2 coats distemper. Balconies rendered with cement paint.

Cost excludes decorations.

Ceiling finishes

Generally bonding and finishing coat of plaster, finished primer and 2 coats distemper. Cost excludes decorations.

Decorations

To BS colour range, with strong colours restricted to balconies and public parts of block. Distemper: walls and ceilings.

Emulsion paint: bathroom and kitchen walls and

Oil paint: woodwork and metal windows. Cement paint: balconies and public areas.

4-storey maisonettes

2 23 Wall finishes

External walls to access balconies, 1-in. render, I: I: 6 finished rubber based paint. Internal walls of all dwellings, 1-in. render 1:1:6 and set Class "B" plaster, finished with distemper. Public staircase, facing brick, fair face finish.

Ceiling finishes

Within dwellings, concrete soffits, bonding plaster and setting coat, finished sealer and 2 coats washable distemper. Joist soffits of 4-in. plaster

board, gypsum skim, finished 2 coats washable distemper. Joist soffits over access balconies rendered 1:1:6 on expanded metal lath, finished rubber-based paint.

1 73 **Decorations**

Generally, oil bound distemper, emulsion paint, cement paint and gloss paint to BS colour range. Strong colours restricted to balconies and public parts of block.

FITTINGS

Gas drying cabinets in all kitchens, in stove enamelled metal, ventilated directly to open air by

Galvanised gas wash-boilers, as regularly supplied to tenants of West Ham Council.

Kitchen equipment

Painted softwood dressers and cupboards and natural softwood worktops. Teak draining boards, twice oiled.

Larders with block work partition and flush door, vented to open air.

FITTINGS

Washboilers in kitchens of maisonettes, same as 11-storey block.

Kitchen equipment 31

Kitchen cabinets and worktops in kitchens of maisonettes, cabinets painted, worktops of natural wood.

SERVICES

External plumbing and rain water disposal

Roof and balcony, enclosed in ducts where not hidden behind balcony wall. Cast-iron pipes with combined balcony inlets. Painted three coats oil.

Internal plumbing

Soil and waste ducts in bathrooms and kitchens, 4-in. c.i. with anti-siphonage unit, 2-in. c.1 vent pipe, to BS416. One-pipe system with copper branches.

Cold water installation

3 03 Storage tanks in roof house, galvanized m.s. with capacity of 6,700 galls. Booster pump feed to tanks operated on time switch, necessary at certain times of day to boost pressure which is normally 60 ft. during day, 90 ft. at night.

SERVICES

External plumbing and rain water disposal

Rain water disposal by cast-iron r.w.p.s on roof and public balconies, in main ducts.

Internal plumbing

Waste disposal by soil stacks in ducts. Cast iron. 1 23 Branches to bathrooms and kitchens. Copper.

Cold water installation

Galvanised iron storage tanks on roof. 100 gall. capacity to each maisonette.

analysis

II-storey flats

4-storey maisonettes

Sanitary fittings

Glazed fireclay sinks in kitchens: c.i. 5 ft. 6 in. enamelled bath, glazed fireclay l.b. and w.c., in combined bathroom-w.c's.

Heating installation

Low pressure hot water c.i. radiators, two per flat. This provides partial central heating system with one radiator in hall to give background heating only and one in living room. Electric point is provided. Flue carried up within building adjacent to lift.

Hot water installation

Balanced flue multipoint gas water heater in kitchen. Vented by terminal on external wall, designed to give flexibility in use to tenants, many of whose wives go out to work and need instant hot water on return.

Refuse disposal

Two glazed earthenware chutes, each serving alternate floors.

Fire protection

Dry rising fire main.

Drainage

Cost not included.

Gas installation

Run in floor screed to connections with cooker, washboiler and multipoint water heater.

Electric installation

Source and fitting type: Electricity Board's mains. Wiring and switching types: conduit, A.C. and time switches throughout.

The block is wired for television from a main aerial and amplifier and is also wired for wireless and telephones.

Power supply type: 3-phase 415/240 A.C. duct in lobbies. Solid copper rising main.

T :64.

Two per block, from central hall, holding eight persons and travelling 100 ft. per minute.

Passenger operated. Stops arranged alternate floors.

Paved area

Pre-cast concrete slabs at entrance. (Cost not included).

Total cost per sq. ft. floor area
(Tender figure)

26,081 sq. ft.

1 3 Sanitary fittings

In kitchens, glazed fireclay sink. In bathrooms, cast iron enamelled bath and glazed fireclay w.c. and l.b. 111

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4 11 Heating installation

Open fires in living rooms with continuous burning type fire with back boiler. Finished glazed tile and hardwood surround and hearth. Wall type: cavity. Electric power point provided in bedrooms.

1 4½ Hot water installation

Direct cylinder in linen cupboards, 27 gallon actual capacity. A plug is fitted in the cylinder for tenants to instal their own immersion heater and thermostat for summer use. Insulation jacket.

44 Refuse disposal

Tenants are provided with dustbins, which are housed in a store adjacent to the public staircase. The entrance door to the store has a lock, for which each tenant has a key.

Drainage

Cost not included.

2 Gas installations

To cooker and wash boiler points in kitchens.

3 23 Electric installation

Each block is wired for telephones and relay radio and television. Wiring and switching types. Screwed conduit in concrete floors. T.R.S. in timber floors. Television aerials.

Power supply types: 3-phase 415. 240 V.A.C. Solid copper rising mains.

4 51

Paved areas (cost included in floor finishes) Precast concrete slabs in front of blocks, to public staircase, and at rear of blocks at entrances to ground floor maisonettes.

71 $4\frac{3}{4}$ Total cost per sq. ft. floor area $\frac{\text{£}60,726}{31,580 \text{ sq. ft.}} = 38 5\frac{1}{2}$

analysis

II-storey flats

SPECIAL ACOUSTICAL TREATMENT

Sound insulation

Floors and lifts to all dwellings, Grade I impact and airborne. Structural isolation and ½-in. cork between basement walls and lift walls. I-in. glass quilt, provides maximum insulation that can be economically obtained.

FIRE

Structure, 2 hour. Separation walls, 2 hour. Floors, 2 hour. Dry riser with outlet at each floor level, Block is under 100 ft.

Planning precautions: Lifts are operated on a separate electrical circuit and have a master control for use by Fire Brigade. Two staircase means of escape provided, with one hour separation, ½-hour fire check doors to dwellings.

4-storey maisonettes

SPECIAL ACOUSTICAL TREATMENT

Sound insulation

Vertically, at 2nd floor, Grade I airborne and impact, I-in. glass quilt on concrete slab under wood fillets and t. & g. boarding.

Horizontally, cross walls with 11-in. cavity brickwork.

FIRE

No alternative means of escape are required, since the blocks are less than 42 ft. in height. Means of escape is by open access to open public staircase.

Access is provided at front and rear for fire fighting vehicles.

2 hour separation is provided between dwellings.

ACCOMMODATION STANDARD

Area of site availab	le Total no. of	dwellings	Total n	o. of rooms	No. o		Total no. of persons housed
4.59 acres	163		529		0.86		617
Density:							
Dwellings per acre	Persons per acre	No. of tend stores (inte		No. of tena stores (exter		Total no. of garages	Average area per dwelling
35.21	134.42	63		100		16, 1 sub-station	n 704 sq. ft.

SCHEDULE OF ACCOMMODATION

MA: maisonette type. SA: staircase access. PB: point block type.

Block	Type	No. of storeys	I room	2 room	3 room	4 room	5 room	Totals:	
								Dwellings	Rooms
I	PB	II		21	22			43	108
2	SA	3		3	12	6		21	66
3	SA	3			18		3	21	69
4	SA	3			20	6		26	84
5	SA	3		3		9		12	42
6, 7, 8, 9	MA	4				46		40	160
								163	529

ROOM AREAS

Туре	PB 3 room	PB 2 room	MA	Type: continued	PB 3 room	PB 2 room	MA
LR DK	185 sq. ft.	180 sq. ft.	180 sq. ft. 100 sq. ft.	BR1 BR2	137 sq. ft. 115 sq. ft.	138 sq. ft.	137 sq. ft. 81 sq. ft.
K	96 sq. ft.	65 sq. ft.		BR ₃			76 sq. ft.

Floor to floor height: 8 ft. 3 in. average; room heights (fin to fin) to include ground floor slab: 7 ft. 9 in. average.

TIME SCHEDULE (details relate to the whole contract)

Drawings: January 1954. Work completed 18.5.57. Tender date: 30.12.54 Type of contract: RIBA as amended for use by L.A.s. Contract signed: 17.5.55.

Work commenced: 18.5.55 and completed in contract time.

COST COMMENTS

The cost analysis of the eleven-storey and four-storey blocks shown alongside provides more evidence for those interested in the difference between the costs of high and low building. Comparison of the total cost of 71s. $4\frac{3}{4}$ d. and 38s. $5\frac{1}{2}$ d. respectively give rise to the following comments: (a) That consideration must have been given to the relation between cost of land and density of building, as it is

obviously cheaper to provide four-storey blocks.

(b) That the accommodation provided has basically the same finishings and fittings in high and low blocks, with two exceptions: (i) the four-storey blocks have open fires instead of central heating; (ii) hot water is supplied from different sources.

(c) The wide difference of cost must therefore be occasioned simply by building in multi-storey construction. Reference back to the article on flat costs by R. O. Whittington (AJ, July 26, 1956) will amplify the marked variations in cost apparent when examining the above analysis.

The increase of height immediately introduces additional factors such as lifts, fire escapes, refuse disposal and dry risers, items which are not normally required up to 42 ft. in height.

Generally, the high building structure is more complex,

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Viewpoint 12: the three-storey block on the right has a projecting gable at its link point to preserve the visual enclosure of the square when approached from the main road. There is other evidence of careful thought throughout the scheme in the "floor-scape" treatment, the paved area, the detailing of kerbs and the choice of lamp standards etc.

The great advantage of the point block plan form is the pleasant internal access it gives with enclosed lobbies shared on each floor by only four dwellings. Bright colours have been used; B.S. 0 006 red on the doors and on the rendered surfaces to give warmth, and B.S. 5 062 yellow green on the ceiling. The choice of granolithic, however, for the floor finish does not exploit the form of access to the fullest extent and is unrewarding to tenants, who have to clean it, and is therefore more likely to be neglected. The block has two lifts, each stopping at alternate floors to reduce time taken for travel.



for example, the electrical installation is more costly because of conduit in floor screeds, lift control and rising main installation. Perhaps the findings of the RICS Cost Research Committee, who are investigating the cost of housing and flats, will throw some light on these matters and show at what point an economical optimum is arrived between land values and multi-storey construction.

SITE ORGANIZATION

Site labour and equipment: The labour on this contract was organized under the supervision of a site agent, assisted by one general foreman, one foreman carpenter, one foreman bricklayer and one ganger, The whole of this labour was under the jurisdiction of a visiting contracts manager. The equipment on this contract for the bulk excavation was a 22 R.B. digger for a period of 3-4 months.

A 33M Maryon excavator with 70-ft. jib for use as a crane; was used for pouring concrete floors etc., hoisting material and placing roof trusses.

Sub-contractors: Painting, plastering, glazing, roof tiling, asphalting, wrought iron work, tarmacadam, fencing, wall tiling.

The reasons for sub-letting this work were to obtain the services of specialists in each particular trade, which is the normal practice of the Company.

Job management: In common with other contracts, the job was completely pre-planned and progress charts prepared, which dealt with the question of programme and phased material delivery.

The labour on the contract, other than sub-contract labour, worked on an incentive scheme, which is common to the Company, and the progress of the contract was reviewed weekly by the contracts manager and monthly by the board of directors.

Liaison between the site and head office was through the medium of the contracts manager daily by telephone and on his weekly visits.

CONTRACTORS

Clerk of Works: D. G. R. Welch. General contractors: Tersons Ltd. Sub-contractors-Damp courses: Hine Ltd. Asphalt: Ragusa Asphalt Co. Ltd. Concrete blocks: Broad & Co. Ltd. Reinforced concrete: G. K. N. Reinforcements Ltd. Formwork: Scaffolding (Great Britain) Ltd. Bricks: Hall & Co. R. Passmore Ltd. Roofing: Permanite Ltd. Tiles: L. Whittaker & Co. (London) Ltd. Partitions: Broad & Co. Ltd. Glass: E. A. Hetherington Ltd. Patent flooring: Semtex Ltd. Central heating: Stitson White & Co. Central heating boilers: Ideal Boilers & Radiators Ltd. Staircases, balustrading: Scaffolding (Great Britain) Ltd. Sprunce thrower units: B. Finch & Co. Ltd. Door furniture: Teuten-Davis Bennett Ltd. Grates: Ashley Brandon (Kensington) Ltd. Casements, window furniture: (point block) Henry Hope & Sons Ltd. (other blocks) Crittall Manufacturing Co. Ltd. Sanitary fittings: Jacobs & Son Ltd. Refuse chutes: Broad & Co. Ltd. Plaster: Tunnage & Laverty Ltd. Tiling: L. C. Keates & Son. Shrubs and trees: Borough Engineers Dept. (Parks Section). Lifts: Express Lift Co. Signs: Drakard & Humble Ltd. Ironnongery: Teuten-Davis Bennett Ltd. Precast concrete: Tercrete. Hollow floor blocks: London Brick Co. Ltd. Terrazzo Panels: Jaconello Ltd. Asbestos panels: G. R. Speaker & Co. Ltd. Water heaters: Ascot Gas Water Heaters Ltd. Tarmac areas: Val-de-Travers Asphalte Paving Co. Ltd. Garages: Bell & Webster (Contracts) Ltd. Paint: T. H. Kenyon & Son Ltd. Suppliers: E. Wood Ltd. A. T. Morse & Co. Ltd. Joseph Freeman Sons & Co. Ltd. Duresco Products Ltd. Flower boxes: Clark Hunt & Co. Ltd. External rendering: Callow & Keppich Ltd. Chain link fencing: Fencing (Shepperton) Ltd. Fireman's Ladder: Bardsley-Colchester Ltd.

