THE ARCHITECTS' JOURNAL

andard contents

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

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HE ARCHITECTURAL PRESS
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Registered as a Newspaper.

★ A 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 Ii one week, Il to Z the next. In all cases where the town is not mentioned the word LONDON is implicit in the address.

ILA	Institute of Landscape Architects. 2, Guildford Place, W.C.1.	Holborn 0281
I of Arb	Institute of Arbitrators. Hastings House, 10, Norfolk Street, Strand, W.C.2.	Temple Bar 4071
IOB	Institute of Builders. 48, Bedford Square, W.C.1.	Museum 7179
IQS	Institute of Quantity Surveyors. 98, Gloucester Place, W.1.	Welbeck 1859
IR	Institute of Refrigeration. Dalmeny House, Monument Street, E.C.3.	Avenue 6851
IRA	Institute of Registered Architects. 68, Gloucester Place, W.1.	Welbeck 9966
ISE	Institution of Structural Engineers. 11, Upper Belgrave Street, S.W.1.	Sloane 7128
JFRO	Joint Fire Research Organisation (DSIR & Fire Offices' Committee). Fire Research Station, Boreham Wood, Herts.	Elstree 1341/1797
LDA	Lead Development Association. 18, Adam Street, W.C.2.	Whitehall 4175
LMBA	London Master Builders' Association. 47, Bedford Square, W.C.1.	Museum 3891
MAFF	Ministry of Agriculture, Fisheries and Food. Whitehall Place, S.W.1.	Trafalgar 7711
MOE	Ministry of Education. Curzon Street House, Curzon Street, W.1.	Mayfair 9400
MOH	Ministry of Health. 23, Savile Row, W.1.	Regent 8411
MOHLG	Ministry of Housing and Local Government. Whitehall, S.W.1.	Whitehall 4300
MOLNS	Ministry of Labour and National Service, 8, St. James's Square, S.W.1.	Whitehall 6200
MOS	Ministry of Supply. Shell Mex House, W.C.2.	Gerrard 6933
MOT	Ministry of Transport, Berkeley Square House, Berkeley Square, W.1.	Mayfair 9494
MOW	Ministry of Works. Lambeth Bridge House, S.E.1.	Reliance 7611
NAMMC	Natural Asphalte Mine Owners and Manufacturers Council. 94/98, Petty France, S.W.1.	Abbey 1010
NAS	National Association of Shopfitters. 9, Victoria Street, S.W.1.	Abbey 4813
NBR	National Buildings Record, 31, Chester Terrace, Regent's Park, N.W.1.	Welbeck 0619
NCBMP	National Council of Building Material Producers, 10, Storey's Gate, S.W.1	Abbey 5111
NEFMAI	National Employers Federation of the Mastic Asphalt Industry. 21, John Adam Street, Adelphi, W.C.2.	Trafalgar 3927
NFBTE	National Federation of Building Trades Employers. 82, New Cavendish Street, W.1.	Langham 4041/4054
NFBTO	National Federation of Building Trades Operatives. Federal House, Cedars Road, Clapham, S.W.4.	Macaulay 4451
NFHS	National Federation of Housing Societies. 12, Suffolk St., S.W.1.	Whitehall 1693
NHBRC	National House Builders Registration Council. 58, Portland Place, W.1.	Langham 0064/5
NPL	National Physical Laboratory. Head Office, Teddington.	Molesey 1380
NRDB	Natural Rubber Development Board. Market Buildings, Mark Lane, E.C.3.	Mansion House 9383
NSAS	National Smoke Abatement Society. Palace Chambers, Bridge Street, S.W.1.	Trafalgar 6838
NT	National Trust for Places of Historic Interest or Natural Beauty. 42, Queen Anne's Gate, S.W.1.	Whitehall 0211
PEP	Political and Economic Planning. 16, Queen Anne's Gate, S.W.1.	Whitehall 7245
RCA	Reinforced Concrete Association. 94, Petty France, S.W.1.	Abbey 4504
RIAS	Royal Incorporation of Architects in Scotland. 15, Rutland Square, Edinburgh.	Fountainbridge 7631
RIBA	Royal Institute of British Architects. 66, Portland Place, W.1.	Langham 5533
RICS	Royal Institution of Chartered Surveyors. 12, Great George Street, S.W.1.	Whitehall 5322/9245
RFAC	Royal Fine Art Commission. 5, Old Palace Yard, S.W.1.	Whitehall 3932
RS	Royal Society. Burlington House, Piccadilly, W.1.	Regent 3335
RSA	Royal Society of Arts. 6, John Adam Street, W.C.2.	Trafalgar 2366
RSH	Royal Society of Health. 90, Buckingham Palace Road, S.W.1.	Sloane 5134
RIB	Rural Industries Bureau. 35, Camp Road, Wimbledon, S.W.19.	Wimbledon 5101
SBPM	Society of British Paint Manufacturers. Grosvenor Gardens House, Grosvenor Gardens, S.W.1.	Victoria 2186
SE	Society of Engineers. 17, Victoria Street, Westminster, S.W.1.	Abbey 7244
SFMA	School Furniture Manufacturers' Association. 30, Cornhill, E.C.3.	Mansion House 3921
SIA	Society of Industrial Artists. 7, Woburn Square, W.C.1.	Langham 1984/5
SIA	Structural Insulation Association. 32, Queen Anne Street, W.1.	Langham 7616
SNHTPC	Scottish National Housing. Town Planning Council. Hon. Sec., Robert Pollock, Town Clerk, Rutherglen	
SPAB	Society for the Protection of Ancient Buildings. 55, Great Ormond Street, W.C.1.	Holborn 2646
TCPA	Town and Country Planning Association. 28, King Street, Covent Garden, W.C.2.	Temple Bar 5006
TDA	Timber Development Association. 21, College Hill, E.C.4.	City 4771
TPI	Town Planning Institute. 18, Ashley Place, S.W.1.	Victoria 8815
TTF	Timber Trades Federation. 75, Cannon Street, E.C.4.	City 5040
WDC	War Damage Commission. 6, Carlton House Terrace, S.W.1.	Whitehall 4341
ZDA	Zinc Development Association. 34, Berkeley Square, W.1.	Grosvenor 6636

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H-W.118

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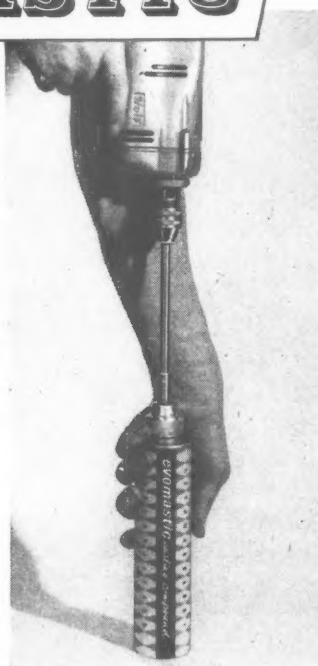

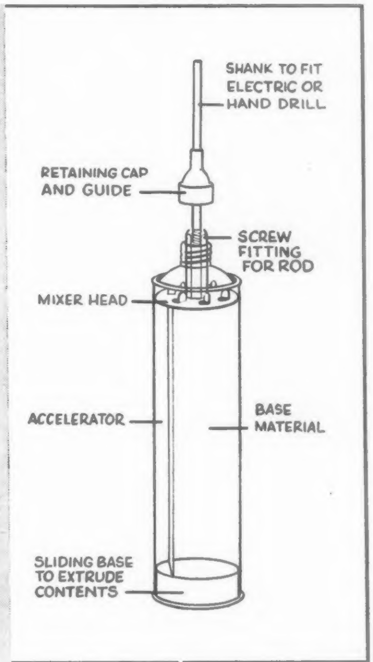

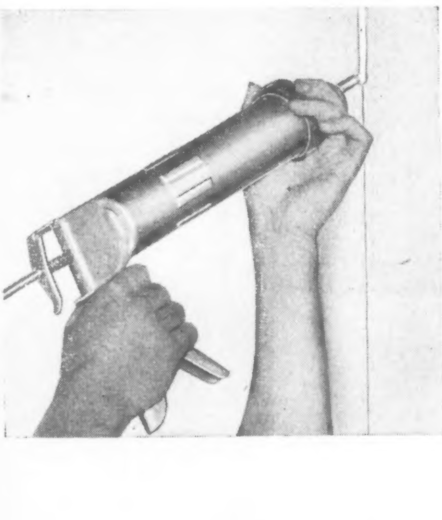

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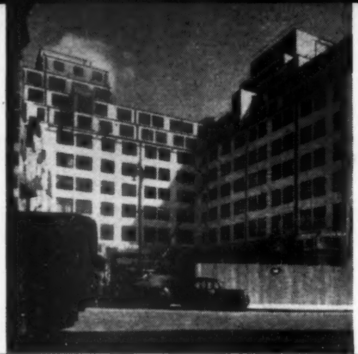
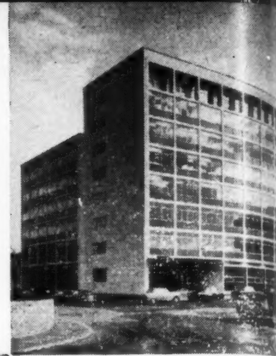
H-W.88

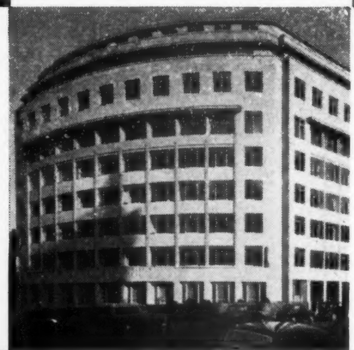
PLANTATION HOUSE
MINCING LANE · CHEAPSIDE
Architects:
Albert W. Moore & Son



ROMAN HOUSE · LONDON WALL
Architect:
R. N. Wakelin
of Campbell-Jones & Sons



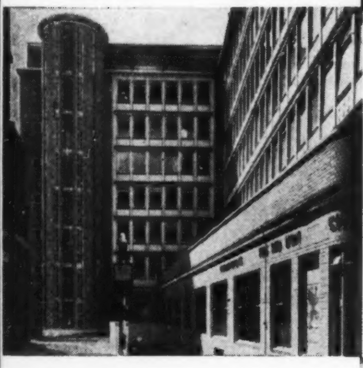
MERCERS' HALL · CHEAPSIDE
Architects:
Gunton & Gunton



HOLBORN VIADUCT HOUSE
HOLBORN CIRCUS
Architects:
T. P. Bennett & Son

1 NOBLE STREET
GRESHAM STREET
Architects:
Ellis, Clarke & Gallannaugh

ROYAL LONDON HOUSE
(EXTENSION) FINSBURY SQUARE
Architect:
H. Bramhill



WATLING HOUSE · CANNON STREET
Architects:
Easton & Robertson

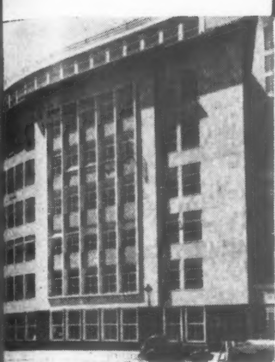
34-35 KING STREET · EC
Architects:
Alan W. Pipe & Sons

WALBROOK HOUSE
CANNON STREET · WALBROOK
Architect:
Henry Tanner

12-20 CAMOMILE STREET
Architects:
Fitzroy Robinson
& Hubert H. Bull

MCCANN-ERICKSON HOUSE
FETTER LANE
Architects:
Hannen & Markham

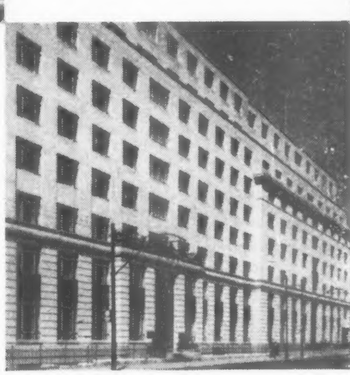
BUCKLERSBURY HOUSE
Architects:
Campbell-Jones & Sons



ST. BRIDGET'S HOUSE
BRIDEWELL PLACE
Architects:
Trehearne &
Norman Preston & Partners

SADDLERS' HALL · GUTTER LANE
Architect:
L. Sylvester Sullivan

3-10 FINSBURY SQUARE
Architects:
Lewis Solomon Son & Joseph



THE AMALGAMATED PRESS
FARRINGDON STREET
Architects:
Ellis, Clarke & Gallannaugh

BANK OF LONDON
& SOUTH AMERICA
QUEEN VICTORIA STREET
Architect:
Victor Heal

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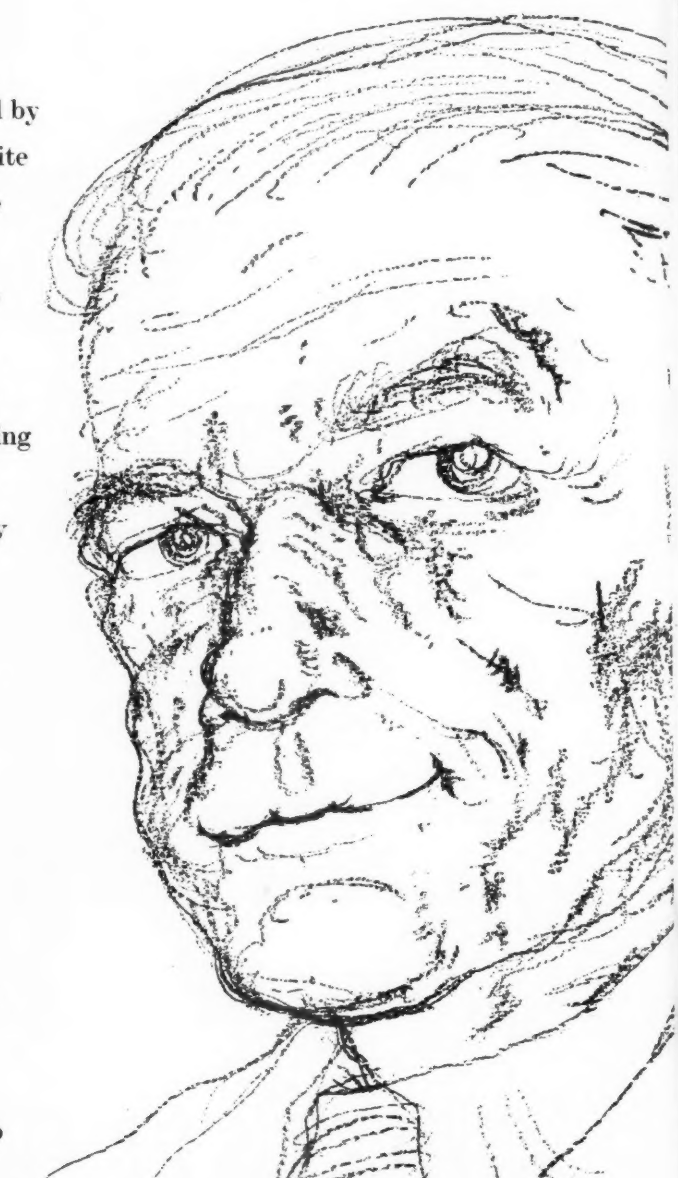

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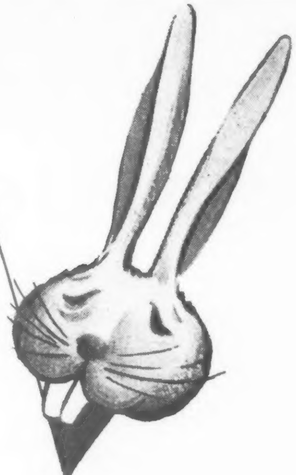

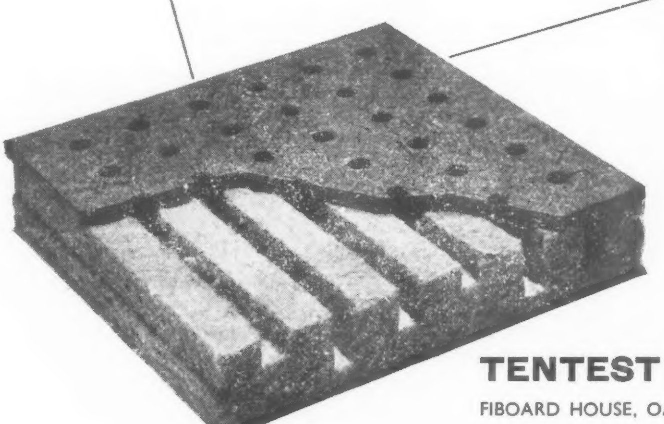

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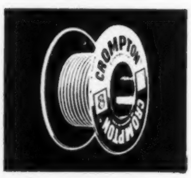
With electric cable—as with music— much depends on who makes it

The score for the Pastoral Symphony is a detailed specification that is set down in a precise notation. Specific though the score be, its interpretation can vary considerably and that is why every discriminating music-lover looks for the name of the conductor before booking his seat for a performance. That is true of music, you may say; but surely electric cable can be specified *completely?* It can; but it still has to be made. In this case it is the almost intuitive competence—the know-how—which plays an important part. Competence in manufacturing grows with experience and that is why, when specifying electric cable, it pays to look for the name of a company with a long history behind it.



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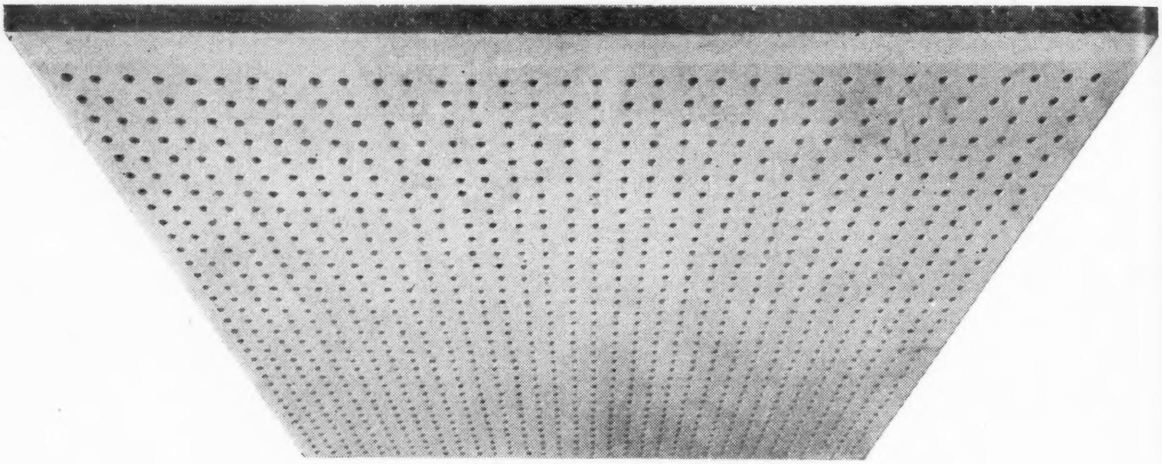

PAXTILES above

Newalls (reg'd brand) PAXTILES are the most effective method of suppressing unwanted sound; they are also a decorative treatment in themselves, capable of being painted without impairing their acoustic qualities. Composed of asbestos they are absolutely FIRE-, rot- and vermin-proof, and they resist condensation. Additionally, they provide an appreciable degree of heat insulation. It is not surprising therefore, that all these practical attributes recommend PAXTILES to the attention of modern architects as the most suitable sound insulation medium available.

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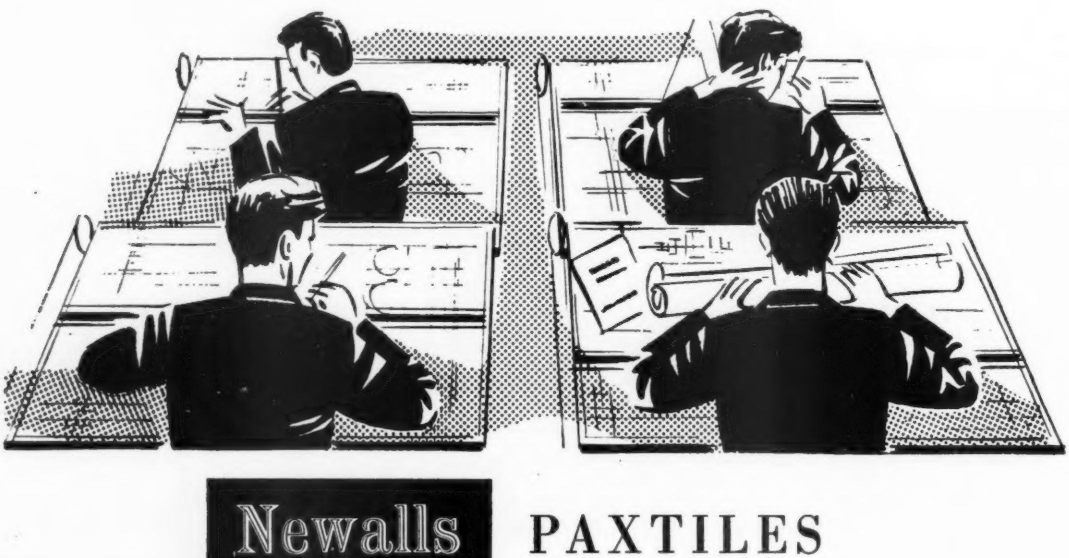

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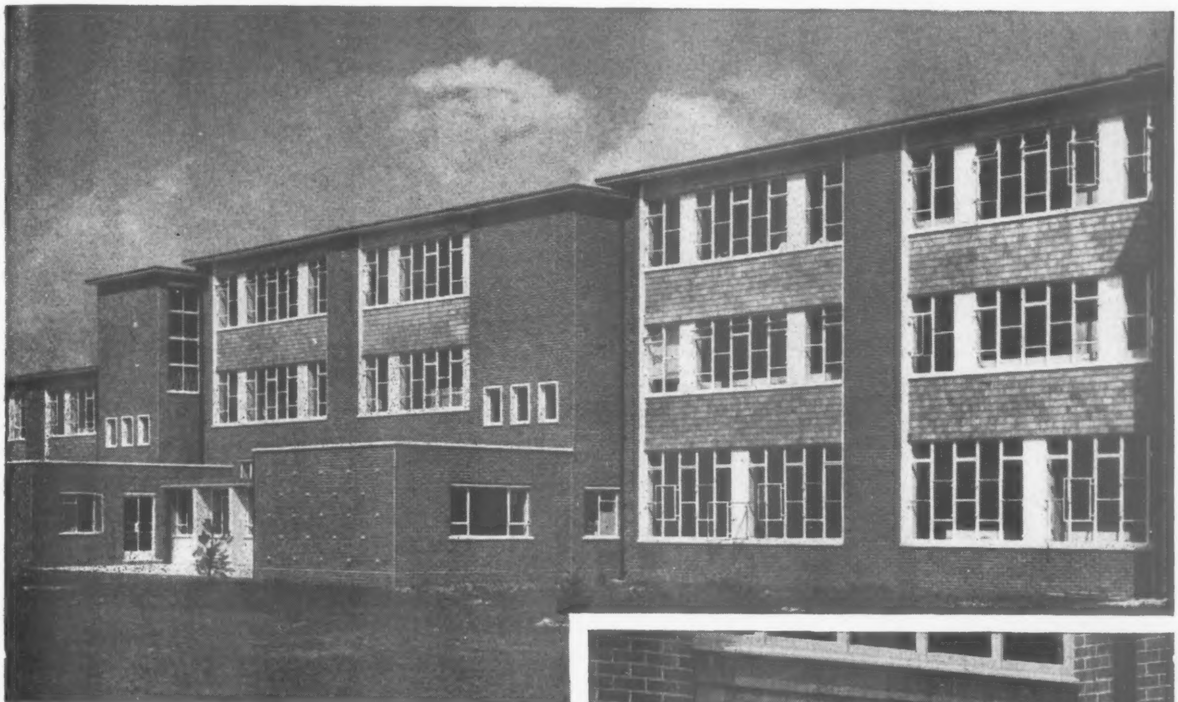

Southern Grammar School for Boys, Baffins, Portsmouth.
City Architect, Frank Mellor, F.R.I.B.A.

NEW STYLE WALLS with an old and well tried method. Weathering to a pleasant silver grey, Shingles are a most attractive method of providing a distinctive elevation. Nailed to battens on brick, breeze or timber studding, the construction is most economical and is completely weatherproof.

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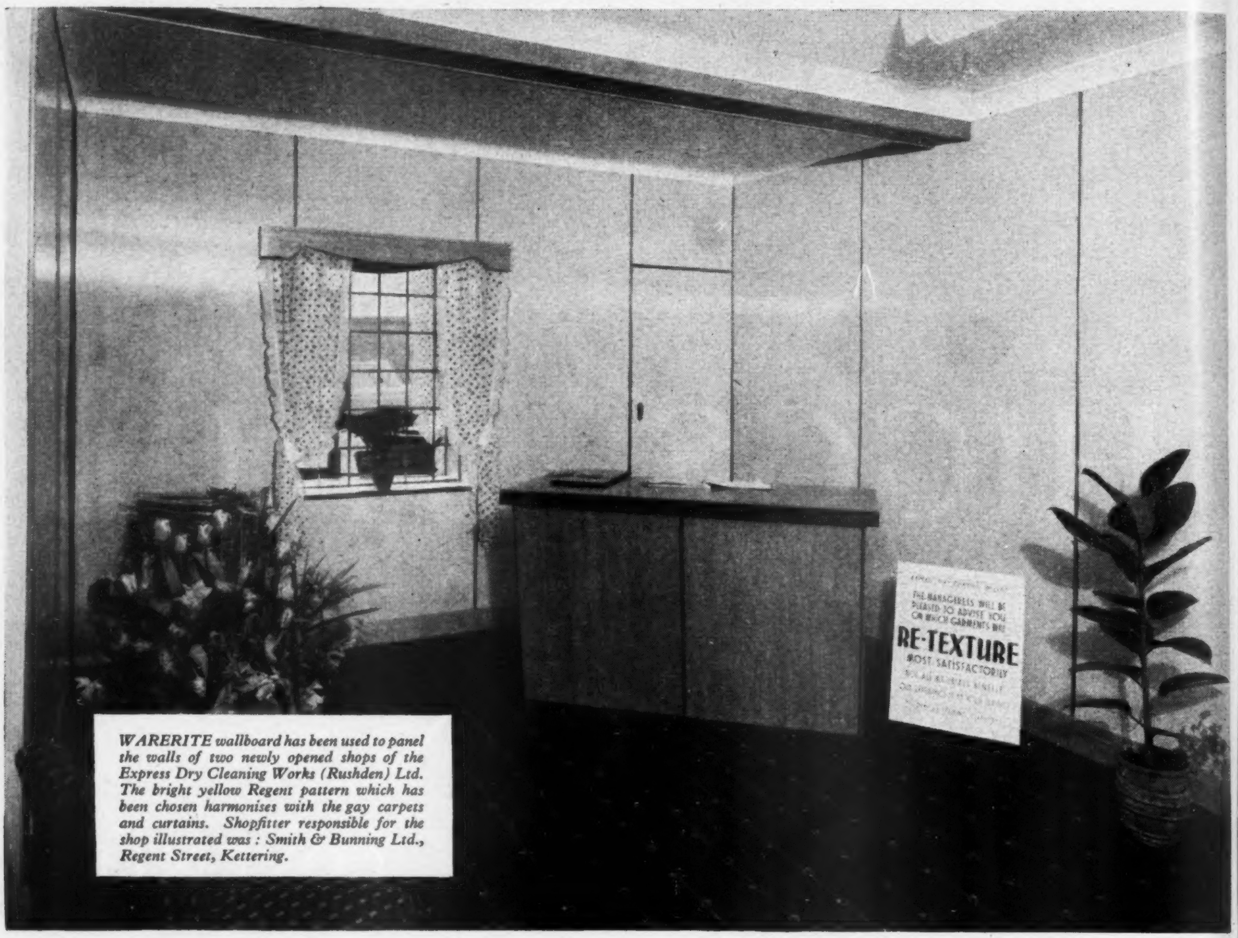

WARERITE wallboard has been used to panel the walls of two newly opened shops of the Express Dry Cleaning Works (Rushden) Ltd. The bright yellow Regent pattern which has been chosen harmonises with the gay carpets and curtains. Shopfitter responsible for the shop illustrated was: Smith & Bunning Ltd., Regent Street, Kettering.

For attractive, hardwearing vertical surfaces choose New WARERITE wallboard

REGD.

Wherever decorative vertical or ceiling surfaces must be moisture-resisting, durable and easily cleaned, new WARERITE wallboard is the obvious and economical choice. Counter fronts, partitions, cupboard fronts and flush doors are typical applications. WARERITE wallboard can be screwed or pinned, or fitted into extruded jointing sections.

WARERITE *materials are supplied from stock in cities and towns throughout the country. Write for literature, samples and the name of your nearest distributor.*

WARERITE wallboard

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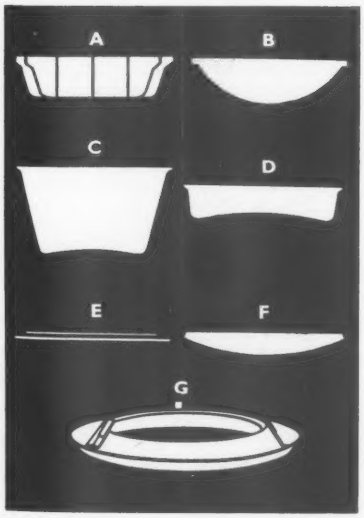
TGA WW1o

atlas leads in lighting / **suggestions for store and showroom display lighting**

W. H. Smith exhibit at the World Fair, Brussels—illustrating a typical use of Atlas display lighting.

atlas display lighting



Successful display lighting requires, above all, flexibility within the lighting system. It is this quality which is a predominant feature of Atlas Display Lighting fittings. From four basic units and half a dozen attachments some fifty fittings can be assembled, suitable for surface or recessed mounting, with horizontal or vertical lamps, in ratings from 60 - 300 watts. A unique Soffit ring (g) clips into position hiding all fixing screws and carrying the attachments which include (a) a white metal louvre, (b) clear or pearl stepped lens, (c) deep and (d) shallow satin etched bowls, (e) a selection of Cinabex colour filters and (f) a glass 'festival' diffuser. A number of additional fittings designed for special display lighting jobs complete this range of fine quality Atlas fittings.

Atlas Lighting Engineers are available for consultation at any time, and will gladly call by appointment.

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monthly review by WILLIAMS & WILLIAMS

SPEEDY DELIVERY, SPEEDY ERECTION WIN CONTRACT FOR 'ALUMINEX' PATENT GLAZING

1 The big Pirelli factory at Burton-on-Trent required a massive new extension. The new building would house many new machines. But it was also intended to transfer the very heart of the factory to the new building. Heavy machinery, vital to the flow of production, was involved in the move. Speed was of the essence.

The speed and simplicity of erection of 'Aluminex' patent glazing commended itself to the Architects. And that was one of their reasons for selecting 'Aluminex' for the roof and sidewall glazing. Williams & Williams quoted only ten weeks delivery from approval of drawings. And this time was short enough to enable northlight slopes to be cladded as soon as the steelwork was sufficiently advanced.

The price was naturally an important factor further affecting the decision as to choice of materials. The extremely competitive prices quoted for 'Aluminex' clinched the matter.

Although mechanical roof extractors were provided for general ventilation, in certain areas in the factory, where excessive heat was to be generated, additional provision had to be made for rapid dissipation of this heat. This was accomplished by the introduction of large areas of opening northlight glazing operated by electrically controlled Teleflex gear. It was also felt by the clients that the ability to see a clear opening in the roof had a psychologically beneficial effect on the operatives' morale. The good natural lighting achieved throughout the new extension has been greatly welcomed by the staff.

LARGEST CURTAIN WALL INSTALLATION IN FAR EAST IS 'WALLSPAN'

2 The new American International Assurance building is the only structure of its kind in the Far East. Its unique architectural features coupled with local building ordinances and sub-soil conditions necessitated many innovations, especially in materials.

The building's reinforced concrete frame is supported on concrete piles which were driven deep into the muddy swamp that was once Singapore's sea frontage! Far beneath the building was unearthed the remains of the old seawall, built about 1843. The 2-story pediment is faced with sun-absorbing glass, marble and granite in contrast to the 10-story tower block clad in dark-grey anodized aluminium 'egg-crate' curtain wall, using a high-silicon content aluminium alloy.

The ground floor, a full quarter acre, is occupied entirely by gardens—partly open, partly glass-enclosed; an entrance lobby with two walls of glass; and off-street parking concealed from the lobby by a marble wall. The second story not only covers the entire building site but projects over the pavement as well, providing shade and comfort for pedestrians and making the exotic garden a part of the street scene. Faced with granite, this story provides a broad terrace on three sides of the main tower and carries the landscaping to the third floor level by elaborate plantings along its outer edges.

The gleaming 10-story tower is clad from top to bottom by an unusual and original application of 'Wallspan'. It takes the form of decorative aluminium louvres which, fixed in place both vertically and horizontally, skilfully shield the interior from direct rays of the tropical sun but allow all floors an ample supply of natural daylight. No part of any tower floor is more than 24 feet from a window, and only two columns break into working floor space.

Topping the slender tower is a practically 'weightless' 7-room penthouse, complete with kitchen, baths and large terrace. Extremely light walls are obtained by the use of styrofoam—the white synthetic sponge used in floral decorations. The styrofoam sheets are held in place by 'Wallspan' members.

INTERIOR OF MODERN LABORATORY IS ROFTEN MODULAR PARTITIONING

3 The laboratory is one of many departments of this new Vickers-Armstrongs factory that is tastefully segmented by Roften Modular Partitioning. The colour scheme, selected from the Roften range of 13 standard colours, is black and cream. Black pilasters and skirting; cream infill panels.

Vickers were greatly impressed by the robust construction and superb finish. And they particularly liked Roften's easy interchangeability. All components are made to the finest tolerances, absolute precision of steel parts is ensured by cold-rolling method of manufacture. Complete demountability and interchangeability are very necessary in such a rapidly expanding factory. Indeed, change of office layout is always on the cards.