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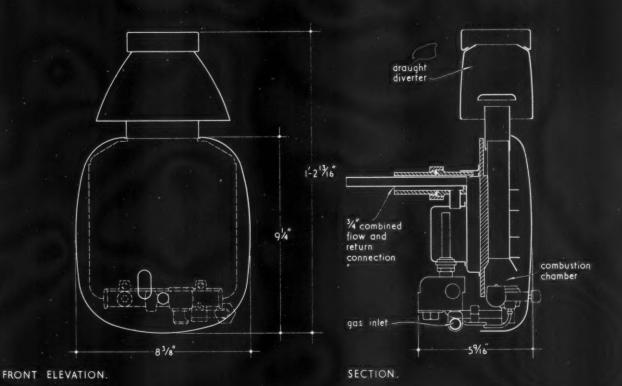
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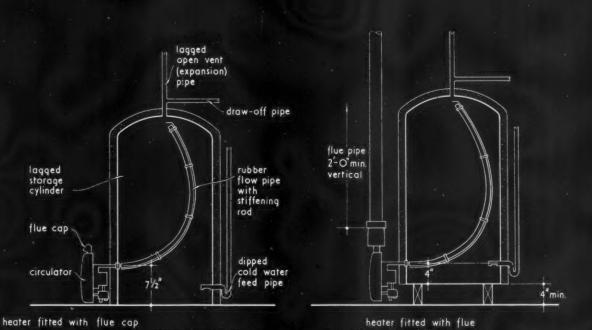
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WATER HEATING UNITS GAS

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TYPICAL INSTALLATIONS SHOWING CYLINDER ON FLOOR AND RAISED

32.C4 ·STRATALYN· INJECTOR GAS WATER HEATER NO. ST.12

This Sheet describes the Stratalyn injector gas water heater which can be applied to a domestic hot water storage cylinder or tank by means of a single water connection.

General

The appliance is designed for connection to a domestic hot water supply system and may be installed either as the sole means of providing hot water or to supplement a solid fuel boiler. Its small size makes it possible to install it in restricted situations, such as small airing cupboards. It is suitable for all types of water. The head of water must not exceed 30 ft. The storage vessel should not exceed a capacity of 30 gallons.

The heater makes available small supplies of hot water at short notice and it may be used continuously or intermittently according to requirements. The gas consumption is automatically controlled by means of an integral Regulo. The average storage temperature is 140°F.

Characteristics

Output: 4500 B.t.u./hr. (approximately 5½ gal./hr. raised through 80°F.).

Input: 6000 B.t.u./hr. (12 cu. ft./hr. of 500 c.v. gas).

Components

Outer casing: This is in sheet steel, vitreous-enamelled.

Water body: The water body is of rectangular section with integral heat exchanger. It is constructed of heavy-gauge copper with all joints brazed and comprises a "return" compartment in which the Regulo rod-couple is immersed and a "flow" compartment connecting with it at a low level by means of a pierced waterway. The outlet from the "flow" compartment consists of a short brass tube screwed into the water body concentric within the "return" connection. The latter consists of a hot brass stamping brazed to the water body with connection to the "return" compartment only.

Heat exchanger: This forms one side of the combustion chamber and consists of an aluminium-alloy die-cast plate with corrosion-resisting steel fins. It is fixed to the water body by screws, the joint being sealed with heat-conducting material.

Combustion chamber: The combustion chamber has a three-sided casing of Radaloy heat- and corrosion-resisting steel to which can be fitted either a draught diverter or a flue cap in vitreous-enamelled sheet steel. The gas supply unit has a cast-iron burner fitted with non-aerated Bray jets, thermo cut-off, gas adjuster and union connection to Regulo. The latter

includes main gas filter and is fitted with pilot gas supply connection incorporating both adjuster and filter. A constant pressure gas governor is supplied for fitting in the supply pipe.

Separate flow pipe: A separate flow pipe of steamquality rubber with external supporting rod and clips is fixed to the outlet pipe of the heater after curving and cutting to suit the inside of the storage vessel, as shown in the diagrams on the lower face of the Sheet. Its function is to convey heated water to the top of the storage heater, ensuring good stratification.

Installation

The heater is attached direct to the storage cylinder or tank, which should be provided with a 1-in. B.S.P. female connection and 1-in. by \(\frac{3}{4}\)-in. B.S.P. bush, as indicated in the drawings on the lower face of the Sheet

Water: The cold feed pipe should be dipped before it enters the storage vessel and should also be fitted with a spreader. A drain valve should be included at the lowest point in the cold water feed. The cold supply should be from the household feed cistern with a maximum head of 30 ft. The water connection on the circulator is $\frac{3}{4}$ -in. B.S.P. combined flow and return. In hard water districts the use of a New World Scale Reducer is recommended.

Gas: The gas inlet is \(\frac{1}{4}\)-in. B.S.P., right- or left-handed. Flue: In freely-ventilated situations the flue cap can be used, but a flue is recommended for most domestic installations. This should be in accordance with B.S.CP.331.104.1947 Flues for Gas Appliances. The first 2 ft. 0 in. at least of secondary flue pipe should be vertical. The flue connection can be for 2-in. or 2\(\frac{1}{2}\)-in. diameter asbestos-cement or 2\(\frac{1}{2}\)-in. or 3-in. steel.

Insulation: The hot water storage cylinder or tank and 5 ft. minimum of the adjacent expansion and draw-off pipes should be lagged (see BS.1304:1946 Ready-to-fit Thermal Insulating Materials).

Finish

The outer casing is in white vitreous enamel with all visible fittings finished in stoved aluminium paint.

Compiled from information supplied by: Radiation Ltd.

Address: Grappenhall Works, Warrington, Lancs. Telephone: Warrington 30411.

Head Office: 7-8, Stratford Place, London, W.1.
Telephone: Mayfair 6462.

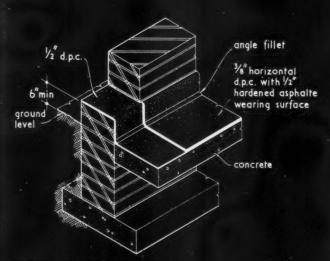
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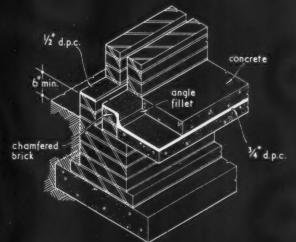


DAMP-PROOF COURSES ASPHALTE

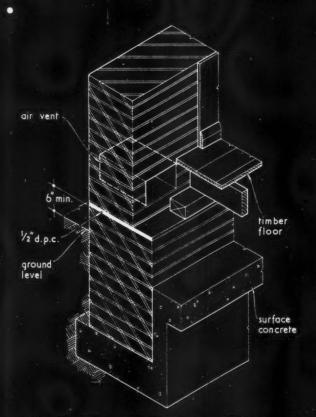
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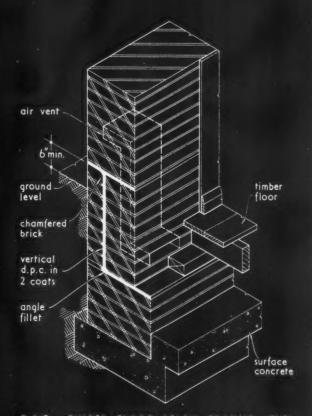
FLOOR AND D.P.C. COMBINED.



D.P.C.: CONCRETE FLOOR



D.P.C.: TIMBER FLOOR ABOVE GROUND LEVEL



D.P.C.: TIMBER FLOOR BELOW GROUND LEVEL.

26.A2 ASPHALTE DAMP-PROOF COURSES

This Sheet is one of a series on asphalte. It deals with the use of asphalte for damp-proof courses. Sheet 12.F1 describes the material as used in building construction, and other Sheets in the series deal with its general use and specific applications in flooring and paving, in tanking and in roofing.

General

Mastic asphalte is completely impervious and provides a complete barrier against rising damp and seepage of rain through joints and porous materials. It has a natural elasticity which enables it to give to slight structural movements and temperature changes without cracking.

Damp-coursing work can be carried out in acid- or oil-resistant asphalte, or specially manufactured to withstand extreme temperature conditions (see Sheet 12.F1, Grades).

Laying

Horizontal d.p.c.'s (walls): These should be laid in one coat $\frac{1}{2}$ in. thick and at least 6 in. above ground level. The upper surface of the asphalte should be scored to form a key for the brickwork above or angular grit beaten in and left proud of the surface. The first detail on the face of the Sheet shows the d.p.c. integral with an asphalte floor and the detail on the lower left shows it below the level of a timber

Horizontal d.p.c.'s (floors): Where a continuous damp-proof membrane is required the asphalte should be laid in two coats to a total thickness of in. For foundations, the hardcore, etc., should be covered with a layer of concrete at least 4 in. thick to form a solid base for the asphalte. The main concrete slab is then laid over the asphalte. The horizontal membrane must form a continuous layer with a

vertical d.p.c. running up the interior face of the external walls and jointed to the horizontal d.p.c.'s through the walls above ground level; at all internal angles a stout angle fillet must be provided. A typical example for a concrete floor above ground level is shown on the face of the Sheet.

Vertical d.p.c.'s: Vertical damp-proof courses should be applied in two coats to a total thickness of at least ½ in. The drawing on the lower right of the face of the Sheet shows a vertical d.p.c. to protect a timber floor below ground level.

Joints: Joints should be lapped 3 in. minimum.

Angle fillets: At all internal intersections of horizontal or vertical d.p.c.'s a solid asphalte angle fillet should be provided under the asphalte coats.

Relevant British Standards

BS.1097: Mastic asphalte for damp-proof courses and tanking.

BS.1418: Mastic asphalte for damp-proof courses and tanking-natural rock containing 6 to 10 per cent. bitumen.

Compiled from information supplied by:

Val De Travers Asphalte Ltd.

Head Office: Val de Travers House, 21-22 Old Bailey, London,

Telephone: City 7001 (10 lines).
Works: Sun Wharf, Creekside, Deptford, London, S.E.8.
Telephone: Tideway 2611.

Branches: Birmingham, Canterbury, Exeter, Glasgow, Lincoln, Liverpool, Manchester, Newcastle.

NOTE.—Throughout this series of Sheets the spelling asphalte has been adopted to comply with this manufacturer's usage.





BALUSTRADE, OFFICES IN LONDON, S.W.1

Clive Pascall and Peter Watson, architects

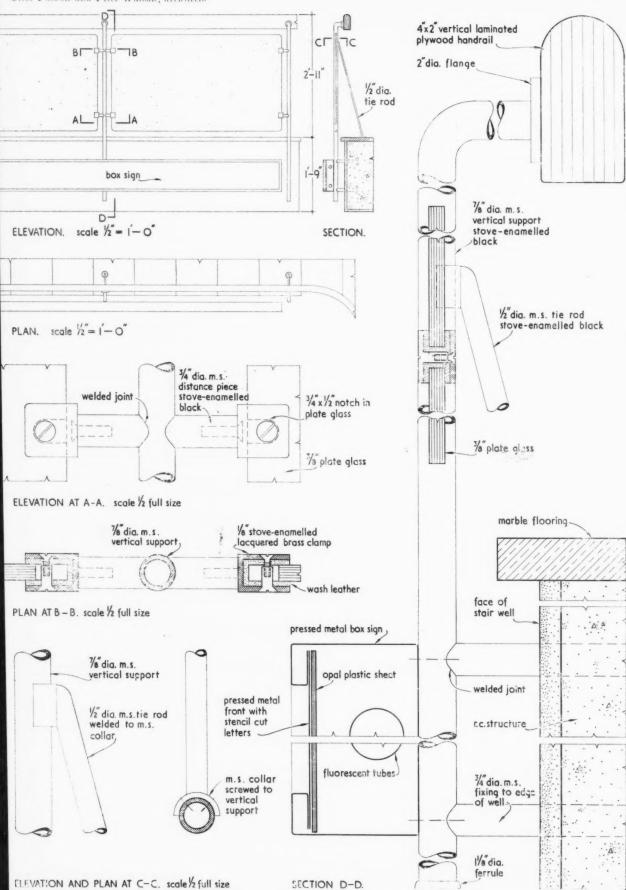


This is a very sophisticated version of the kind of balustrade which has the handrail set several inches on the inward side of the balusters, so that one can lean on it without catching the knees. It was decided to use a mahogany ply handrail as it is a continuation of the stair handrail. The balusters also serve to support a plastic-faced box sign on the balcony fascia.

working detail

BALUSTRADE, OFFICES IN LONDON, S.W.1

Clive Pascall and Peter Watson, architects





The Bei

NEW ULSTER AT

HOSPITAL DUNDONALD, BELFAST

The new 500-bed Ulster hospital at Belfast, designed for the Northern Ireland Hospital Authority by Frederick Gibberd, is planned as four distinct buildings. In the left foreground is the group of maternity buildings. In the centre, to its right, is the main entrance and Out-Patients' Block. Beyond it are the Children's, Radiology-Pathology and Main Ward blocks, grouped around garden courts. A standard ward unit has been designed for all three ward blocks, based on a grid of 10-ft. 6-in. centres, with a depth of 24 ft., two bays forming a six-bed ward (four beds and four cots in the maternity block). The buildings are of steel frame construction and are faced in part with pre-cast exposed aggregate cladding slabs with brickwork as end stops to several of the elevations.