In those offices where it was felt that undue noise would be distracting to the occupants, double glazing was used with highly efficient results. To supplement the draughtproofing at door jambs and to reinforce the insulation where absolute quiet was demanded, proprietary extruded aluminium and rubber thresholds are fitted.

'HEADLINE' HOUSE HAS STANDARD METAL WINDOWS BY WILLIAMS & WILLIAMS

4 The deeper than usual dormer window of this widely publicised Low Cost All Brick House allows the ceiling joists to be run through without a break.

The use of roof space as part of the habitable area has played a major part in keeping down costs. The actual window fitted in the dormer and the other windows in the house are standard metal windows from the Williams & Williams 'Z' range.

PERMANENT EXHIBITION

See and examine examples from the whole range of Williams & Williams products at the modern showroom at 36 High Holborn, London, W.C.1. Open daily from 9 a.m. to 5.30 p.m.

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1 FACTORY EXTENSION, PIRELLI LTD., BURTON-ON-TRENT.
Architects: Douglas & J. D. Wood, FF/A.R.I.B.A.
A *Good natural lighting achieved by 'Aluminex' northlight glazing.*
B *Continuous hinge for opening lights in 'Aluminex' glazing.*

2 AMERICAN INTERNATIONAL ASSURANCE BUILDING, SINGAPORE.
Architects-Engineers: John Graham&Co., New York and Seattle.
Supervisory Architects: Swan Maclaren, Singapore.
Contractors: Paul Y. Construction Co., Singapore.
A *Twelve stories high, it makes an imposing addition to the skyline.*
B *The main entrance: aluminium doors by Williams & Williams.*
C *The first floor terrace.*
D *A close-up view of the cladding.*

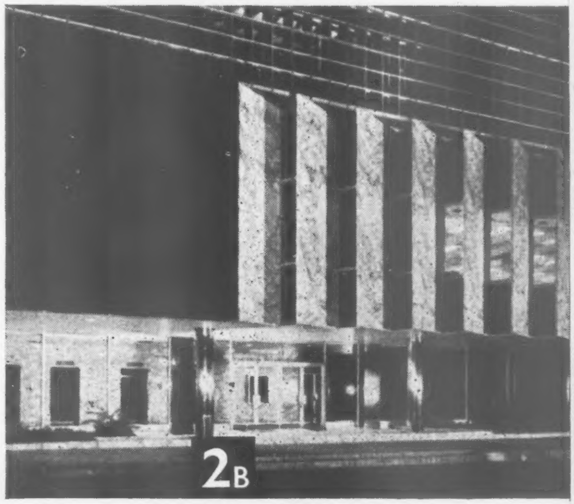
3 VICKERS-ARMSTRONGS LTD., SOUTH MARSTON, SWINDON.
Laboratory: right hand wall has glass infill panels from cornice height to ceiling.

4 GREGORY LOW COST HOUSE.
Architect: J. E. S. Glover, A.R.I.B.A.


1A


CONTINUOUS
HINGE FOR
OPENING LIGHTS
IN ALUMINEX
GLAZING
safety cleat
Aluminex
glazing bar
1B


2A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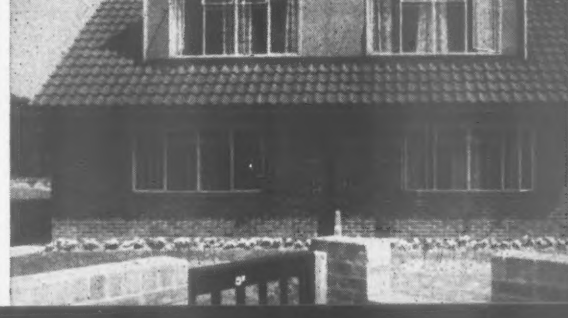
2C


2D


3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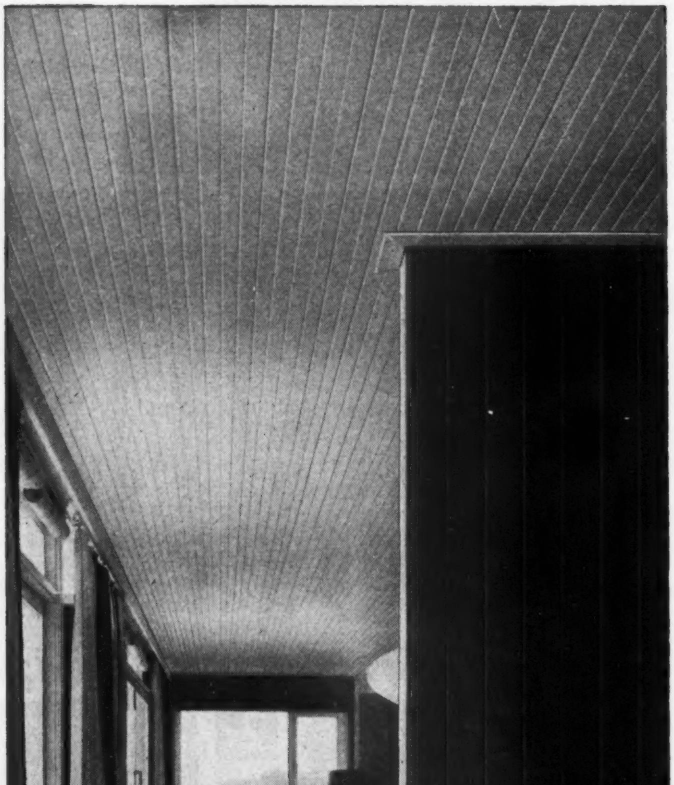
DESIGN IN TIMBER

INTERIOR FINISHES



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In this design timber has been used for windows, flooring, ceilings and partitioning —all with pleasing effect reflecting the warm, liveable qualities of wood.

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ASSOCIATE ARCHITECT	R. A. Green
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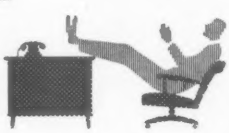
FLOOR COVERING. Close fitted carpet throughout in wine and black.



Under the direction and to the satisfaction of
G. E. P. DAY A.R.I.B.A.
of Matthews & Son · 91 Gower Street · W.C.1

Showing the partition sliding behind a leaf in the false wall.

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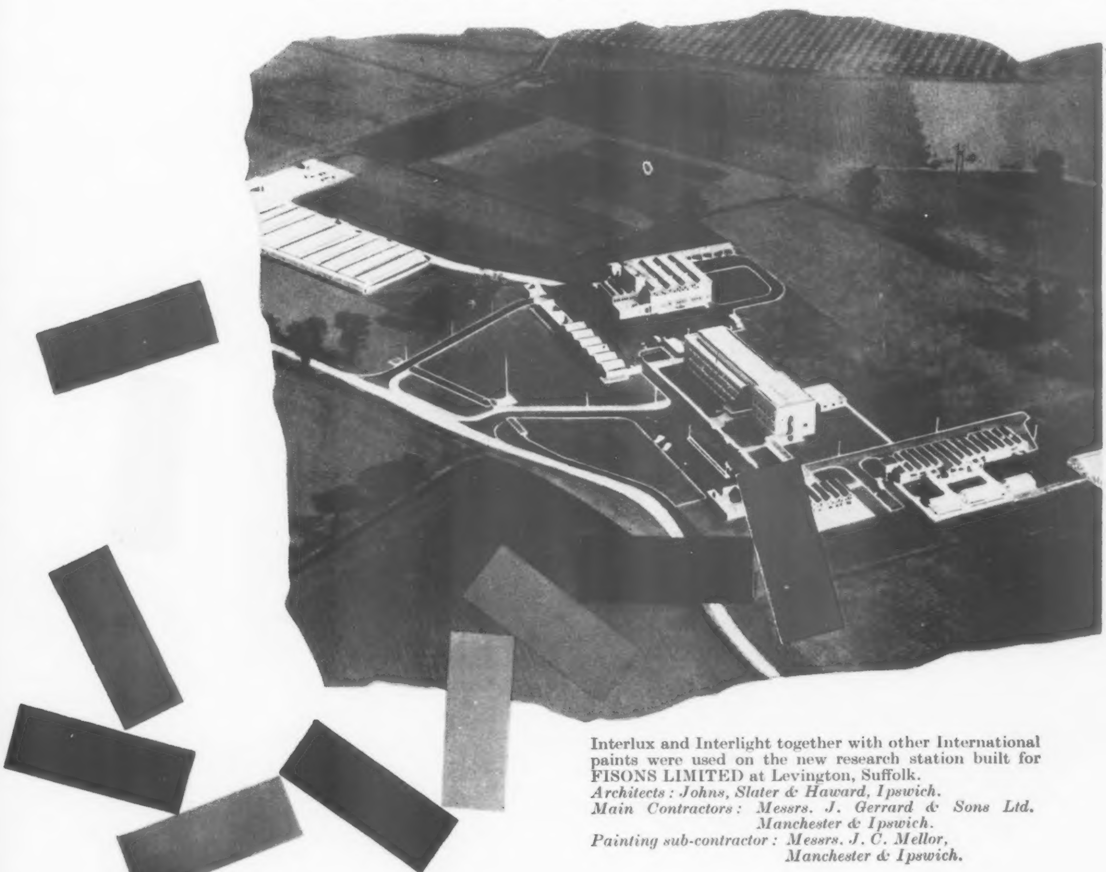

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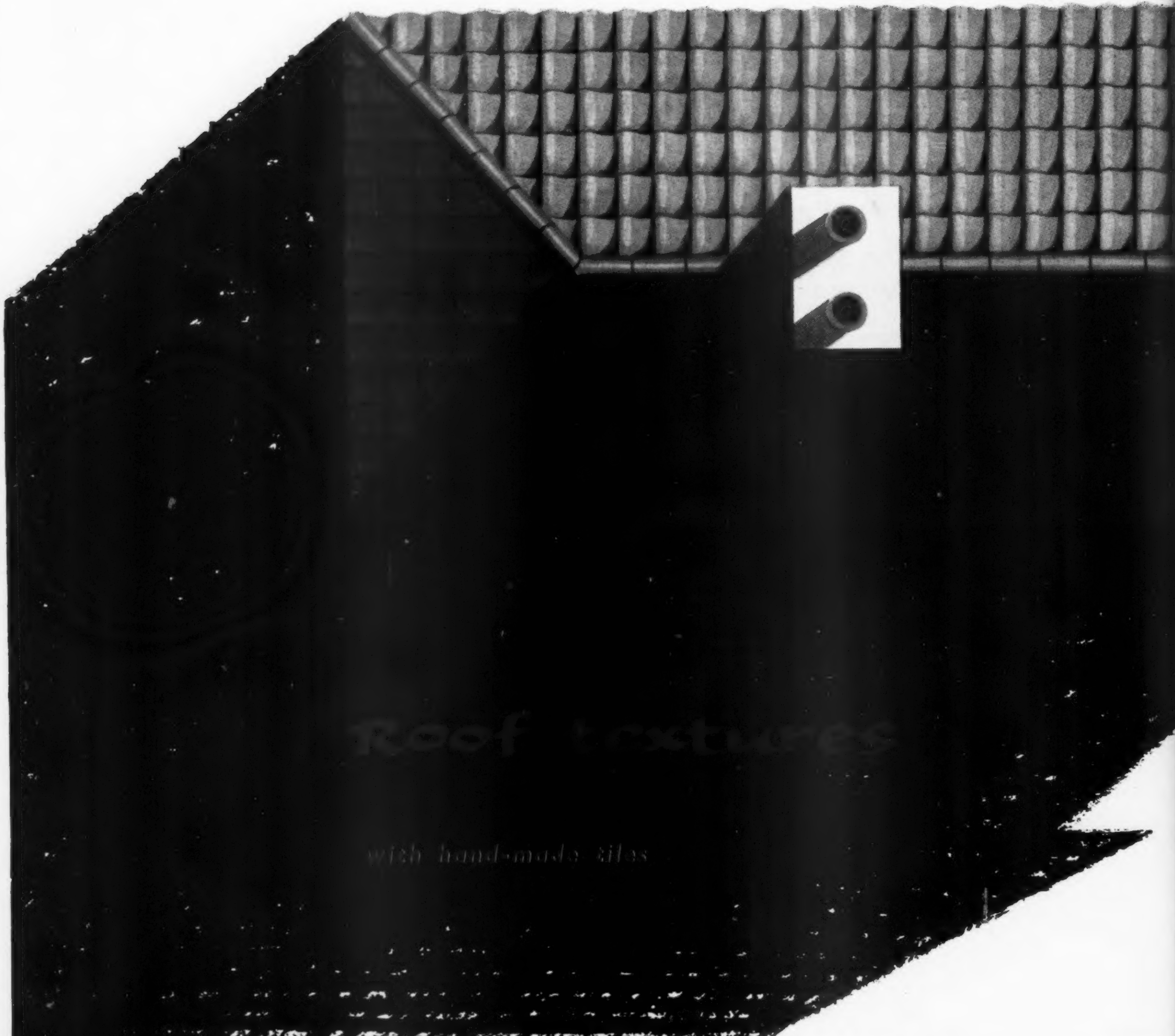

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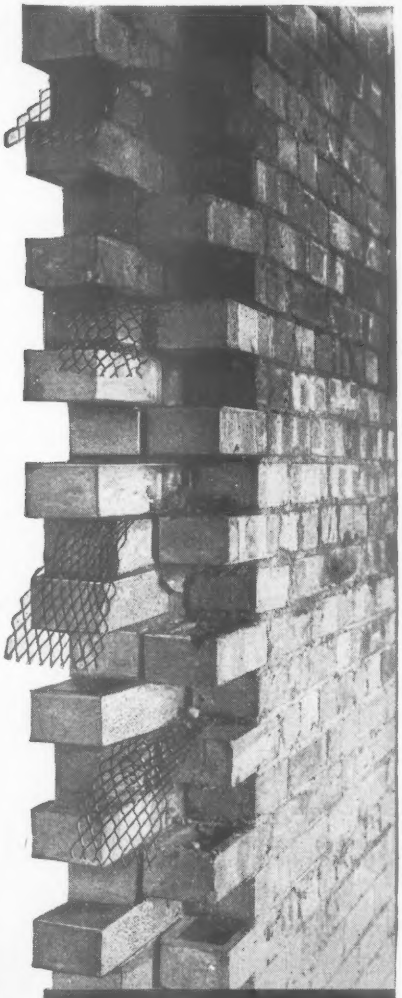

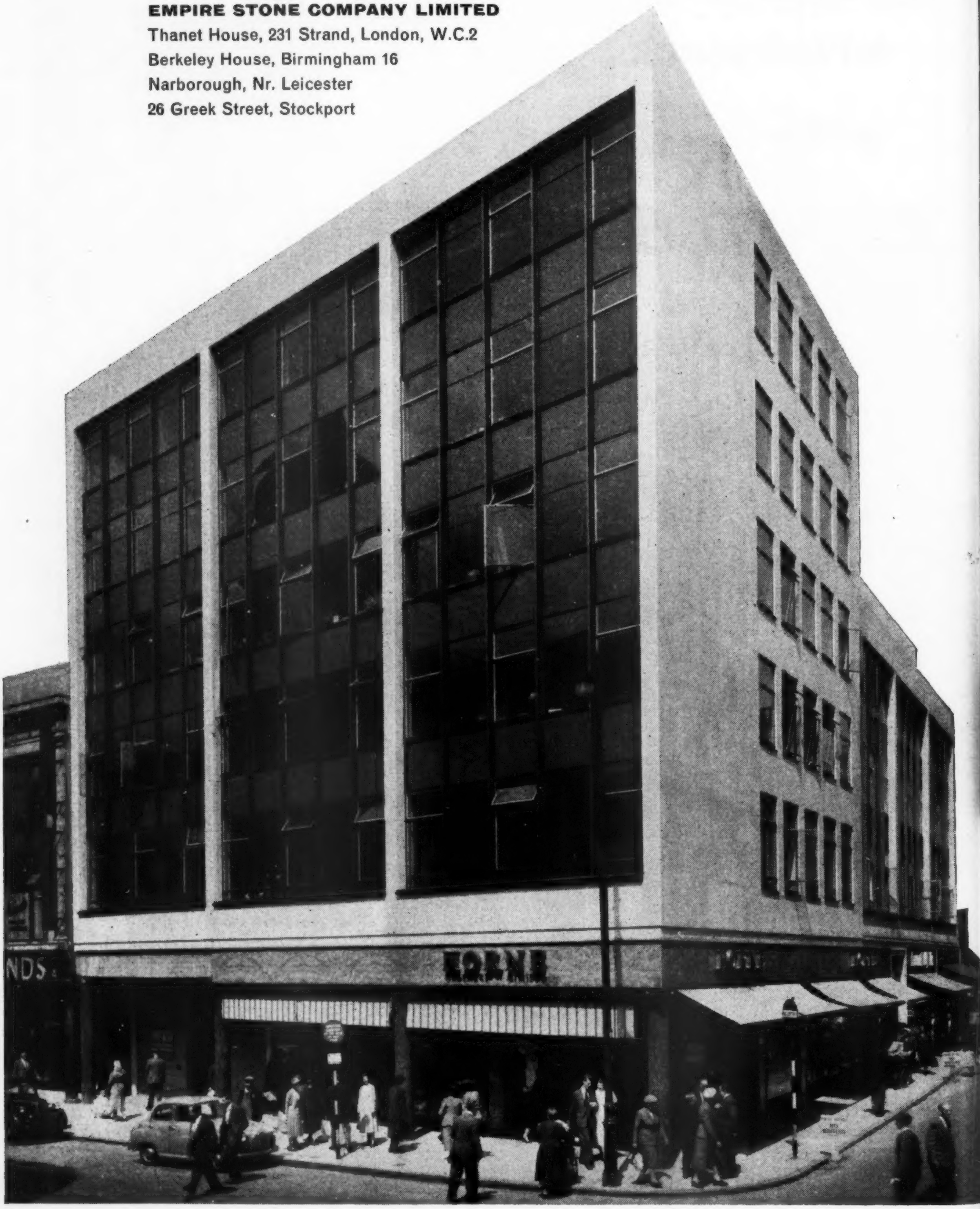

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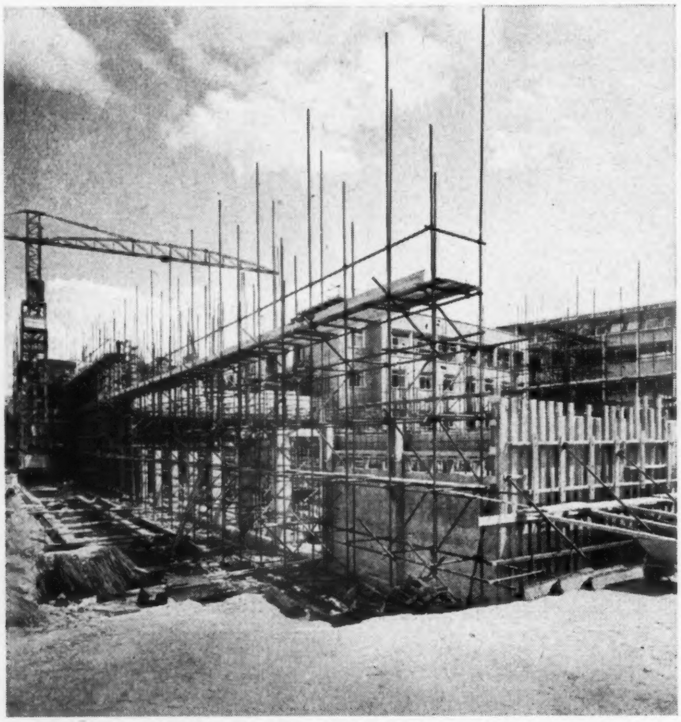

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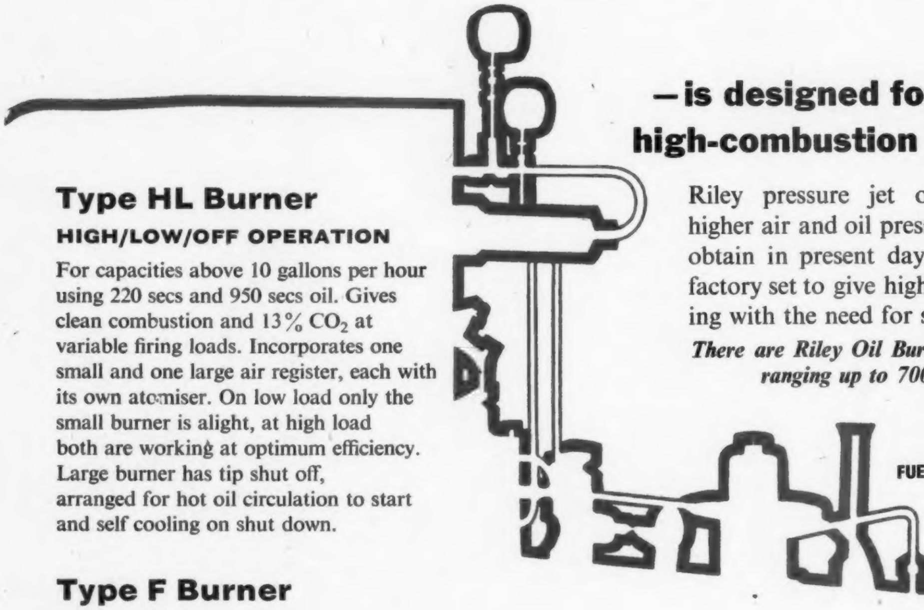

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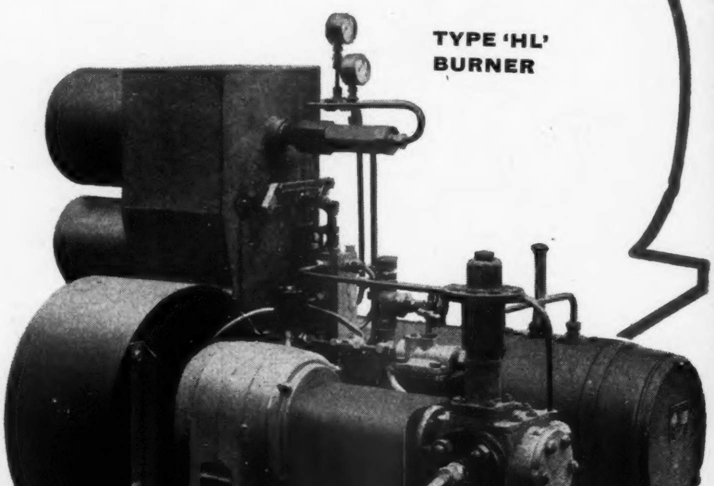

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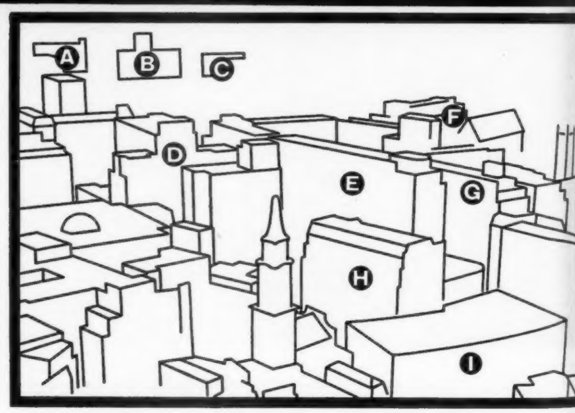

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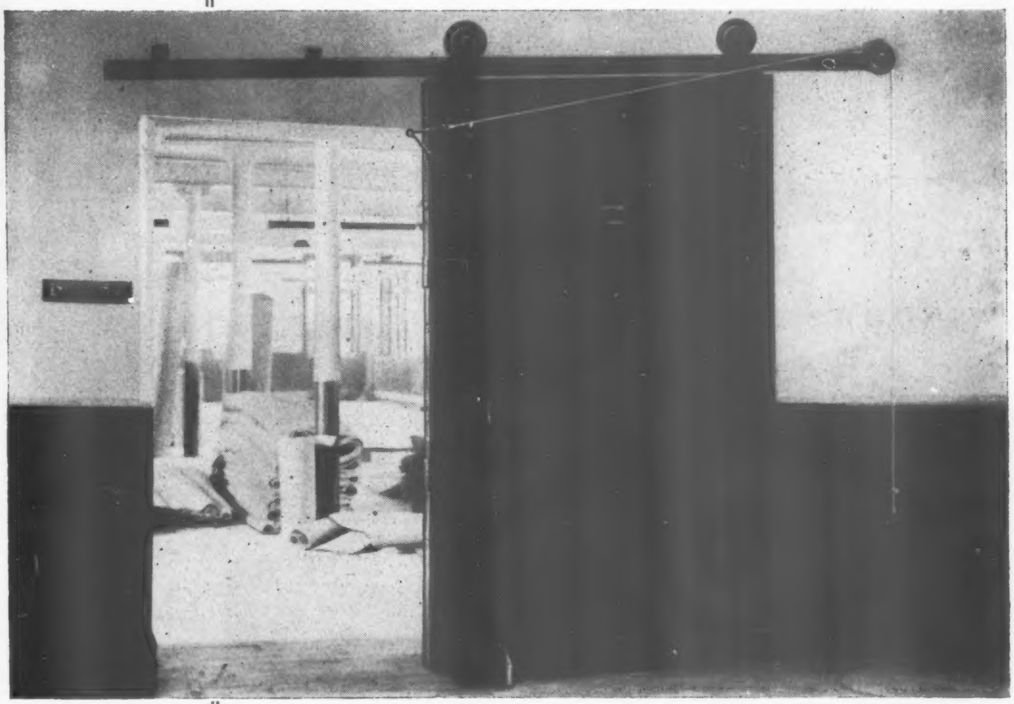

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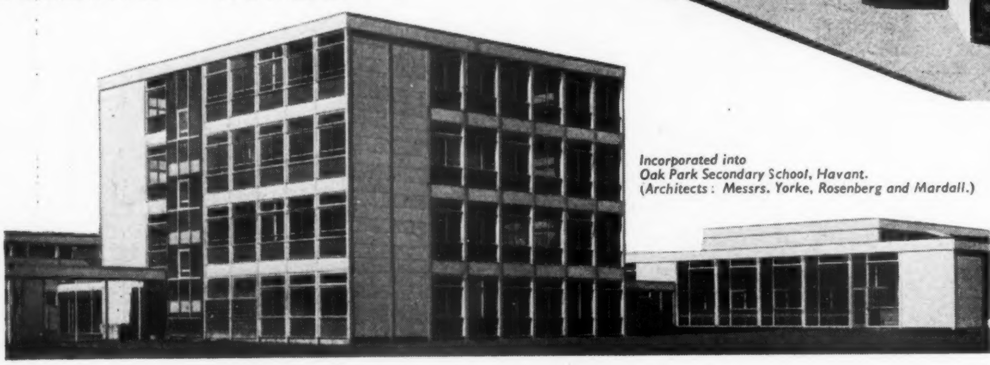

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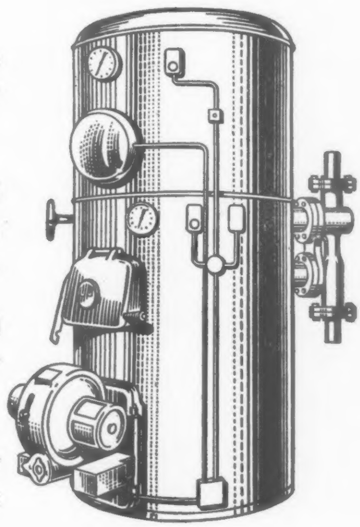

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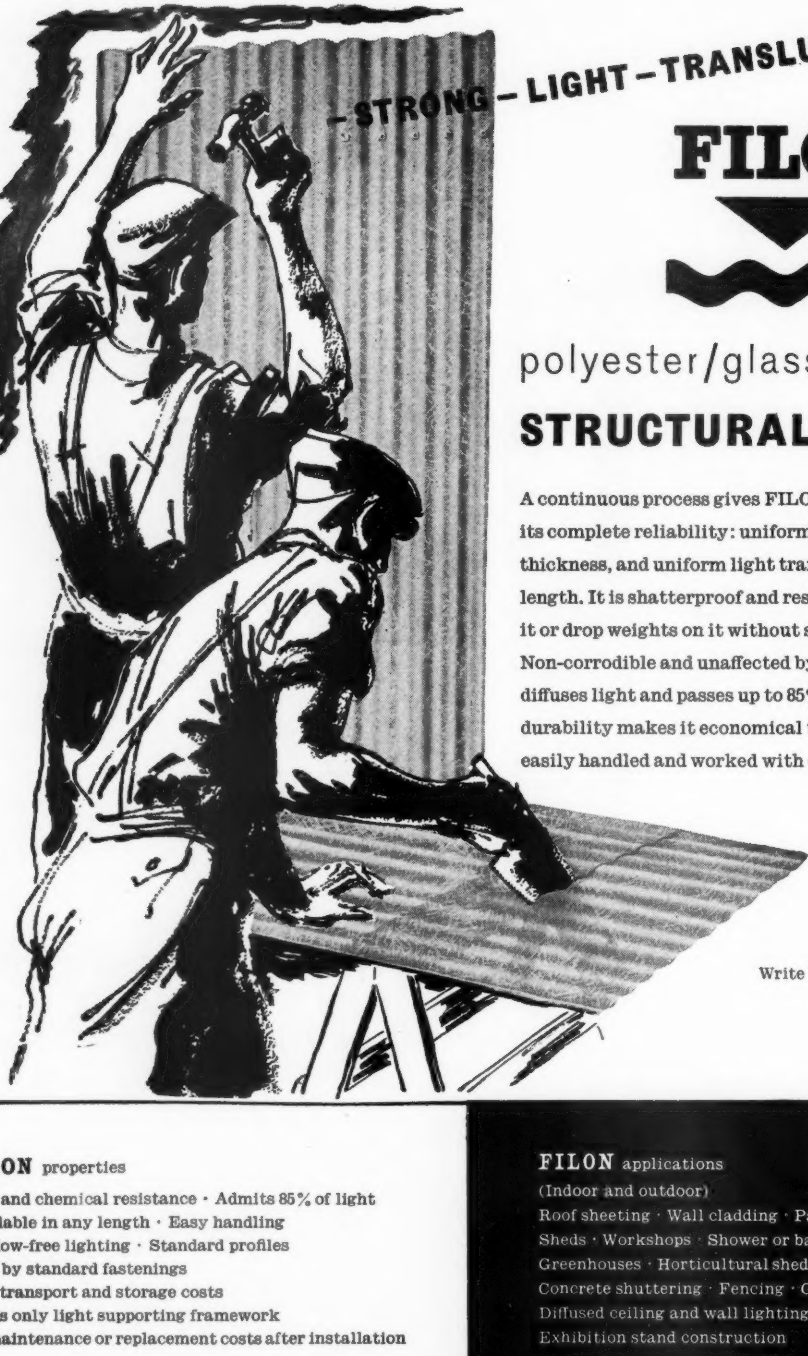

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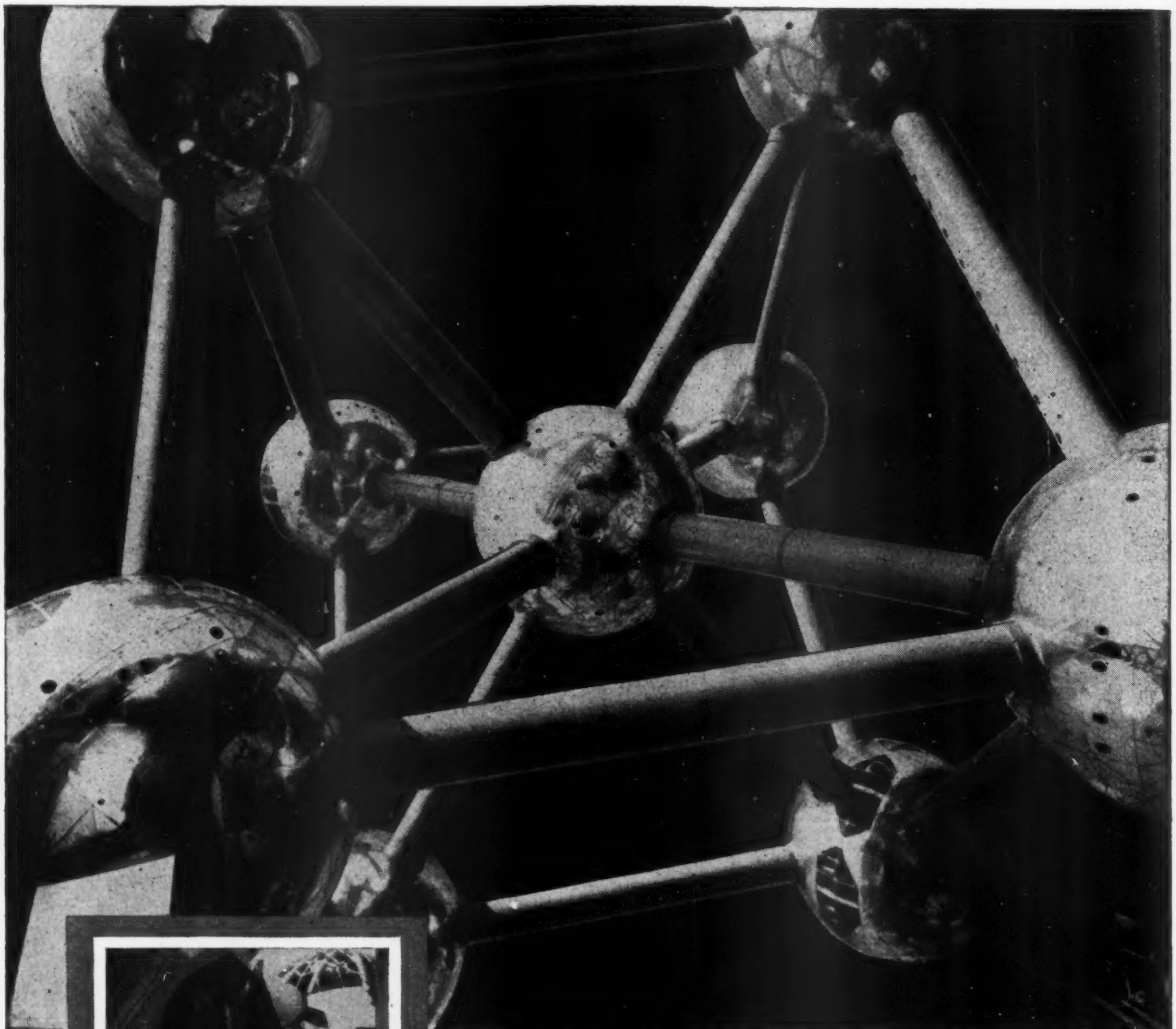

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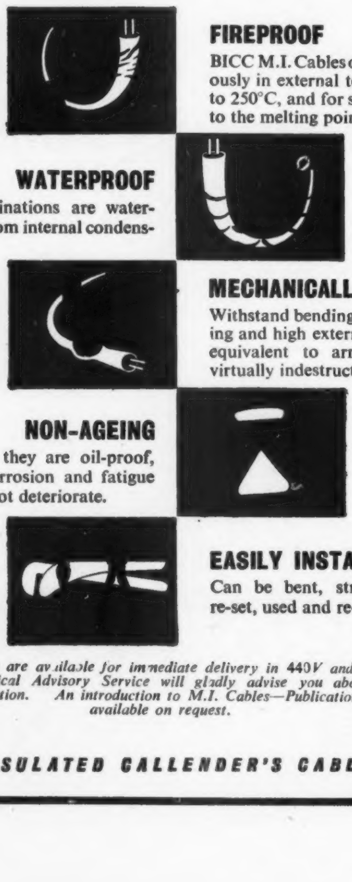

FIREPROOF
BICC M.I. Cables operate continuously in external temperatures up to 250°C, and for short periods up to the melting point of copper.

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Cable and terminations are waterproof and free from internal condensation.

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Withstand bending, heating, twisting and high external pressures—equivalent to armoured cables, virtually indestructible.

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Can be bent, straightened and re-set, used and re-used.

BICC M.I. Cables are available for immediate delivery in 440V and 660V grades. The BICC Technical Advisory Service will gladly advise you about usage and methods of installation. An introduction to M.I. Cables—Publication No. 390—is available on request.

BICC M.I. Cables consist of fully annealed copper conductors embedded in compressed mineral insulant, within a solid-drawn copper sheath. These cables for both lighting and power applications have exceptional strength and electrical stability. New manufacturing techniques developed by the Company ensure accurate control of cable size . . . they are specially suitable for hospitals, factories, ships, public buildings etc.

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Designed and approved for use in conjunction with certified apparatus for flameproof classifications II and III. These glands are suitable for all sizes of M.I. cables. They may be distinguished from the standard gland by their greater thread length and by the letter 'F' stamped on them. The undoubted merits of the M.I. cable system can now be utilized to the full in the wiring of petrol pumps, tankers and oil refineries.

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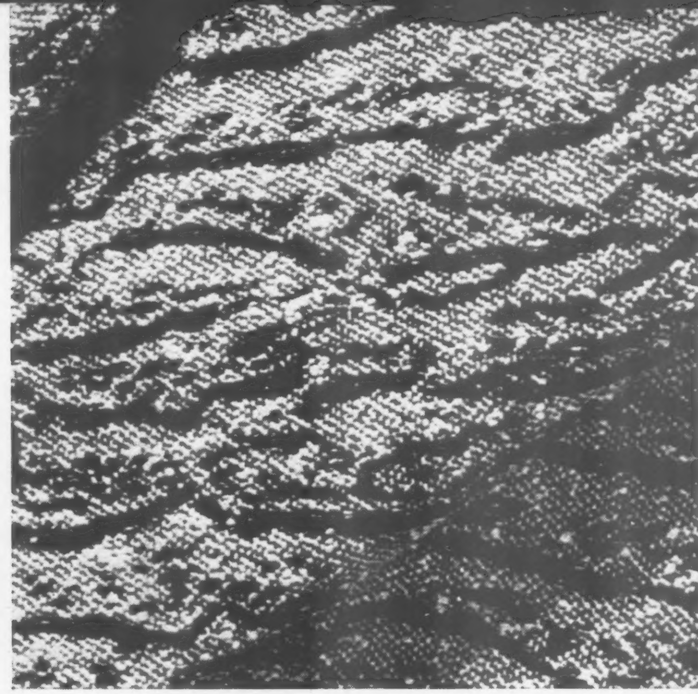

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THE WOBURN SIDEBOARD
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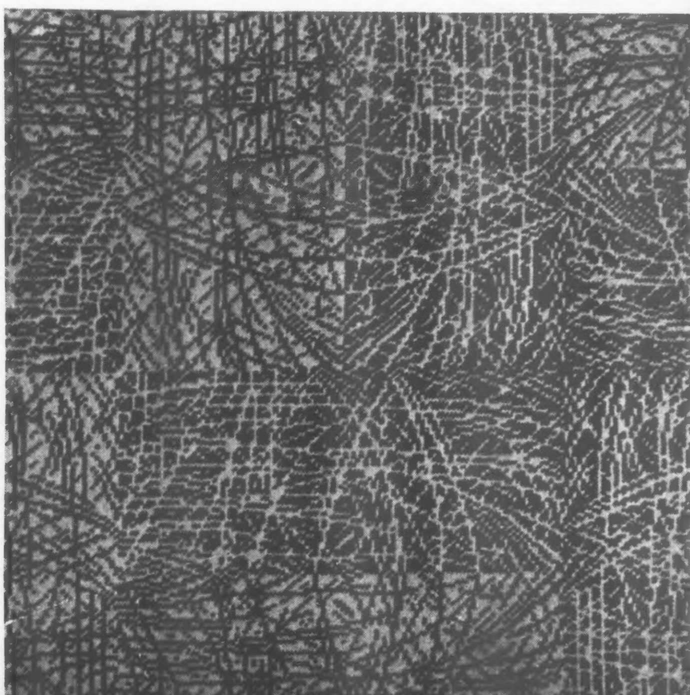
Designed by Andrew J. Milne, F.S.I.A.



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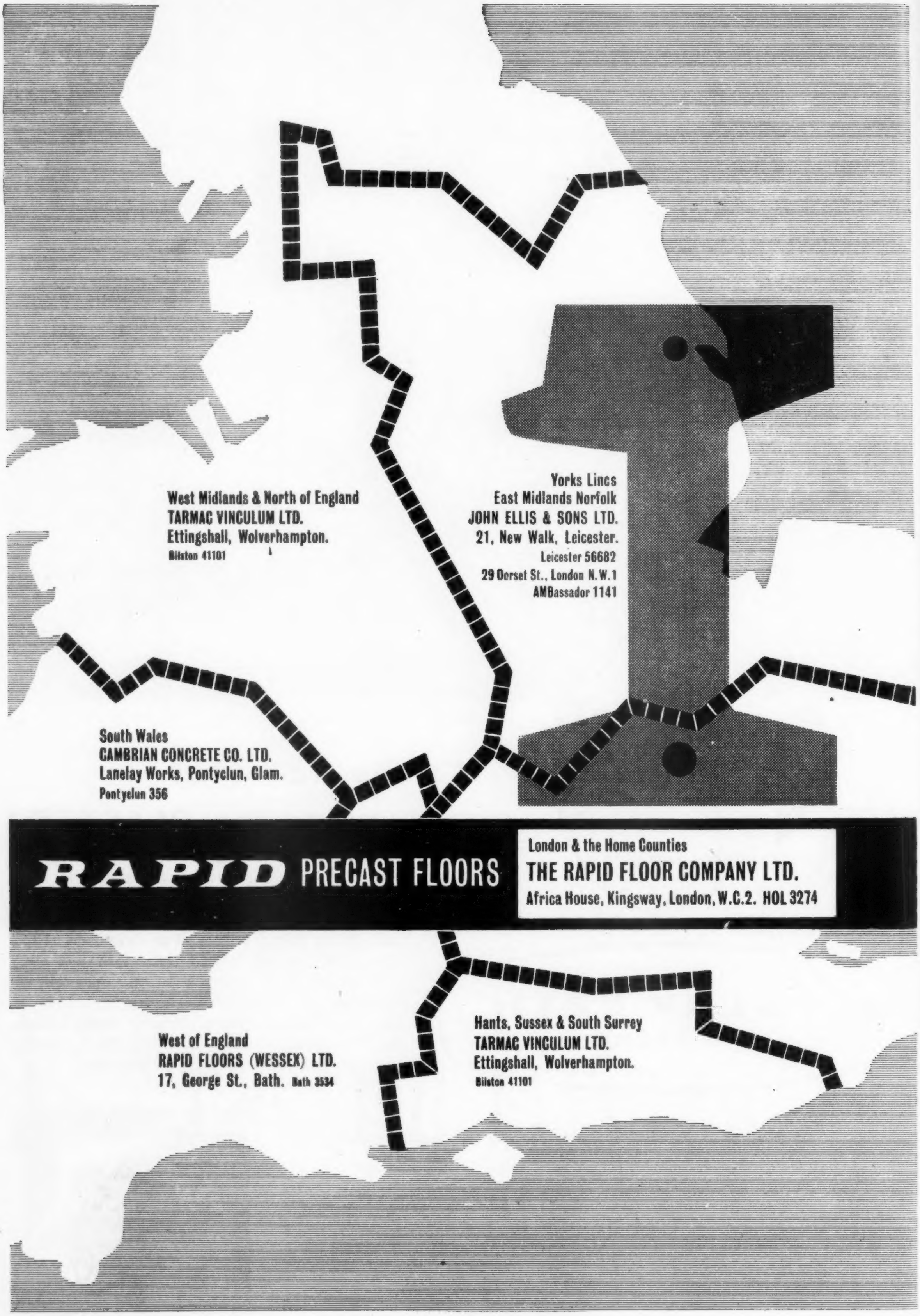
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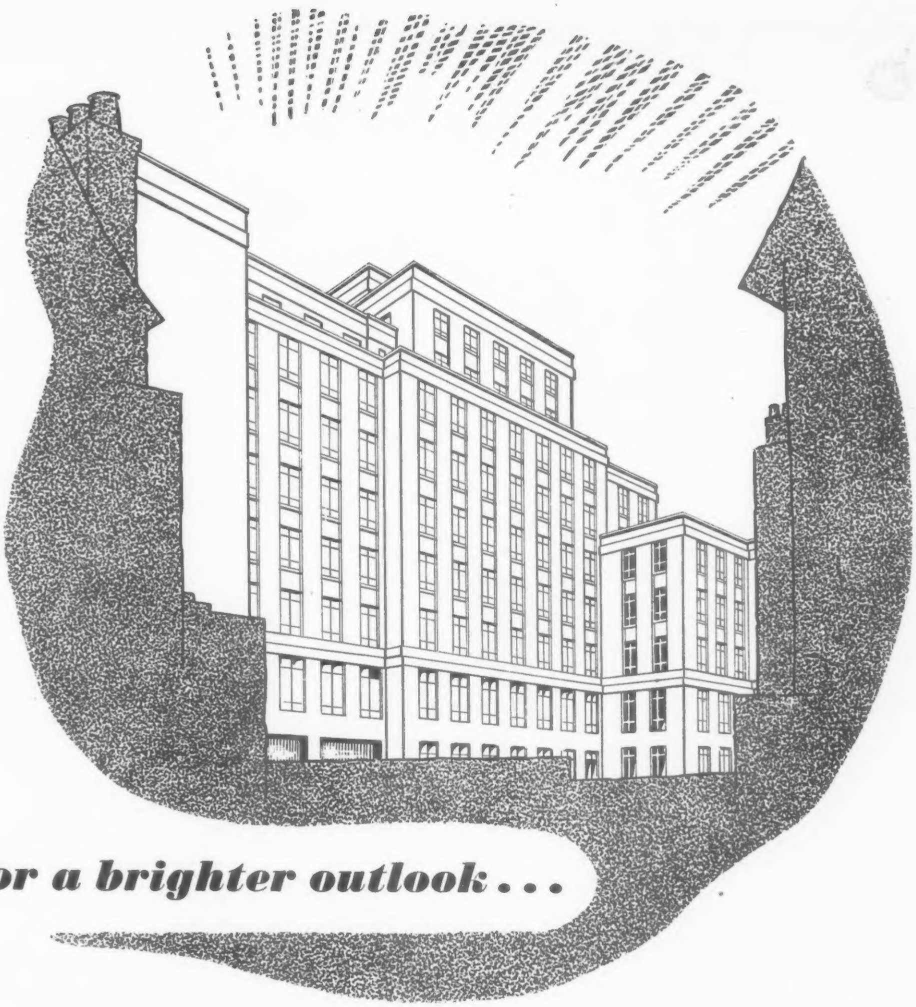
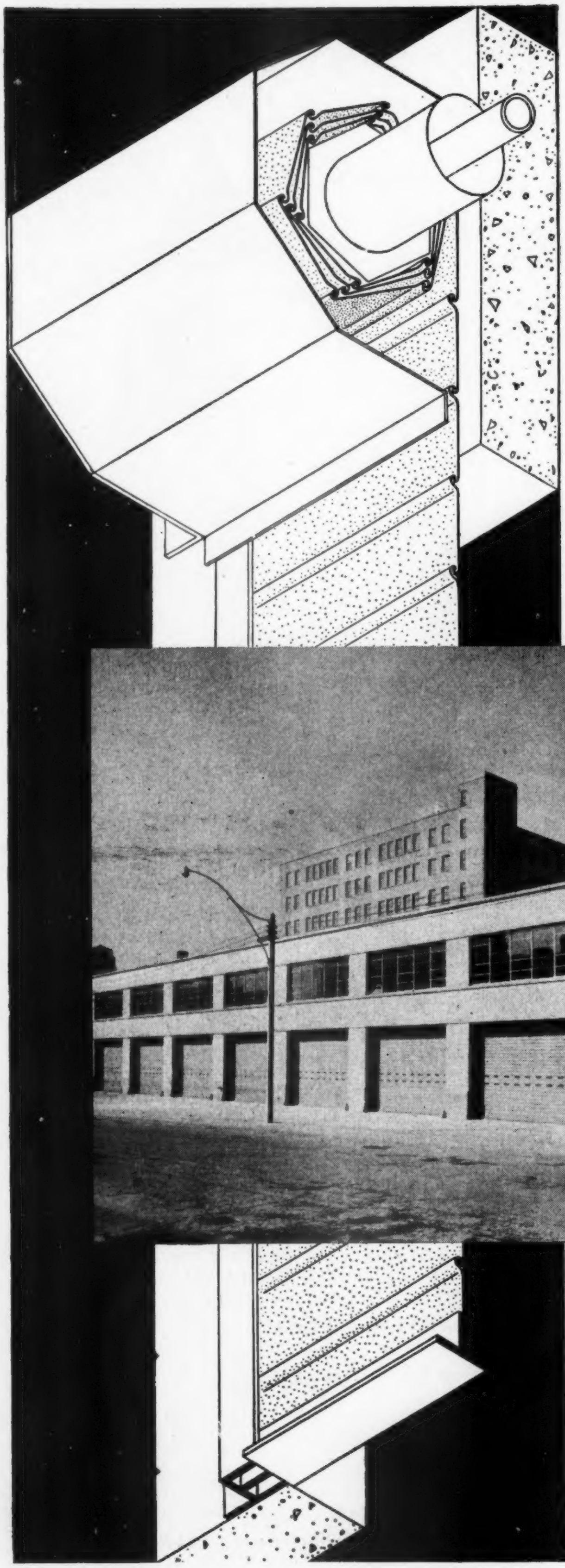

For a brighter outlook . . .



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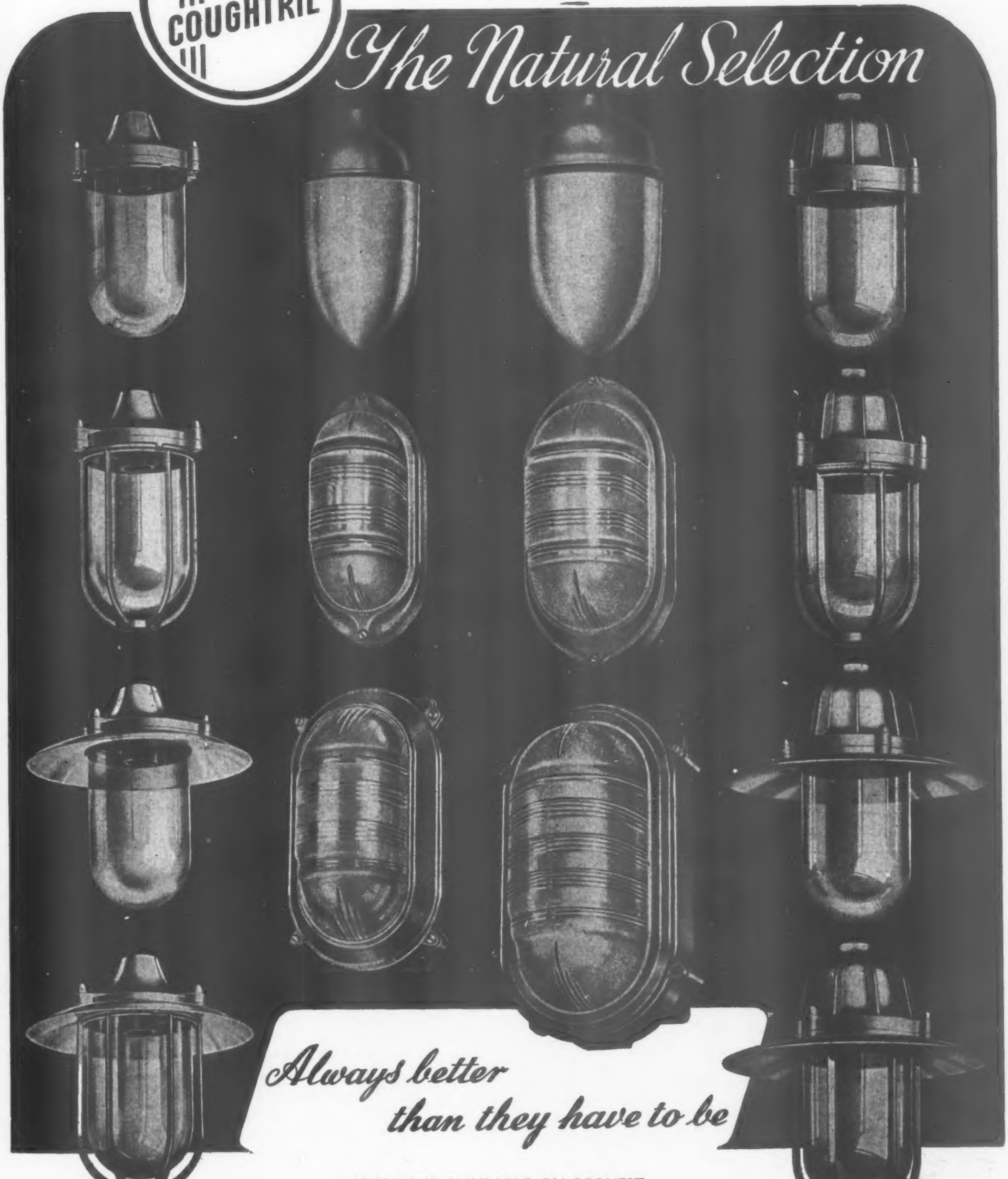

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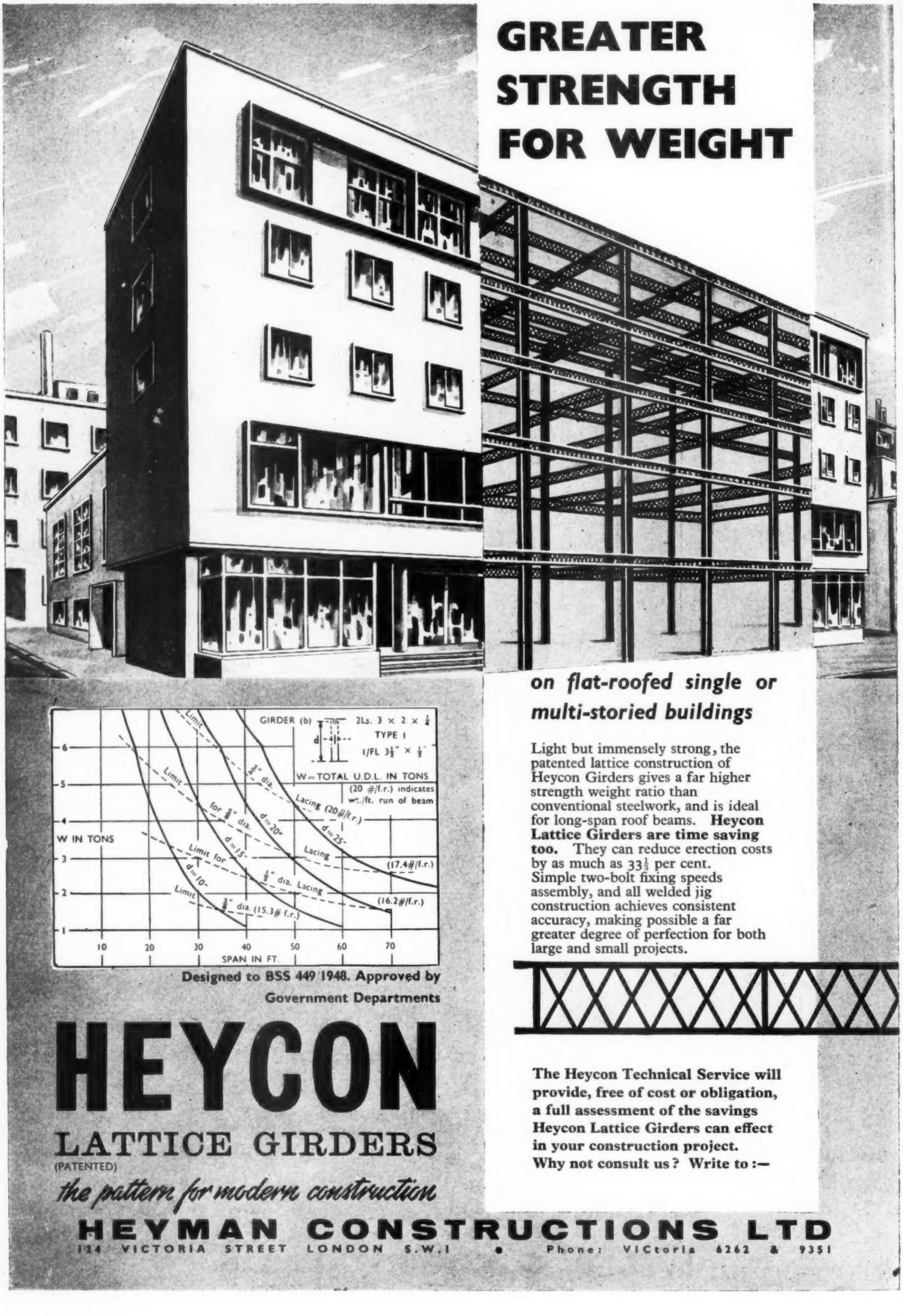
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Gulf angled radiators are the perfect answer to bay windows because they can be tailored to exact requirements. A single radiator can be planned to extend the full width of the glass area including the side windows. An attractive installation with the absolute minimum of pipe work is the result.

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Visit the permanent exhibition featuring the latest methods of Central Heating by Electricity, Gas, Oil and Solid Fuel incorporating latest methods of automatic control. Open 9.30 a.m. – 5.30 p.m. Monday to Friday, 9.30 a.m. – 12 noon Saturday at 229 Regent Street. Corner of Hanover Street, and Regent Street, near Oxford Circus.

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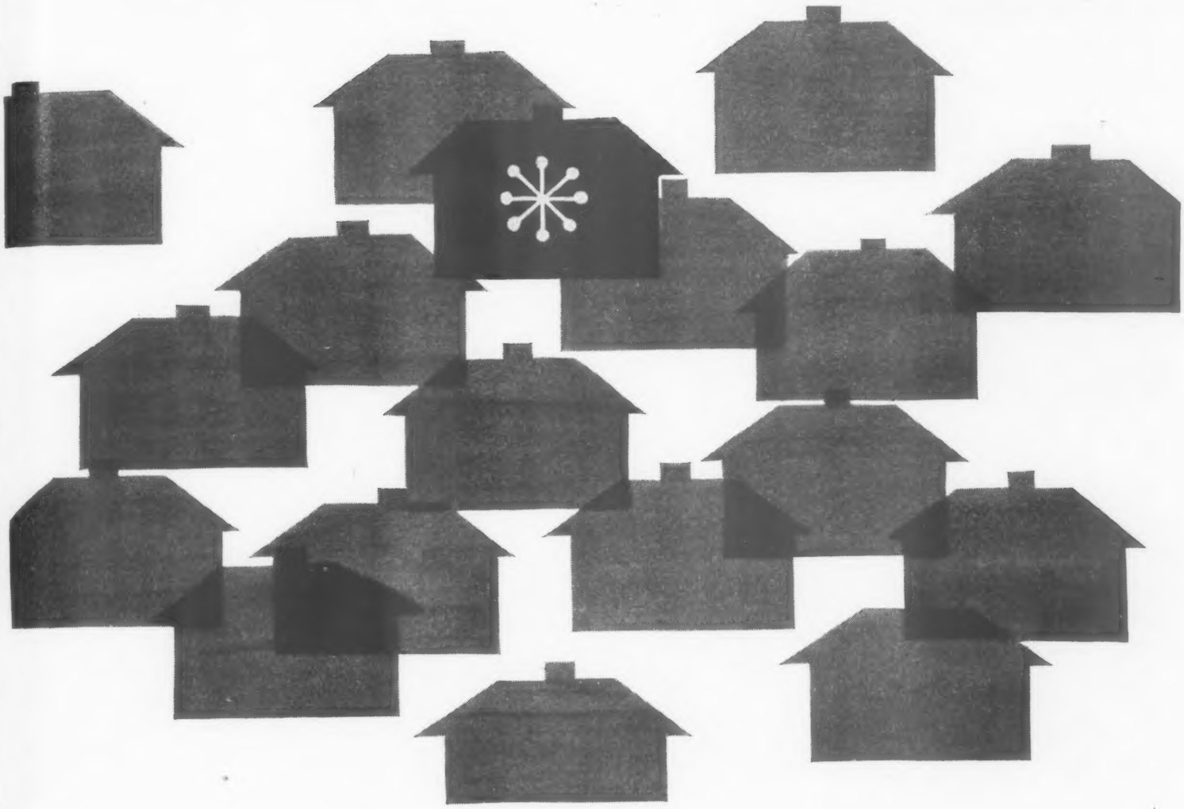
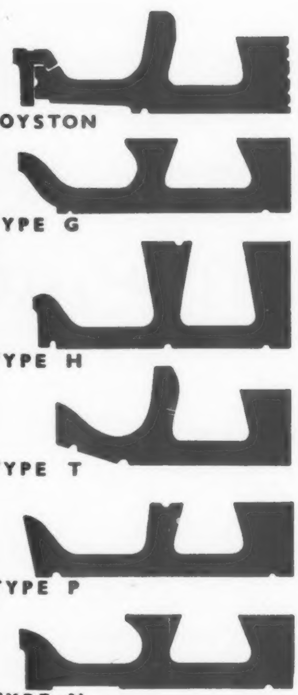


*This house cost nothing to build



It is possible to build an extra house in every sixty or so—by using Finlock Gutters. Reason :

★ It is cheaper to convey rainwater at eaves level than underground.

★ By fixing the whole of the eaves with one simple unit, five expensive items are redundant.

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WITH THE 20 YEAR GUARANTEED LINING

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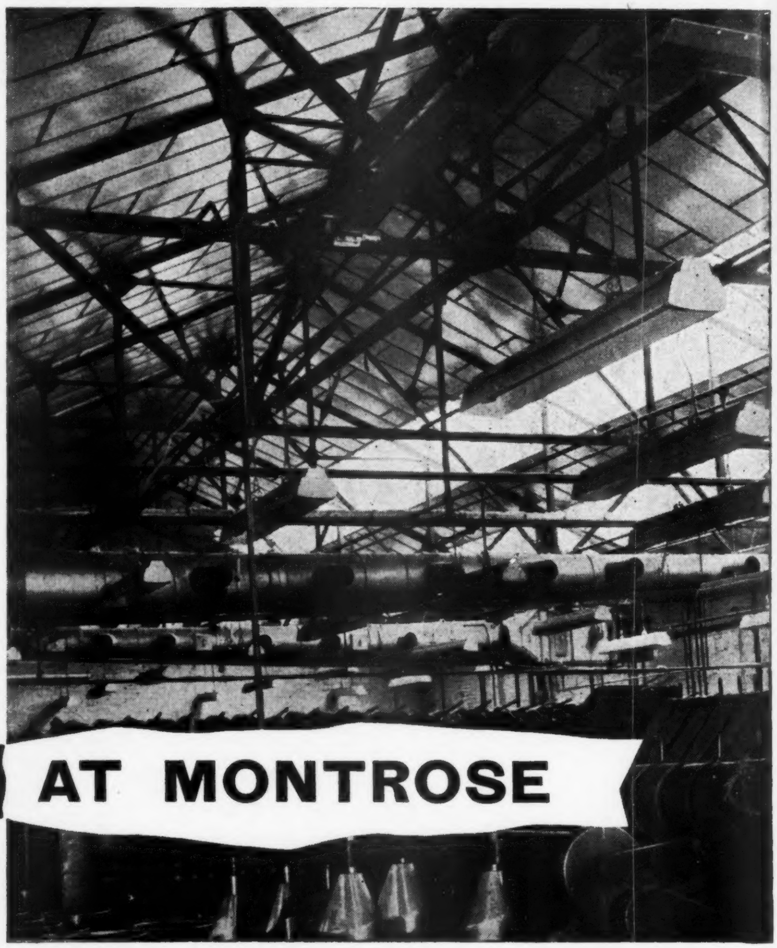

GYPROC AT MONTROSE

...stopped roof condensation in this jute spinning mill where operating conditions involve an internal temperature of 75°F with 75% relative humidity...

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The many advantages of the GYPSTELE System
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5. Lightweight "dry" construction.
6. Completely adaptable to individual requirements.

The system is worth studying in all its aspects, particularly for use in factories, offices, schools and hospitals. For full information write for Information Sheets A22.E1 and A22.E2

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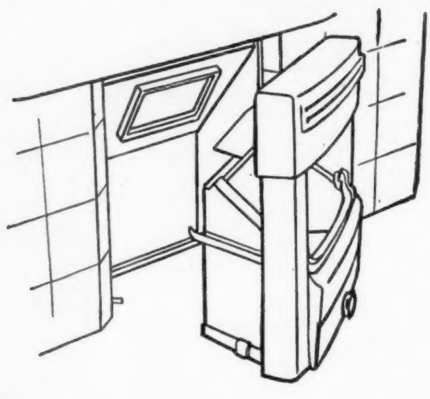
S/GS5

New—a convector that fits exactly into existing high and low fire openings the RAYBURN No. 2 convector fire

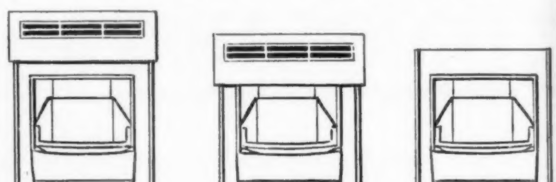


New indeed—a convector that fits nearly every fireplace in the country, provided the fire opening is 16″ wide.

The latest addition to the Rayburn range of convector fires has been designed as a replacement fitting. As more and more people are realising the value of convectors and converting to them, the important question of *appearance* has arisen. Convectors are usually made as a unit, and fit snugly against the modern flat-fronted fireplaces. But there are many fireplaces with a low overhang, and unless the fire *happens* to fit underneath it exactly, there is an unsightly gap and trouble in making a proper seal. The Rayburn No. 2 convector overcomes this difficulty.

A back-plate seals into the fireplace, leaving only a flue-opening. The fire flue itself makes a seal at the flue-opening, and between the fire and the back-plate the convection chamber is formed. That in itself is a unique construction.

And the size adjustment? The RAYBURN No. 2 convector has an adjustable head. With it fixed high, the whole fire stands 24½″: with it fixed low, 21½″—and it can be fixed anywhere between those heights. And for a very low fireplace it can be removed altogether, when the height will be 19½″.



Here's how the fire looks with the various adjustments—with the head fully raised—fully lowered—off altogether.

You as an expert can explain how convection works and how valuable it is—and your arguments will be backed up by the Rayburn.

The Rayburn has all the other outstanding features of its series. A restrictable throat keeps the flue-opening to its minimum, and spinwheel air control regulates the rate of burning. An extension piece (optional) is used for all-night burning. There is a deepening bar above the fire front. A special portable gas igniter to clip into the ashpit can also be supplied. Available in a choice of seven colours.

Space heating capacity for rooms up to 1,750 cu. ft.