ALUMINIUM FOR STRENGTH!

and lightness and durability. Other advantages of the 128E include * automatic throw-out gear * vertical rubber-sealed joints * self-lubricating bearings. Virtually no maintenance!

AND THE DOORS STAND FLUSH WHEN CLOSED!

...fully-flat and flush, saving space and simplifying your storage layout. Write to Esavian Limited, makers of the 128E, for full details. Do it now.

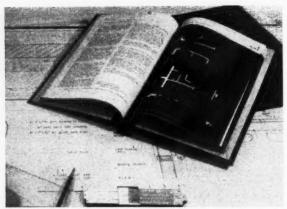


FOR FOLDING AND SLIDING DOORS, WINDOWS, PARTITIONS AND SCREENS

Set of 128E doors installed at S. Smith & Son (Eng.) Ltd., Witney Architects: T. P. Bennett & Son

Esavian Ltd...

Esavian Works, Stevenage, Herts. Telephone: Stevenage 500 Esavian Works, Carfin, Lanarks. Telephone: Holytown 391



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Oct., 1947-June, 1957

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Announcements

PROFESSIONAL

D. Dixon, A.R.I.B.A., has accepted the appointment of assistant architect to the County Borough of Tynemouth and L. Young, A.M.T.P.I., the appointment of chief town planning assistant.

TRADE

Polycell Products Ltd. announce that from November 1 their headquarters will be at 5, Carker's Lane, London, N.W.5 (telephone Gulliver 3494). They will continue to use their Albert Street, N.W.1, premises for part of Polycell's production.

Chipperfield & Beam Associated Ltd., of Brighton, flooring contractors, have changed their name to Beves & Co. (Floors) Ltd. and their address is now Kingston Wharf, Shoreham-by-Sea (telephone Southwick

Charrington, Gardner, Locket & Co. Ltd., of Tower House, Trinity Square, London, are now operating a fully automatic fuel oil delivery service. They are sole regional distributors of Mobil's fuel oils.

Nuralite Co. Ltd., of Gravesend, have opened regional offices at 4, Blagrave Street, Reading, under the management of L. W. Maskell, and at 63, Bardon Chambers, Infirmary Street, Leeds, 1, under the management of R. Sheard.

Correction

The total costs of the Fire Station, Brownley Road, Wythenshawe (AJ, Oct. 3) should have read 90s. 0\frac{1}{2}d, per sq. ft. and not 73s. 10\frac{1}{2}d. as stated.

REMOTE CONTROL OF WINDOWS IS SMOOTH, TROUBLE-FREE POSITIVE with . . .

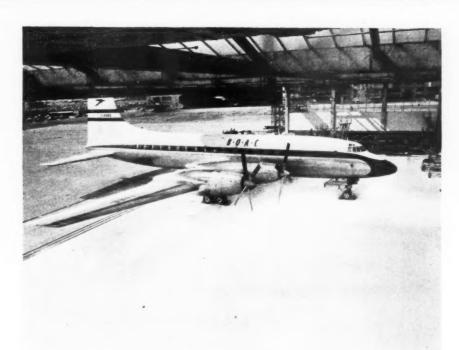
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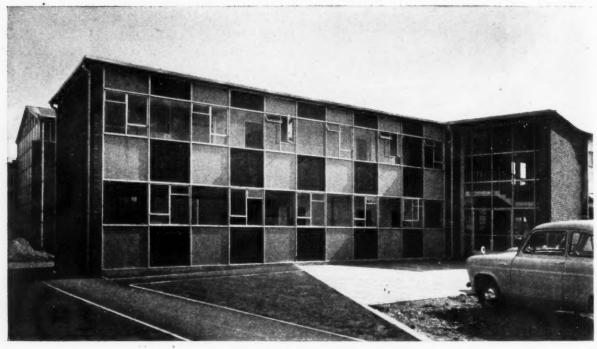
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NEWS SHEET



New Works, Wales Gas Board, Aberavon. W. F. Edwards, F.C.I.S., A.I.G.E., General Manager & Secretary. Architects: T. Alwyn Lloyd and Gordon, F./AA.R.I.B.A. Engineers: S. L. Wright, B.Sc., M.Inst.G.E. and W. D. Rees, M.Inst.G.E.

The office has 'Wallspan' along each face in conjunction with 'Z' Range windows and purpose-made doors in aluminium. The infilling panels are yellow and dark blue 'Muroglass'. To the left of the photograph may be seen the gable of the compressor house (and beyond, the emergency generating plant).

Industrial Symmetry at Aberavon

The new works of the Wales Gas Board at Aberavon are nearing completion and the industrial symmetry which was one of the ambitions underlying the plans for the development of the works has been fully realized.

The gas received at the new works from the Steel Company of Wales is sent out through the grid system of the Board eastward to Bridgend and Porthcawl, westward to Neath, Swansea and Llanelly and onward to Milford Haven and Pembroke.

The new works is notable for having been designed by a team of architects and engineers. Their co-operation is producing an architecture which makes no attempt to disguise its technical function. In the architect's own words, the objective is that "a gas works should look like a gas works and be proud of it".

Extensive and varied use of aluminium has been made in all three main blocks—'Wallspan' Curtain Walling with aluminium faced infillings; 'Aluminex' Patent Glazing; standard 'Z' Range and purpose-made aluminium windows. Aluminium was specified for these purposes because of its known resistance to corrosion, which is especially valuable in a situation such as this where there is a sulphur laden atmosphere both inside and outside the building—in the latter case complicated by proximity to the sea.





The interior of the compressor house showing the runs of Aluminex' sidewall glazing under the caves and the gear-operated vertically pivoted aluminium windows. The gable end is clad with 'Wallspan'. A feature of this building is the way in which possible gas traps in the roof have been avoided by omitting a central ridge. The highest point in each bay is occupied by opening windows designed to give maximum ventilation.

The emergency generating plant includes 'Aluminex' sidewall glazing with continuous gear-operated ventilators. The purpose-made aluminium windows and pressed aluminium mullions are also by Williams & Williams.



VARIED USES FOR STANDARD WINDOWS

ABOVE: 'Z' Range windows in the 'Blue Door' at Maidstone designed by Fremlins Ltd., Surveyors' Department, Maidstone.
Contractors: Mills & Sharp Ltd.

BELOW: Two examples of private house building.

House at Crawley, Sussex. Architects: Lomas & Pooley, A/A.R.I.B.A.

Bungalow at Ifield, Sussex. Designed by E. M. Monk.





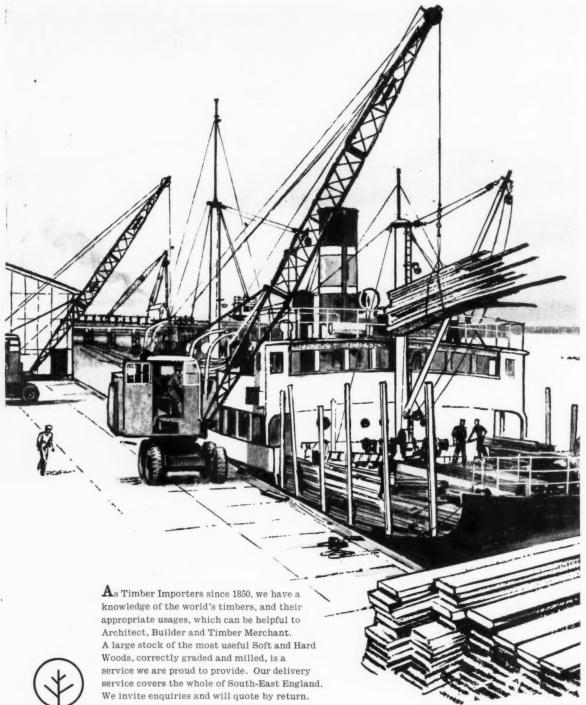
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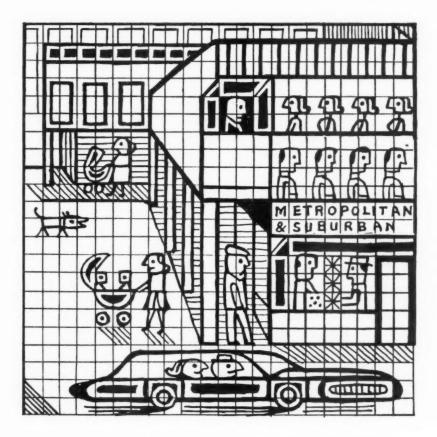
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The Bankers' Dilemma

WHEN the Metropolitan & Suburban Bank decided to open a branch in Harvenage New Town, they were confronted with a grave architectural dilemma.

A normal Met. & Sub. branch office, with its Grecian pillars, rusticated stonework and brass-studded doors epitomizing security, was out of the question. And what sort of bank could be built with plain yellow bricks and armoured glass?

The result, something between an exhibition stand and a welfare centre, was surprisingly effective. The Man from Chubb, consulted at the blue-print stage about strongrooms, safes, and fire-resisting equipment, had the idea of making the strongroom door visible from the street.

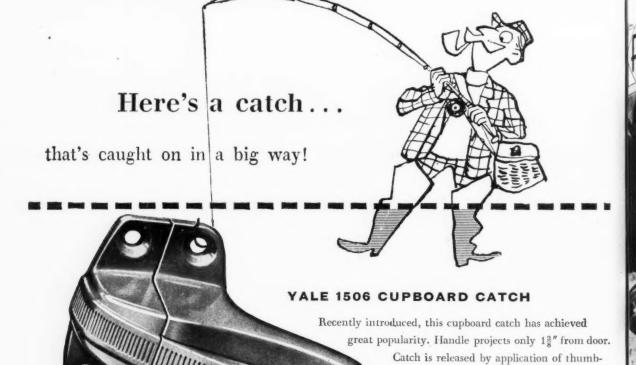
"A more up-to-date symbol of strength than stone pillars," he said, "and stronger, too."

And so it was. The one professional burglar who had moved to Harvenage for easy pickings took a quick look and caught the next train for London.

"These Chubb people are getting in everywhere," he was heard to say. "It's downright dishonest."

There are many ways in which these Chubb people can co-operate with architects, at every stage of planning. But for a start, you should certainly have the Chubb catalogue. It details the simpler, but equally burglar-daunting, equipment which you might need any day. Write or telephone for your copy to Chubb & Son's Lock and Safe Co. Ltd., 175-176 Tottenham Court Road, London, W.I. (MUSeum 5822).

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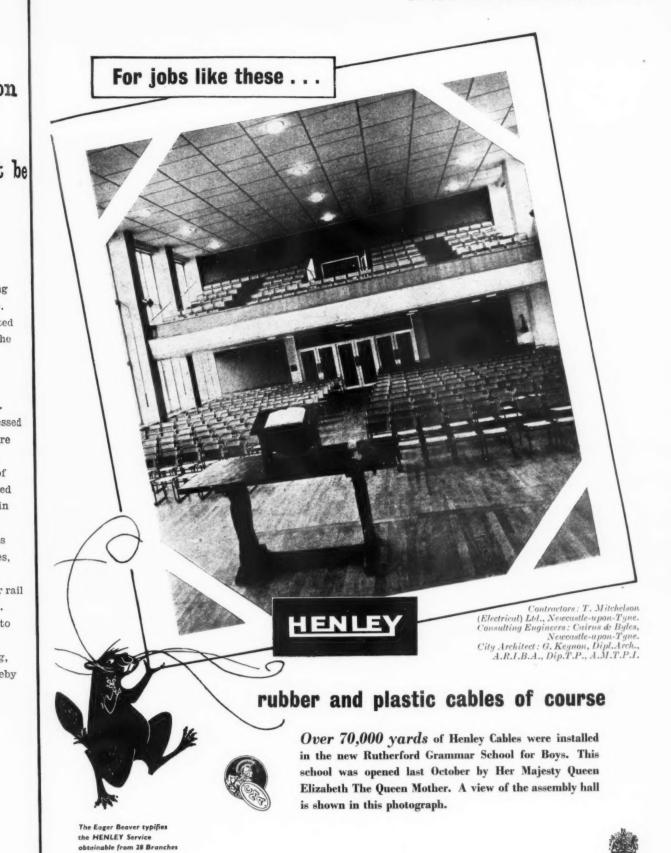


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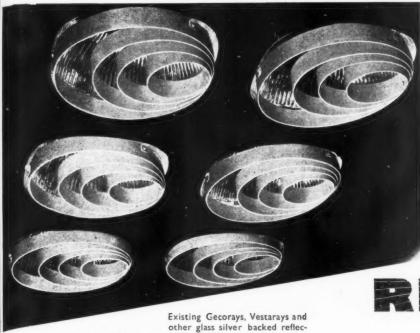
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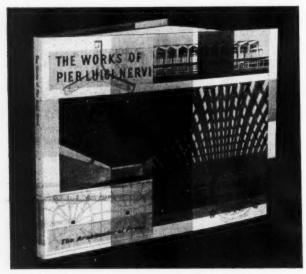
coming shortly

THE WORKS OF

PIER LUIGI NERVI

Introduction by Ernesto N. Rogers

THIS BOOK SURVEYS AND COMPREHENSIVELY ILLUSTRATES all the completed works of the Italian engineer-architect-contractor Pier Luigi Nervi, unquestionably the greatest master of concrete construction of our age. His buildings of the past thirty years take their place in the tradition of Europe's finest engineering architecture, related in spirit to the work of Freyssinet, of Perret, and of Maillart.