For further details of the Rayburn No. 2 convector fire write to the Housing Division of

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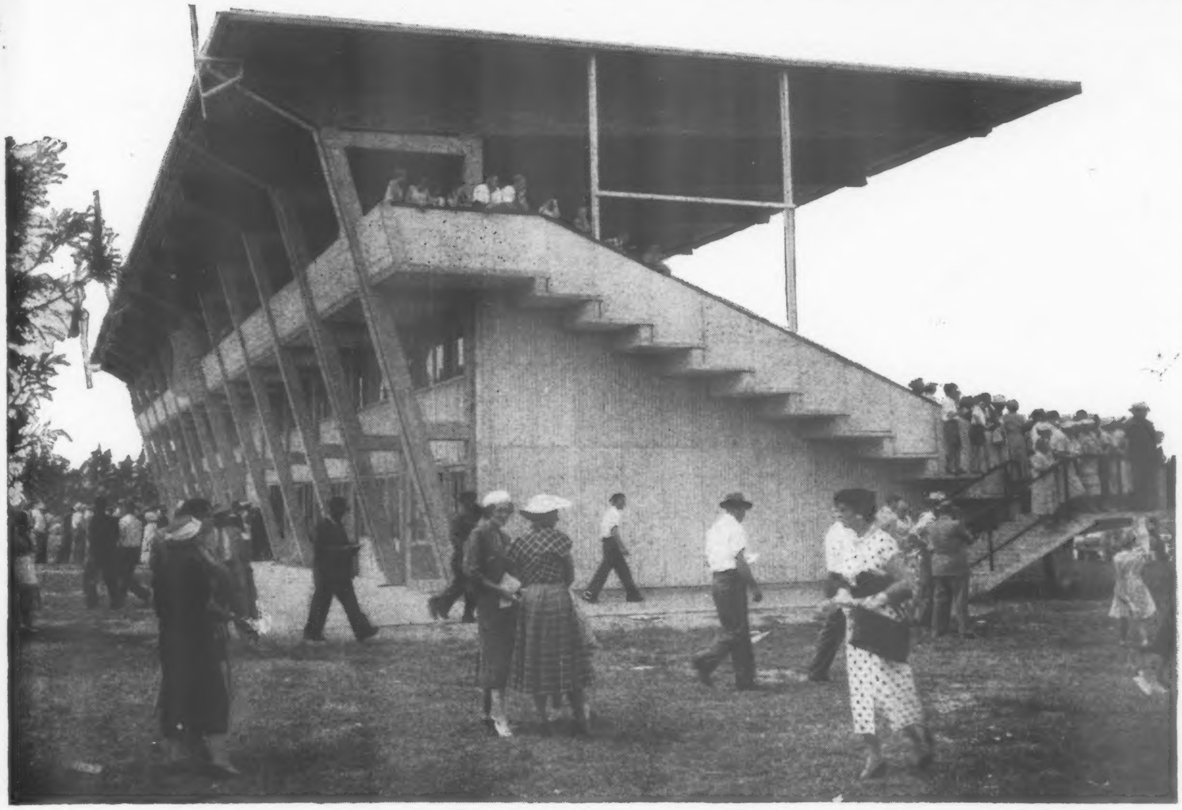
The word Rayburn is a registered trade mark of Allied Ironfounders Ltd.



The grandstand at the Matamata racecourse.
Architects: Messrs. Jones, Adams, Kingston & Reynolds.
Contractors: V. Edmonds Ltd.

UP OVER DOWN UNDER

The new grandstand of the Matamata (New Zealand) Racing Club is notable for its cantilever timber roof, using laminated beams of radiata pine, constructed by the Lamwood Division of the Fletcher Timber Co. Ltd. at Auckland. These beams each measure 46 ft long, 12½ in. wide and taper from 43 in. to 16 in. deep. Each pair of beams was cut from a block of laminated wood weighing over four tons, and containing 5,000 super ft of timber. The radiata pine was kiln dried to a specific moisture content, which was kept constant by special 'black heat' tubes. Aerodux 185 resorcinol resin glue was used throughout, because of its unequalled durability, resistance to all weathers and stability in the event of moisture changes occurring in the wood.

Cleaning the surface of one of the 4-ton laminated blocks by means of a floor sander.

Aerodux 185 **resorcinol resin glue**

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AP433

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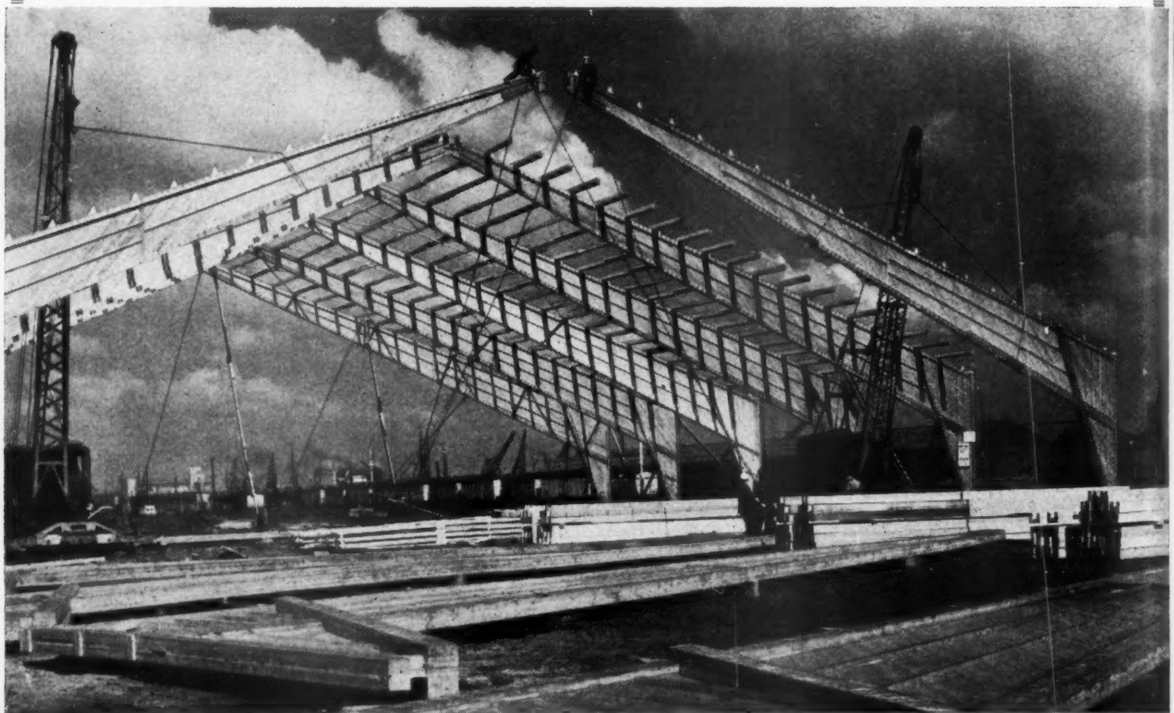

The H.B. system of timber construction has been used for twenty years in Scandinavia for every sort of wide span roof structure from barns to factories and from school halls to aircraft hangars. We have acquired the sole licence to manufacture in the United Kingdom under British Patent No. 754,303 and are now in production. The system is based upon the use of glued laminated flanges and boarded webs through-nailed together to form a versatile I section. Designs are prepared in our own office to meet the specified functional and architectural needs of each project. Some of the special merits of H.B. are :—

1. A free choice of design solutions to suit the purpose, i.e. two or three pin portal frames, straight or low pitched roof beams, continuous beams over intermediate supports, and cantilevered eaves to roofs.

2. A range of clear spans from 40 ft. to 160 ft., all economically practicable.

3. Post spacing up to 40 ft. by the use of secondary beams.

4. Economic cost by comparison with any other design system or material.

Enquiries are welcomed.

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Constructional Engineers in Timber and Timber Importers.
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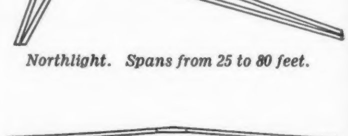
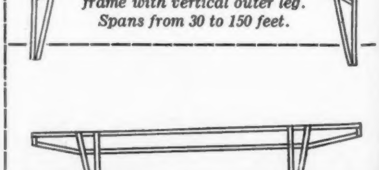
Ridge beam. Spans from 20 to 100 feet.

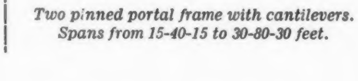


Northlight. Spans from 25 to 80 feet.

Two pinned portal frame. Spans from 30 to 150 feet.



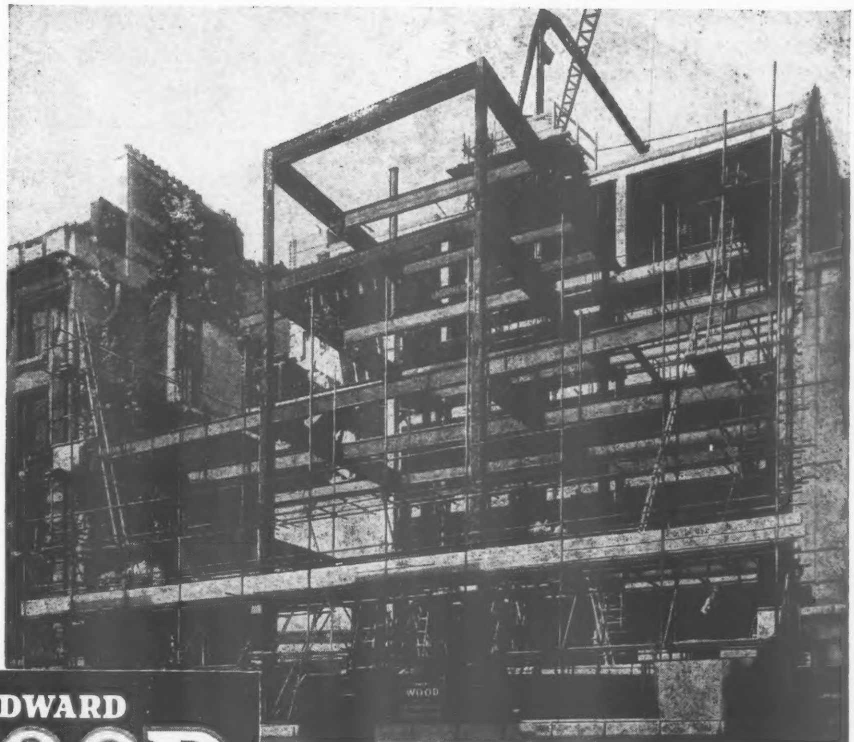
Three pinned frame with vertical outer leg. Spans from 30 to 150 feet.

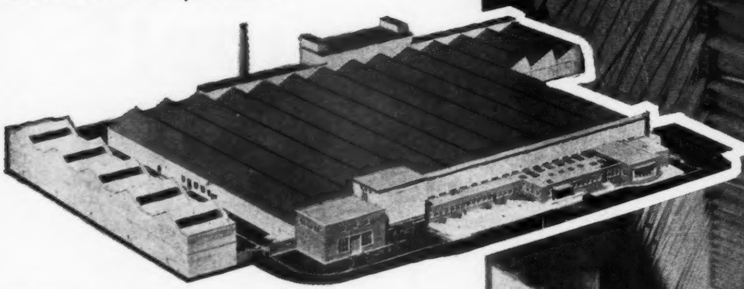


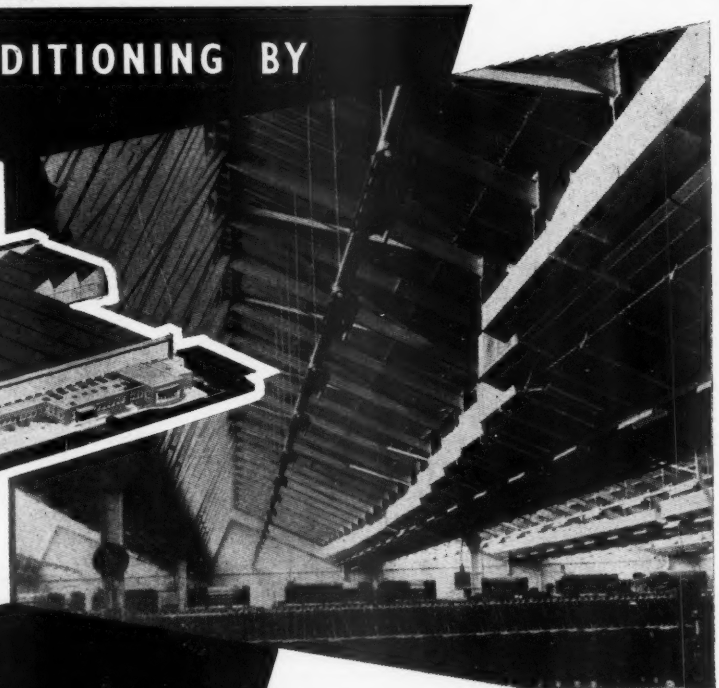
Two pinned portal frame with cantilevers. Spans from 15-40-15 to 30-80-30 feet.

CVS-31

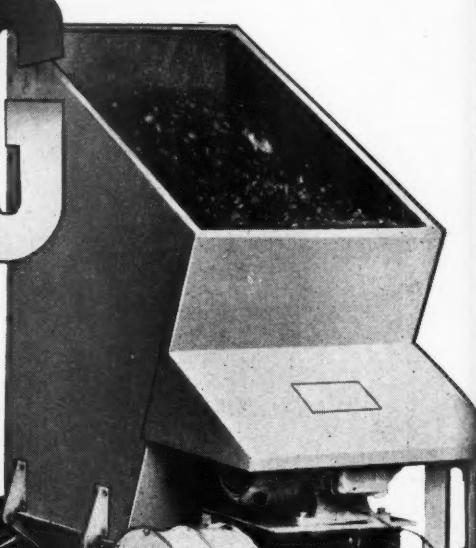
Landmarks of Today

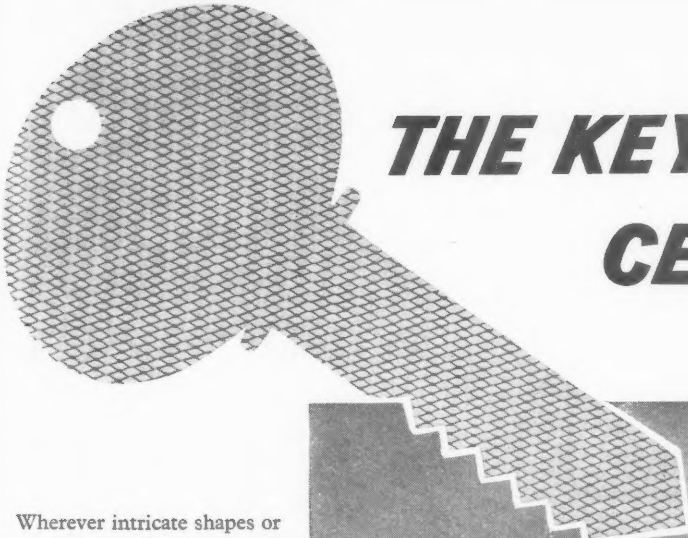




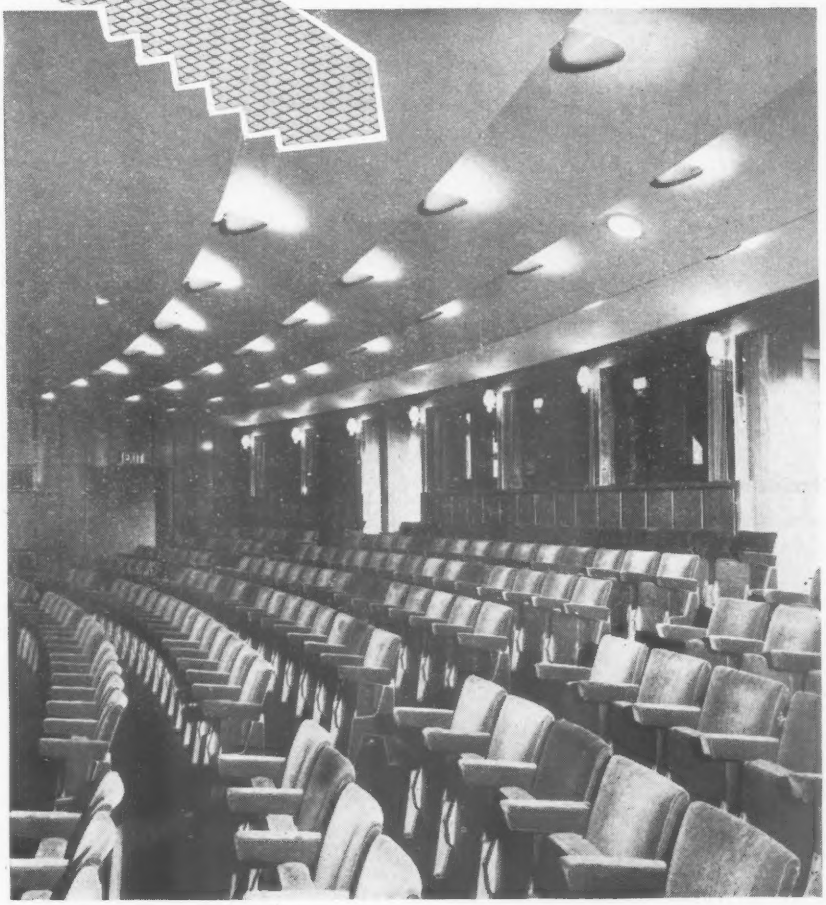


JUTE INDUSTRIES LTD. DOUGLASFIELD
Architects and Consultants: Sir Alexander Gibb & Partners, London





THE KEY TO THIS CEILING IS . . .



Wherever intricate shapes or curves over long spans are required, Steelbrac framing and metal lathing provide the ideal suspended plaster ceiling grounds. The special Steelbrac sections are light yet very strong, flexible, and rigid, enabling special effects to be obtained at a cost much lower than with other types of construction.

The highest possible fire rating is afforded and because materials used are all steel, the work will not shrink or warp. Our picture shows part of the new Belgrade Theatre, Coventry, where Steelbrac lightweight framing was employed, with metal lathing for flat and shaped plaster ceilings throughout the theatre.

City Architect: Arthur Ling, B.A., F.R.I.B.A., M.T.P.I.
Principal Architect: Douglas Beaton, A.R.I.B.A.
Group Architect: Kenneth King, A.R.I.B.A.

. . . METAL LATHING ON 'STEELBRAC' LIGHTWEIGHT FRAMING

STEEL BRACKETING & LATHING LTD

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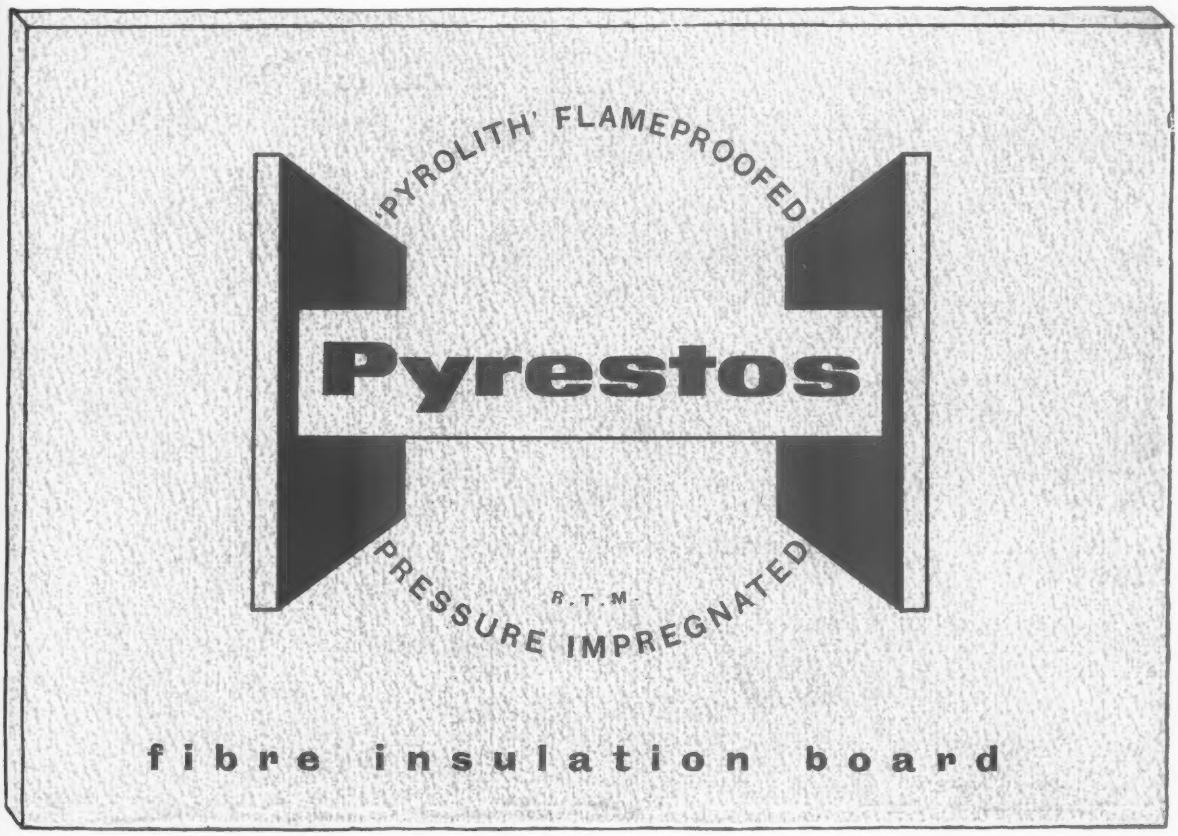
throughout under pressure

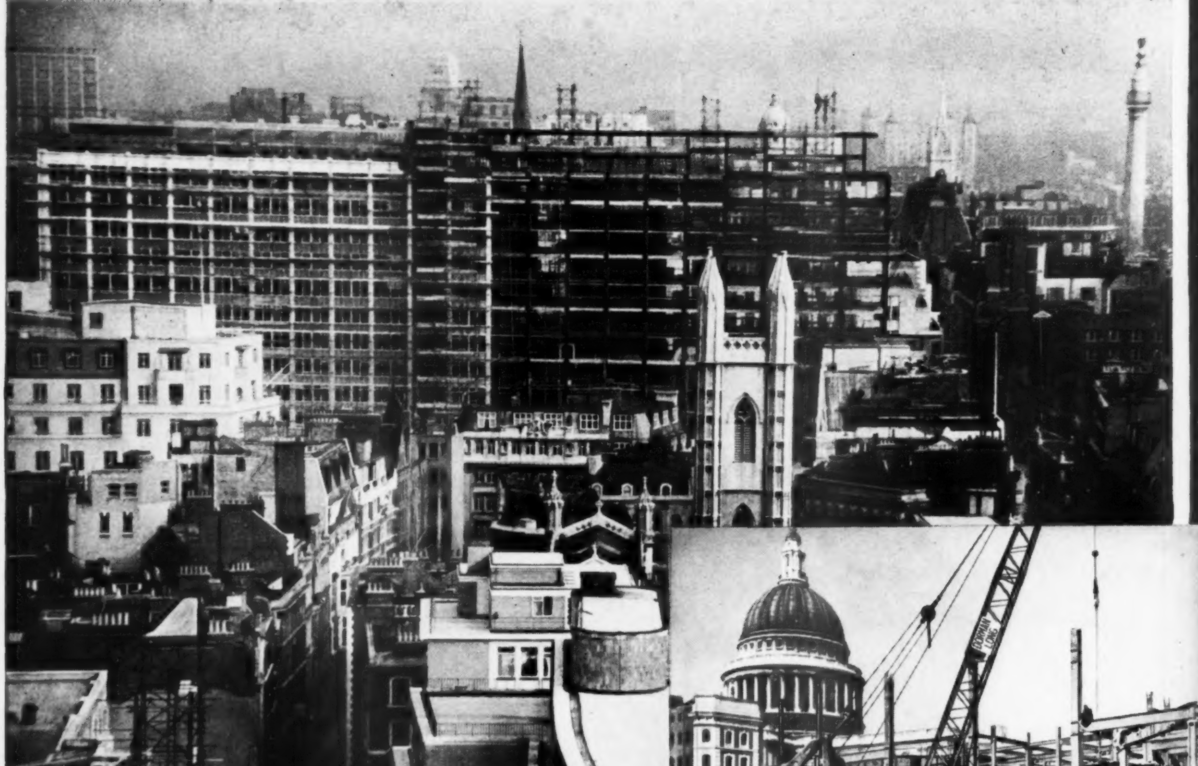


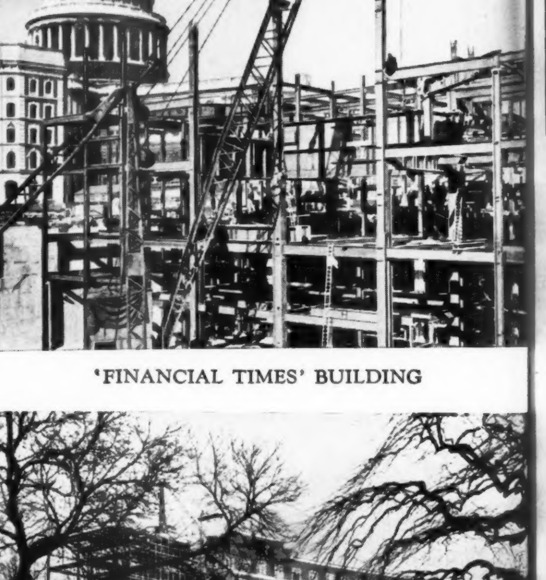
Factory insulation with fire-safety—by 'Pyrestos'. Cutting, grooving and bevelling do not reduce its flameproof qualities. The fire retardant chemicals are an integral part of the board, they are effective throughout its thickness, whilst leaving the thermal efficiency of the board unchanged. 'Pyrestos' is proofed against fungal decays, insect grubs and termites, and has been officially shown to conform to Class 1, BS 476—with no flamespread whatsoever. **Specify 'Pyrestos' now for use in January, 1959, when new production plants will be fully operative. Limited output is available for current work.**

Class 1—without a flicker of flame or a shadow of doubt **Pyrestos** LIMITED

C9750

8 BUCKINGHAM PALACE GARDENS · LONDON S.W.1.





'FINANCIAL TIMES' BUILDING

REBUILDING IN THE CITY OF LONDON

These illustrations show a few of the post-war buildings in the City of London, built with Dorman Long structural steelwork.

At top: Bucklersbury House

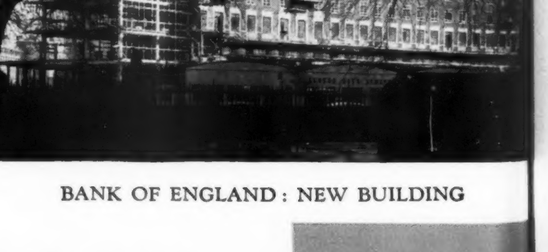
Architects: O. Campbell-Jones & Sons, F/F.R.I.B.A.
Consulting Engineers: Wheeler & Jupp, M/M.I.C.E., M/M.I.Str.E.
Hurst, Peirce & Malcolm, M/M.I.C.E., M/M.I.Str.E.
Main Contractors: Humphreys Limited.

Above right: new building for 'The Financial Times'

Architects: Sir Albert Richardson, P.P.R.A. and E. A. S. Houfe, Esq., F.R.I.B.A.
Consulting Engineer: W. A. Mitchell Esq., M.I.Str.E., M.I.W.
Contractors: F. G. Minter Ltd.

At right: new offices for the Bank of England

Architects: Victor Heal & Smith, F/F.R.I.B.A.
Consulting Engineers: Hurst, Peirce & Malcolm, M/M.I.C.E., M/M.I.Str.E.
Quantity Surveyor: Sydney C. Gordon, Esq.
Contractors: Holland & Hannen and Cubitts, Ltd.



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AJ

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NOT QUITE ARCHITECTURE

NOT QUITE FULL SIZE

The school-boy of yesterday has become the aircraft designer of today, and his paper darts have prophetically become the supersonic delta-wing aircraft of today. But to some of us the fascination of building and flying model aeroplanes has never been lost.

*

A new, shining model is gently carried out into the sunshine of a large flying field. It can never be too large nor too sunny; in many parts of the world deserts are used as model aerodromes. Photographs are now taken from all angles, with the subject on the ground, or held up to the sky with a well-shaped cloud behind and the filter on the camera. (Movement in 3-D can be disastrous, even on a maiden flight, and a "fly-away" is another known hazard.) Friends, and dozens of small boys, gather round the creation, they look, they touch, they praise, they criticize.

*

"Your own design?" "Is it to FAI formula?" (Specifications are prescribed for all international competitions by the Federation Aeronautique Internationale, governing size, weight, wing areas, size or weight of motive power, length of glider tow-lines and so on.) "What wing section have you used with that geodetic construction?" (Geodesic, "diagrid" or "lamella" to architects.) "Don't know why you chaps bother to design your own kites, you never know whether they will fly as you wish; why not buy a well-tried kit, or at least a good plan, where the model is guaranteed to fly "off-the-drawing board."

*

Yes, most of my models are "Own Design," the letters OD being an accepted abbreviation in the modelling world, where the

Misplaced Symbolism

The great interest at present shown by architects—unbelievers as well as Christians—in church design can largely be put down to a frustration with the many sterile stylisms into which orthodox functionalism has developed. Churches appear to present a nice unrational problem, in which the imagination can run riot, or, in current jargon, pure plastic form can be experimented with. There is irony in the fact that Le Corbusier's chapel at Ronchamp has stimulated a great reaction against functional principles; it has in fact a sound functional basis. A development of a slightly different kind can be seen in the Lutheran church of the Holy Trinity, Hamburg, by Reinhardt Riemerschmid, illustrated here. The plan of the church and the elevation of the tower represent A and Ω—one of the symbols of Christ. Quite apart from the fact that this cannot be appreciated except from the air, there is nothing to justify this stunt on Christian iconographical grounds. Buildings make, indeed are, their own symbols, and the architect might have produced a more convincing symbolism had he given a little more attention to functional analysis. This is also true of the furnishings; the font, left, is supposed to represent the world (why?). A font should look like a font, and there is plenty of functional material to work on.

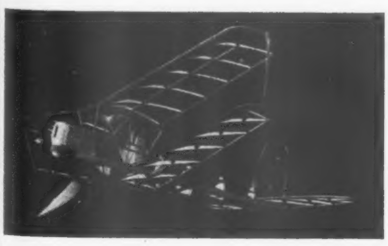
designers' name is seldom missing from plans, photographs or advertisements, and we recognize a good designer's work when we see it. All sorts to things inspire the designer; a gull soaring on air currents above a cliff top; the beauty of a full-sized aircraft; the screaming power of a miniature engine small enough to lay in the palm of a hand, yet developing more than one brake horse-power; the idea of having a model high above performing perfect aerobatics, controlled by a small box of radio in the modeller's hands.

*

Then my fingers itch for drawing materials, technical data books, small cutting tools, balsa wood (only a third of the weight of cork), cement (not to BS, but a special pear-drop-smelling glue guaranteed *never* to come off clothes and carpets), wire, wheels, rubber in writhing, twisted lengths to store energy to fly rubber driven models, engines (usually bought, but sometimes also home made on a lathe), ranging from 10 c.c. or more down to 0.10 c.c. At last the dream is designed, but it often differs considerably from the original conception. Forms of construction and appearances are considered all the time the design is being formulated. Full size drawings are drawn up, usually very sketchily, as the builder and designer here are the same person. This fact also produces surprising simplicity of detailing and even greater simplification as the work proceeds. The balsa-wood is sawn, cut, fitted, glued and fixed in position. Sandpaper smooths the whole structure and the wood and wire skeleton is then smoothly covered with a skin of fine, strong tissue paper. This is "doped" to make it as taut as a drum skin (the "dope" is another pear-drop compound, attracting fruit flies from miles around in the summer).

*

Colour schemes are carefully considered (many models owe their recovery from a dense undergrowth to a lively colour scheme). Engines are bench-tested before being fitted to the model, and everything



possible is tested and checked before the first outing.

*

And so an original flying model aeroplane is produced for duration, speed, height, distance, radio control, as a scale model of a real aircraft, to fly off land, water, snow, ice, desert, or simply for the pleasure of lying on one's back to watch a "sport" model flying lazily in the blue above.

PATRICK O'KEEFFE

The Editors

PENNY WISE

IT was perhaps inevitable that the Select Committee on Estimates, when they enquired into the workings of BRS, should have concerned themselves with the subsidiary question of how to recover from industry money spent on building research, instead of the main questions of "Is building research worth it?" and "Are we doing enough of it?" Nevertheless their Report and the Minutes of Evidence (extracts of which are printed on page 405) make sorry reading and we have the impression that if they had spent some time marshalling the evidence on the major issues, the financial aspect would have fallen into a truer perspective. As it was, a reading of the Minutes makes it appear that Dr. Lea and his colleagues at BRS spent £528,000 of public money and only bothered to get £35,000 of it back. That, evidently, is what was giving the Select Committee sleepless nights. Yet what a travesty of the truth this is! The real question which should have been bothering the Committee is "Can a nation which spends £2,000m. a year on building (nearly half of which is spent by national or local government) afford to spend only one-fourthousandth of this sum on building research, at a time when building is passing from a craft to an industrial basis?" During this changeover, research is of vital importance and has been repeatedly shown to pay vast dividends. The Select Committee, unfortunately, are burdened with old-fashioned terms of reference which send them forth into the backwoods of Whitehall, not enquiring whether good value is got for the money spent, or whether better value could not be got from spending more, but searching, axe in hand, for possible reductions in government spending. Consequently, they devote hours of questioning to the failure of BRS to recover a few paltry pounds from Shell for some vital research, initiated by BRS for its own purposes and only of questionable and incidental value to Shell, but ignore Dr. Lea's revelation that BRS lives "in a perpetual state of overload," is unable to handle a large volume of correspondence, and has difficulty in recruiting or retaining staff because it cannot offer competitive salaries.

One is tempted to guess that BRS work on programming, the simplification of plumbing, building insulation or on any one of these, saves the nation every year at least ten times the annual income of the Station, and there are many others. The Committee in their recommendations call for a more determined attempt to recover money spent on research from industry, and they lay down that when any specific piece of research seems likely to benefit any particular firm, this firm should be approached before work is begun and asked to contribute a definite sum towards it. Though there is nothing new in this, it seems to us to betray a wrong conception of the nature and purpose of BRS, which are essentially those of a body which makes facts about building available to everybody. For once sums are levied from individual firms for sponsored research the results tend to be in some measure the private property of the sponsor; and in practice this can be a big factor hampering the public usefulness of the Station. If the government decides that building research is to be paid for by some method other than by a block grant from central funds, it would be far better to levy some small building research tax on contracts. Even if this were of the order of 0.1 per cent. it would raise a sum four times the present BRS allocation.

If the indirect outcome of the Select Committee's enquiry were to make funds available which would really match the needs of building research, good would have come of it; but if it is merely to be interpreted as a rap on the knuckles to Dr. Lea for having thrown away public money it will be bitterly resented by all knowledgeable people.

ASTRAGAL
NOTES & TOPICS

BARK, BUT NO BITE

The Monopolies Commission has the power to bark, but not to bite. For some years it has been barking about the timber importing trade's restrictive practices, but without much effect. In 1953 the Commission ordered that the agreement and undertakings by traders on the approved lists to deal only with each other should be abrogated, and not replaced by similar agreements. Under protest the trade associations complied. In a report published last week the Commission alleges that the former agreements have been replaced by "gentlemen's agreements" having the same effect. Approved lists of agents (who sell on behalf of shippers) and importers have been circulated; cosy little dinners seem to have taken place to fix up the new arrangements, and consumers who have tried to buy softwood or hardwood direct from shippers or their agents have found themselves unable to get supplies. The whole aim of the Commission, of course, must have been to enable large consumers to go direct to the source of supply without paying too many middlemen.

*

Only the Government can now take action through the courts. But will it? If it doesn't, then the reports of the Commission cease to be worth the paper they are written on.

DO GROCERS *want* MORE JAM?

A good many shopkeepers cling to the ignorant prejudice that traffic congestion is good for trade. But it was astonishing to find this prejudice in a paper on town planning and retail trade given to the recent Town Planning Institute Summer School by O. W. Roskill, an industrial consultant and "expert adviser" on shops and shopping. Mr. Roskill (see the report on page 406) agreed that the pedestrian precinct provided a pleasant and safe environment for shoppers, but he considered we had already gone too far in our efforts to reduce congestion. We should aim, he thought, at *creating* congestion in shopping centres as an indispensable condition for successful retail trading.

*

Mr. Roskill must be very hard to please if traffic congestion is not yet bad enough to satisfy him. Which towns and streets achieve his goal of the optimum degree of traffic congestion? Presumably he believes in keeping the traffic moving, but at what speed? Is 1 m.p.h. the shopkeeper's (and the expert's) ideal? Or is it argued that you can shop more conveniently if your car is actually locked in a traffic jam outside the main entrance?

*

If Mr. Roskill is right, town planners can just sit back and leave the rest to the motor manufacturers.

SPEC INSPECTION

With bated breath, ASTRAGAL walked into the exhibition of spec. houses put on by *Homefinders* magazine in London last week—and only unbated it at Span Developments' stand. Many of the working drawings (rendered), the layout plans and the elevations (painstakingly rendered) bore pre-war characteristics, and the exhibition was a reminder that spec. builders aren't even practical. There were roofs of wasteful span (and cube), flourishing gables, valleys and dormers ready to swallow up maintenance costs. There were heavy r.s.j's. to hold up brick first-floor walls to hold up roof struts. There were walls curved on plan to no very obvious gain . . .

*

Here and there a firm was struggling

to catch up (clinker block inner skins, underfloor heating, heat pump cooling and hot water, one-way pitches) and all for £3,200. It is clear that the spec. builder is beating the private architects for price (£1,750 for a Sussex bungalow) and is capturing the "purpose made" market (£4,400 for a house at Tonbridge). There was even a firm which had taken a hint from the spec. builder team's report on its visit to America and had provided a "split level" house.

*

Nearly every time he asked, ASTRAGAL was told, "Oh yes, our houses are architect-designed." Anyway, thank goodness for Span, who are not resting on their laurels but are continuing to experiment. ASTRAGAL hopes to have news soon of a new housing development from Eric Lyons's drawing board.

SHOT-GUN WEDDING

From the New Empiricism to the New Brutalism the last two decades have been haunted with a cyclic desire to get that something plus into modern architecture. However greatly we admire the Godlike ice palaces of Mies and his followers, they tend to leave us with a seven-year-itch for something more robust, fantastic, jazzy or baroque. Wright, the native American alone of all the old masters, has been consistently jazzy. The *Architectural Review* has, one must admit, both recognized and championed these trends.

*

Now ASTRAGAL'S old friend Doug. Haskell, Editor of *Architectural Forum*, makes a plea—in an article called "Architecture and Popular Taste"—for a "reciprocal interchange" between the popular taste of the jazzy "honky-tonk" and the "ranch house" with modern architecture. He calls this, if I have not misread him too much, the New Sweetness, and sees it in the later academic buildings of Yamasaki and Rudolph and the new buildings by Saarinen at Idlewild (all three architects, incidentally, being Mies followers). Haskell points also to the US Pavilion at Brussels as a really successful example of this union of popular taste and modern architecture, and who of us, having seen the Pavilion, will fail to agree with him? But isn't Mr. Haskell already a little behind the times? He himself has quoted a great many examples of buildings of this kind which must have been on the drawing boards three or four years ago at least. Ronchamp and the Torre Vellasca both pointed to a change of view among the mighty. The marriage might not have been legalized, but its progeny are popping up all over the place.

WORKS SEEK YOUNG ARCHITECTS

Donald Gibson's appointment as joint Director of Works at the War Office aroused hopes that, following his successes at Coventry and Nottingham, he would breach the military redoubts that have given the War Office (architecturally speaking) such a bad name. The office, ASTRAGAL learns, is now being reorganized on the group basis associated with all Donald Gibson's work, and the range of work is much wider than one would associate with the War Office. Mr. Gibson has now started to recruit new staff, and it is to be hoped that he gets men and women of the calibre he needs to make a success of this very important job. To work in the War Office has not, to put it mildly, been the ambition of young architects in the past. But to work under Donald Gibson is rather a different proposition.

RECORDED AND REVIEWED

Great Magazines think alike apparently, and the Persian City of Isfahan gets a boost this month both from *Architectural Record* and the *Architectural Review*. "The most beautiful city in the world," says William Wurster in the *Record*. That is an opinion one must respect, since Mr. Wurster, who has just spent a sabbatical year looking at the world, should have some standards of comparison. The two subjects he seems to find most interesting to report on are the universal validity of the row-house as an urban building type (from Khathmandu to Harlow by way of Rome) and Corb's predecessors, from Lutyen's backwards, in the oriental capitals business. The article is only in the form of brief notes, but it reads perceptively. Could there be a big book coming?

*

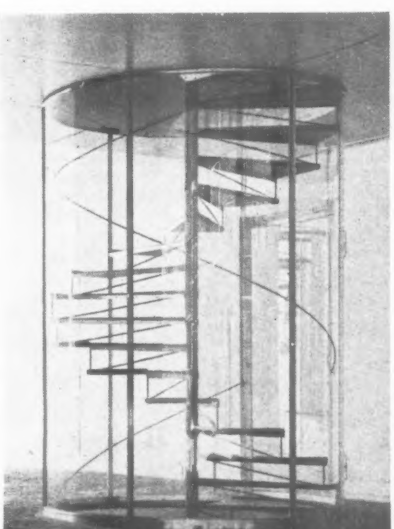
The *Review* is doing Isfahan from the inside. The vaults of its mosques and palaces appear in a new feature called *The Exploring Eye*. This is intended to take readers into little known, but visually remarkable, corners of architectural geography and history. This sort of feature could do a useful job in broadening architects' minds. It will undoubtedly pad out their crib books as well.

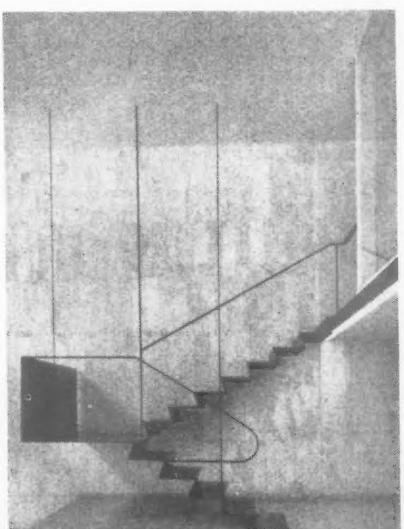
*

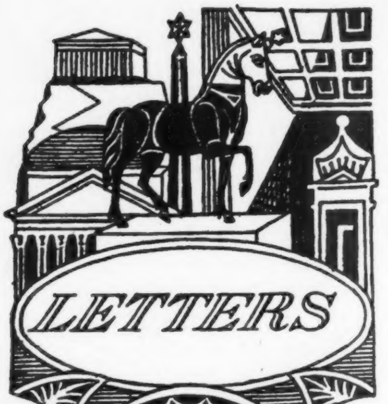
Footnote : the apparent crib from the vault of the palace of Ali Quapu, in the new offices of Middle East Airlines in Piccadilly, is nothing to do with the *Review*.

ASTRAGAL

Do stairs betray a secret desire for the gift of levitation? Have a look at these two. The one on the left is the emergency stair in Arne Jacobsen's new office building in Copenhagen. The one on the right is in a newspaper agency in Rio de Janeiro by Sergeo Bernardes, who designed the Brazilian Pavilion at Brussels.







Robert Maguire, Peter Matthews, A/A.R.I.B.A.

Cecil C. Handisyde, A.R.I.B.A.

(Mrs.) Barbara Dent, A.R.I.B.A.

Duncan M. Stewart, A.R.I.B.A.

Robert Shaw, A.R.I.B.A.

Haydn W. Smith, A.R.I.B.A., *Public Relations Officer, Manchester Building Forum*

Colin and Mary Oates, A/A.R.I.B.A.

A. D. Power, A.R.I.B.A.

Coalbrookdale

SIR,—Many thanks to ASTRAGAL for his congratulations on our Iron Bridge researches, but hasn't he indulged a little too freely an aversion to the phraseology of certain critics.

There is surely a difference between the conscious use of materials in a perverse manner when the materials are already well-tried, and the borrowing of familiar but unsuitable techniques for use with a new, untried material. We specifically mentioned this in our article: "It (the Iron Bridge) is a fascinating example of the situation which so often arises when an entirely new material is tried out. In the lack of an established technique and intuitive sympathy for the material, the new material is pressed into forms derivative of other materials and techniques."

We would therefore disagree with ASTRAGAL that the bridge *as built* is an "entirely convincing pioneer work"; our article was partly concerned with pointing out that the final design was a compromise, while the original design by the intuitive Pritchard did not suffer from the same shortcoming.

That this was also the opinion of the more reliable critics of the early 19th century is best illustrated by a remark by Telford: "... they had not disengaged their ideas from the usual masonry arch, the form of which in iron is not graceful. . . . The original design for this bridge (which formed an Era in bridge building) was made by Mr. Thomas Farnolls Pritchard . . . and I consider it only justice to the ingenious artist to record his merit on this occasion."

ROBERT MAGUIRE,
PETER MATTHEWS.

London.

Bills of Quantities

SIR,—In these days of awareness of the importance of costs and of an ever increasing attempt to simplify building procedure by standardization, is it not time that a fresh look was taken at some of the units of measurement used in Bills of Quantities?

Under the Standard Method a Bill at the moment includes items in cube feet and cube yards for cubic measures, and in square feet, square yards and squares for area measurements. Would it not be simpler for the q.s., the architect and the builder if one unit was used instead of two or three?

The question is immediately prompted because of an error in pricing a Bill which occurred recently and resulted in a builder having to be given the alternative of standing by his tender or losing the job. The error was a serious one as it was caused by pricing at "per yard" when the Bill, quite correctly, gave an item as "per square." True, this was a stupid mistake by the estimating clerk, but nevertheless it might have been avoided if the custom had been to have all area items measured in a single unit.

I hope that both architects and quantity surveyors may feel disposed to comment on this.

CECIL C. HANDISYDE.

London.

Siting the Dishwasher

SIR,—In turning up old copies of the ARCHITECTS' JOURNAL I have just noticed the COID kitchen designs published in the number of March 13. In kitchen *A* a dishwasher is shown at the opposite end of the kitchen from the sink.

As the proud owner of a dishwasher I think it might help less fortunate architects to know the reasons why I am horrified at this arrangement. To operate the dishwasher, debris must be removed from the crockery first. It is used for "kitchen" as well as "dining room" washing up and some juggling always takes place between items for the machine and those for the sink. It is helpful for ideal working to provide a "working top" on the opposite side from the sink for the dishwasher basket, for which one frequently needs a place when it is partly filled.

My final reason for placing the two together is economy of plumbing.

BARBARA DENT.

Godalming.

Woolton County Primary School

SIR,—May I reply to criticisms of this school made in your issue of September 4. You say "the architects have imposed on their design the discipline of a constant roof line which appears surprising . . ." In fact, there are many different roof lines because of internal requirements and varying ground levels, but a conscious attempt was made to relate those lines to each other where possible. For example, the roof line of the assembly halls is at the same level as the two-storey block. In your own article on the Batford School (same issue) you say "a judicious change of level has allowed the taller assembly hall roof to line through with the lower block." Woolton exhibits precisely the same feature for the same reason. Sauce for the goose. . . .

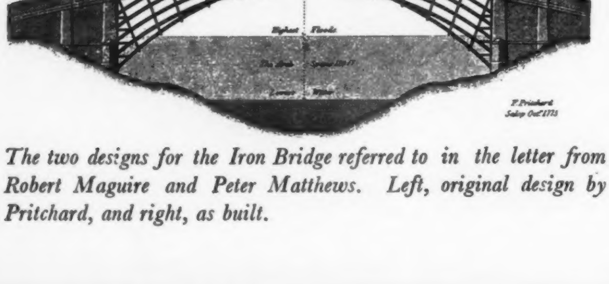
You also comment on the remoteness of the classrooms from the ground by being raised above it, resulting in lack of intimacy with the ground level outside. I agree that with the infants this smallness of scale and intimacy is important and once the landscape planting matures this effect should be achieved. But with the Junior School one had to choose between this approach or allowing the children to enjoy what is a very pleasant view over the playing fields with mature trees and a distant prospect. There was no hesitation in choosing the latter. In Liverpool such a view is a rare occurrence, and is well appreciated by children up to 11 years, as well as adults. It would be a crime to give the sense of enclosure whose absence you deplore.

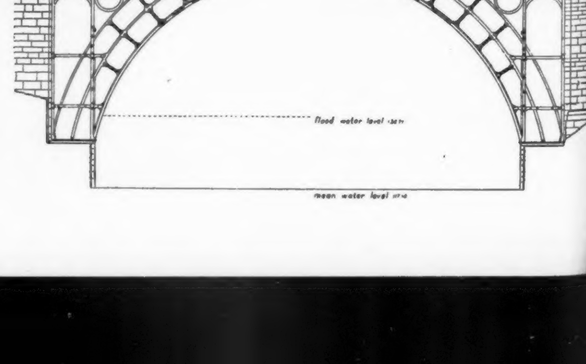
The same view dictated the placing of the windows in the gable of the Junior wing, giving a pleasant atmosphere inside the rooms. I agree that the relationship with the external brick pattern could be improved.

The windows at the entrance to the Junior School must be different from those of the large assembly hall since they light individual staff rooms and lavatory which require a certain amount of privacy. As for the tubular loops, they were in fact later additions to prevent vehicles running into the courtyard and it was thus impossible to relate them exactly to the paving. The children take a keen pleasure in using them for gymnastics, though I must admit this effect is accidental.

As for the north elevation, it has been planned to allow for a future two-storey extension adjoining the boiler house chimney which, incidentally, will become part of the end wall, and this is the reason for its somewhat uncompromising shape. Naturally there are windows of different size since they light spaces of different function, but they all have a common denominator in terms of proportion.

It seems a pity that your review of these two schools did not include any construc-





The two designs for the Iron Bridge referred to in the letter from Robert Maguire and Peter Matthews. Left, original design by Pritchard, and right, as built.

tional drawings (though they were supplied), since they are both interesting and contrasting as constructional types. One would have thought that these would form an essential part of a cost study. The written description is not enough. Again the basic sciences of heat, light and sound are hardly mentioned, yet are of tremendous importance in a building of this type.

Also under cost comment your statement that "both schools have achieved a good finish, Woolton with the emphasis on its floors and Batford on its decorations," is misleading. It is true that the decorations at Woolton were economical, but the implication is that little attention was paid to them. In fact, a very thorough study was made. I think it must have been a foggy day when the AJ visited Woolton.

Finally, your cost comments are very incomplete! For example, one would assume in the Woolton School that the saving in final as against tender figures was approximately £3,000, whereas in fact, increased cost of labour of £3,000, plus many items additional to the contract added at the request of the Education Authority were all included in the final gross cost. The real saving on the contract, therefore, in terms of cost at time of rendering, amounts to at least £6,000.

May I say that I consider your series of cost analyses of very great help to the architect, and that you are doing valuable work in this way.

DUNCAN M. STEWART.

Liverpool.

Two Depressed Readers

SIR,—We are not certain whether the sudden deterioration in the standard of Working Details (AJ, August 28) is due to staff holidays or the depressing influence of our English summer, but we do feel you have reached zero with your latest pictorial composition of flue-pipe, milk bottle and builder's second-hand door.

Surely the purpose of publishing a journal such as yours is, amongst others, to interest and inform its readers, not to fill them with gloom and despair, which is the effect this particular piece of squalid development has on COLIN and MARY OATES.

Aylesbury.

The Technical Editor is sorry that our correspondents do not fancy this Detail, in which they are not alone. The fact remains, however, that it confronts—boldly—the problem of how to handle the flue of a free standing boiler in a single-storied flat-roofed building. Other and possibly better solutions will be gladly and as earnestly considered for inclusion in Working Details.

The Clerk Of Works

SIR,—In reply to Mr. P. A. Hickson's letter (AJ, August 21), regarding the payment of clerk of works, I would draw his attention to the RIBA's Conditions of Engagement which states that the clerk of works shall be nominated for approval by the architect, and appointed and paid by the client. He shall be under the architect's direction and control.

I consider that the clerk of works is primarily the client's representative on the site.

A. D. POWER.

Liverpool.

Liverpool Society

SIR,—The Liverpool School of Architecture Society, which has not met since the war, is giving a sherry party for all past and present students, and members of the staff of the Liverpool School of Architecture. It will take place on Friday, October 3, in the Members' Room of the RIBA from 6 p.m. until 7.30 p.m.

Will all those intending to be present kindly let me know by September 26, so that the necessary arrangements can be made?

ROBERT SHAW.

43, Clabon Mews,
Cadogan Square, S.W.1.

Manchester Forum

SIR,—The Manchester Society of Architects, the Manchester, Salford and District Building Trades Employers' Association and the Lancashire and Cheshire Chartered Quantity Surveyors (Royal Institution of Chartered Surveyors) have jointly formed the Manchester Building Forum.

The object is to make it possible for all sides of the building industry to examine and discuss jointly mutual problems in the management of building projects. It is a non-political, non-executive organization, as such matters can be adequately dealt with by existing Joint Consultative Committees.

Primarily, an Annual Forum will be held as a residential week-end, where national and local speakers will be invited to read papers on a mutually interesting subject. It is hoped that people of junior executive level of their particular sections of the Building Industry as well as the older and more experienced members will participate, putting forward their points of view in an open and free assembly where these views would be subject to the experience and examination of all sides.

HAYDN W. SMITH.

Manchester.

BOOK REVIEW

Modulor 2. Le Corbusier. (Faber & Faber, 42s.)

That methods of dimensional control are essential in building is now generally accepted by architects. Even if they are spatially illiterate they know that many dissimilar bits and pieces have to be put together to make a building, and that complicated joints, patching up on the site, or using specially made bits in small quantities, are expensive.

Modulor 2 is a dialogue between Le Corbusier and those people who have spoken or written to him of their experiences with the Modulor. In addition to the dialogue the idea of the Modulor is developed; Serralta and Maisonnier, working at the Rue de Sevres, made a definitive geometrical construction for the Modulor which overcomes the uncertainties of the construction given in the first book (Figs. 7, 8, 9, 10, 12). Le Corbusier shows how he used the Modulor at Chandigarh and Ronchamp amongst other places. He gives a fascinating description of his game with Zip-a-Tones (pp. 149-153), the transparent, regularly patterned sheets are overlaid and rotated to produce a variety of larger scale and more complex patterns. He points out that there are definite points in the rotations at which these complex patterns appear, between these points there is confusion. Surely this is germane to modern building in which the separate elements, each with their own set of dimensions, need to be meshed in a comprehensible manner.

When a great deal of authoritative work on standardization and modular co-ordination is being carried out by official bodies why is it that, although the Modulor is frequently discussed, it remains peripheral and unadopted? Greece, for example, while putting forward a dimensional series based on the dimension 1·83 m. (6 ft.), observes that the two series of the Modulor have not the necessary simplicity that would allow them to become second nature to the architect and contribute to the rational industrialization of components. The OEEC publication EPA Project No. 174, *Modular Co-ordination in Building*, the most thorough technical study of the subject to date, suggests that it is too complicated for practical use adding that "in practice the measurements have a limited use and this appears to be mainly due to the small degree of additivity between different sizes" (*i.e.*, the sum of dimensions departs from the scale if repeated more than once).

To those who have used the Modulor these objections would seem to be unfounded. It is true that the mathematics of the scale are more complicated than the arithmetic of preferred sizes, but then who would tell an engineer that he may only add and subtract? A modern building is, after all, dimensionally complex. The question of additivity is more complicated because superficially it would appear that there are many useful dimensions which are not contained in the Modulor. Le Corbusier himself remarks on this at the beginning of the book. But the objection is very easily overcome in practice by extending any part of the series arithmetically, a secondary relationship with the basic scale is still maintained. This fact is amplified in two valuable contributions to the book: Serralta and Maisonnier compare traditional units of measure with the dimensions of the Modulor and find interesting affinities (pp. 51-58). In the height of the Modulor man there are six feet, four cubits, and 24 palms (3 in.), or for that matter 72 in. Alfred Neumann in his "mϕ" system which he calls "The Humanisation of Space," develops each term of his ϕ series arithmetically to produce groups of numbers which can be related to one another in different ways by virtue of their positions in the group. Both examples are extensions within the Modulor which show that additivity is possible providing you know what you are trying to do with the dimensions and therefore the building under consideration.

Two approaches to dimensional co-ordination and standardization can be stated: a system may be sought in the dimensions already in use industrially; the work of those contributing to the EPA project tended toward this approach. It was found that certain groups of dimensions were in frequent use; these dimensions, it seemed, could be rationalized more to provide groups of what were termed "preferred sizes." Alternatively, an *a priori* system may be postulated and then imposed on the industry; this was the approach of Le Corbusier. On the face of it the two approaches appear irreconcilable, the former is passive and undirected, the latter may be called unrealistic and possibly arbitrary. In practice the two contribute to a solution within our grasp. The EPA Project was led to investigate in detail the nature of modern building; the use of planning grids, the theory of dimensions and tolerances, an examination of junctions, and the classification of building parts. None of the results of these investigations appears to invalidate the use of the Modulor which, although no more than a flexible tool, gives direction in so far as it is rooted in our tradition, has a firm and undisputed anthropometric basis, and is charged with philosophical significances absolutely relevant to the present time.

Modulor 2 shows, through discussion and practical example, that the modulor provides at least a series of dimensions no less suited than any other to the dimensional co-ordination of modern building.

JOHN VOELCKER.

NEWS

TERRACE HOUSING

Appeal Allowed

The Minister of Housing and Local Government has allowed the appeal by H. J. Wedge Ltd., speculative builders, against the refusal of Essex County Council to permit the erection of terraced houses in Rayleigh. At the hearing of the appeal (AJ, July 24) the clerk to Rayleigh UDC referred to terrace housing as "retrograde architecture" and "this evil." The terraces were designed by J. M. Bion.

An interesting feature of the Minister's decision is that he has, in accordance with the practice recommended by the Franks Committee, revealed that the Inspector recommended the refusal of the appeal, and suggested a revised layout incorporating lock-up garages. The Minister, while recognizing that the omission of lock-ups might be a disadvantage, did not think this a sufficient reason for refusing permission.

RICS

Gold Medal

The RICS Gold Medal and Prize (100 guineas) for 1959 will be awarded for a paper on either The Place of Agriculture in Land Economy, The Realization of Positive Town Planning, The Costs of Building, or The Influence of Legislation Upon Land Development. It is open to any person ordinarily resident in the British Commonwealth or Ireland. Entries must be received not later than April 30, 1959, by the Secretary, The RICS, 12, Great George Street, S.W.1, from whom entry forms and the rules may be obtained.

BIRMINGHAM

16-Storey Flats

The sixteen-storey blocks of flats by A. G. Sheppard Fidler, Birmingham City Architect, which are scheduled for erection towards the end of this year, illustrate well the current trend in local authority housing both in regard to ever increasing height and general plan form. The precursor of this type of block was undoubtedly the eleven-storey point block with four flats per floor, which overcame the prejudice in this country against living in tall flats with internal w.c.s and bathrooms, and at the same time showed the advantages which tall blocks can give to site layouts and community environments. This cleared the way for even taller blocks and the revision of subsidies in 1956 accelerated this trend, by making subsidies applicable only to slum clearance, forcing local authorities more into central areas, to higher density sites, and also by introducing subsidy related to height instead of to cost of land, as previously. Even so, to build higher costs more and to offset this more dwellings are usually grouped per floor in these higher blocks; in this case there are six flats, two three-bedroom and four two-bedroom, on every typical floor.

Some dwellings are included on the ground floor and this has presumably been done to take advantage of the additional subsidy for this floor. Under the new Housing Act blocks above six storeys in height are eligible for the six-storey subsidy, plus £1 15s. per dwelling per storey per annum. In consequence, the higher the block the greater the financial importance of including ground floor dwellings.

There is no doubt, however, that ground floor dwellings in tall blocks are an embarrassment, visually, architecturally, and for the unfortunate tenants, who suffer severe loss of privacy, particularly those next to the main entrance, used here by the 250 inhabitants of the block. There also seems little excuse for the architectural distress of the ground floor where flats, tenants' stores and other ancillary accommodation are hidden behind an arbitrary facade of punch-hole windows, regularly spaced and sized regardless of partitions, structure or day-lighting function.

This same forcing into what amounts to an "architectural treatment" is apparent elsewhere in the building: the way in which living rooms and private balconies next to the escape staircases are expressed as part of the staircase recession, for example. These elements, and there are others, such as the balconies on the south face, are in direct contrast to the major portions of east and west facades, which are alternate window and brickwork strips and could have led to a simple and straightforward block.

It is important that tall blocks should be good; they are not two-storey houses which can be lost in a morass of other development. Their height and the greater space around them make them visually important, at least for the moment, though they may well become the two-storey blocks of the future.

Accommodation schedule

	1-BR	*2-BR*	*3-BR*	*4-BR*	*Total of rooms*
Ground floor	1	1	1	1	12
Fourteen typical floors	—	—	56	28	280
Penthouse	—	1	1	—	5

Total number of dwellings	90
Total persons housed at 1·1 per room	327

Perspective of the sixteen-storey flats at Birmingham referred to above.

The Select Committee (of the House of Commons) on Estimates has examined the estimates of the Department of Scientific and Industrial Research. The Committee's Report and part of the minutes of evidence taken by a sub-committee have been published (Fifth Report from the Select Committee On Estimates, HMSO 9s.). We publish below excerpts dealing with the work of the Building Research Station.

SELECT COMMITTEE ON ESTIMATES

BRS Told To Make Building Industry Pay More

The Select Committee on Estimates is appointed by the House of Commons "to examine such estimates as it thinks fit, and to report what, if any, economies consistent with the policy implied in those estimates may be effected therein." In this report the Committee says that it has dealt only with questions of organization and administration, and emphasizes that it is making no criticism of the quality of the practical work of the DSIR. In 1956 the DSIR was reorganized, and the Council for Scientific and Industrial Research formed with executive powers. When it came into being the Council immediately embarked on a full scale review of all the work of the establishments, and the review was mainly concerned, according to Dr. H. W. Melville, Secretary of the DSIR, with "pruning the programme and seeing what ought to be stopped." This was the result of criticism by a Committee of Enquiry in 1956 which had reported that much research was started and not enough stopped. The Select Committee welcomed this review and the Council's policy of continuous reviews for the future.

Publications criticized

A section of the report on relation with industry, the Committee say that "a major administrative problem is that of ensuring that information on these results reaches those to whom it would be of value." The Committee criticize some of the reports put out by DSIR, and the annual reports in particular, as too general in character to arouse the interest of the average industrialist. It was explained that the annual reports were designed to give the people in a particular industry a "broad indication" of what the establishment was doing, but the Committee suggest that people in a particular industry are not interested in broad indications, discard such publications unread, and so may come to discard unread a publication that would be of great interest to them. The Committee recommend the DSIR to decide precisely whom it wishes to interest by the information which is to be given, and to design the publication accordingly.

Financial recoveries

The major part of the Committee's report deals with financial recoveries from industry. The following table shows the estimated receipts of each DSIR establishment as a percentage of expenditure :

National Physical Laboratory ...	37·6
Building Research Station	6·5
Chemical Research Laboratory ...	39·3
Fire Research Station	95·4
Food Investigation Organization ...	3·4
Forest Products Research Laboratory	6·7
Fuel Research Station	1·8
Geological Survey and Museum ...	19·6
Hydraulics Research Station ...	24·6
Mechanical Engineering Research Laboratory	5·9
Pest Infestation Laboratory ...	11·7
Radio Research Laboratory ...	0·3
Road Research Laboratory	11·4
Water Pollution Research Laboratory	13·8

The Committee considered that the recovery rates of the Food Investigation Organization, the Mechanical Engineering Research Laboratory and the BRS were much too low. Their report continues :

"Evidence was received that the Department's Headquarters are aware of the problem, and it was explained that there was great difficulty in recovering any substantial sums from the building industry, for example, owing to the great number of small firms involved and owing to the division of the industry into architects, contractors and users. But the BRS does not make any attempt to raise contributions from manufacturers of materials when research work is to be undertaken which may result in recommendations to their benefit and Your Committee are not satisfied that this principle is justifiable. Your Committee note that since the coming into force of the Department of Scientific and Industrial Research Act, 1956, the Department has prescribed a scale of charges to be paid by industry for work done on its behalf and that provision is made in the new regulations for assessing charges to industry in some cases by the value rather than by the cost of the work. They believe that the rates of recovery of the three stations will show some improvement when the new rates are put into force, but they believe that the most important factor in achieving a satisfactory rate of recovery is the attitude of the station concerned, *and they recommend that the BRS, the Mechanical Engineering Research Laboratory and the Food Investigation Organization should approach the question of recovering money from industry with greater determination to achieve the best possible rate consistent with departmental policy, and in particular that the BRS should not necessarily disregard the benefits which a supplying industry may receive when research conducted with its products is successfuly undertaken.*

The Shell Building

"Your Committee do not criticize the levels of the new scale of charges to industry which the Department has recently prescribed. But the evidence revealed that the charges do not cover one particular form of work which, in your Committee's opinion, ought to be covered. At present the BRS is making measurements of the effect on the Bakerloo tunnel of removing and replacing the earth cover while the new Shell building is being constructed. The cost of the work to the Department including overheads is about £1,000 a year and the London Transport Executive provide facilities without charge, the direct cost of which is estimated at £750. The work is of great value to the Department in connection with its study on tunnels, but when witnesses were examined on this point, they at first stated that the work is also of value to Shell, in that it is helping to reduce their risk of causing damage to the tunnel. A memorandum was subsequently submitted by the Department, in which it is stated that the Department have assumed no responsibility for the safety of the tunnel, and that it is not possible to say whether any direct financial benefit to the London Transport Executive or to Shell Buildings Ltd. has been, or will be, derived from this work. Your Committee accept this view, but they suggest that when this study was begun, it was certainly reasonable to suppose that it might be of value to the Executive or to the Company, and in fact the Department are still unable to say whether or not advantage will result."

(The DSIR memorandum explains that BRS has been carrying out studies for some years on the design and construction of tunnels, to obtain information which would lead to economy in future work. As part of this programme BRS wanted to obtain information on the way in which the forces on the linings of tunnels varied with the depth of the earth cover over them. An additional reason was the substantial trend towards high buildings in London with deep foundations for which knowledge of the effects on construction works in the vicinity of tunnels could be of great importance. The construction of the Shell building seemed to provide a unique opportunity to get information which was wanted, and the BRS secured the agreement of the LTE to a programme of observations of movements in the tunnels and the stress variation in the tunnel linings. The investigation is providing data that will assist in the design of future tunnels and future constructional work over tunnels, and is not devoted to diminishing the liability of the Shell Buildings Ltd. in respect of possible damage to the Bakerloo Tube.) The Select Committee conclude : "They cannot accept that because the work will be of value to the community, or because the initiative came from the Department, a contribution from the Company should not have been considered, *and they therefore recommend that in future where it seems possible that any work carried out by the Department for its own purposes may incidentally result in direct advantage to an individual firm, an agreement should be negotiated with the firm concerned, before the work is started,* whereby the firm should pay a contribution to the costs of the work if in fact the firm obtains a direct advantage as a result of the work; and that the Department's Headquarters should give explicit instructions to the establishments to cover such cases, and should insist on being informed when such cases occur."

Excerpts of evidence

Sir Ian Orr-Ewing asked Dr. H. W. Melville, secretary of the DSIR : "Now we come to the Building Research Station. Here you have a case which really does puzzle me very much indeed. As far as I can make out, the gross expenditure is £528,000, and the recovery is only £35,000. An awful lot of people build and an awful lot of people make use of buildings and an awful lot of people want to make use of new materials. That seems a very small recovery?"

Dr. H. W. Melville replied : "That is a thing which bothers everyone. As far as I have heard the figures, I think it is true to say that there is £2,000 million spent on building of one type or another in this country, and I think it is also true to say that about £500 million is spent by the government in one form or another on building. You may reasonably say that if we have a building research station, we are in duty bound to advise government departments who do this very large amount of building. The problem is what happens to the other £1,500 million; and that is a real problem. Naturally, we should like to recover a substantial part of the cost of this research, but the trouble is that, apart from the few big contractors, the building industry comprises a tremendous number of very small firms; and there is a practical difficulty in devising some mechanism to recover from the multitude of small firms some contribution, and no one has yet suggested a practicable scheme which might help in this connection."

Sir Ian : "Why can there not be a research association within the industry itself?"

Dr. Melville: "I do not think you can define 'the industry.' It consists of architects, people who make bricks, people who provide windows and doors and so on. There is no industry really. That is another of the difficulties in trying to solve this financial problem. We are very well aware of it, but we do not quite know how to solve it."