Among the many buildings illustrated are the stadium at Florence with its audacious widely cantilevered grandstand roof; the 320-ft. by 130-ft. aircraft hangars at Orbetello poised miraculously on six slender supports; the already famous Exhibition Halls at Turin with their magnificent roofs; a number of industrial buildings each of very original construction; and the Unesco Building in Paris designed in collaboration with Marcel Breuer and Bernard Zehrfuss. In addition, the book illustrates all Nervi's more important projects.

In his preface Nervi says: 'My belief in the inherent aesthetic force of a good structural solution was never shaken.' His genius is such that he not only intuitively creates surprisingly daring and original architectural forms: he also calculates them, thinking out and solving constructional problems down to the last detail; and then he builds them. He thus achieves a synthesis between art and science such as only Maillart and Perret have previously achieved in our time. His concepts are truly three-dimensional in character: form and content are fused into a single spatial diagram. Most of his commissions have, nevertheless, been awarded not primarily on the basis of their incredible daring and beauty but because they cost so much less than comparable structures by anyone else.

Because Nervi's work so clearly reveals the immense possibilities offered to architects and engineers by reinforced concrete the book devotes much space to illustrating and explaining the details of his designs, his methods of building with prefabricated elements.

Size 83 in. by 11 in. oblong. 156 pages with over 280 illustrations. Price 56s, net. Postage 1s. 9d.

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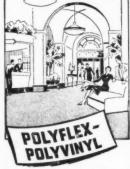
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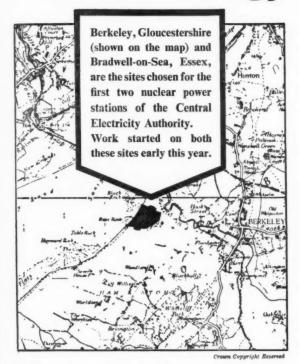
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The growing need for power

As Britain's industrial efficiency increases, so does the need for power. The demand for power doubles every ten years; supplies of home-produced coal do not keep pace with these developments. Nuclear energy and oil will make up the discrepancy between the demands for electric power and the available coal supplies.

Central Electricity Authority has placed contracts for two nuclear power stations, sited at Berkeley in Gloucestershire, and Bradwell in Essex. A third station—the largest yet projected—is to be erected at Hinkley Point near Bridgwater in Somerset. These three stations will have an aggregate capacity of some 850,000 kilowatts.

The Government's revised nuclear power station programme provides for 19 nuclear power stations to be completed by 1965. They will develop from 5,000 to 6,000 megawatts of capacity and add to the national power resources the equivalent of some 18 million tons of coal a year.

As the demand for power grows, nuclear energy will become more and more important as a source of electric power, upon which the economic future of the country so largely depends.







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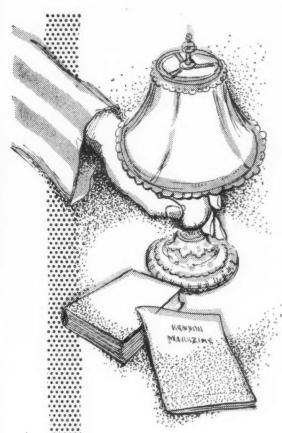
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THE ARCHITECTS' JOURNAL for October 17, 1957

Universities Staircase Arcadia

October Architectural Review

Vexed by conflicting interests and lack of comprehension of the issues at stake, the design of Universities has become a pro-



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blem that excites passion and prejudice, rather than constructive thinking. In the October number of the Review, Professor Pevsner and the Hon. Lionel Brett will attempt to put the problem back on a realistic basis in a special feature covering both

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he historical growth of universities and their present needs, emphasising the diversity of concepts, both in organization and architecture that the term embraces. Two articles in the same issue will deal with problems of architectural lettering: Nicolete Gray contributing a study of Lettering in Three Dimensions and Skill, surveying the design of Fascia Boards. Also in Skill will be an illustrated description of Arne Rudberger's stunning staircase for the MEA department store in Stockholm, and other recent structures to be illustrated will include a small house by Sir Hugh Casson on the South Coast, and another well-designed adjunct to a department store-G. A. Jellicoe's roof garden on top of Harvey's at Guildford. historical features will deal with developments in the first quarter of the present century: Nairn's delayed study of Hampstead Garden Suburb is now expanded into a larger study of Arcadia as a place to dwell in, and Reyner Banham will investigate the implications of recent publications on the position of Mondriaan both as a pioneer of modern design, and as a model to be set up for emulation by architects in the future



Staircase at the MEA Store, Stockholm.

Smithsons | Building Exhibition ONNO

November Architectural Review The controversial Smithsons will make their first appearance as contributors to the Review in November, with an illustrated study of the Shape of the Community, in which they set against the exhausted diagrams of CIAM planning their vision of a more humane type of city. For nonvisionaries—and for visionaries too-Skill will provide a full cove age or the Building Exhibition from the technical point of view, as well as an Interiors treatment of G. A. Jellicoe's restaurant and shopping floors at Harvey's of Guildford.

Visionary qualities, spurred by hard practical necessities, illuminate Kenneth Browne's proposals for applying the ONNO traffic-directing technique to Park Lane and west Mayfair. The study of the functional tradition is advanced by Brian Spiller's article on Georgian Breweries. Buildings described in this issue will include the new Bowater Factories by Farmer and Dark, whose cladding provides a practical follow-up demonstration of patent-glazing techniques, and Rangoon University and Technical Institute, by Raglan Squire and Partners, extensively illustrated in colour. Professor



Entrance to the Library of the new Rangoon University. Architects, Raglan Squire and Partners.

Pevsner reviews Tschudi Madsen's important book on the Origins of Art Nouveau, whose character is summed up in the title Beautiful and, if need be, useful, and Dr. S. Lang will provide a note on Architectural Visitors to Padua, based upon a register kept by the university there, in which practically every English architect and amateur of note signed his name when passing through.

TUC Brasilia Street Lighting

December Architectural Review
Design for public and administrative functions will form the subject of the two most important features in the Review for December. The TUC Memorial Building, designed by David Aberdeen, which is only the second public building of consequence to go up in London since the War, will be described and illustrated for the first time in completed form, and a supporting article in Skill will examine in detail the finishes



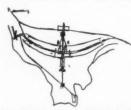
irview drawing of David Aberdeen's TJC Memorial Building.

and mechanical equipment that make this one of the most lavish buildings—outside the commercial field—of recent years. The other major feature is concerned with *Brasilia*, the projected new capital city for Brazil, typically grandiose and Latin-American in conception, but more likely than most such schemes to achieve completion. Sir William Holford.



Oscar Niemeyer's design for the Congress Building as Brassilia.

who was one of the jury who assessed the competition for the new capital's plan, introduces the project and its site, discusses the competition, and adds a few words by way of introduction to the brilliant and unconventional winning scheme, by Lucio Costa, father of Brazil's modern movement, whose report is published in English for the first time.



One of Lucio Costa's sketches for Brasilia.

Another father of his art, John Britton, founder of English topographical studies, will be the subject of an historical article by Peter Ferriday, and the bicentenary of the birth of the great neo-Classical sculptor Antonio Canova is celebrated by one of England's leading neo-Classical scholars, F. J. B. Watson, with a chronicle of English visitors and admirers at the sculptor's studio in Rome. Gordon Cullen will tackle one of the most vexed and debated problems of outdoor detailing, Street Lighting, in terms of distribution and siting, as well as the design of equipment, and interiors to be described include the IBM offices and the Garden Centre, both in new office blocks in Wigmore Street. Foreign reports will cover the Triennale di Milano, and the Berlin Interbau exhibition, and regular features like the Counter Attack Bureau and Robert Melville's provocative art-criticism will continue.

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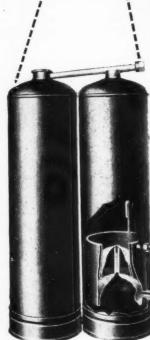
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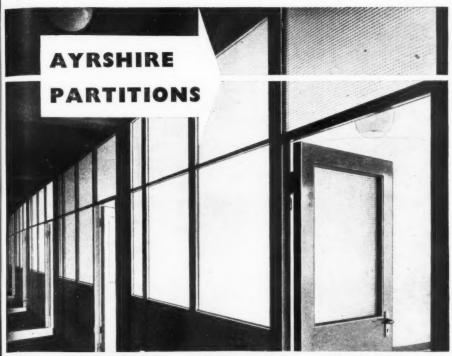
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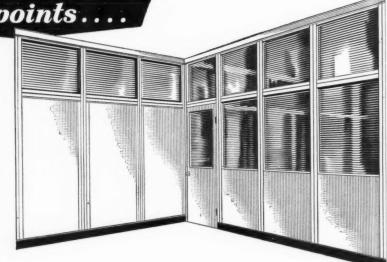
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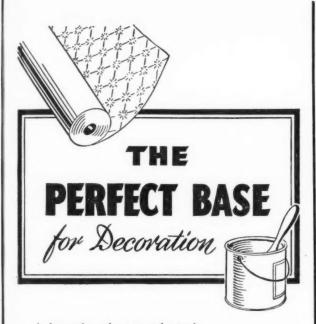


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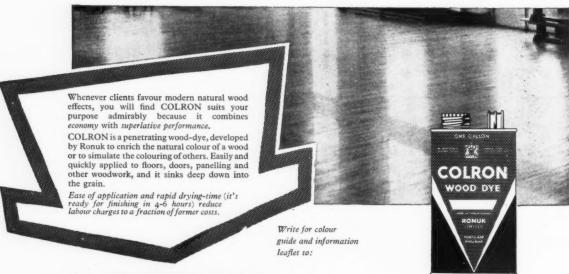
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Two sheets of corrugated Cascalite 'Selfex', each 27in. by 72in., were tested, fixed successively in an opening in a roof section of corrugated steel sheet at an angle of 40 deg. A continuous strip of asbestos wool approximately 3in. wide was inserted between the roof light and the steel sheeting.

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Sheet No. 2 was placed at an angle of 40 deg. to the horizontal in front of a vertical furnace panel giving out an intensity of radiation equivalent to that which would be experienced at a distance of 60 ft. from a burning building 100ft. long by 40ft. high with 40 per cent. window openings through which flames at a temperature of 1,000 deg. C. were being emitted. Emission of gases accompanied by charring of the upper surface occurred. A luminous gas flame 3in. long from a \(\frac{1}{8} \) in. diameter pipe was applied after one minute to the upper surface of the sheeting, when ignition occurred and the flames gradually spread over the whole face. The flaming started to diminish at two minutes and by three minutes the only flaming was along the front edge and this

finally died out at 5 minutes 15 seconds. No penetration of fire to the underside occurred nor were any flaming drops formed. The sheet was able to support the weight of two bricks placed on it after this test.

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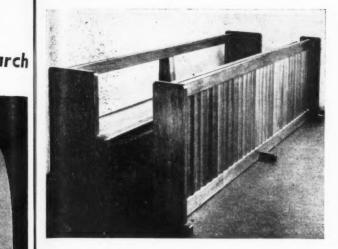
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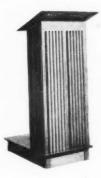


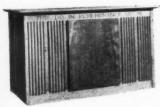
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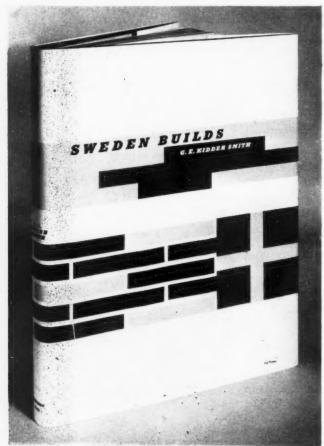
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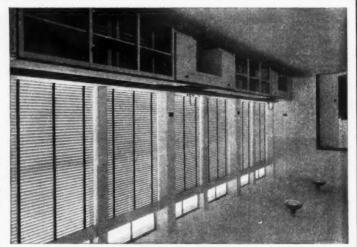
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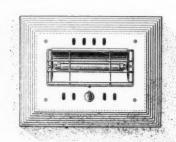
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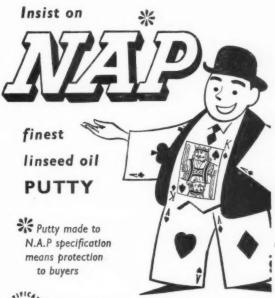
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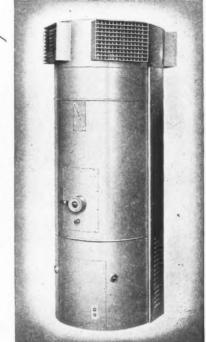
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What wouldn't most tenants of flats and converted houses give for someone or something to deal with callers and so cut out all those tiring and irksome treks up and down stairs answering doors? The STERDY PORTER SYSTEM is the answer. This "doorman" enables tenants to deal with all callers-tradesmen, canvassers, pedlars-and open the door to visitors without porters or caretakers. It's simple to install and use too-one speaker on the door, individual telephones in the flats and a tenant-operated release secured to the door jamb and connected to the existing rim latch. But why not drop us a line for fuller

Available on purchase or rental.