Dr. F. M. Lea's evidence

Mr. Turton asked how the results of research were brought to the attention of the building industry and architects. Dr. Lea, Director of BRS, said: "This is a very big problem, because the building industry is a most complex one. You have something of the order of between 15,000 and 20,000 practising architects; you have the associated professions, such as the structural engineers and specialist ones like the heating and ventilating engineers and the lighting engineers and so on; then there is the quantity surveyor, who is the link between the architect and the building on the costing side; then there are the builders, about 100,000 firms; and finally you have the user of the building because, after all, the first way in which you get a good building is for the client's brief to be good. That is the broad problem . . . we have, over the years, experimented with a great many techniques, and, may I say, we are still thoroughly dissatisfied with the present rate at which we can get the information over and the proportion of industry we can reach."

Dr. Lea distinguished between the "handful of large building firms with their own technical development organizations," which could absorb straight technical information and understand how to use it, and the rest, which cannot use straight information. For these it has to be converted for application to particular problems. BRS believed their most potent document was the monthly digest which had a circulation of over 30,000, reaching 40,000 after a few years, and dealt in the main with some particular aspect or problem of building. The RIBA bought a block amount for insertion in their journal to go to every member each month. The NFBTE took about 3,000. Other publications were put out by the Stationery Office at different levels, a lot of papers were published in scientific and technical journals, the staff gave up to 70 lectures a year, and parties of builders, architects and others visited the station. Films used by BRS as a research tool were shown to about 60,000 people last year. The station did quite a lot of work on building sites, such as packaging bricks, and other builders became interested.

Mr. Turton asked if there was a Building Research Association. Dr. Lea pointed out that building was divided into three entirely separate branches: design, manufacture and construction, with the result that there was not the inter-action between the design side and those who had the production problem. That was one of the big troubles they were up against the whole time. "One very useful purpose we serve is as the interpretative link between the different sides of the industry, trying to bring home to the architect that certain types of things in design are going to mean more difficulty in construction which will resolve itself into higher prices on the tender." Dr. Lea reckoned that some 30 per cent of the BRS effort was going into the promotion of publicity for the results of research. They had done quite a lot of broadcasting, but had been very infrequently on television. But they had to be careful about this. "We are anxious to publicize our work among the building industry as much as possible but we do not want to attract a very large general correspondence here because we would be quite incapable of handling it."

Finance from industry

In his evidence on the financial recovery from industry Dr. Lea was asked about the work on the Shell site, and said that while BRS work was ensuring the safety of the railway tunnel, and giving Shell a certain insurance against risks, "our primary purpose is to improve the whole basis of design, so that when design engineers are going to work, they will have more knowledge to go on than they have today and will be able to do a design that will lead, in the end, to lower costs to the client. . . . The benefits of this work flow back to the country as a whole, and you cannot distinguish the different pockets into which they will flow in the end." Reminded by Mr. Turton that it was general DSIR policy to recover from industry the cost of work carried out for them, he said: "the industry is indefinable. . . . So much of our work has a bearing on the design, whether it is the design the architect uses or the structural engineers use, and so on. You cannot define your client in that case. It is being used generally by the architectural profession, by the structural engineer and so on, and it results in the ultimate client getting a cheaper building structure." He said that the cost of work in fly ash (£3,000) was borne by the Central Electricity Generating Board, and on brick packaging (£2,000) by the Brick Development Association. A contribution of £3,000 was made by the European Productivity Agency for work on modular co-ordination, and of £1,100 for building site management. The Midland Regional Board for Industry contributed £2,500 for a Committee they set up on factory design, the NFBTE contributed £2,000, and ICI contributed £1,500 for work on a particular building problem.

Asked if the RIBA made a contribution Dr. Lea said: "No, professional bodies are not a source of funds for research. If you take the RIBA, half their members are salaried employees. . . . I know of no industry in which salaried employees contribute to the cost of research." No contribution was made for work being done on heat and noise insulation in flats, because this was a Ministry of Housing problem. Complaints from tenants in the immediate post-war period were so large that £100 to £200 had to be spent on each flat, so it was extremely important for the Ministry to have guidance.

Mr. Turton suggested that heat insulation affected industry, and Dr. Lea replied: "Yes, but again you are stating the general problem of heat lost from buildings. You are providing the data which the designer can use by which he can predetermine what level of insulation he is going to use. . . . Of the total output of the building industry of £2,000 million, something like £950 million is actually paid for by either the taxpayer or the ratepayer, so that the government interest is extremely large . . . . it is very difficult to put these things into particular pockets and say 'this is benefiting Mr. X'."

Dr. Lea also pointed out that the government controlled building through model byelaws, which were influenced by the work of BRS. Architects would not specify something new until they had seen something on it from the station. The large manufacturing firm could afford to experiment, but the individual architect was in a much more difficult position. Asked if it was normal for the architect to recommend materials Dr. Lea explained that the architect prepared a complete specification, a lot of the information being drawn from BRS researches.

"Perpetual overload"

Brig. Prior-Palmer asked if staff was adequate. Dr. Lea said: "This station lives in a state of perpetual overload. We are in real difficulties at the present time with the recruitment of certain types of staff, such as the recruitment of engineers, scientific officers and chemist scientific officers. . . . The initial starting salaries are not really competitive with industry. It is the salary at the starting point. The youngster is apt to look at what he is going to get in the next few years." Asked "are you losing staff to industry," Dr. Lea said: "I have the biggest turnover of staff of all stations in the Department. We have been for so many years the only source of highly trained staff in our line, and the result is that our turnover has been relatively large."

The Town Planning Institute's Summer School, held last month, covered a wide variety of topical subjects: shopping areas, water supply, the expanded towns, British landscape and the development of Milford Haven. This report is contributed by Paul Brenikov.

TPI SUMMER SCHOOL

Stimulating and Controversial Papers

The Town Planning Institute's Summer School was held this year in Wales at University College, Bangor. The full course, which lasted ten days and covered a very wide variety of subjects, followed the pattern set at last year's Oxford meeting and was divided into two main sections: the first dealing exclusively with British planning problems and techniques; the second (following immediately afterwards) with matters relating to planning overseas. In addition to its traditional function as the main annual get-together of planning officers for talking shop amongst themselves, the School also provides the occasion for experts in related fields to present their own points of view to planners and pass comments on the statutory planning process. Contributions from outside experts were prominent at this year's School, for of the five main papers read during the first section, only one came from a professional planner.

At the start of the School the delegates were welcomed by Lord Brecon who, in his opening address, suggested that the main defect in planning so far as Wales was concerned was the failure to recognize and plan for the development of Welsh resources. For example, it was only recently that the full potentialities of the magnificent harbour at Milford Haven had been recognized. He thought that planners should be more positive in their efforts to attract new employment into the smaller towns and villages of Wales, for this was the most effective way of checking the serious and continued outward drift of younger people that had left so many areas in Wales with a reduced and ageing population. This new employment, he maintained, must come from the development of more small-scale industry rather than from agriculture. Referring to the recent controversies over sites for new major undertakings in Wales—at Trawsfynidd and Milford Haven—Lord Brecon appealed for a more balanced view, particularly on the part of the general public. When large developments with peculiar siting requirements were put forward unexpectedly they were bound to create very awkward and unpredictable problems. It seemed to him that many members of the public did not realize how necessary these big developments were to the national economy, nor how difficult it was to find non-controversial sites—particularly in Wales where one-fifth of the country was now protected landscape.

The first of the main papers to the School came from an industrial consultant, O. W. Roskill, who discussed "Town Planning and Retail Trade." As an expert adviser on shops and shopping he was highly critical of what he believed was the planners' approach to retail trading. His main complaints were that the present system of controls over shop fronts and shop types was far too rigid and also that planning was failing to take account of powerful new trends that had developed in trading methods since the war. The moves towards self-service stores, prepackaging, supermarkets and the new-style "vending machines" were part of a new pattern that could not and should not be resisted. On the layout of shopping areas Mr. Roskill seemed to think that planners did not attach enough weight to the retailers' own views but preferred to impose their own set solutions. In opposing this approach he suggested that the planners' aims should be twofold; firstly to achieve the greatest possible flexibility both in space and time, and secondly to allow for the greatest possible measure of competition. Unfortunately he had little to say on the practical methods of achieving these objectives. While he himself agreed that the pedestrian precinct provided a pleasant and safe environment for shoppers, he was forced to admit that many traders were still opposed to it. He seemed to think that more provision for parked cars and better planned loading areas were more important to most retailers than carefully laid out squares and piazzas. As to congestion, he held that we had already gone too far in our efforts to reduce it. Our aim should rather be to *create* congestion in shopping centres, as it was an indispensable condition for successful retail trading. If and when relief became necessary then planners must learn to do this without bypassing the centre or draining its customers away. Neither Mr. Roskill nor anyone else appeared to know how this particular trick could be done.

The School went on to hear some further expert opinion, this time from Sir George McNaughton, Chief Water Engineer to the Ministry of Housing and Local Government, who spoke on "Water Supply in Relation to Regional Planning." Sir George's paper was primarily a factual review of recent developments in water engineering, and progress in administration since the passing of the 1945 Water Act. He also made special reference to the water supply surveys recently completed by the Ministry. These surveys, covering practically the whole country, could be of great value in planning large-scale developments but up to now they have been little used by planning authorities. Sir George agreed that because of the heavy demands likely to arise in future, particularly from industry and agriculture, close cooperation between planners and water engineers was essential; but he seemed doubtful if planners could be left to draw their own conclusions from the results of his department's survey. Some planners on the other hand were left with the impression that the obvious connection between water supply and land-use planning is not sufficiently recognized inside the Ministry itself. Sir George confessed that he did not know what tie-up there was between his own water inspectors and the planning staff of the Ministry; while the fact that the paper seemed to assume that land-use planning in Britain is undertaken on a regional scale struck some of the audience as a little ironic.

There was no trace of a loose end however in the paper given by W. O. Hart on the "Expansion of Towns." Mr. Hart, speaking with a double qualification as Clerk of the LCC and the former General Manager of the Hemel Hempstead Development Corporation, impressed his audience with a masterly exposition of the intricacies of the Town Development Act. Having outlined the difficulties—financial, social and technical—that have inhibited the operation of the Act up to now, Mr. Hart went on to make several major points in his conclusion. It was now clear, he thought, that even if all the current difficulties could be resolved, town expansion schemes would always be slow, small-scale and expensive in terms of capital and man-power. As an instrument for decentralization they were much less effective than new towns. For one thing they had not succeeded in attracting industry—the key to successful decentralization—in the way new towns had done. Bearing in mind the scale of the problem to be dealt with, he considered that schemes for town expansion would have to be supported and supplemented by more new towns. These alone could provide the big blocks of quick new development that would certainly be required. He himself believed that both new towns and expanded town schemes would be needed; but it was now apparent that in future new towns would have to come as a result of local authority rather than Government action.

Sylvia Crowe, President of the Institute of Landscape Architects, provided the School with its only serious discussion on æsthetic matters. Her paper on "Tomorrow's Landscape" began by shocking her audience with a horrific vision of the British countryside fifty years hence. ". . . a network of poles and wires, a transformer in every field, the roads lined with rival filling stations, the green belts nibbled into with speculative building and housing estates until the towns merge one into another; streams and lakes dried up or piped and trees dying from the falling water table." Nor did she hold out much hope for the National Parks. "In the National Park areas, sadly reduced and isolated, congested crowds will picnic on rocks and worn herbage, surrounded by notice boards exhorting them to put their litter into the bins, which will far outnumber the remaining trees." This dismal future, she maintained, was the inevitable consequence of our failure to persuade people that they could only have civilized surroundings if they were prepared to care for them, plan for them, and where necessary pay for them. The old historic tapestry of the British countryside was being shot to pieces and we were now faced with the task of restoring it or creating something entirely new to take its place. While Miss Crowe believed it was hopeless to resist all changes, almost any new incursion into the landscape could be handled in one of three different ways: as something to be absorbed (if it were small enough), as a new focal point within the existing landscape or as material with which to create an entirely new landscape form. Miss Crowe suggested that if we can approach them in this way no new developments in the landscape need become eyesores. By way of illustration she described various classes of "objects" and outlined a possible means of dealing with each class. Buildings, she believed, were best treated as focal points in the landscape provided their form and function warranted it. On the other hand with the multitude of small "things in fields" the aim should rather be to absorb them into the existing landscape completely. Wires, masts and latticed towers could be looked on as a detached aerial pattern formed above the ground if the rhythm of the existing landscape could be made to flow on uninterrupted beneath them, while bridges, dams and motorways should seem to grow from and merge with the earth itself. As to the last and most difficult class of all—the nuclear reactors—here, Miss Crowe suggested, was a new element related to the enlarged scale of the mind, not the human scale of the body. These called for a completely new approach and opened up new and exciting possibilities for landscape design.

In the last paper the School was invited to consider a practical planning problem of the first magnitude—how best to reconcile conflicting demands for the use of land in Milford Haven. The matters involved are major national assets, the deep-water haven and the Pembrokeshire National Park: and J. A. Price, the County Planning Officer for Pembroke, set out the impressions of a man on the spot in his account of "The Development of Milford Haven." In spite of Ministerial assurances of a bright future for the new port, the main point to emerge from Mr. Price's account was the uncertainty which still surrounds the whole question of development on the Haven. Several schemes had been scrapped or shelved and only one—the BP Oil Terminal—is far enough advanced for its full effects to be assessed. This uncertainty makes effective planning, for preservation or future development, a very difficult task indeed. Faced with rapid and unpredictable changes over the nature of the developments themselves and conflicting evidence from the experts on critical matters such as the actual number of deep-water berths available, Mr. Price seemed to think that his main task was to maintain a sense of proportion. As matters stood he believed (very sensibly it seemed) that "we dare look no farther ahead than 1966 or matters will get completely out of hand." This hardly seems to be a satisfactory basis for planning what may be a major European port in the not too distant future.

It was evident that Mr. Price himself and his Council were very well aware of this and alive to the great importance of all the factors involved. At the moment there is no overall industrial plan, although the need for one is self-evident if the separate concessions obtained by the big developers through private Acts of Parliament are ever to be brought together into one coherent whole. The present piecemeal approach seems to be the surest way of making certain that irreparable damage is done to an outstanding National Park. Nor has any decision been taken over the proposal to construct a tidal barrage and road bridge across the Daucleddau Valley, even though the road connection and the water supplies these will provide are essential for industrial development on any scale. The lesson seems to be that what Milford Haven needs more than anything else is a policy for the future and this can only come from Government action.

Not many of the British delegates stayed on for the meetings of the Overseas Section. This was a pity, for it would have provided them with a refreshing opportunity to set aside the details of technique, administration and day-to-day problems that occupy so much of their time and examine instead the basic principles that ought to underlie their actions. Planners from overseas lack the common background that all British planners take for granted. The areas in which they work and the problems they have to deal with are so radically different that when discussing them, matters of detail become irrelevant In consequence most of the main papers and discussions centred on general questions that are fundamental to planning everywhere: for example, "Problems of Administration and Planning," "Legislation for Planning" and "Planning Research." Now that planning in Britain has become an accepted and established function of Government, there seems to be a tendency for the British planning profession to concentrate too much on the manipulation of the various powers at its disposal and turn aside from the questions of aims and objectives. Perhaps the very nature of a planning officer's daily work makes this inevitable. The Annual Summer School, however, is intended to redress the balance by bringing matters of principle to the fore. This objective was so effectively realized in the Overseas School that perhaps the Town Planning Institute might consider making attendance at this section obligatory for all scholars next year.

Michael Laird describes two churches recently built near Edinburgh. One, at Clermiston, was designed by Basil Spence and Partners and the other, at Easthouses, was designed by Alan Reiach.

Two Scottish Churches

The two churches shown here are among the most successful so far built under the scheme of the National Church of Scotland Extension Committee for dual purpose buildings to serve the new housing areas. These purposes are, in the first place, to serve as a church seating some 400 people and, in the second, to be used as a hall serving a variety of purposes on other occasions. While there is considerable debate even now as to the wisdom of this general design policy, apparently these two examples work remarkably well, within their simply conceived—and largely traditional—form, in fulfilling both functions.

This demand for the " hall-church " arises from exigencies of the present financial situation, and it is hoped that in many cases it will eventually be possible to build a separate hall adjacent to each church, which will then revert to a more exclusive purpose of worship. This further requirement for expansion of the building group must make the initial design problem unusually difficult, and it should be noted that this condition affects the hall-church at Easthouses more than that at Clermiston though not, in the event, to Easthouses' disadvantage.

At Clermiston there has been and still is, a timber hall which served as a temporary church until the time of this new church being dedicated. Easthouses, on the other hand, is a " from scratch " job and is more often subject to the full run of secular activities. These considerations have influenced the architect's designed disposition and area of window, the arrangements whereby light fittings may easily be drawn back against the wall, and the provision of a stage (specified client requirement) at the back of the nave. The stage will be removed and a gallery substituted for it when the hall is built.

The Easthouses church construction is traditional, 11 in. hollow walls, Tyrolean rendered, pantile roof on purlins carried on a welded portal frame, one leg of which is exposed forming a separation between aisle and nave. The open ceiling is lined with mahogany strip boarding. Stone has been used for the tower and at the sanctuary flanking walls. The sanctuary itself is lit by a large window from one side only, which gives ample lighting without glare. The stone wall at the window side acts both as a light baffle and as a screen to hide the curtain which comes across the sanctuary when the church is used for secular purposes. This curtain has been hung from the ceiling by means of a light, white-painted " hospital type " runner, and a sharply contrasting black cross has been delicately interwoven to the supporting ties. The flooring is of beech in the nave, and of precast concrete blocks in the sanctuary, aisles and entrance hall. The organ is electronic and the amplifier is concealed behind the grille above the console in the sanctuary. The sanctuary furniture, with the exception of the elders' chairs (from Denmark), was designed in the architect's office; the communion table being simply of two rectangular pieces of Aberdeen granite.

At Clermiston the construction is once more traditional. The outside walls of the group are mainly of cavity brick constructed with white harling and plastered inside. The end gable behind the sanctuary, which is a shallow " V " on plan, is of warmly coloured second-hand stone solid masonry construction, flush pointed. The session room gable, with its pointed window adjacent to the main entrance, is also of stone and is built directly over the front retaining walls. The roofs are of re-used Ballachulish slates, on timber rafters over steel portal frames at 11-ft. centres.

The interior has been treated very simply, using almost entirely natural materials. The white plaster walls show off to advantage the stone sanctuary wall which holds the large wooden cross behind the communion table. The floor is of polished ramin hardwood, which is of a honey colour. The chairs for the congregation are of Danish design in natural beech. The " Discus " glass light fittings are also of Danish design. In this case also, the sanctuary furniture, excepting the elders' chairs (by Soburg Mobler), was designed in the architect's office. The floor of the sanctuary area is carpeted in deep blue, and plants of *Cissus Antarctica* are being trained to climb on the stone wall behind. Apparently this church is only used for secular functions when the sanctuary is separated by " temporary movable screens " but it is hoped that the main church will eventually be used only for religious functions.

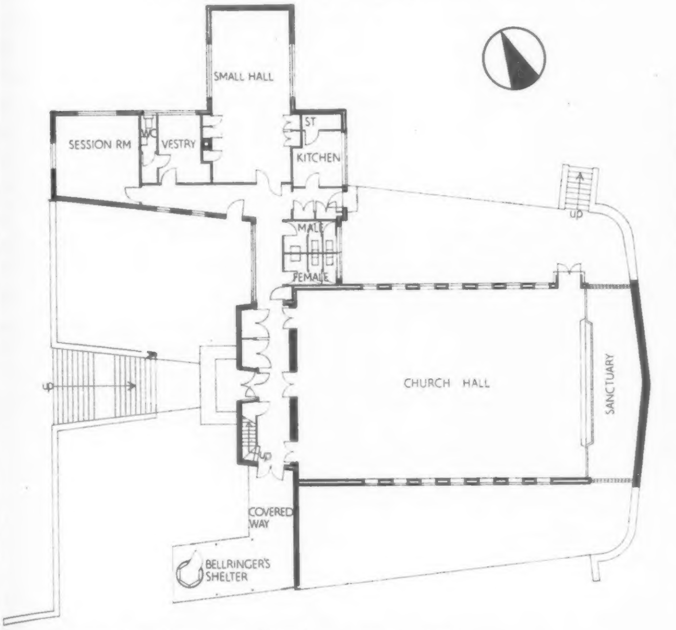
The campanile at Clermiston stands some 50 ft. high and takes the form of a prestressed concrete tripod supporting the bell (which has been used in two other churches over the last century). At Easthouses, the bell-tower is more traditionally conceived in stone; it is physically a part of the main building, the base area being adapted as an entry to the stage from the rooms adjacent to the entrance which serve as changing rooms during dramatic performances.

On each job, the vital statistics are as follows:

	Easthouses	*Clermiston*
Overall floor area ..	4,568 sq. ft.	4,980 sq. ft.
Building cost ..	£15,588	£16,820
Furnishing cost ..	£1,034	£1,293

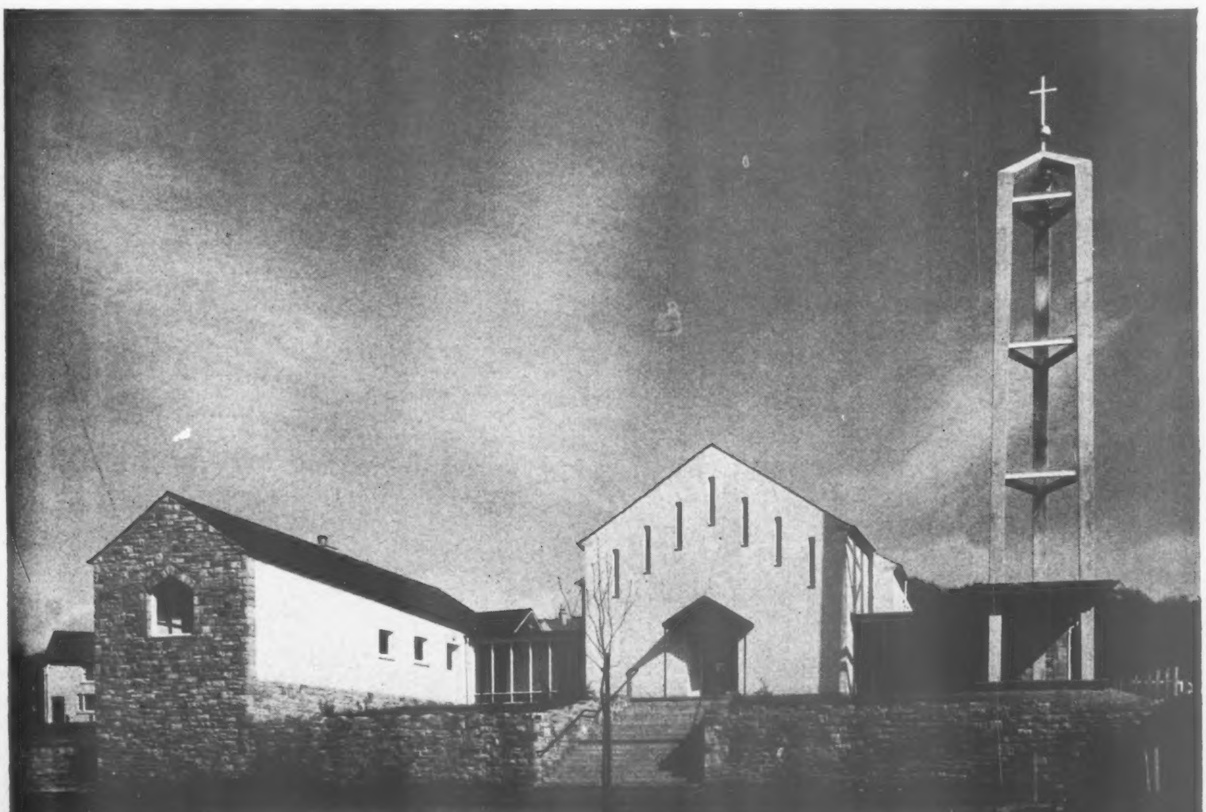
Note: Easthouses also has a new Manse of 1,500 sq. ft. floor area, costing £4,593.

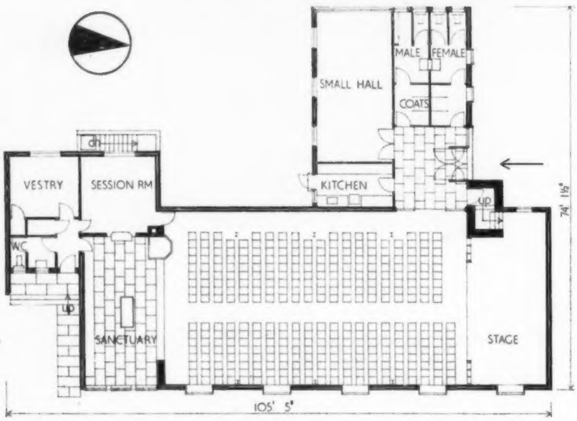
So much for the facts. It will be seen that in size, cost, and facilities the two building groups compare closely with one another. Both churches have been built for only a little over £3 per sq. ft., and it is significant that the furnishings for congregations of about 400 people have been more economically provided from Denmark and Jugoslavia than from the mother country, though indigenous materials otherwise prevail to realize a regional character too rarely found now even in such traditionally conceived buildings. It is not the purpose of this report to draw competitive comparisons (indeed the architectural standards are very similarly high), but rather to enlarge slightly upon some aspects which cannot be fully evident in photographs and also to give an individual's impression of the general circumstances. So far as photographs are concerned it should be explained that those of Basil Spence and Partners' work at Clermiston are by professional photographers who have been able to take advantage of the comparatively open site, while those of Alan Reiach's church at Easthouses were "snapped" by the architect shortly before the building work was completely finished and the devastating commencement of building immedi-



Ground floor plan, Clermiston Church [Scale: $\frac{1}{32}'' = 1' 0''$]

Two views of the church at Clermiston designed by Basil Spence and Partners. Above, looking toward the sanctuary from the western end of the nave. Below, general view of the entrance frontage from the west.

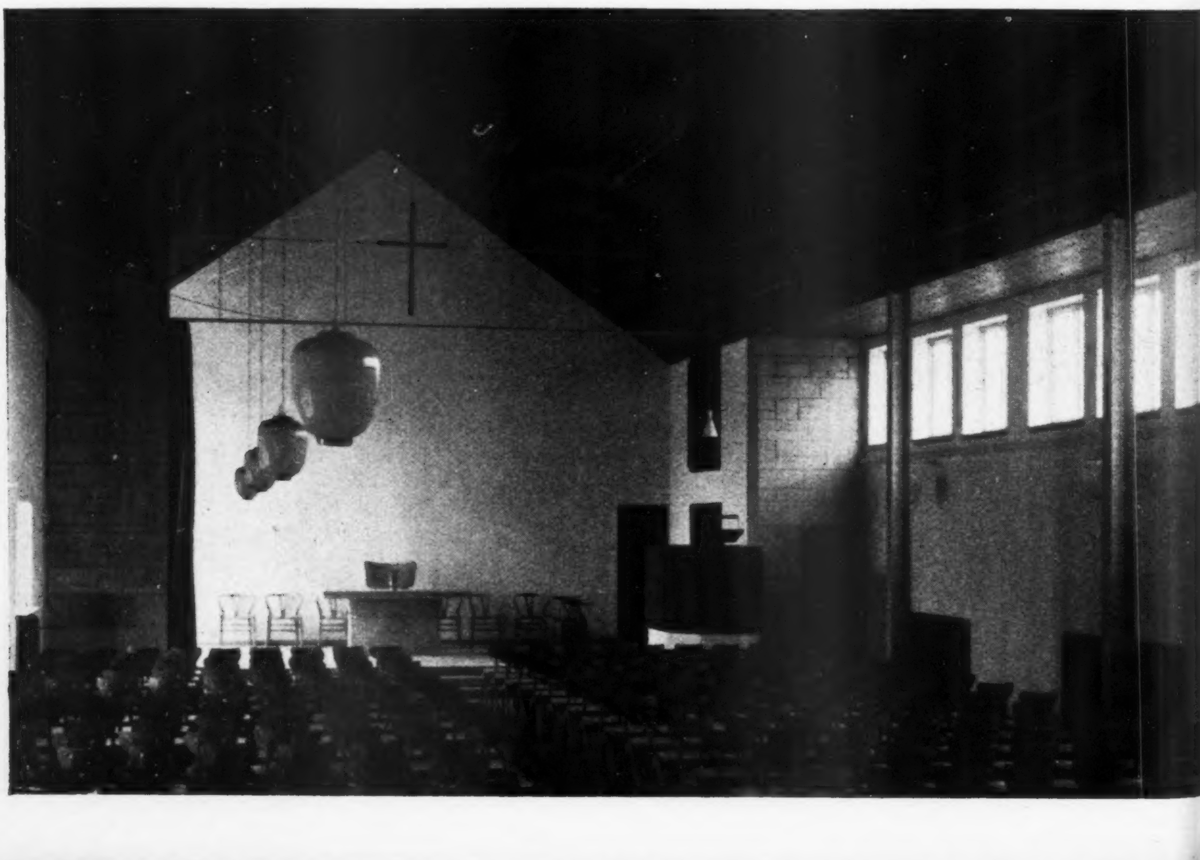




Ground floor plan, Easthouses Church [Scale: $\frac{1}{32}$" = 1' 0"]

ately surrounding the site itself. In both cases the surrounding new housing development, layout, street "furniture," and general character seem to plumb the depths of overt nihilism. It is therefore not surprising to find that, in the period of a year or more since completion, there are broken windows, defacement, and locked doors throughout the week. Easthouses church is now completely engulfed by a rubbish of building, chestnut fencing, lamp-posts, etc., which too many people pass for architecture. In fact, some callous hand has written large upon the outer wall of the church a remark which alludes to some old fellow being given to "the crime of bestiality" and one wonders whether the vice is any more unnatural than the character of the environment whence the remark has sprung. At Clermiston the architects are trying hard to persuade the church authorities not to put up some gates which they now find necessary at the foot of the steps to the main entrance. More fortunately, this building is sited at the top of Clermiston Hill, clearly overlooking the new housing development westwards to the Firth of Forth and hills beyond. The adjoining ground to the south is zoned for a nursery school, and to the north, tentatively, for open space.

Above left, the entrance of the church at Easthouses, designed by Alan Reiach. Below, the interior looking towards the sanctuary.



technical section

THE REPAIR AND PRESERVATION OF OLD BUILDINGS, 4

the diagnosis

Before describing specific repair techniques (which will form the subject of a special number of the JOURNAL next week) the author, Donald Insall, discusses the general diagnosis of an old building's structural faults and the means at the architect's disposal for putting them right. Previous articles in the series were printed in the issues of August 28, September 4 and September 11, 1958.

Movement

In examining any old building, the architect will often find a challenge to his imagination and ingenuity in deciding just what structural movements are going on, how significant they are, and what is to be done about them.

What principal agents of structural movement are likely to have been active? Firstly there are the external elements—wind and rain, temperature and ground movements. Secondly come the effects of human use and misuse. Thirdly there is the internal pattern of loading, thrust and counterthrust, active through history and derived from the building's own structural form. Lastly, structural movement is an inherent quality of the different materials which go to make up every building.

Vertical cracks in a church tower caused by bell-ringing.

The external elements

Most of the effects of wind and weather are all too familiar to architects. There is, however, one which applies particularly to old buildings, and of which too little account is taken. It is the differential settlement of foundations caused, not by mining subsidence, but by the ordinary operation of soil mechanics. A large building may occupy a site with varied subsoils, of different bearing capacities. For one reason or another, part of a site may settle—through the leeching action of underground streams or running water, or as a result of drainage improvements. A frequent cause of damage (as was discussed in BRS Digest No. 3, *House Foundations on Shrinkable Clays*) is the planting near buildings of quick growing trees such as poplars: it is easy to forget when planting a small tree the astonishing volume of water which it will eventually draw daily from the ground and send into the atmosphere, drying and shrinking the surrounding soil.

All subsoils are also of course liable to seasonal variations, but some are affected by them more than others. Clay, in particular, shrinks appreciably and visibly in hot dry weather, and expands again in winter. Thus clay soil immediately surrounding a building will shrink and crack away from the walls. On the other hand, underneath a building the subsoil will be protected both from direct absorption of winter rain, and also from sunshine and evaporation; so that it will expand and contract much less. In consequence, a differential movement is set up, the external ground level rising and falling with the seasons much more than under the interior of the building. The movements which result are typified in an outward lean of the walls in the summer, when the garden is dryer than the subsoil, and a reversed tendency to lean inwards in winter, when the wet surrounding ground has expanded upwards, and the protected interior ground has not. The reappearance of cracks, rapidly increasing in a matter of weeks, can naturally be very alarming, especially if, for example, some grit should fall in the back of a church during prayers—so that this seasonal movement can assume a concern out of all proportion to its real importance. These effects are often added to and made more complex by human agency, as for instance when a " tortoise " stove stands habitually in one corner of the interior. Faithfully stoked to red heat, it parches one small piece of floor and foundation while the rest is swollen with the rain of winter. A particularly delightful case is recorded in which the architect's answer to seasonal settlement was to send for the fire brigade, when the parched and shrunken clay was quickly hosed back to a more normal water content.

Human use

The most spectacular case of movement resulting from human use to be found in old buildings is that caused by bell-ringing in a church tower (page 411). You have only to climb the belfry when ringing is going on to feel the strain on the masonry of the rhythmic sideways battering of several hundredweights of bell. The effects of wartime damage by bombing, blast and incendiarism are not always immediately felt, and long-term damage may often be a delayed result of bombing. Less notorious but equally important is the vibration caused by traffic, especially on cobbled roads. The pulsing of air set in movement by powerful organ pipes is another often-forgotten source of structural vibration. Perhaps the most damaging use of a secular building is the rhythmic pounding of dancing feet. But human use is really one of the less harmful causes of structural movement.