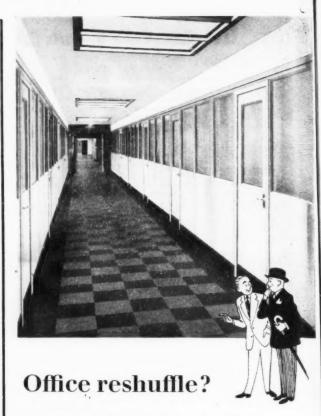
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SANKEY-SHELDON Adjustable Steel Partitions provide complete flexibility of lay-out. They can be quickly and easily erected and the standard component assembly permits alterations and additions with minimum expense. Flush or Semi-flush Partitions—rigid, durable and fire-resisting—are available in a choice of colours. Our Technical Division will advise on all floor space planning problems and prepare schemes.

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"window efficiency" in
Offices, Factories and
Laboratories, the
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TOMO double-glazed WINDOWS are the pre-eminent choice for maximum thermal and sound insulation, and draught-free comfort. They afford the advantages of finely-controlled ventilation and total indoor window-cleaning, and pleated blinds can be fitted between glazing. They are suitable for inward or outward opening and can be top-hung, bottom-hung, side-hung or pivot-hung.

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in finest
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even design
and
finish

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Visit our Stand 162, Row K.
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Scemco Standard 80 watt CIRCULAR FLUORESCENT



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Incorporating the finest control gear available

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Scemco House, 53, Great Eastern St., London, E.C.2

VULCANITE
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for every type of roof
VULCANITE LIMITED
TRIDENT WORKS, WIGAN - and at
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The Janitor Junior is the latest model to be produced by Janitor Boilers Ltd. It has been specially designed to meet the need for an economical boiler which will supply domestic hot water and a central heating system for the small 3-4 bedroomed house.

Amongst its many features are:—

- Rated Output 35,000 B.t.u./h.
- Capable of heating 233 square feet of radiating surface with a mean water temperature of 150° F. and air temperature of 60°F.
- Domestic hot water and background heating for an average five or six roomed house, using 30 gallons capacity indirect cylinder and Janitor Heater Cabinet, or three or four radiators.
- Gravity feed and constant firebed thickness ensure constant output being always available. Economy in operation is the result of the belief the belief and the belief and the belief and the belief and pre-heated secondary air being applied at the correct point, thereby ensuring combustion efficiency of 75.80°...
- The water temperature is controlled by an automatic natural draught damper and can be maintained at any selected level.
- The boiler is independent of electricity, and is therefore unaffected by failure of supply.
 - The Janitor Junior is extremely economical, is easy to clean, and is available in any colour, or in two colours if required, to suit any decorative scheme.
- The boiler burns anthracite beans or large peas which are made available through the Small Anthracite Supply Scheme

Janitor

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90 VALE ROAD, CAMBERLEY, SURREY

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Good health is part of the professional man's capital and disablement from accident or sickness is soon reflected in his income.

A Group Insurance has been arranged for Architects on the "Non-cancellable" basis with the leading Office in this field, at premium rates well below those charged for individual policies.

The benefits under this policy provide an income which continues to be payable so long as the member is unable to work—up to age 65 if necessary. These benefits may not be restricted or cancelled by the Insurance Office or premiums increased on account of the number or duration of claims made.

This type of Insurance is the only effective protection in case of permanent deterioration or total breakdown in health.

Write for details, in confidence, with a note of your age to:-

The Manager,
A.B.S. Insurance Agency, Ltd.,
78, Wimpole Street,
London, W.1

Telephone: WELbeck 1526



- Engine divided durable — non-wearing.
- Body spring loaded against the slide.
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- Bevel of body utilised as scale—may be used for pencil or ink layout.
- New ineffaceable constant value table on plastic label inlet on the reverse side assures good legibility.

STUDENT MODELS ACCURATE, EFFICIENT

The student models are slightly cheaper and splendid for all student purposes.

W. PATTERSON & CO.
LIMITED,
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Obtainable from Drawing Office Dealers and High Class Stationers

NESTLER MEANS PRECISION

CLASSIFIED ADVERTISEMENTS

Advertisements should be addressed to the Advt. Manager, "The Architects' Journal," 9, 11 and 15, Queen Anne's Gate, Westminster, S.W.1, and should reach there by first post on Friday morning for inclusion in the following Thursday's

paper. Replies to Box Numbers should be addressed gas of "The Architects' Journal," at the address

Public and Official Announcements 30s. per inch; each additional line, 2s. 6d.

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ARCHITECTURAL ASSISTANTS
Required by
MINISTRY OF WORKS
For employment in London and Provinces on design and detailing work on construction and maintenance of all types of public buildings.
Salary range 2550 (age 21) to 2870 p.a., London (slightly less elsewhere).
Salary range 2550 (age 21) to 2870 p.a., London (slightly less elsewhere).
Say week. 34 weeks' annual leave initially. Sisting pay according to age, qualifications and experience. Good prospects of promotion, with salaries of £1,030 p.a. and above.
Opportunities for permanent posts leading to pensions (non-contributory).
Interviews at Regional Offices, where possible. Applicants should be of Inter. R.I.B.A. standard. State age, training and experience to Chief Architect, Ministry of Works (A), Abell House, John Islip Street, S.W.I.

BOROUGH OF WARWICK
READVERTISEMENT
CHIEF ARCHITECTURAL ASSISTANT (Special Grade, 2750—£1,030)
Applications are invited for the above permanent appointment from candidates who are Associate Members of the Royal Institute of British Architects.
The appointment is on A.P.T. Special Grade

Associate Member British Architects.

Associate Members of the Royal Institute of British Architects.

The appointment is on A.P.T. Special Grade (2759—e1,030).

The commencing salary will depend upon the qualifications and experience of the successful candidate. Applications, stating age, qualifications, training and experience, must be delivered to the undersigned with the names of three Referees by first post Saturday, the 26th October, 1957.

Canvassing will disqualify, and applicants should disclose relationship with any member of senior official of the Council.

The Corporation is offering FREE HOUSING ACCOMMODATION to the successful candidate. HECTOR SETON BROWN, A.M.I.C.E., A.M.I.W.E., Borough Engineer, Surveyor and Water Engineer.

Z. Jury Street, Warwick.

Est October, 1957.

Table 1959.

Table 1959.

Table 1959.

Table 2059.

25. Jury Street. Warwick.

18t October, 1957.

EAST ANGLIAN REGIONAL HOSPITAL
BOARD
ARCHITECTURAL STAFF
Applications invited from suitably qualified
persons for a range of architectural appointments
for work in connection with development and
design of a large new hospital and general
hospital work for the whole region.
The posts are permanent and pensionable proriding scope in the entire field of hospital
planning, design, construction, specification
writing, surveys, etc. Hospital experience desirable, but not essential.
All grades of staff are required, ranging from
qualified ASSISTANTS to DRAUGHTSMEN.
Applications, giving full personal details, qualifications, experience, present salary, etc., with
ames and addresses of two referees, to Secretary
of Board, 117, Chesterton Road, Cambridge, by
2th October, 1957.

LONDON COUNTY COUNCIL

26th October, 1957.

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
Vacancies for ARCHITECT'S and SURVEYING
ASSISTANTS in the Building Regulations
Division as follows:—

(a) For surveys of existing premises and consideration of proposals for alterations and new construction in the Theatres Section;

new construction in the literature and the connection and the best properties of the connection with applications under the London Building with applications under the London Building Acts and Bye-laws as regards compliance with the Council's construction and means of escape standards.

Salaries up to £860, with starting rates according to qualifications and experience.

Application form and particulars from the architect (Ref. AR/EK/47/57), The County Hall, 8.E.1. (1610)

SURREY COUNTY COUNCIL
Applications invited for following appoint-

Applications invited for following appointments:

1. ASSISTANT ARCHITECT GRADE IV, 1727 15s.—2907 2s 6d. p.a. plus £30 London allowance. Must be AR.I.B.A.

2. ARCHITECTURAL ASSISTANT, GRADE II, 1809 17s. 6d.—2691 17s. 6d. p.a. plus LA. up to 230 p.a. Must be of good general training, preference given those who have passed Intermediate R.I.B.A.

3. ASSISTANT BUILDING SURVEYOR, 9RADE III, £656—2784 2s. 6d. p.a. plus LA. 230 p.a. Preference given those who have passed intermediate R.I.C.S. (Bidg. Sub. Div.). Capable drafting specifications in all trades. prep. Schedules of dilaps., detailed estimates for gen. Maint. works and surveys of properties.
Full details, present salary and three copy testimonials to County Architect, County Hall, Kingston, as soon as possible.

CITY OF COVENTRY
ARCHITECTURAL AND PLANNING
DEPARTMENT
(QUANTITY SURVEYING DIVISION)
AMENDED ADVERTISEMENT
Quantity Surveyors required in the following
Grades:(a) SENIOR QUANTITY SURVEYOR, A.P.T.
V (61.175×250—61.325)

Grades:—

(a) SENIOR QUANTITY SURVEYOR, A.P.T.

(b) SENIOR QUANTITY SURVEYOR, A.P.T.

IV (£1,175×£50-£1,35).

(c) QUANTITY SURVEYOR, "Special"

Grade (£750×£40-£1,030), with additional local award of £26 p.a. on salaries up to £750×£40-£1,030, with additional local award of £26 p.a. on salaries up to £750×£40-£1,030, with additional local award of £26 p.a. on salaries up to £750×£40-£1,030, with additional local award of £26 p.a. on salaries up to £750×£40-£1,030, with additional local award of £26 p.a. on salaries up to £750×£40-£1,030, with additional local award of £26 p.a. on salaries up to £750×£40, with additional local award of £750 p.a. on salaries up to £750×£40, with additional local award expenses.

HOUSING ACCOMMODATION may be granted in approved circumstances, also interestire loan to cover removal expenses.

An interesting and expanding programme of work is being undertaken for major City redevelopment projects, new schools, and large housing schemes, including multi-storey flats, also smaller works of a varied nature, many involving new constructional techniques.

Applicants should have good general experience and the ability to undertake responsibility and to work with subordinate staff.

Further details and application forms (stating post for which application is made) may be obtained from the City Architect and Planning Officer, Bull Yard, Coventry, to be returned by 28th October, 1957.

BOROUGH OF RICHMOND, SURREY YUNIOR ARCHITECTURAL ASSISTANT—

Officer. Bull Yard, Coventry, to be research 28th October, 1957.

BOROUGH OF RICHMOND, SURREY JUNIOR ARCHITECTURAL ASSISTANT—GRADE A.P.T. II

Salary in accordance with A.P.T. Grade II (£725—£945, plus London weighting), Preference will be given to candidates who have passed the Intermediate Examination of the R.I.B.A. Applications to the Borough Engineer and Surveyor, Hotham House, Heron Court, Richmond, Surrey, naming two referees, by 28th October, 1957, and stating relationship, if any, to members of the Council or senior officers. No assistance with housing. Canvassing prohibited.

CLIFFORD HEYWORTH, Town Clerk. 7731

COUNTY BOROUGH OF MERTHYR TYDFIL PERMANENT APPOINTMENT OF TWO SENIOR ARCHITECTURAL ASSISTANTS Applications are invited for the above appointments at a salary in accordance with Grade A.P.T. V of the National Scheme of Conditions

A.P.T. V of the National Scheme v. Consideration of Service.
Applicants must be Associate Members of the Royal Institute of British Architects, and must have had good all round experience in the architectural work usually undertaken by the Local Authority.

Planning experience would be an advantage.

Authority. Planning experience would be an advantage.

Housing accommodation will be provided if required, and reasonable removal expenses of the successful applicant will be paid.

The appointment will be subject to the Local Government Superannuation Acts and to the passing of a medical examination. The appointment will be terminable by one month's notice on either side.

Applications, stating age, past and present appointments, qualifications and experience, together with copies of three recent testimonials, should be delivered to the undersigned not later than 12 noon on Thursday, 24th October, 1957.

Canvassing in any form will disqualify.

Town Hall Merthyr Tydfil.

Town Hall, Merthyr Tydfil. 1st October, 1957.

ISL October, 1957. T729

STEVENAGE URBAN DISTRICT COUNCIL
ARCHITECTURAL ASSISTANT
Applications are invited for the above-mentioned appointment in the Engineer and Surveyor's Department.
Salary within Special Grade (£750—£1,030).
Applications, stating age, qualifications and experience, together with the names of two referees, must reach the undersigned not later than Saturday, 19th October, 1957.
Housing accommodation will be available if required.

E. J. BOWERS.

required.

E. J. BOWERS,
Clerk of the Council.
Stevenage. Herts.

WOKING URBAN DISTRICT COUNCIL
The Council invite applications for the following temporary appointment, in the architectural section of the Engineer and Surveyor's Department.

ment.

ASSISTANT ARCHITECT.
Salary £900-£1,000 per annum.
Candidates must be A.B.I.B.A., and experience in large modern office buildings will be an advantage.
The work is the further development of the Council's proposals for a New Civic Centre.
Forms of application to be obtained from and returned to Mr. H. P. Tame, A.M.I.C.E., M.T.P.I., Reg. Arch., Engineer and Surveyor, Council Offices, Woking, not later than Monday, 28th October, 1957.

M. SHAWCROSS.

Clerk of the Council. Council Offices, Woking. 30th September, 1957.

COUNTY BOROUGH OF ROTHERHAM ARCHITECTURAL ASSISTANT Applications are invited for the above appointment on the salary scale 2750 × 240-21,030 per annum from Associate Members of the R.I.B.A., with several years' post-registration experience, preferably with a Local Authority. The commencing salary will be as considered appropriate to the successful applicant's age and experience.

appropriate to the successful appropriate to the successful appropriate to the successful appropriate to the experience.

HOUSING ACCOMMODATION AVAILABLE IF NECESSARY.

Applications, to be endorsed "Architectural Assistant," stating age, qualifications and details of experience, together with the names of two referees, should be received by me not later than Wednesday, 23rd October, 1957.

JOHN S. WALL,

Town Clerk.

Municipal Offices, Rotherham,

27th September, 1957.

RITTSH RAILWAYS

LONDON MIDLAND REGION

Applications are invited for the following vacancies in the Office of the Architect, London Midland Region at Euston Station.

Staff are required for work in connection with the modernisation plan, research and development, and work of wide architectural scope and interest. LEADING ASSISTANT ARCHITECTS

Salary range £1,065-£1,170. Applicants must be qualified with well developed abilities in contemporary design and administration, and should have had several years' experience in a responsible position.

ASSISTANT ARCHITECTS

have had several years' experience in a responsible position.

ASSISTANT ARCHITECTS

Salary range 2916—2956. Applicants must be qualified with keen interest in contemporary design and some years practical experience.

ASSISTANT ARCHITECTS

Salary range 2809—2377. Applicants should be qualified with some experience or should have passed the Intermediate R.I.B.A. examination and have several years' experience.

Five-day week, residential travel and other favourable travelling facilities available. Superannuation scheme.

Apply in writing stating vacancy applied for, and giving details of age, qualifications, previous experience and positions held to Chief Civil Engineer. British Reilways, London Midland Region (Reference 51), 5.8, Euston Grove, London, N.W.L.

BOROUGH OF WILLESDEN

Region (Reference 51), 5A, Euston Grove, London, 7799

BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT
Applications are invited from suitably qualified and experienced persons for the following permanent appointments:—
(a) ASSISTANT ARCHITECTS (2 Posts), Special Grade (4750—41.030 p.a.),
(b) ASSISTANT ARCHITECTS (4 Posts), Grade A.P.T. II (4725—6845 p.a.),
(c) ASSISTANT ARCHITECT, Grade A.P.T. I (575—6725 p.a.), London weighting, maximum £30 p.a., is payable in addition to the above salaries.

The Council is unable to assist with housing accommodation.
Forms of application and conditions of appointment may be obtained from the Borough Engineer and Surveyor, Town Hall, Dyne Road, Kilburn, N.W. 6. Applications to be returned to the undersigned not later than 9 a.m. on Monday, 4th November, 1957.

When writing for application forms candidates must state for which appointment they wish to apply.

R. S. FORSTER,

R. S. FORSTER. Town Clerk. 7800 7th October, 1957.

Tth October, 1957.

COUNTY BOROUGH OF WEST BROMWICH Applications are invited for the following appointments in the Architects Section of the Borough Engineer and Surveyor's Department:

(a) ARCHITECTURAL ASSISTANTS (two posts), Grade A.P.T. III (4845—41.025).

(b) ARCHITECTURAL ASSISTANT, Grade A.P.T. I (575—4725).

Applicants for post (a) should have experience in housing and schools and preference will be given to applicants who have passed the Final R.I.B.A.

given to applicants who have passed the Final R.I.B.A. N.J.C. Conditions of Service.
Applications, together with copies of two recent testimonials, to Borough Surveyor, Town Hall, West Bromwich, by 26th October, 1957.
7802

West Bromwich, by 26th October, 1957. 702

WARWICKSHIRE COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
Applications are invited for the appointment of
ASSISTANT ARCHITECTS, on salary scale
2750×240-21,030, the commencing salary to be
in accordance with ability and experience.
Applicants must be Members of the Royal
Institute of British Architects, or have passed
parts I and II of the R.I.B.A. Final or Special
Final Examination, or their equivalent, at one
of the recognised schools of architecture.
The appointments are on the established staff,
and are subject to the Scheme and Conditions
of Service of the National Joint Council for Local
Authorities, and the Local Government Superannuation Acts, 1937-1955, Successful candidates
will be required to pass a medical examination.
Applications are to be on forms which can be
obtained from G. R. Barnsley, F.R.I.B.A., County
Architect, Shire Hall, Warwick.

L. EDGAR STEPHENS,
Clerk of the Council.
October 1957.

Shire Hall, Warwick. October, 1957.

BOROUGH OF HESTON AND ISLEWORTH APPOINTMENT OF DRAUGHTSMAN Applications are invited for the appointment of Draughtsman in the Architect's Section of the Borough Engineer and Surveyor's Department. Salary Grade A.P.T. 1 (£575-£725) per annum) plus London weighting. Candidates must be capable and expeditious draughtsmen and preference will be given to those with architectural experience.

ence will be given to those with a concessful experience. The Council are unable to assist the successful candidate with housing accommodation. Applications, on forms to be obtained from the Borough Eugineer and Surveyor, 88, Lampton Road, Hounslow, must be returned to him not later than noon on October 28, 1957,

D. MATHHESON, Town Clerk.

Town Hall,
Hounslow.

NORTH EAST METROPOLITAN REGIONAL
REGIONAL ARCHITECT'S DEPARTMENT
Applications are invited for the following

HOSPITAL BOARD

REGIONAL ARCHITECT'S DEPARTMENT
Applications are invited for the following appointments:

ASSISTANT ARCHITECTS. Salary according to age and experience up to a maximum of £1,065. Applicants must be registered Architects having passed the requisite examinations, and must be good designers, capable of preparing working drawings and specifications for, and site supervision of, all types of building projects, under limited supervision. Previous hospital experience not essential.

Applications giving age, qualifications and experience, together with the names of two referees, should be sent to The Secretary, North East Metropolitan Regional Hospital Board, 11a, Portland Place, W.I., within 14 days. 7803

COUNTY BOROUGH OF DERBY APPOINTMENT OF CHIEF PLANNING ASSISTANT

Applications are invited for the above permanent appointment in the Borough Engineer and Surveyor's Planning Department.

Salary in accordance with A.P.T. Grade V (21.175 to £1,325). National Scheme of Conditions of Service, pensionable and subject to medical examination and one month's notice.

Candidates must be Members or Associate Members of the Town Planning Institute, and should also be A.M.I.C.E. or A.M.I.Mun.E., or A.R.I.C.S., or A.R.I.B.A., and have considerable experience in planning, preferably in urban areas. Forms of application and further details may be obtained from Mr. M. L. Francis, F.R.I.C.S., M.I.Mun.E., Borough Engineer and Surveyor, The Council House, Derby, to whom they must be returned, together with the names of at least two persons to whom reference can be made, not later than 9 a.m., 4th November, 1957.

Canvassing will be a disqualification, and the Council cannot assist in the provision of housing accommodation.

G. H. EMLYN JONES, Town 7804

G. H. EMLYN JONES Town Cle October, 1957.

CITY OF CARDIFF
APPOINTMENT OF ASSISTANT ARCHITECTS
Applications are invited for the following
appointments in the City Architect's Department.
Assistant Architects. Special Grade, 2750 ×
240-24,030 per annum.
Candidates should possess the minimum qualifications and experience prescribed by the
National Joint Council for Local Authorities'
Administrative, Professional, Technical and
Clerical services for posts in the above mentioned
Grade.

Grade.

General Conditions of appointment may be obtained from the undersigned.

Applications, accompanied by the names and addresses of three referees and endorsed "Assistant Architect—Special Grade," must be delivered to me not later than 30th October, 1957.

S. TAPPER-JONES, Town Clerk.

City Hall, Cardiff. October, 1957

October, 1957.

KENT COUNTY COUNCIL

ASSISTANT ARCHITECTS are required for work on the Council's extensive building programme which includes schools, colleges, old people's and children's homes, clinics, fire and police stations and other public buildings. Candidates should be capable of accepting responsibility and displaying initiative, within a group system, in the design and control of building projects, and possess experience and ability in current problems of design and control of costs.

Salaries within Scale £750 × £40-£1,030 a year. Commencing salary according to qualifications and experience. N.J.C. Cenditions of Service. Further details and application forms from County Architect, Springfield, Maidstone. Closing date 7th November, 1957.

HUNTING DONSHIRE

date 7th November, 1957.

HUNTING DONSHIRE

COUNTY ARCHITECT'S DEPARTMENT
ARCHITECTERAL ASSISTANT

Applications are invited for the above appointment from suitably qualified persons.
Further details and application forms may be obtained from the County Architect. County Buildings, Huntingdon. Completed application forms should be returned to the undersigned by Friday, 25th October, 1957.

A. C. AYLWARD.

Clerk of the County Council. County Buildings, Huntingdon.

HERTFORDSHIRE COUNTY PLANNING
DEPARTMENT
Applications are invited for the following vacancies on the permanent staff of the Planning
Department at County Hall, Hertford:—
(a) ARCHITECTURAL ASSISTANT (Planning)
(Design and New Towns Section).
Qualifications: A.R.I.B.A. (A.M.T.P.I. an advantage).

Qualifications: A.R.I.B.A. (A.M.I.F.A. en avantage).
Experience in Architectural design necessary with preferably some Planning training. Successful applicant will be required to prepare schemes and designs in relation to planning applications.

(b) PLANNING ASSISTANT (Architectural). Successful applicant required for work upon Town Centre schemes. Must be A.M.T.P.I. An architectural qualification or experience in design would be an advantage.

Salary, both posts: Special Grade, £750 × £40 to £1,030 p.a.

to £1,050 p.a.
Application forms from : The County Planning
Officer, County Hall, Hertford, Closing date
1st November, 1957.
7784

officer, County Hall, Hertford. Closing date X November, 1957.

AIR MINISTRY require WORKERS-UP in Quantities Division London. Must be fully experienced and competent to Work-up entire Bills of Quantities. Preference holders C. & G. Quantities), O.N.C. or equivalent technical qualification. Salary range £695 at age 26 to £1,030 starting pay dependent on age, qualifications and experience. Pensionable and promotion prospects. Fiveday week. Over three weeks' leave a year. Applicants normally should be natural born British subjects. Write stating age, qualifications and previous appointments including type of work done, to P.E. 104, Manager, Professional & Executive Register, Ministry of Labour and National Service, 1-6, Manager, Professional & Executive Register, Ministry of Labour and National Service, 1-6, Tayistock Square, London, W.C.L. No original testimonials should be sent. Only candidates selected for interview will be advised. 7404

CITY AND COUNTY OF CANTERBURY Applications are invited for the temporary and permanent appointments of ARCHITECTURAL ASSISTANTS Grade A.P.T. I. (2665—2725).

Applicants must have passed the R.I.B.A. Intermediate examination.

The successful candidates will be engaged on school projects, including the design and erection of a new Technical College. This last project, which is in the early stages of design, offers considerable scope for initiative and experience both in design and construction. Work on the College is likely to extend over a number of years.

years.

The commencing salary will be fixed within the Grade according to ability and experience. Opportunities for promotion occur from time to

Applications, together with the names of two referees, must reach the City Architect and Planning Officer, Mr. J. J. Berbiers, A.R.I.B.A., A.M.T.P.L., not later than Saturday, 9th November, 1957. Canvassing will disqualify.

J. BOYLE, Town Clerk. Municipal Buildings.

Canterbury

Canterbury.

Canterbury.

COUNTY BOROUGH OF SOUTHAMPTON BOROUGH ARCHITECT'S DEPARTMENT Applications are invited for the following permanent positions:—

(a) SENIOR ASSISTANT PLANNING OFFICER, Grade A.P.T. IV (£1,025—£1,175).

Candidates should be members of the R.I.B.A. and T.P.I., preferably experienced in the redevelopment of central urban areas.

(b) ASSISTANT PLANNING OFFICER, Special Grade (£750—£1,030).

(c) PLANNING ASSISTANT, Grade A.P.T. I (£875—£725).

(c) PLANNING ASSISTANT, Grade A.F.I. (£575-£725).
(d) SENIOR ASSISTANT ARCHITECT, Special Grade (£750-£1,030).
(e) ARCHITECTURAL ASSISTANT, Grade A.P.T. 1 (£575-£725).
(f) JUNIOR ARCHITECTURAL ASSISTANT, H.G.D. (£230-£550).
Candidates should possess appropriate qualifications and should state their housing needs. Application forms from the Borough Architect, Civic Centre, Southampton. Closing date 28th October, 1957.
STEPNEY M.B.C. require the following staff:

October, 1957.

STEPNEY M.B.C. require the following staff:
PRINCIPAL ARCHITECTURAL ASSISTANT,
£1,055-£1,205. Registered Architects experienced
in design, construction, supervision of local
building contracts, and capable of supervising
architectural staff.

SURVEYING ASSISTANT, £780-£1,060. Must
be A.R.I.C.S. or equivalent or hold equivalent
qualification.