Loading

Every building has its own pattern of loading. The most clearly articulated are those of Gothic buildings, the only misfortune here being that the care with which the Gothic builders brought their loads down to ground level did not always extend to the foundations. To the inequalities of loading caused, almost inevitably, by structure, we must add inequalities caused by the unequal bearing properties of the soil. The science of structures in historical times was largely one of trial and error, and there are also a great many cases where utterly unexpected loads were subsequently concentrated on piers and foundations quite unprepared to receive them. When a building is new, both the spreading of the subsoil and all the little internal "easings" and equalizings of loads will initially bring about a gentle "settling" process involving compression and local movement. Many old buildings took decades or perhaps centuries to complete; and frequently additional wings have been juxtaposed, or additional floors added, at widely separated dates. The pattern of "settling" and self-adjusting structure is therefore often complex. The result of initial movement in a new addition may in turn be to place an unequal loading upon its junction with existing work; and so a chain of movements may be set up through the building.

"Punching shear" beneath the tower of Salisbury Cathedral. The upper "step" is caused by differential settlement between the tower loading (20 tons per sq. ft.) and the nave.

Materials

Movements caused in buildings by the unequal behaviour of materials are likewise generally well known to architects. Wood is, of course, the commonest cause of this kind of movement, though fortunately it was a trouble of which traditional craftsmanship was fully aware. There were, however, certain very common practices which we now recognize as bad; as, for instance, the building of timber plates into masonry walls, where the timber will weaken the wall by shrinking and, in too many cases, by decaying. Another source of trouble is where materials of different hardness are bedded together, or where large units are bedded adjacent to small ones. Brickwork faced with butt-jointed marble slabs, or the more frequent Early English example of a soft stone pier of many units, surrounded by a cluster of long Purbeck marble shafts, are typical examples of situations in which unequal materials are yoked together to their mutual disadvantage. Under load, the softer or many-jointed material compresses, and the load falls unfairly on the smaller and harder unit, which may then crack or spall.

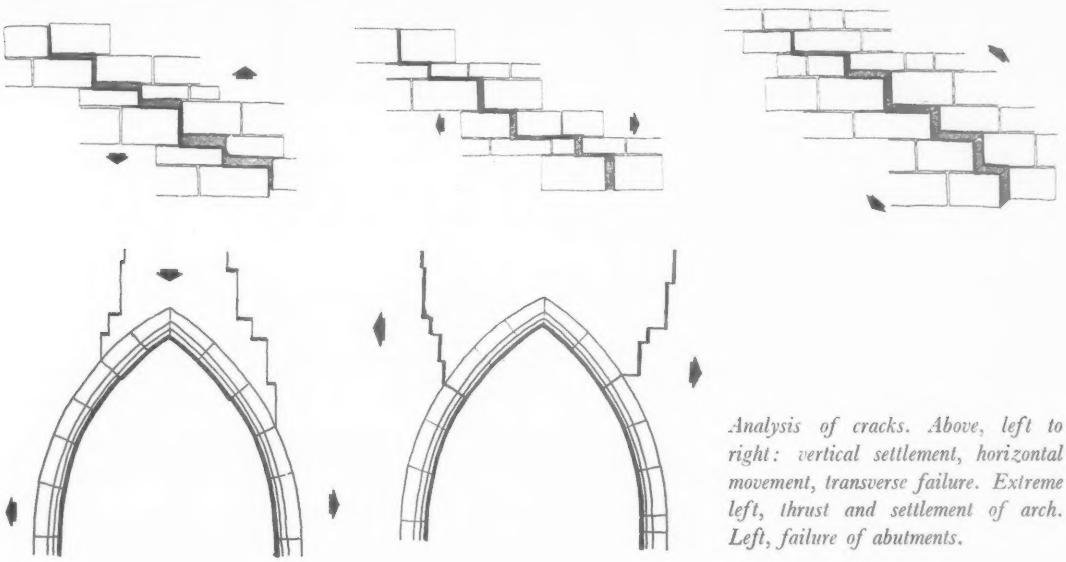
From these four causes, every building is, as it were, structurally "alive," with all its parts perpetually on the move. Indeed, one of the outstanding characteristics of traditional building techniques is their provision for this constant state of minor adjustment. In an old building which has been altered and added to at many periods in its history, the analysis of its structural movements may be deceptively complex. How does one set about the diagnosis, and what cures can be prescribed?

Analysing cracks

An owner will sometimes very easily take fright at a crack in walling, which may in fact be the best thing that ever happened to it. The crack represents a line of structural discontinuity, and while it may be a serious weakness in taut, tensely-stressed stonework such as window-tracery, it may provide a point in heavier, massy structures at which differential settlements and movements can congregate to relieve damaging stresses elsewhere. The first step is almost invariably—when justified—to reassure the owner where a structure is obviously not going to fall about his ears.

In next analysing the appearance of cracks, it must first be asked whether they are recent, or of long standing. This is not difficult to distinguish, especially in polluted city atmospheres, where old cracks will

technical section



Analysis of cracks. Above, left to right: vertical settlement, horizontal movement, transverse failure. Extreme left, thrust and settlement of arch. Left, failure of abutments.

have been blackened by soot and dirt, and new ones will by contrast appear bright and clean. If a crack appears in a painted surface, close inspection will quickly show whether the movement occurred before or after the last repainting.

The next significant clue to the cause of a crack is its direction. Converging cracks running upwards from the bearings of a lintol or from the springings of an arch, indicate a direct settlement of the lintol, or of the voussoirs of an arch due to its thrust. Cracks diverging upwards and outwards from the head of an arched opening may however indicate failure of the abutments, very possibly from foundation weakness. Stepped cracks in brickwork or coursed stonework will usually show wider openings, representing greater movement, in either the horizontal or the vertical plane, thus indicating either a vertical settlement or a horizontal movement. One side of a crack may be in advance of the other, when a thrust at right-angles to the wall will be suspected. The wider end of a crack, representing the greater movement, may be either near or far from the source of the trouble, but will give valuable information on the direction of the movement.

The function of cracks and whether they are " alive," may be readily checked by " tell-tales " made of glass, cement or any hard material. Glass breaks definitely on any movement; but if the pieces are lost, the movement cannot be measured—occasionally also, one end may become detached without this being apparent. A dated cement stitch is the most useful, provided the masonry is well wetted so that no initial shrinkage cracking is caused. Flexible materials are of course useless—one case is recorded of tell-tales made of elastoplast! Clever new methods such as the use of plastic tell-tales viewed by polarized light are very interesting, but rarely applicable to the scale of movement which may be regarded as serious in old buildings. Often the best means of marking is purely to point up or plaster the area of walling concerned. Whenever tell-tales are fixed they should be dated, and their position recorded on a key drawing, safely filed for reference.

One can also use measuring instruments. Metal pegs may for example be inset into masonry on either side of the break, and their distance measured by means of a vernier scale. But usually, any really significant movement can be seen without mechanical devices.

Vertical departure from the plumb can easily be

Cement tell-tale on a crack in a re-entrant angle at Fulham Palace. (Photograph by courtesy of MOW.)

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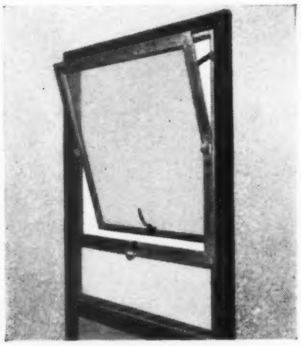

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Some points often invite cracks which may be of no significance at all. These include the line of junction between vaulting panels and walls, and between materials of different expansion and contraction rates such as carpentry and masonry, where movement must of necessity be expected and accepted. Everything in fact depends upon an intelligent analysis of all the structural history and movements of a building, viewed as a single comprehensive picture.

Foundation movement

The great majority of walling cracks and failures may be traced to foundation movement. The subsoil under any wall will inevitably compress through the centuries, and a loose, sandy soil may run away from under loads. The heavier parts of a building will then settle relatively more; and the junction between light and heavy structure will show movement-cracks. It was because of this that the towers of mediæval churches in fenland districts were so often constructed to stand independently of the main building. Under really concentrated loads, such as the later spire added to the central tower at Salisbury Cathedral, the overloaded piers have been visibly "punched" downwards several inches (page 412). A simpler example is the apparent "upwards" bow of many window sills, caused by the foundations under the windows being less heavily loaded than under the piers between, causing differential settlement.

A frequent source of differential foundation movements is the building having partial cellars, with foundations set in deeper geological beds, more remote from seasonal movement than those near the surface. It is the bed of subsoil immediately under the foundations which produces the greatest movement. More serious is the case of buildings constructed on marshy ground and carried by heavy oak piles. So long as these were permanently saturated, little harm may have resulted; but there have been many cases of drainage "improvements," where the subsoil water-table has been greatly lowered and the piles exposed to rot. The serious settlement and underpinning of Winchester Cathedral earlier in this century offers an example in point.

The remedy for foundation settlement may be found in careful underpinning. Local point loads are in this way spread over a greater area and perhaps bridged over weak ground, or alternatively carried directly down to a deeper and more homogeneous stratum of the subsoil. But even with careful temporary shoring, the underpinning of a building can rarely be undertaken without risk of disturbing the upper structure. It is usually much better to accept and provide for controlled movement by means of straight or sliding joints. A perfectly sound and reliable mechanical solution can often be found at a fraction of the cost of tampering with existing foundations, and without the risk of setting up new problems worse than the first.

It is frequently possible to carry a structure over a weak patch by bridging loads across to sounder flanking sections in the actual wallings—for example, by casting an *in-situ* reinforced concrete band in its thickness. A similar result in simple structures may sometimes be achieved by cutting away the walling and building in a deep bonding-course of strong tiles in cement mortar, forming a continuous beam through the full thickness of the wall. These methods may be combined with restraining measures against overturning thrusts or mechanical forces, as when a reinforced concrete wall-beam is used to spread the point-load from an arch or beam, or cracks in a bell-tower are stitched across by a concrete or tile band.

If underpinning is the only remedy, or if a continuous band must be formed in existing walling, the methods of operation are the same. The loading is first reduced as much as possible by carefully strutting the upper walling, and any heavy floors and roofs whose load they carry. Sections of walling are next removed at equal intervals, leaving a longer section of sound structure between. The gaps are then carefully rebuilt, and the adjoining sections taken down and rebuilt in rotation, each bonded with its predecessor, until a continous band of new walling or foundations is formed. A similar method is sometimes adopted for inserting a damp-proof course into existing walling.

Wall movements

Movements are however not all due to foundation weakness. The thrust of an arch or an untied couple roof, exerted constantly on a wall for centuries, is bound to have results; and uneven loading of any kind is always cumulative in effect.

It is important to appreciate the distinction between a dangerously tottering wall and a leaning tower. Pisa is quite safe (although recent reports suggest that shifting subsoil may make the tower insecure two centuries hence)—but a thin brick garden wall at a similar angle may be quite the reverse. The Tower of Temple Church, Bristol, is one hundred and fourteen feet high and leans six feet: it was for centuries a showpiece for important visitors, for whose delight small stones would be thrust into a crack at the base, and ground into powder by the ringing of the bells. Yet the story is told that in wartime after local bombing, the struc-

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technical section

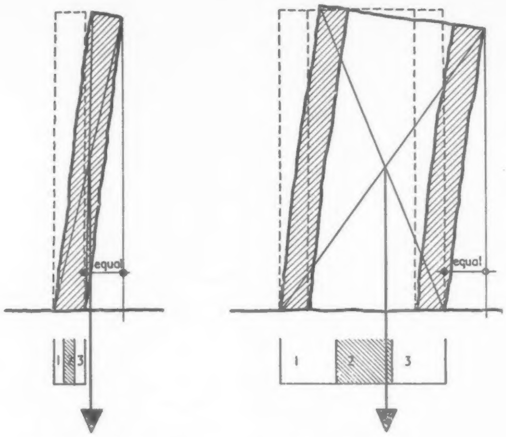


Diagram illustrating the " middle third " rule.

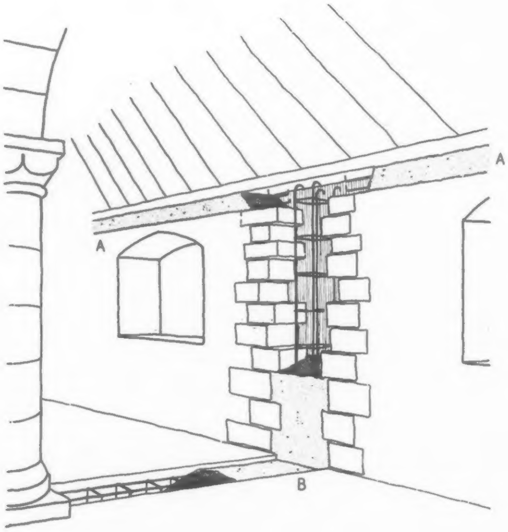


Diagram illustrating the use of a cranked internal buttress to arrest movement in an aisle wall.

ture was almost pulled down one morning by the military as a casualty, dangerous to the public. The Tower still stands.

The old rule of the " middle third " is a particularly useful one. If the main weight of a structure, summarized as a single force acting vertically through its centre of gravity, would bring the load beyond the middle third of its base, then there is a potential state of tension at its unloaded edge—and buildings are normally designed to be in compression. But this rule cannot be applied to a single point in the wall of a leaning circular chimney, nor even to any wall which is tied into and buttressed by its neighbours. Provided the total state of loading of a building is well in equilibrium, its parts derive tremendous mutual support; and the whole context must be studied before any drastic remedies are indulged in. Perhaps all that may be necessary is the sound bonding of the member into existing stout cross-walls, or even the addition of an increased direct vertical load, acting on the principle of the mediæval pinnacle, so as to bring the first load within safe limits. Further, where in a particular case it is desired to save a leaning feature, there is no reason why even the middle-third rule need be followed, if proper provision is made for adequate tensional strength where it is needed.

The first decision in remedying wall movements is to enquire whether in fact it must be stopped at all, or whether its action can be localized harmlessly at certain points, on the principle of the sliding or expansion joint. Between unequally stressed parts of a live structure, relative movement is a perfectly healthy and natural phenomenon; and it is better to make reasonable provision for it than to " set " a structure into a falsely stiffened state, which may often be a source of real weakness. If movement is to be checked, the next point to decide is the position at which restraint can most easily be employed, and to the maximum effect. Sometimes, only secure re-bonding to existing sound work is sufficient, once the cause of the movement has been eradicated. At other times, additional stays and supports will be essential.

Tie bars in direct tension offer great strength if their junctions with weaker materials are well spread. Iron should not generally be used in great lengths owing to its thermal movement, the effect of which may be considerable. If possible, a means of adjusting any tie, such as a collar with opposed threads, will always prove useful. Ties can sometimes usefully be linked at each end with the reinforcement bars of r.c. beams in the walls when no visible tie-plates are necessary.

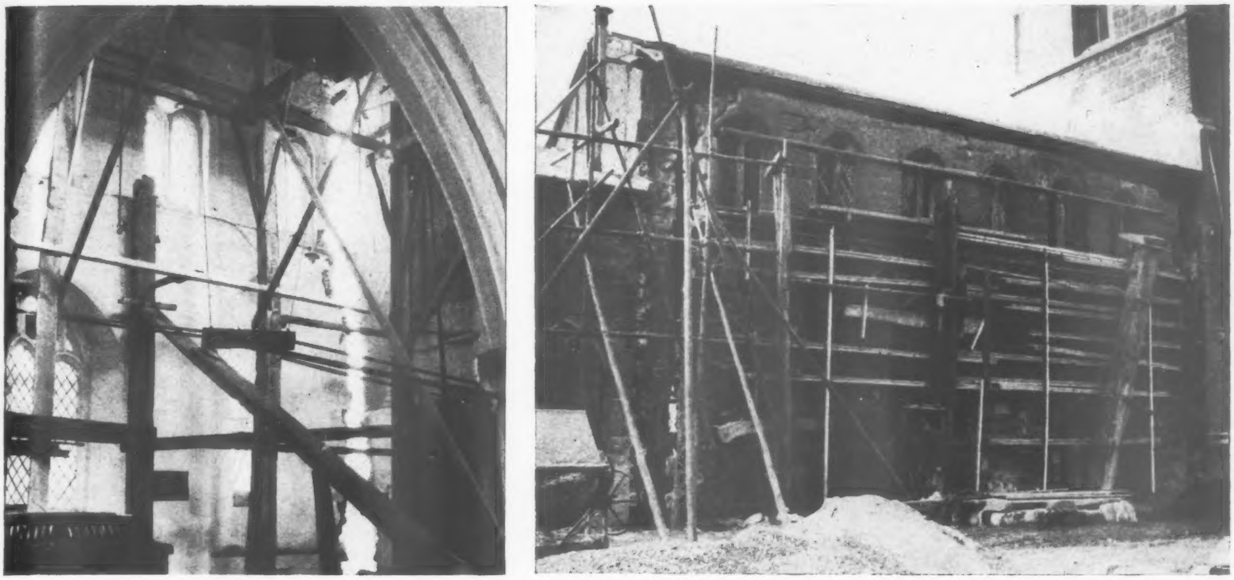
Compressional supports may take the form of *in-situ* reinforced concrete beams or struts, or sometimes of L-shaped ribs or stays between walls, or between wall and floor. Sometimes, as when a building is re-roofed, it is possible to combine structural reinforcement with new work. A reinforced concrete slab is often useful here, and may be tied right into the walling, if suitable gaps are left inside the parapets for any movement of the concrete during the setting period.

Very occasionally, strengthening may even take the form of bold flying arches and other new and striking architectural features of an interior, as in the Cathedrals of Salisbury and Wells. But usually, it is the unseen stay, quietly engineered in the thickness of walls, which offers the least conspicuous and most successful repair.

The " correction " of movements

It is often asked whether or to what extent a leaning and crooked building should be " straightened " and corrected.

To the builder accustomed to new work, where



Left, internal and, right, external view of the rectification of a leaning aisle wall by the use of winches. Orby Church, Lincs. (Architect, John E. MacGregor.)

straightness is constantly sought after, and any deviation from the true horizontal or vertical may represent bad building, it may have become a natural tendency to try and straighten everything in sight. Too often he wants to give a face-lift when all that was really needed was a good wash and shave.

In some circumstances, however, for one reason or another, it may be specially required to tilt back a leaning wall, or to jack up a sagging section of flooring. There is no reason why this should not be done. The first necessity is to ensure the homogeneity of the part to be moved: it must be carefully strutted or temporarily strengthened to withstand the hazards of moving. For example, a wall might have all windows and joinery removed, the openings strutted and a stout framework of timber splints built up, perhaps on both sides, and tied through the openings. The two faces can even be close-boarded for added safety. Every care must then be taken to ensure that no train of movements can be set up, for example by the linked joints of a tenoned wooden frame transferring new stresses to a far end of the structure. The next step is therefore to prop or stay any other part of the building which normally derives support from the offending member, by means of shores placed so as to cause no interference with the work. After similarly ensuring its own stability, the wall can at last be dissociated completely from all its erstwhile surroundings. By means of jacks, block-and-tackle, levers, wedges, a Spanish windlass or any other gentle but powerful persuasion—even by inflating bladders full of air—the whole unit can then be carefully moved, strutting and all, to its new position, and the structure re-bonded together and its temporary supports removed. Here, as always, when new work is bonded into old, provision should be made in the jointing for a little spreading and settling of the new work, and for the initial compression of freshly loaded subsoil. This can for example be done by means of wide bed-joints under the toothings of new work, filled with a soft lime mortar to permit gentle settlement.

If the effort and expense are justified, the principle can be carried to extreme lengths, walls being tilted, raised or lowered, and indeed even whole buildings "boxed" with a framework of temporary stays and moved bodily on rollers, or hoisted by crane to entirely new sites. Needless to say, this is a job for careful and intelligent labour under particularly watchful and resourceful direction, preferably by an architect with very considerable experience of old buildings: but it can be done, and may offer a solution when the only other answer might be the demolition of a valuable building.

Decay

If a building is alive, it is also mortal. From the moment it takes life, its various materials each begin at their own rates to wear away and to decay.

This constant process brings with it most of the problems of an ancient building. Unlike a plant or animal, a building cannot help itself by replacing its own worn parts. True maintenance consists not only in renewing evident decay but also in preventing it, the key being an intelligent appreciation of the very distinct life-cycles of different building materials.

It is often not appreciated by the layman that each of

the various parts of a building has its own life-span, higher or lower in the scale of permanence. The most frequently renewed material is paint, requiring attention at intervals of a very few years. Flaking paint is an eyesore, a symbol of neglect, while fresh paintwork is universally attractive, as every Property Agent knows.

Further along the scale are the short-lived materials like thatch, roofing felt and, at some remove, asphalt, all of which require relatively frequent replacement. Next come the metals—copper and lead roofing especially. Copper requires renewal, and lead can either be renewed or simply recast and made up with new.

After the longer-term but periodical replacements, like roof battens, a new problem enters the picture. Stonework indeed decays, but so slowly that it becomes somehow identified in the public mind with the building itself—so much so, that piecing with obviously new stone can sometimes seem almost an affront. The problem of replacing worn-out materials is therefore immediately complicated by considerations not only of utility and decay, but of identity. To quote an absurd example, it would be possible to renew every unit of an ancient building wholesale, either by taking it down and erecting a copy in entirely modern materials, or even by copying it utterly, piece by piece, *in situ*. But the new building thus erected will be a modern copy, and will never look or feel like anything else. How far are we to go?

It must first be admitted that the occasional case does occur in which the modern copy is defensible or even justified. No one is likely to suggest re-erecting an exact copy of the Parthenon in Hyde Park or even on the Acropolis. But after wartime damage, there have been countless buildings in which a lost wing of a symmetrical pair, or several bays of an arcade or colonnade have subsequently been replaced with new work to universal approval—it was the only thing to do. The tenacity of sentiment is however by no means always so reasonable; and proposals have been quite violently defended for the rebuilding of buildings completely destroyed by war, in the self-same jumble of original " styles " which was merely an accident and expression of their genuine history. The desire to rebuild a memory can be very strong, even to the extent of building an absurdity. Even the best modern copy has about it something self-conscious and unreal. The decision must nevertheless somehow courageously be taken. At some stage in history, every part of every building dies. Stucco has a short life; marble has a long one. Except in the extreme case, the modern copy is a lie, and the decision can only be taken, with courage and conscience, to rebuild in the spirit of our own time.

The difficulty lies in knowing just where to draw the line. All the world will agree to a fresh coat of paint, but few to a fresh stone facing. The one is an accepted periodical maintenance necessity—the other may be seen as the destruction of something irreplaceable. What are the criteria? Where is the line between replacement and destruction, and between maintenance and the modern copy?

The first element which must be acknowledged is that of original craftsmanship, as in an elaborate or characterful stone carving; this can rarely be replaced, and the only thing to do is to save as much as possible, and then to give some modern craftsman a chance to show his own hand. Carved details and craft-work of any kind can rarely be copied without some feeling of faking, or at least of intrusion. In the case of features such as a well-authenticated classical moulding, for which even the original drawings or templates may still be available, the repair of a damaged or missing section is far less offensive, for the " craft " element is no longer articulate, and its differing dates do not obtrude.

The second criterion is the importance of the actual materials themselves. Stonework may come from a quarry which is now closed and cannot be matched. Crown glazing is not made today and even if it is cracked, cannot be replaced by new glass without losing something valuable of its period. On the other hand leadwork does not, as is sometimes said, contain silver or anything else valuable; and if it is perished, it is a simple matter to recast it. Further, the principle extends not only to the visible but to the normally unseen parts of the building, if these are of sufficient interest. It would be nonsense to replace a uniquely interesting roof construction by steel trusses; and vandalism is not diluted by being out of sight.

The final element is that of architectural necessity. If an essential part of some outstandingly beautiful feature is missing, making nonsense of the whole, there is sometimes a strong case for local renewal. If one arch or pier of a series is missing and a fine symmetry thereby destroyed, there may be justification for replacement. But every case must be very carefully considered on its merits.

The new addition or replacement need not be deceitful: where an essential part of a fine rood-screen is missing and has to be re-carved, there is no reason why the new work should not bear its date. On the other hand there was until recently so necessary a reaction to the " restorations " of Victorian times that patching was often done not only obviously but even assertively, to the detriment of the building. A building is not only a " dig " for some future archæologist but a piece of architecture today and tomorrow, and the chief concern of repairs is that they should either be quite inconspicuous, or else contribute in a positive way to the true architectural effect which the builders intended.

It has been suggested that the whole process of decay and renewal might be likened to the life of a landscape. Every year, leaves fall to the ground unlamented, to be replaced by new. At intervals, branches fall; and at longer intervals, trees fall. But as long as the intentions of the original landscape artist are carefully followed, it is the same landscape. The parallel is not exact, but the principle of the relative decay of leaf, branch and tree, and the necessity of periodic renewal and replacement are a valid lesson if old buildings are to live long.

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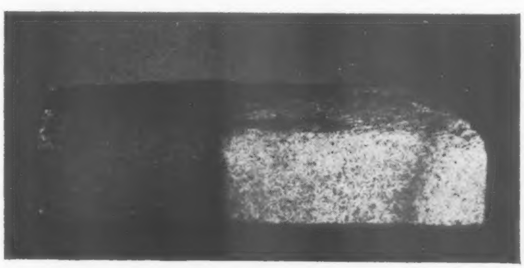
Cutting horizontal damp-proof courses. Above, by means of a light pneumatic saw; below, using an electric saw mounted on a supporting frame.

The effect of silicone application. A piece of Clipsham stone had been exposed to natural weather elements for six months in Central London. The right-hand half had been treated with silicone.



THE CONTROL OF DAMP

Almost every trouble found in buildings can be attributed in one way or another to a single factor—damp. Damp weakens the physical endurance of materials and their resistance to frost and erosion, it softens timber and attracts pests, and is an essential condition of fungal growth. The protection of old structures is very largely a question of controlling natural moisture travel through the fabric, and directing it into the healthiest and least harmful channels.

The first point to determine in analysing structural damp is to locate its source. Apart from damage due to defective plumbing, unwanted dampness may appear either (*a*) from the ground, or (*b*) from rain and weather or (*c*) from atmospheric humidity.

Once admitted to the building, water will thereafter travel either by gravity or by capillary suction, especially where there are considerable differences in evaporation potential on the two sides of a wall. Moisture therefore generally moves either downwards, or else towards any drying element, such as an exposed corner swept by the wind, or the warmed air currents from an internal radiator. In combating moisture travel, the most useful remedy may be found either in a barrier or in a counter-attraction. The most impervious barrier is any form of structural discontinuity; and the most tempting counter-attraction is proper ventilation. From an intelligent combination of these two, the answer to almost every problem can be found.

Rising damp

Ground water is everywhere present in some degree, and is generally " on the move " through the sub-soil. After rain, it will be penetrating downwards; and at other times, evaporating upwards to the surface. The lateral flow of ground water follows the configuration of the ground, unless underground rock strata slope and lead it in other directions. Rising damp may thus appear even on a very dry day, if the ground itself is sufficiently wet. It may be more marked on the " uphill " side of a building, or anywhere near a spring or watercourse.

Often, the underground water-table can be lowered by improved site drainage, when no work to the building may be necessary. It is virtually impossible to " dam " underground water movements; and all that need be done is to provide an easier and more tempting route, either by open ditching or preferably by means of proper land-drains.

Frequently the only improvement needed to dry out a damp wall itself is plenty of fresh air. A narrow external dry-area or trench against the foot of the wall will often provide sufficient ventilation to dry the damp outwards, before it can rise to the level of vulnerable internal decorations. Ready drying out is much more effective than any impervious renderings. Indeed if, as often happens, a mediaeval timber framed wall has been faced with Georgian brickwork, it may be positively unwise to trap the rising damp in this way, when a serious threat could be caused to timbers buried in the walling.

The commonest cause of rising damp is the wall without any damp-proof course, in which moisture is drawn up by capillary attraction and by the heat of the interior, bringing with it salts harmful to masonry, softening timber into beetle-fodder and ruining decorations and finishes.

The classical remedy for rising damp is to build in a damp-proof course. This is a laborious operation, and is usually done by shoring up and removing alternate sections of the lowest courses of walling, rather as in underpinning, and rebuilding them complete, incorporating a proper damp-proof course of blue brick, slate or a similar material. The remaining sections are then removed and rebuilt in turn until a continuous barrier is formed. The method is extremely expensive, and a number of new solutions to the age-old problem have been developed during the last few years.

One method has recently been recommended by the Building Research Station* as being suitable for regularly coursed materials like brickwork. This entails progressively sawing a slot in walling, into which a metal damp-proof membrane is then driven, a section at a time. The required continuous slot can be cut either by a power-driven saw, or by a hand-saw wielded by two operatives. The power-driven saw is an electric or pneumatic, circular or reciprocating model, the heavier types of which require support from a travelling carriage. The hand saw may be about 3 ft. 6 in. long and must have stout knuckle guards: a narrower blade than usual is useful in reducing frictional resistance.

The cut is commenced at any projecting angle, or else by knocking out a brick from the walling to form a starting hole; and work may take an hour or so for every 2 to 10 feet of a 9 in. wall, depending on the obstacles encountered. In really thick old walls, progress might be very much slower.

The damp-proof membrane can be of any impermeable material but is preferably of metal, which can readily be driven into position, carried if necessary in a stiffening "cradle." Units are about 2 ft. long and about $\frac{1}{2}$ in. wider than the wall, to allow a slight projection on each side: they are laid in double courses with joints lapped about 3 inches.

In old buildings, the shorter-lived materials such as zinc are not worth the effort involved; but copper is very suitable and permanent. The soft crumbling mortar in which old brickwork is frequently set will however yield a wider slot than newer, hard mortar; and either an extra thickness of metal or less ideally, a thickness of material such as bituminous felt must be inserted, to prevent excessive settlement as the work proceeds. A "sticky" lime mortar which has never set fully is more difficult to cut, but will enable a narrower incision to be made. Even so, a slight settlement of the order of $\frac{1}{16}$ in. or so is to be expected: but in practice, this is rarely very significant.

* Building Research Station Digest No. 107, February, 1958.

As with any damp-proof course, the membrane should be at least 6 in. above the external ground level to avoid splashing. It may only be practicable to make the cut above floor level, when the vertical face of the wall between the new damp-proof course and the floor should be protected with two coats of bitumen paint. Especially where the floor is itself of impermeable material, the skirting should then also be of a material unharmed by moisture, such as one of the plastics.

The damp-proof membrane must be absolutely continuous, and should be continued through chimney breasts and similar features. Walling in poor condition or with a loose rubble core cannot be treated by this method.

A newly-developed method of great interest is the impregnation of a complete course at the foot of a wall with a silicone water repellent. The brickwork or stonework is first drilled at frequent intervals with lines of small holes leading down into the heart of the wall, when one of the proprietary solutions can be poured in until saturation point is reached, and a continuous water-barrier formed. Little is yet known of the permanence of the system, but especially in soft brick walls, any method calling for so little structural disturbance must offer very great possibilities, and deserves more research and experiment than it has so far received.

Particularly fascinating experiments have been made more recently with electrical methods of repelling damp. The theory is that if an electrical potential can be set up between a building and the earth, moisture can be induced to flow from the one to the other. Only a small amount of current is said to be required; and the installation involves virtually no structural disturbance. If this method is satisfactorily proved on test, it might indeed prove to be very valuable.

Rainwater penetration

The source of penetrating damp is usually obvious. The direct effect of weather may be more pronounced on the western side, or facing whichever is the prevailing wind, and irrespective of ground layout. Water penetration will certainly then occur wherever any large impervious surface discharges over a less resistant one. Defective gutters and downpipes are otherwise at the root of three-quarters of the damage from this cause.

Very few walling or even roofing materials are themselves, however, literally *impervious* to damp. Almost all absorb and carry moisture to some extent; and the successive movement of water into walling, followed by its drying-out and evaporation, produces in effect a kind of structural "breathing" inherent in all materials.

This alternating moisture-movement takes place firstly in the bolder pattern of units and joints, and secondly in the actual pore-structure of the materials. Both processes are conditioned by the position and exposure of the materials concerned. Copings, parapets, cornices and projecting ledges must stand up to a great deal of weather, and indeed for long periods may be almost permanently wet.

Modern experiment has taught that traditional building practice with regard to the jointing of materials had a very sound scientific basis. As a general rule, unit materials were almost always set in a softer and more porous jointing material, as occurs with brickwork and stonework set in lime mortar. Not only does the walling then adapt itself naturally to loading, without damage to the stones, but also moisture travel is controlled and localized at the joints, so that deleterious salts are deposited harmlessly in the softer material. In the jointing of materials, there is often no sounder guide than traditional practice.

Within the materials themselves, the pattern of moisture travel is governed not only by the total volume of the pores, but also by their relative sizes and arrangement. The fine pores generally draw from the larger ones. The actual capillary "suction" of a material varies with its moisture content, and cannot be judged only by its total thirst or saturation capacity. Much more useful research is now needed on this point.

From a diagnosis of causes, the next step is to consider suitable remedies. In situations where it can be accepted that saturated walling is suffering no harm, although discomfort is nevertheless being caused to a building's occupants, the inner face may sometimes be lined with a separate and impervious skin, isolated from the face of the wall by a continuous, ventilated air-space. This means was adopted in many Victorian houses, when walls were often battened and counter-battened internally before being faced with lath and plaster. A ventilated cavity will carry away moisture and stop its travel more surely than any barrier, and by equalising the evaporation rates from the two faces of a wall, will remove the chief initial cause of moving damp. The best example of ventilation against damp is, of course, the continuous air-space behind tile-hanging, by which a supreme degree of efficiency in weather exclusion is achieved by a quite absorbent facing material, allied with proper ventilation. Slate or tile-hanging is still an effective if drastic treatment for any wall which is not man enough to keep out the weather. The weight of slates is liable to pull out their fixing nails unless they are centre-hung. Tiles are eminently suitable; and an ingenious variant is the 18th century "mathematical tiling" sometimes encountered, and which on face looks exactly like brickwork, until the outer angles are examined. The corners of buildings where tile-hung faces abut at an angle may need careful treatment; and with a single face, the ends of the battens must be protected by some form of cover-flashings.