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ARCHITECTURAL ASSISTANTS, £780—£1,060, ust be Registered Architects and suitably Aust be Registered Archive qualified. Forms from Town Clerk, 227, Commercial Road, Forms from Town Clerk, 201, POPATION

E.I. 7798
STEVENAGE DEVELOPMENT CORPORATION Applications are invited for the post of ASSISTANT LANDSCAPE ARCHITECT in the Chief Architect's Department on New Towns Salary A.P.T. Grade IV. 4728-4597, starting salary according to experience.
Candidates should have passed the Final Examination I.L.A. and be experienced in the layout of open space in housing areas.
Housing accommodation will be available in due course in an appropriate case.
Applications, giving full details and names of two referees, to be sent to the Chief Administrative Officer, Aston House, Nr. Stevenage, Herts, not later than Thursday, 24th October, 1957. 7805

122

MIDLANDS ELECTRICITY BOARD Applications are invited for the position of QUANTITY SURVEYOR in the Building Section at Board Headquarters, Mucklow Hill, Halesowen, to prepare Bills of Quantities for general building and civil engineering work, and to deal with measurements for interim payments and final accounts. Preference will be given to those who have passed Intermediate examination of Institute of Quantity Surveyors. Salary Legistropies of Logistropies of Logistropies and experience. Superannable, Apply, by letter, within fourteen days, stating age, qualifications, experience, present position and salary, to the Secretary (Ref. FWC), Midlands Electricity Board, Mucklow Hill, Halesowen, Nr. Birmingham.

A. STEPHENS.

Cor

MIDLANDS ELECTRICITY BOARD

A. STEPHENS.

27th September, 1957.

GOVERNMENT OF NORTHERN IRELAND Applications invited from ARCHITECTURAL ASSISTANTS with recognised training and fair experience for unestablished posts in the Chief Architect's Branch, Ministry of Finance, Salary scale (under review) 4485-4766; starting pay for candidates who have passed RIBA Intermediate examination will be not less than £605. Preference will be given to ex-Servicemen. Application forms obtainable from the Director of Establishments, Ministry of Finance, Stormont, Belfast.

Belfast.

COUNTY BOROUGH OF BOLTON

ROROUGH ARCHITECT'S DEPARTMENT
Applications are invited for (1) PRINCIPAL
ASSISTANT ARCHITECT Grade A.P.T. IV
(£1,025-£1,175) and (2) ARCHITECTIRAL
ASSISTANT Grade A.P.T. IV
(£2,05-£1,075) and (2) ARCHITECTIRAL
ASSISTANT Grade A.P.T. IV
(£3,05-£1,075) and (2) ARCHITECTIRAL
dates for (1) should be fully qualified and able
to lead a group on varied work. Commencing
salaries will be according to experience.
The posts are superannuable and subject to
medical examination. Applications, giving fulled
tetails, and the names of two referees, should
be received by me by 10 a.m., October 28th. 197.

PHILIP S. RENNISON,
Town Clerk
Town Clerk

EASTERN ELECTRICITY BOARD
NORTHMET SUB-AREA
ARCHITECTURAL ASSISTANT
SUB-AREA HEADQUARTERS (REF. 736)
Candidates should have had experience in the preparation of Drawings for Building and Civil Engineering work for offices, service centres, workshops, etc., and should be capable of carrying out site surveys and supervising staff.
Salary—N.J.B. Schedule D. Grade 5 (£760-£860), plus London Allowance.
The successful candidate will be required to contribute to a Superannuation Scheme and may be required to undergo a medical examination.
Apply by letter to C. C. Hill, B.Sc.(Eng.), M.I.E.B., M.I.Mech.E., Manager, Northmet Sub-Area, Eastern Electricity Board, Northmet House, Southgate, London, N.14, by 28th October, 1351.

Southgate, London, N.14, by 28th October, 1957.

COUNTY BOROUGH OF SOUTHAMPTON requires under N.J.C. Conditions of Service:—
(a) ASSISTANT ARCHITECT—
Special Grade 2750—£1.030.
(b) ARCHITECTURAL ASSISTANT—
Grade A.P.T. I £725—£2845.
(c) ARCHITECTURAL ASSISTANT—
Grade A.P.T. I £575—£725.

(d) QUANTITY SURVEYING ASSISTANT—
Grade A.P.T. I £575—£725.

Duties include site measurement, working up and taking off (under supervision) in connection with housing schemes.
Applicants must possess the appropriate qualifications and experience for special classes of officers under N.J.C. conditions of service. Apply on application forms obtainable from the Borough Enginer and Surveyor, Civic Centre, Southampton.

BOROUGH OF WALTHAMSTOW
Applications are invited for the following appointments in the Borough Architect. Engineer & Surveyor's Department (F. G. Sonthgak, A.R.I.B.A., M.I.Mun.E., A.M.T.P.I., Borough Architect, Engineer & Surveyor):

(a) ASSISTANT ARCHITECT/PLANNER.

(b) SENIOR ASSISTANT ARCHITECT, The salary for each post will be in accordance with the Special Grade A.P.T. Division (£780-£1,060 inclusive of London Weighting) with the commencing salary according to experience.

Applicants for post (a) must be Associates of the R.I.B.A. and will be required to prepare surveys and reports on the re-location of industry within the Borough and be capable of designing and supervising the erection of new industrial estates.

Applicants for post (b) must be Associates of e R.I.B.A. and have had experience of housing

schemes.

Applications stating age, qualifications, experience and present occupation, together with the names of two referees, one of whom should be the present or former embloyer, are to be received by the undersigned not later than noon of Priday, 1st November, 1957, endorsed "Assistant Architect," Planner " or "Senior Assistant Architect."

G. A. BLAKELEY

Town Hall, E.17. 9th October, 1957.

NATIONAL COAL BOARD EAST MIDLANDS DIVISION Applications are invited for the following posts the Divisional Architect's Department, Not-

in the Division and the state of the state o

SUR20—QUANTITY SURVEYING ASSISTANT, Grade 1.
Salary £625 × £25 to £750 (exceptionally £900). Applicants should preferably have Intermediate E.I.C.S. or considerable practical experience.
Both posts are superannuable, initial salary will depend on qualifications and experience.
Applications, giving age, qualifications and details of previous experience, present post and salary should be addressed within 14 days to Divisional Chief Staff Officer, National Coal Board, East Midlands Division, Sherwood Lodge, at Alaold, Nottingham, Please quote appropriate georence.

GOVERNMENT OF NORTHERN IRELAND

mr. Araold. Nottingham. Please quote appropriate glerence.

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GOVERNMENT OF NORTHERN IRELAND

ASSISTANT ARCHITECT CLASS II

Applications are invited for pensionable posts in the Chief Architect's Branch, Ministry of Finance. Candidates must be Regristered Architects by examination, with at least two years' experience in an Architect's Office in the preparation of working drawings. Salary scale 4780 (at age 25)—£1,655 (age 34 and over)—£1,215. Transfer of existing Pension rights may, in certain circumstances, be approved. Preference will be given to ex-Servicemen. Application forms may be obtained from the Secretary, Civil Service Commission, Stormont, Belfast.

PADDINGTON BOROUGH COUNCIL Require QUANTITY SURVEYOR (A.P.T. IV: £1,055—£1,225), A.R.I.C.S. essential with experience in all branches of building work particularly housing. Commencing salary will be according to qualifications and experience. Applications stating age, qualifications, names and addresses of two referees should be addressed to the undersigned by 28th October, 1957 (quoting A.353).

W. H. BENTLEY, Trout Clerk

W. H. BENTLEY, Town Clerk.

Town Hall, Paddington Green, W.2.

COUNTY BOROUGH OF HALIFAX ARCHITECTURAL ASSISTANT (SCHOOLS) Applications are invited for the above appointment on Special Grade (£750-£1,030 p.a.). Applicants must possess appropriate technical qualifications, and preferably have had experience on school work. Applications, stating age, qualifications, present position and salary, experience, and names and addresses of two referees, to be delivered to the Town Clerk, Town Hall, Halifax, by 1st November, 1957.

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
Selections for appointment are now being made
from ARCHITECTS who have passed their Final
Examinations this summer. Starting salaries up
to £712 10s. a year, in scale £637 10s, to £860.
Vacancies also for ARCHITECT'S of experience
at starting salaries up to £1,090.
Full programme of Houses, Plats, Schools, and
many other interesting buildings,
Application forms and full particulars from the
Architect (Ref. AR/EK/46/57), The County Hall.
S.E.1. (1609)

COUNTY BOROUGH OF BARROW-INFURNESS
BOROUGH ENGINEER AND SURVEYOR'S
BOROUGH ENGINEER AND SURVEYOR'S
DEPARTMENT
APPOINTMENT OF CHIEF ARCHITECT
Applications are invited from qualified Architects with wide municipal experience for the post
of Chief Architect on Grade A.P.T. V (£1,75—
£1,325 per annum). The commencing salary will
be fixed within the grade.
A car allowance in accordance with the N.J.C.
scales will be paid.
It is possible that the Council will allocate a
Corporation house, subject to the merits of the
case being satisfactory to the interviewing Committee.
Full details of the post conditions of appoint-

case being satisfactory to the mittee.

Full details of the post, conditions of appointment and application forms may be obtained from the Borough Engineer and Surveyor, to whom completed forms must be returned not later than Monday, 28th October, 1957.

LAWRENCE ALLEN, Town Clerk.

Town Hall, Barrow-in-Furness

YORKSHIRE ELECTRICITY BOARD

NO. 4 (LEEDS) SUB-AREA

SECTION LEADER (DRAWING OFFICE)
Applicants should have had a recognised technical training and experience in the design and detailing of new buildings and in the conversion of existing buildings.

Experience in the preparation of Bills of Quantities and Estimates is essential and ability to design simple reinforced concrete and/or steel structures would be an advantage.

The successful applicant will be required to supervise staff engaged on the above work and should hold an appropriate qualification.

Salary: N.J.B. Schedule D Grade 4, £895 × £20—£995 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Nr. Leeds, not later than 31st October, 1957.

COUNTY BOROUGH OF DONCASTER

Electricity Board, Bramhope, Nr. Leeds, not later than 31st October, 1957.

COUNTY BOROUGH OF DONCASTER Applications are invited for the posts of ASSISTANT ARCHITECT and TEMPORARY ARCHITECT and TEMPORARY ARCHITECTURAL ASSISTANT in the Berough Architect's Department Salary in accordance with the Grade for the Special Classes of Officers (£750 × £40-£1,030).

Applicants must be Associates of the R.I.B.A. and have had good experience in design and working drawings. The appointment offers scope for experience in large scale central area redevelopments and educational projects and preference will be given to those with a keen interest in contemporary design.

The appointment will be subject to one month's notice on either side and to the terms of the Local Government Superannuation Acts 1937 to 1953 and the successful applicant will be required to pass a medical examination.

Housing accommodation will be available if necessary.

Housing accommodates the many be obtained from the Borough Architect, L. J., Tucker, Esq., A.R.I.B.A., F.I.Hsq., 15. South Parade, Doncaster, to whom they must be returned by 10 a.m. on Monday, 11th November, 1957.

H. R. WORMALD.

H. R. WORMALD. Town Clerk.

1. Priory Place. Doncaster. 11th October, 1957.

7824



FOR over fifty years Libraco Ltd., have been designing and manufacturing furniture and woodwork of all descriptions for

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The illustration shows the new Shoreditch Library, Lending Department rebuilt after bombing and furnished by Libraco Ltd.

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Stainless Steel SINKS, SINK UNITS, SINK RANGES

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DON: 7 GROSVENOR GARDENS, S.W.I. 'Phone: VICTORIA 1977/8



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AYR COUNTY COUNCIL invite applications for the following established posts in the Planning Department, County Buildings, Ayr:—(a) SENIOR PLANNING ASSISTANT. Salary scale £765—£950 p.a. Applicants should be corporate members of the Town Planning Institute, and preference will be given to those who have also passed final examination of the 1, of C.E., 1. of Mun. E., or R.I.B.A. They must have had good practical experience in planning work and in operation of the relevant statutes, and (b) JUNIOR BIANNING ASSISTANT. Salary scale £565—£610 p.a. Applicants should be good draughtismen and experienced in land use survey, and preference will be given to those who have passed the Intermediate Examination of one of the above mentioned bodies. Both posts are superannuable and placing within scales may be given according to qualifications and experience. Forms of application for each appointment may be obtained from the County Clerk, County Buildings, Ayr, with whom applications should be lodged within 14 days of appearance of this advertisement.

CITY OF BIRMINGHAM PUBLIC WORKS
DEPARTMENT
REDEVELOPMENT SECTION
VACANCY FOR PLANNING ASSISTANT
Salary Grade A.P.T. IV (£1,025/£1,175 per
annum)—according to qualifications and ex-

perience.

Applicants should be Associate Members of the Town Planning Institute and preference will be given to applicants with an additional qualification in architecture.

The duties of the post will include the preparation of surveys and layout plans of future Redeveloment Areas.

tion in arrange of the post with the control of surveys and layout plans of future active of surveys and layout plans of future and evelopment Areas.

The appointment is permanent, superannuable and subject to a medical examination.

Applications, stating qualifications, age and experience and naming two referees should reach the undersigned by 2nd November, 1957.

Canvassing disqualifies.

HERBERT J. MANZONI.

City Engineer and Surveyor.

Civic Centre, Birmingham, 1.

Birmingham, 1.

HALTEMPRICE URBAN DISTRICT COUNCIL
ENGINEER AND SURVEYOR'S

DEPARTMENT

Applications are invited for ASSISTANT
ARCHITECT in the Engineer and Surveyor's
Department, A.P.T. Special Grade (£750-£1,030).
Commencing salary dependent upon qualifications and experience.
Applications, stating experience and commencing point within the salary scale desired, and names of two persons to whom reference may be made, should be forwarded to the undersigned not later than noon on Wednesday, 36th October, 1957.

A. B. GLASSPOOL.
Cierk of the Council.

Anlaby House,
Anlaby, E. Yorks.
HOLLAND COUNTY COUNCIL,
LINCOLNSHIRE
COUNTY ARCHITECT'S DEPARTMENT
Applications are invited for the following permanent appointments:—
(a) ARCHITECTURAL ASSISTANT, salary

Applications are invited for the following permanent appointments:—

(a) ARCHITECTURAL ASSISTANT, salary Grade A.P.T. II. £275—£845 p.a. (qualification. Intermediate R.I.B.A.).

(b) QUANTITY SURVEYING ASSISTANT, Salary Grade A.P.T. II. £725—£845 p.a. (c) QUANTITY SURVEYING ASSISTANT, Salary Grade A.P.T. II. £725—£845 p.a. (Appointments (b) and (c) qualifications, Intermediate R.I.C.S., Intermediate I.Q.S. or H.N.C.)

The appointments will be subject to the provisions of the Local Government Superannuation Acts, the N.J.C. Scheme of Conditions of Service and a medical examination.

Applications, on forms provided by the undersioned, should be returned by the 28th October, 1967.

Clerk of the County Council.

County Hall.

Architectural Appointments Vacant

4 lines or under, 9s. 6d.; each additiona', line, 2s. 6d. Box Number, including forwarding replies, 2s. extra. ONDON office with widely varied practice urgently requires all grades of ASSIS-TANTS, preferably with London experience. Five-day week. Lewis Solomon, Son & Joseph, 21, Bloomsbury Way, London, W.C.1. Holborn 5108

CO-OPERATIVE WHOLESALE SOCIETY, LTD.
ARCHITECT'S DEPARTMENT,
BIRMINGHAM
APPLICATIONS are invited for the following appointments in the above Branch Office undertaking interesting and varied commercial and industrial projects:

undertaking interesting and varied commercial and industrial projects:—

(a) ASSISTANT QUANTITY SURVEYOR, with good experience in the preparation of Bills of Quantities, measuring and adjusting variations and subjects of the property of the project of the proje

S. ATKINS & PARTNERS announce
that they have vacancies for ARCHITECTURAL ASSISTANTS both qualified and of
Intermediate standard for work on contemporary
industrial projects including Atomic Power
Stations

Applications, stating experience, qualifications and salary required to Personnel Manager, 158, Victoria Street, London, S.W.1.

SENIOR and JUNIOR ASSISTANTS required for busy office in the North-East. Ability and a sense of responsibility are the essential qualities. Good starting salaries are offered, and progress will depend on performance. Pension scheme and bonus scheme are both operated.—Box 7412.

A SSISTANT required for Architect's office in Middlesbrough with varied practice., State experience and present salary Excellent prospects for suitable applicant. Box 7722.

for suitable applicant. Box 7722.

A SSISTANT ARCHITECT. Co-operative Whole-sale Society, Ltd., invite applications for the position of Assistant Architect. Must be capable of preparing working drawings from preliminary details. The post is superannuable, subject to medical examination. 5-day week in operation. Applications, giving details of age, experience and salary required, to—W. J. Reed, F.R.I.B.A., Chief Architect, C.W.S. Ltd., 99, Leman Street, London, E.1.

BUSHIECTURAL ASSISTANT required in

London, E.I.

RCHITECTURAL ASSISTANT required in busy London Office with varied practice. Good salary and prospects for suitable applicant. Five-day week. Write, giving particulars of age, qualifications, experience, etc., to Box 862, c/o. 7, Coptic Street, W.C.I.

7593

VARIED experience all branches of Building Surveying and Architecture for young ASSISTANTS (B.I.C.S. Inter. and Final standard—2 and 3 years' practical experience respectively), with City Chartered Surveyors and Architects.—Box 7653.

WELL-KNOWN London Architects require ASSISTANTS between Intermediate and Final standard. Interesting projects. Five-day week.—Write, Box 361, c/o 7, Coptic Street, W.C.1.

A SSISTANT ARCHITECTS required. Work includes hospitals, a technical college, flats, a ship interior and university work.—Applicants should apply to Pite Son & Fairweather, 6, Queen Anne's Gate, Westminster, S.W.1, giving particulars of qualifications, experience and salary required.

LONDON Office requires ASSISTANTS of Intermediate standard. Wide variety of interesting work. Five-day week. Study concessions for evening students according to circumstances. Good salaries.—Box 7587.

W. H. WATKINS, GRAY & PARTNEES require ASSISTANTS for interesting hospital work. Pension scheme in operation.—Write or 'phone, 57, Catherine Place, S.W.1 VICtoria 7761.

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YOUNG Qualified ASSISTANT ARCHITECT
with office experience required to assist with
new building schemes throughout the country
Capable designer. Interest in contemporary shop
fitting an advantage. Willing to travel. Salary
range £750/£900 per annum.—Apply, giving agand experience, to Staff Architect, Prices Tallon
Ltd., Kirkstall Road, Leeds, 4.

A RCHITECTURAL ASSISTANT, Intermedial
to Final level, with some office experience.
Salary consmensurate with qualifications and experience. Applications in writing please to R. A.
Boxall, A.R.I.B.A., 31, Mouisham Street, Chelms
ford.

A RCHITECTURAL ASSISTANT of Intermediate R.I.B.A. Standard required in Reading Office. Applicants must be capable draughtsmen, able to make surveys, produce working drawings and details. Apply in writing stating experience and salary required to Bot 70.

ARCHITECTURAL DRAUGHTSMAN Required in the Architect's Department of Allied Bakeries Ltd. Pension and Life Assurance Schemes in operation. Five-day week. Salary up. 10 £800 per annum, depending on ability and experience. Full details to Chief Architect, Allied Bakeries Ltd., Architect's Department, 17, Canden Road, London, N.W.1.

PART-TIME ASSISTANT wanted, Intermedials standard or better, to work about 20 homs.

standard or better, to work about 20 hour a week at this address.—Colin Penn, 62, Parlia ment Hill, N.W.3.

URGENTLY required for work on oversease projects ASSISTANT ARCHITECTS and ASSISTANTS, Inter-Final standard, Salary according to experience. Offices: London and S.E., green belt area.—Box 7811.

INTERMEDIATE/FINAL TERMEDIATE/FINAL ASSISTANTS required in small office on interesting work.

Leslie Barrow, 10, Imperial Square Cheltenham.

REGENT OIL COMPANY, LIMITED

INVITES applications to fill vacancies in their Head Office, Architectural Section.

(a) ARCHITECTURAL DRAUGHTSMEN. It work on the layout of Pilling Stations and design of small industrial buildings, Candidates should have at least 4 years' experience on Drawing Board or similar work.

(b) ARCHITECTURAL ASSISTANT. Work will be mainly concerned with the planning layout and construction of Filling Stations and with the design of small industrial buildings.

Good salaries, working conditions and Pension and Luncheon Voucher scheme.

Apply to: Personnel Officer, 117, Park Street, London, W.1.

BUCKINGHAMSHIRE firm of Architecta within 30 miles of London, with a varied practice, require TWO ARCHITECTURAL ASSISTANTS, approaching Final R.I.B.1 standard, 5-day week. Salary according to agand experience.—Please write, giving full patticulars, to Box 7768.

A RCHITECTURAL ASSISTANT required is Engineer's office of large Brewery Companine East Midlands area. Work comprises general maintenance, alterations, extensions, and additions of industrial buildings. State age, experience, qualifications and salary required.—Apply Box 7789.



Lady Allen of Hurtwood, F.I.L.A. and Susan Jellicoe

The new small garden

THIS IS A PRACTICAL book in which, with over 130 photographs and plans, the authors illustrate and describe an expertly made selection of successful and charming small gardens. Most of them have been constructed at small cost; all are designed to provide the maximum of peace and relaxation for a minimum of hard work. The plans have been worked out to meet a wide variety of site problems and conditions and the examples include long narrow gardens, children's gardens, a tree garden, a water garden, a roof garden, a scree garden. . . Full details of the materials and plants used in many of the gardens are given; and there is a useful 'How to find out' appendix.

Size 83 in. by 53 in. 128 pages with over 100 half-tones and 25 line blocks. Price 15s. net, postage 1s. 2d.

THE ARCHITECTURAL PRESS 9-13 Queen Anne's Gate Westminster S.W.1.

INTER. ASSISTANT required by Harrow office. Practical exp. wkg. drgs.; specification; surveys, etc. Good draughtsman.—Please write, with full part, includ. sal. read, t. o Field & Shaw, 40, Station Road, N. Harrow, Middx.

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Architects a varied ECTURAL R.I.B. full par-

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SENIOR, INTERMEDIATE and JUNIOR ASSISTANTS required for extensive development programme. Salaries from £350-£1,000 p.a., according to experience. 5-day week, lunch facilities.—Apply in writing to Alan A. Briggs. F.A.I.B.A., 10. Fleet Street, E.C.4. 7787

ARCHITECTURAL ASSISTANT (qualified), not over 30 years of age, required immediately for a Bank's Architect's Department in Manchester. Permanent position. Contributory pension scheme, Salary range: £690 at age 27, rising by annual increments to £825 at age 31, and thereafter upon merit.—Box 7780.

A RCHITECTURAL ASSISTANTS.—Applicative Society. Ltd., for positions as ARCHITECTURAL ASSISTANTS at the Building Works Department, Whitta Road, Manor Park, London, Et2. Pension scheme, paid sickness and holiday schemes. Inter. R.I.B.A. standard required. Commencing salary £647 per annum.—Write Staff Office, L.C.S., Ltd., 54, Maryland Street, Stratford, London, E.15, endorsed "Architectural Assistant."

CITY Architect's office require ASSISTANT, of about Inter. R.I.B.A. standard. Must be quick and reliable draughtsman and accustomed to good class work. Interesting varied work and secure future.—Apply, stating experience, age, and salary, Box 7778.

JUNIOR ARCHITECTURAL ASSISTANT required, Birmingham city centre office. State age, training, and salary required.—Fillmore, 20, Waterloo Street, Birmingham, 2.

MALL West End office, with varied practice, requires ASSISTANTS of Inter. standard.—Write, stating age, experience, and salary required, Box 7771.

FOURTH or fifth year Polytechnic or Northern Polytechnic EVENING STUDENTS required by Russell Diplock Associates. TAT. 4040,

RCHITECTURAL ASSISTANTS required for work on Licensed premises, including interior decoration. Write stating age, experience and salary required to The Secretary, Benskin's Watford Browery Ltd., P.O. Box 106. Watford, Herts.

A SSISTANT, under 30, with at least 3 years' experience, required by the Company Architect of Dorothy Perkins, Ltd., a women's multiple shop organisation, for a recently formed department. This Company has a planned expansion programme, offering interesting work to a man prepared to work with minimum of supervision. Shop fitting experience not essential. Occasional travelling. 5-day week, Pension scheme.—Write, giving age and experience, to the Personnel Manager, 17, Newman Street, W.1 (MUS, 7651).

A RCHITECTS, qualified, and ASSISTANT ARCHITECTS, unqualified, with contemporary outlook and possessing initiative, required for interesting projects throughout Scotland. Good salary commensurate with experience and ability. Excellent working conditions and good prospects for suitable men.—Apply in writing to Alison & Hutchison & Partners, F.R.I.B.A., F.R.I.A.S., 22, Carlyle Road, Kirkcaldy, Fife, Scotland.

DESIGNERS, to act as civilian exhibition and display consultants on a new War Office project, one in each of the following cities: London, Edinburgh, York, Chester and Salisburg, required by small firm of Design Consultants in London. Consultants will attend meetings, give advice and prepare drawings. Certain amount of travelling involved. Office and clerical assistance provided, Age about 30. Salary £1,350—£1,450, plus travelling expenses.—Write to Miller & Tritton, 35, Edith Grove, Chelsea, S.W.10, giving full details of training and experience. Interviews London and York.

A RCHITECTURAL ASSISTANTS required, Intermediate and Final standards, for Industrial and other varied work. Salary between 4500 and 4900 per annum, according to experience.—Eric G. V. Hives, L.R.I.B.A., 46, Queen's Road, Reading. Telephone 55484.

S. W. STONE & PARTNERS, Chartered Architects, 20, The Crescent, Taunton, require ARCHITECTURAL ASSISTANT, about Intermediate standard.—Write, giving particulars of experience and salary required.

A SSISTANT ARCHITECT required by a large Brewery Company with offices in Newcastle-upon-Tyne.

Applicants should be Associate Members of the R.I.B.A., and it would be an advantage if they had experience in erection and alteration of licensed premises.

The appointment is temporary, but would be for a duration of at least two years, and the salary would be £1,000 p.a.

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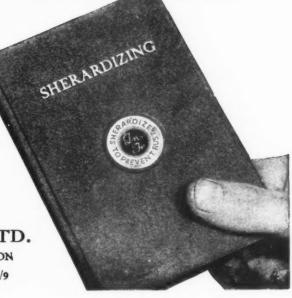
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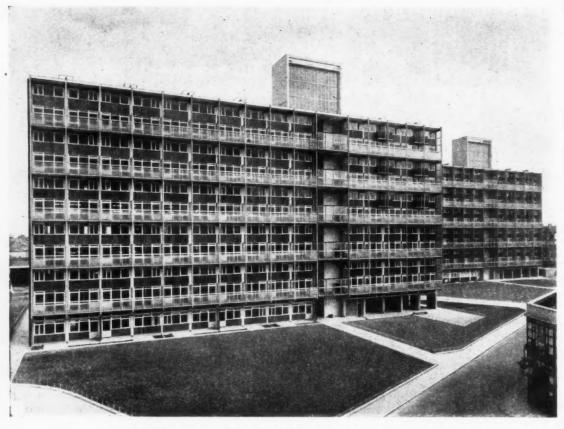
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