There are some circumstances in which really thick and long-established ivy creeper, having damaged walling almost beyond recall, nevertheless now shelters its host in rather the same way as tile hanging, and may be trimmed back and suffered to remain as the lesser of two evils.

Any continuous "skin" of waterproofed rendering is always in principle unsound, since once it is cracked by any movement of the structure behind, rainwater penetration will be canalised into severe local points, where little can be done to remedy it.

Over small areas, a remedy often advanced is the lining of the wall internally or externally with an impervious but flexible material such as an impregnated felt of keyed pattern, subsequently rendered with a flexible lime plaster finish. The life of impregnated felts in such a position is not known, but should not be unduly short. The internal lining of wet walls generally with metal foils and barriers nevertheless almost always acts only as a dam, and drives the moisture path to its unprotected edges. To "tank" the internal surface of a wall satisfactorily in this way is extremely difficult; and very often moisture is only driven into the wooden linings of doorways and openings, where it may set up timber decay in the frames, and soak back around the architraves to soil the finishes and decorations. The *only* really satisfactory check to damp is structural discontinuity, allied with adequate ventilation.

Waterproofing solutions

Several products are marketed for application to walling, which the makers claim to form a protective waterproof "skin." The most obvious form of coating is oil paint, renewed at frequent intervals.*

There is also a long tradition of protecting walling by means of periodical coats of limewash. Particularly in the case of a rather shaggy random stonework, this treatment can be most effective in appearance. The broad texture of the material strikes through its coating, and the weathering effect is not displeasing. In point of fact, there is probably little chemical preservative action, but a good deal of the daily weathering is borne by the limewash. The general physical effect is in fact rather that of a close and absorbent overcoat, needing renewal every three or four years, but meanwhile giving valuable protection at quite low cost.

Experiments have also for centuries been made in the use of solutions leaving wax deposits in the surface pores of a material.* Paraffin wax cannot, however, easily grip anything but a completely dry stone, and an excess of wax does tend to attract surface dirt. Although these applications can do no chemical mischief, and no doubt help to fill the larger surface pore spaces and cracks, they must still be physically foreign to the normal drying process of any walling material. Shellac varnishes and resins have proved even less successful, owing to the deleterious effects of light and water, which quickly make them useless.

It is now thought that apart from a surface coating such as paint, the ideal waterproofer may be one which repels moisture without clogging the pores: to this end, the silicone water-repellents have recently

* A waterproofing solution recommended by the SPAB for brickwork is a mixture of petrol and linseed oil, in equal proportions.

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been developed. Their action is to coat the walls of the surface pores of treated walling with a material of high surface-tension, so that while air can still pass, the water is repelled into globules which run off the material as off a duck's back. The silicone water repellents have the added advantage of discouraging dirt adhesion, so that soot and other sources of chemical attack, are not given the opportunity to gather on the treated surface. After many years of experiment, silicone water repellents are now in commercial production; but they are by no means cheap,* especially since they require periodical renewal, at intervals depending upon their original penetration and the conditions of subsequent exposure. Their cost is therefore prohibitive for the treatment of whole buildings, but they are claimed to be the only material so far developed which combines the advantage of protection, safety and invisibility.

There is still the danger that apart from helping to exclude external weather, any means whatsoever of increasing the water-repellence of surfaces will also operate in reverse, and check the natural drying-out of moisture from inside the wall. The salts in solution can then be concentrated at the inside of the barrier, where they will crystallise and bring about the spalling of the face.

Airborne moisture

A great deal of damp in buildings is caused by condensation, especially from warm, moist Spring air striking cold and massive walls with great thermal capacity. The only real remedy is to provide a separate lining, insulated from the cold wall, and incorporating an airtight barrier to prevent the condensation from occurring behind it. A further source of dampness, which may persist in walls which have once been saturated for any length of time, is the presence in wall plaster of deliquescent salts. These are chlorides and nitrates brought to the surface by the evaporation of contaminated moisture, which in humid conditions attract and absorb atmospheric damp. This then appears as a patchy staining with no apparent cause. The only way of removing the salts is to strip the offending plaster; but since the moisture is absorbed from the atmosphere rather than driving through the wall, this is one of the few cases in which an impervious lining of foil or waterproof paper may also be useful.

Dampness due to deliquescent salts may usually be detected in wet or humid weather, particularly just before rain, and in atmospheres just insufficiently damp to cause actual condensation. Where expensive wall linings are impracticable, some measure of protection can be given by an "overcoat" of highly-absorbent anti-condensation paint. Very little can be done to prevent condensation on glazing; and the only useful remedy is to ensure that running moisture is effectively led away before it can cause any harm.

* A typical present cost is 30s. to 35s. per gallon (coverage 100 to 200 sq. ft., depending on porosity of walling).

THE INDUSTRY

New Tayco Boiler

The illustration below shows the new Tayco Thermatic boiler, which has an output of 25,000 B.t.u., enough for a 30 gallon cylinder plus a towel rail and up to 12 sq.

ft. of radiating surface, though, of course, if the radiator is not needed the cylinder can be larger, 35 to 40 gallons. There is the usual adjustable thermostatic control. On the design side the consultant was Neville Conder, and I must say it is something of a relief to see a boiler looking quite like a boiler instead of pretending to be a refrigerator. Price is likely to be about £25. (*Robert Taylor & Co. (Ironfounders), Limited, 170/172 Victoria Street, S.W.1.*)

Overhead Radiant Heating

The various types of overhead radiant gas heaters produced by Bratt Colbran have been referred to from time to time in these notes, and it is worth mentioning that there is now a new and revised edition of the firm's installation handbook. The first section deals with general information such as mounting heights, spacing, and the heat distribution characteristics of different heater types, and the various methods of control, including electric ignition. The second half of the publication deals with the individual heating appliances, which vary in size from the Miniature, with a heat output of 7,500 Btu per hour, to the 4 unit Satellite, with an output of 70,000. The booklet is in loose leaf form to the small BS size of 8½ in. by 5½ in., and is available free of charge. (*Bratt Colbran Limited, Lancelot Road, Wembley, Middlesex.*)

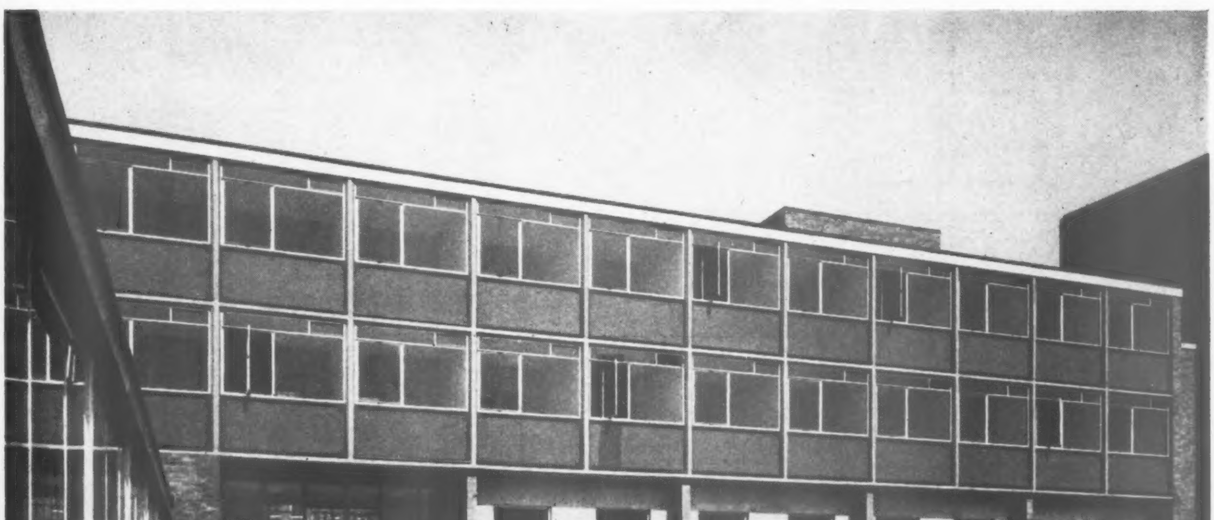
BRIAN GRANT

NURSES' HOME AND TRAINING SCHOOL

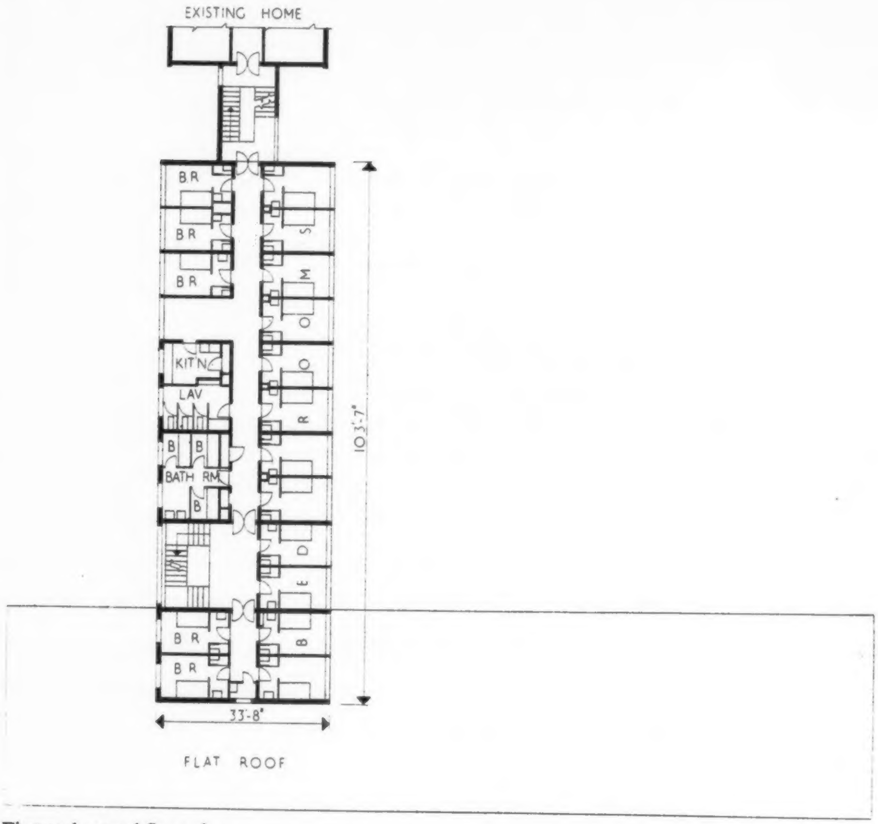
at WESTERN GENERAL HOSPITAL, EDINBURGH; designed by JOHN HOLT, architect to the South Eastern Regional Hospital Board (Scotland); architect-in-charge ERIC P. DAVIDSON; assistant architect JOHN R. OBERLANDER; heating and electrical consultant DONALD SMITH, SEYMOUR and ROOLEY; quantity surveyors PHILLIPS, KNOX and ARTHUR

This small nurses' home and training school is of interest not only because it is the first building of its kind to be cost analysed in the JOURNAL, but because it is low in cost when compared with prevailing rates for hospital buildings. It is an integral part of the very large extension scheme for the Western General Hospital (the radio-therapeutic building at the same hospital, since awarded the RIBA Bronze Medal for buildings in Scotland 1950-1956, appeared in the JOURNAL for December 27, 1956). Its modesty of character and cost seem to arise mainly from a simply conceived structure and competent and straightforward detailing, allowing the economical application of relatively expensive materials and finishes whose quality is consistently high throughout.

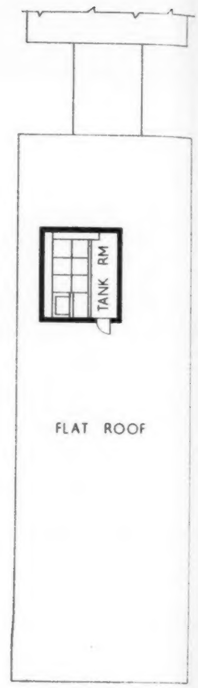
The west side of the nurses' home, showing the main entrance and, on the left, the corridor wall of the training school.



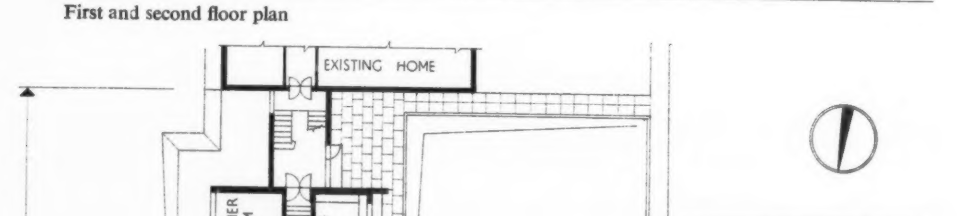
building illustrated



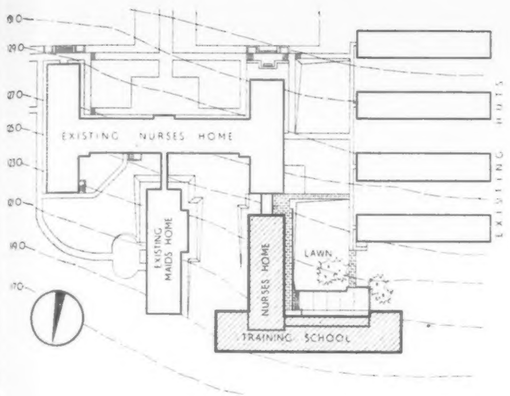
First and second floor plan



Roof plan

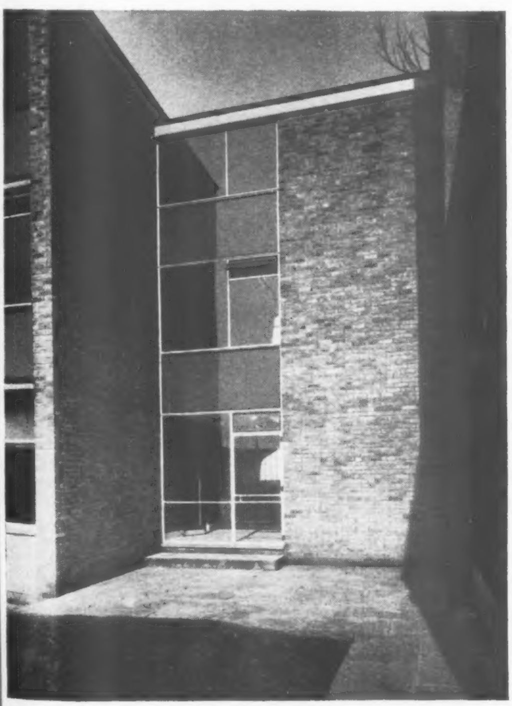


Ground floor plan [Scale: $\frac{1}{32}$" = 1' 0"]



Site plan

The site consists of an area of slightly sloping ground to the north of the existing nurses' home. The building has been placed so that the new three-storey nurses' home forms an extension of one wing of the existing home, with east-west orientation and connected by a short link (below) containing a stair. This stair is arranged to compensate for the difference in levels caused by the slope of the site. The windows are of standard metal sections and the infill panels, of double glazing with coloured glass fibre within the cavity, are secured with teak glazing beads to frames of steel angle. Infill panels are grey-blue (Munsell 5B 4·5/4)*, fixed window sections are white, opening lights are dark grey (BS* 9-098)*, and the timber fascia is painted light grey (BS* 9-094).



analysis

CLIENTS' REQUIREMENTS

The hospital authorities required extension to the existing nurses' home to contain extra bedroom accommodation and a training school to house all student nurse teaching, including a preliminary training school and facilities for block training. The preliminary training school was to accommodate 50 nurses with a further 50 in the block training suite. Cloakroom facilities and office accommodation for the teaching staff were also required and bedroom accommodation for 34 nurses was to be linked with the existing nurses' home.

PLANNING AIMS

Rapid expansion of the hospital in the last few years, and the addition of two new departments, Radiotherapy and Neurosurgery, with 110 beds and 60 beds respectively, made increased accommodation for nursing staff necessary. It was therefore decided to extend the existing nurses' home by the addition of a new wing, and to make this the opportunity at the same time to provide new accommodation for the Hospital Group's student nurse training scheme. The existing nurses' home would then be freed for trained staff, while the new building would provide bedroom accommodation for 34 student nurses, and a preliminary training school for 50, with block training rooms and office accommodation.

The building was designed as two blocks at right angles to one another, one 3-storey block containing 17 bedrooms with ancillary rooms and small kitchen and laundry on each of the two upper floors, and rooms for the Sister Tutor, with cloakrooms and lavatories for the training school on the ground floor. A single-storey block pivoted at the entrance hall to the dormitory block contains the training school and consists of two teaching suites of inter-connected classrooms and demonstration rooms where nursing techniques can be practised. Each room is capable of accommodating 50 nurses at a lecture. The dormitory block is connected to the existing nurses' home by a short flight of stairs to compensate for the difference in levels due to the sloping site. The whole area has been effectively landscaped with paving and planting at various levels.

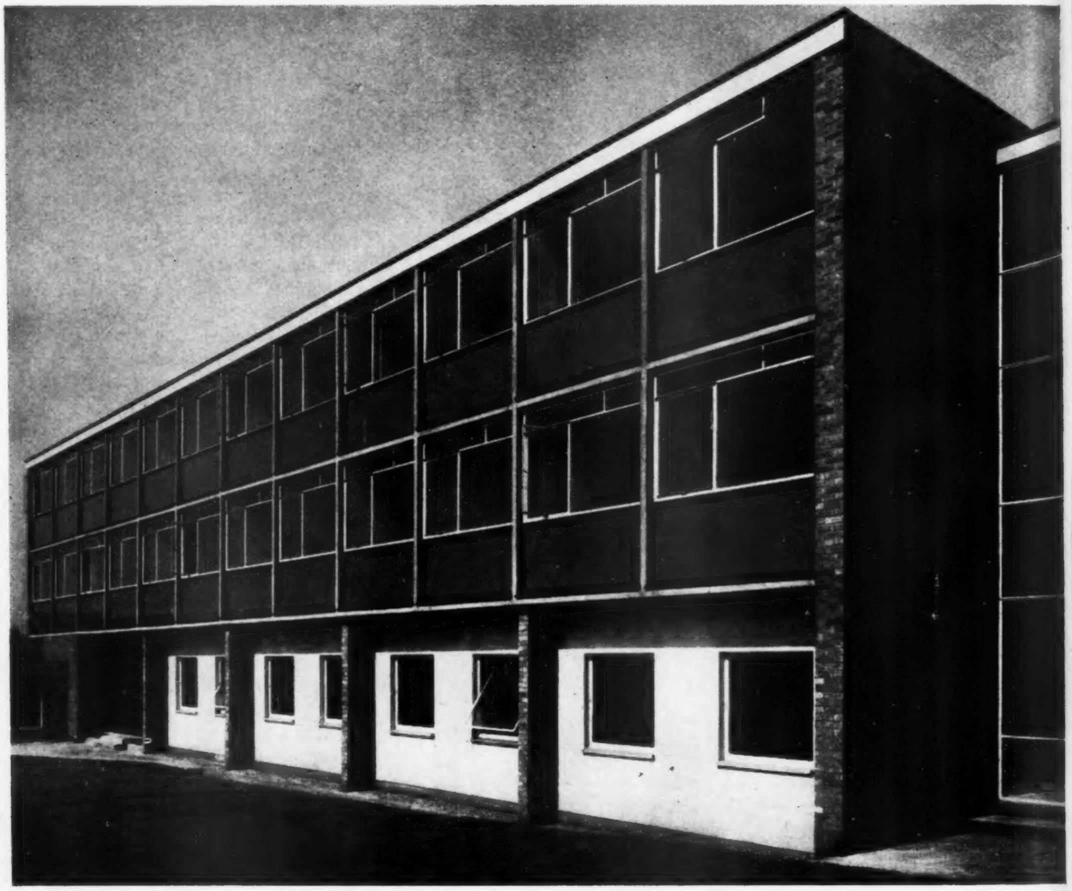
SUMMARY

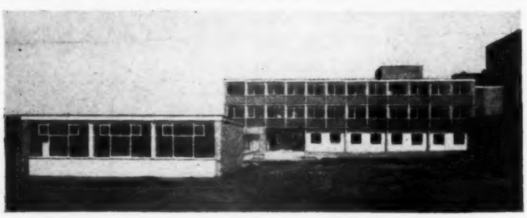
Ground floor area, 8,232 sq. ft.
Total floor area, 15,403 sq. ft.
Type of contract: Separate trades, no general contractor, fixed price on materials
Tender date: December, 1955
Work began: January, 1956
Work finished: March, 1958.
Tender price of foundations, superstructure, installations and finishes: £47,830.
Tender price of external works, drains and installations £3,081.
Total: £50,911.

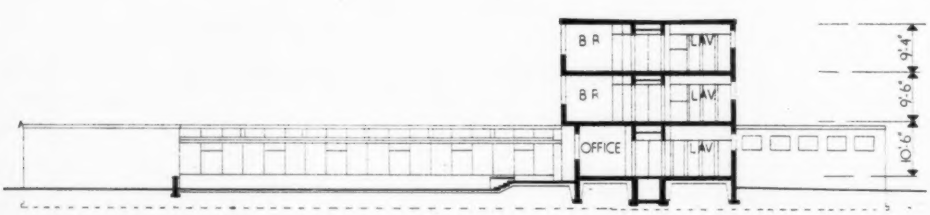
No preliminaries, insurances or contingencies are given in this cost analysis, because the Hospital Board carry their own risk in this respect, and allowances for preliminaries and other insurance is divided over the various trades and included under the element costs. No sums are allowed for contingencies by the Department of Health for Scotland, and this seems to help discipline the programme, for contingent sums rarely occur. When they do, fresh application for financial approval has to be made.

building illustrated

The training school is a single-storey block at right angles to the nurses' home; the corridor on the south side has a lower ceiling height than the main rooms facing north to allow clere-storey sunlight to these. The courtyard formed by the new and existing buildings, seen in the photograph left, has been formed into a level lawn with retaining walls, steps and paving and further planting is to be carried out. The photograph, below, of the nurses' home shows the recessed ground floor, finished with a rough off-white rendering, and window treatment of the upper floors (nurses' bedrooms). Each half-bay is filled with a sub-frame of teak, into the upper part of which steel-framed windows are set. The infill panels, similar to those of the staircase link, are set directly into the teak sub-frame with teak glazing beads. The projecting structural crosswalls and other brickwork are of golden brown wire-cut bricks. Left, view from the west with lecture room No. 1 of the training school in the foreground and the main entrance in the distance.

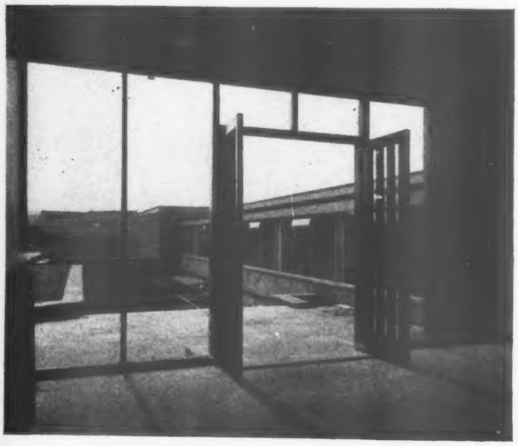






Section A-A [Scale: $\frac{1}{16}$" = 1' 0"]

The entrance has a glazed screen, of teak, across the full width of the bay and teak double doors. Below, another view looking outwards from the entrance hall.



The main stairwell looking along the nurses' home corridor on the first floor. The acoustic tile ceilings are painted pale blue (BS 7-077). The staircase is finished in terrazzo with non-slip nosings and plastic handrail to balusters. The floor is of grey marble lino tiles with black strip inserts. The corridor doors are of mahogany with ribbed aluminium kicking plates.

analysis

	cost per sq. ft.	s	d

Work below ground floor level — 5 s 9¾ d

Design bearing pressure of soil 2½ tons/sq. ft. Cross wall foundations taken down below level of made-up ground. 4-ft. × 1-ft. 3-in. and 3-ft. 3-in. × 1-ft. 3-in. strip foundations with mesh reinforcement. Mass concrete column bases to framed structure. Normal strip foundations to cavity walls. All cross walls 13½ in. thick below ground level. Tanking to duct 2 layers 10 lb. felt with protective brick skin.

STRUCTURAL ELEMENTS

Frame or load bearing element — 3 s 3¼ d

3-storey block: load bearing brick cross walls at 17 ft. centres. Walls mainly 9 in. thick but 13½ in. thick under tank room bay on ground floor. Corridor walls 9 in. thick load bearing for lateral support to cross walls. Lime mortar 1:1:6 and 1:4:3 to brickwork. Gable walls 11-in. cavity.
Training school: Steel frame and load bearing brickwork. 11-in. cavity walls to sill level and on gables.

External walls — 4 s 1 d

11-in. cavity with rendering.
11-in. cavity with external 4½-in. facing brick.
R.c. framed wall on nurses' home east and north elevations with teak frames, metal windows and coloured glass spandril panels backed by 4½-in. brick.

$$\text{Ratio: } \frac{\text{solid wall}}{\text{floor area}} = \frac{0{\cdot}451}{1}$$

Windows — 3 s 5 d

Steel windows, purpose made. Constructed of 1⅜-in. sash sections prepared for inside glazing with patent beads and protected against rust by hot dip galvanizing. Horizontal and vertical pivoted on friction pivots with spring catches for cord operation.

$$\text{Ratio: } \frac{\text{windows}}{\text{floor area}} = \frac{0{\cdot}288}{1}$$

External doors — 1¾ d

Teak framed semi-glazed double entrance doors in entrance hall with check action floor springs.
Steel framed, glazed door to link staircase.

$$\text{Ratio: } \frac{\text{doors}}{\text{floor area}} = \frac{0{\cdot}011}{1}$$

Upper floors — 3 s 6 d

Prestressed concrete planks with hollow block filler units and *in situ* structural topping. Overall depth 8 in. 3-in. screed over floor (1:3 cement and sand) concealing electrical installation.
Span: 17 ft.
Superload: 80 lb. per sq. ft.

Staircases — 1 s 5¼ d

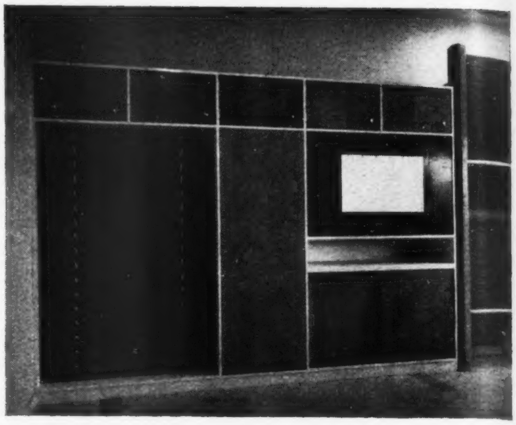
Reinforced concrete *in situ*, ¾-in. terrazzo finish with metal nosings, metal balustrades and plastic handrail. Plastered soffit.
No. of staircases, 2.
Widths: Main stair, 4 ft. 3 in. Link stair, 3 ft. 6 in.
Total rise: Main stair, 20 ft. Link stair 18 ft.

building illustrated

Internal view of demonstration room No. 1. Workbenches are teak topped, floors linoleum tiled with quarry tile base to cookers, and tiled wall behind. This room is used for instruction in sick room cooking, bandaging, preparation of dressings, etc. Colour scheme: walls BS 5-058; ceiling, white; cupboards, BS 2-028 and 7-077 (doors).

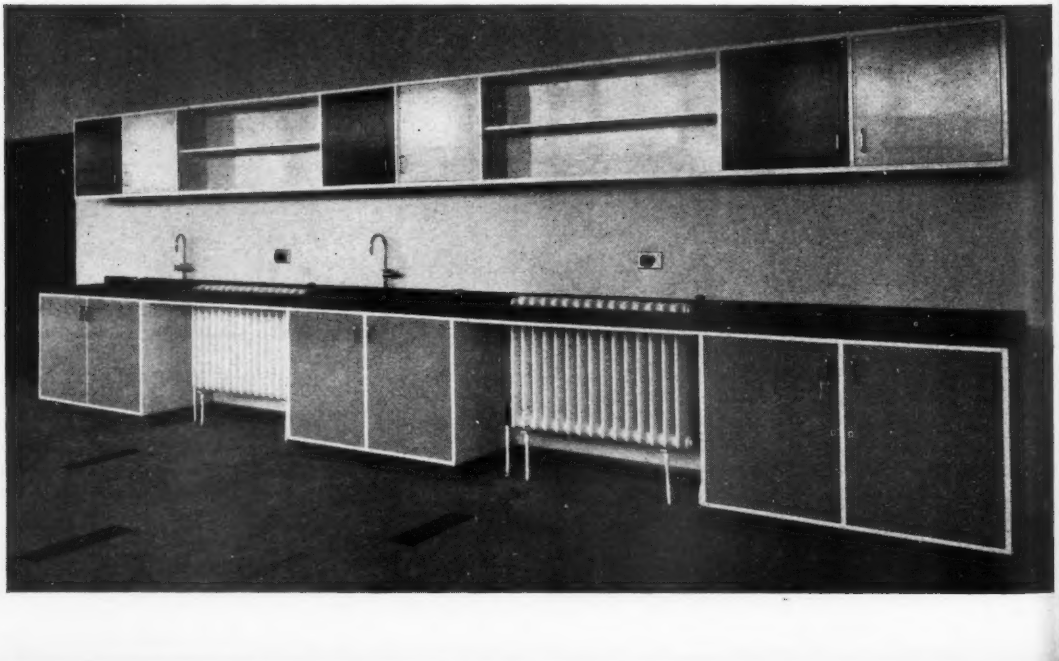
Demonstration room No. 2 is separated by a folding door from lecture room No. 2. This room is used for laboratory work and simple experiments. Colour scheme as in lecture room No. 2, with teak worktop and cupboard doors painted BS 2-028 and 9-097, with white surrounds.

Lecture room No. 2. On the right is a showcase for medical specimens, etc. Colour scheme: ceiling, white; walls, BS 9-094; floors, light grey marble lino tile with terracotta inserts.



The fitment in lecture room No. 1 adjoining the chalkboard. Space is provided for chart storage, a cupboard for a skeleton on a telescopic arm, a built-in X-ray viewing box and book and paper storage.

View of practical room with the utility rooms and viewing window beyond. This room will be fitted out as a model ward, and instruction in normal ward routine given here, and in the utility rooms, which are fitted out in a manner similar to actual ward conditions. The viewing window and screen are mahogany framed. The utility rooms are tiled throughout, with a terrazzo floor. Below, a detail of the cupboard fitment in demonstration room No. 2, which has a teak worktop and laboratory sinks.



analysis

	s	d
Roof construction	5	9¾

Prestressed concrete and hollow block, as for floors. Overall thickness, 6½ in.; superimposed load, 50 lb. per sq. ft. Foam slag screed, average thickness 2 in. topped with cement and sand skim.

Roof lights

One in tank room roof. Area, 16 sq. ft.

Glazing — 1 8¼

Windows: opening lights 26 and 32 oz. clear sheet: ¼-in. plate to larger areas.
Lavatory doors and training school foyer: obscured glass.
Spandril panels in east and west elevation: patent laminated unit made up of 32-oz. clear sheet glass backed by coloured veneer, 1/16-in. sealed air space and glass backing (overall thickness, 7/16-in.), set in teak rebated frames with teak glazing beads and bedded in mastic.

Total of structural elements: 23s 4¾d

PARTITIONS AND FITTINGS

Internal partitions — 2 6¼

9-in. brick load bearing cross wall.
3-in. clay hollow block.
2-in. terrazzo
4½-in. brick.

Screens — 3¼

Hardwood framed glazed partitions in training school with hardboard panels. Bottom roller, end folding sliding partition faced in sapele in training school.

Internal doors — 1 3

No. of single: 84, faced on corridor side with mahogany for veneering and on room side with gaboon ply for painting. Glazed panels in training school doors. All flush faced and skeleton framed with hardwood edging. 5-mm. resin bonded ply.
No. of double: 11, hardwood framed glazed double doors in corridors.

Ironmongery — 1 1½

Satin nickel rim dead locks and cylinder mortice locks with lever handles: mortice latches, check action double floor springs, pull handles, kicking plates.
Plastic lettering and satin nickel name holders. (Master key system.)

Fittings — 2 1½

Workbenches, storage cupboards, display cabinets, instrument cupboards, blackboards, pin-up boards and chart cupboards. Wardrobes, open shelving, laboratory fitments and office fitments.

Total of partitions and fittings: 7s 3½d

FINISHES

Floor finishes — 2 5

Type of finish	*Area in sq. ft.*	*Price per sq. yd.*
3·2 mm. sheet linoleum	1,556	19s. 9d.
4·5 mm. lino tiles	11,214	26s. 8d.
¾-in. terrazzo	990	29s. 8d.
⅝-in. quarry tiles	414	27s. 6d.
1 9/16-in. wood blocks	1,252	38s.

Wall finishes — 1 11½

¾-in. plaster with steel float finish.
¼-in. glazed tiles to utility rooms.
⅜-in. plasterboard and skim in bedroom divisions:
¾-in. terrazzo.

Ceiling finishes — 10½

⅝-in. plaster with steel float finish.
⅝-in. plaster on metal lath to corridors.
13/16-in. acoustic tiles in entrance foyers and stair landings on timber battens.

Roof finishes — 10½

3 layers bituminous felt with ½-in. granite chip finish.
Mineral felt flashings at eaves and copper flashings at upstands.

Decorations — 2 0

All colours selected from BS 2660/1955.
Acoustic tile ceilings, 2 coats emulsion paint.
Walls, one coat sealer and 2 coats oil paint eggshell finish: ceilings, ditto.
Woodwork, 3 coats oil paint gloss finish.
Hardwood varnished and teak linseed oiled.

Total of finishes: 8s 1½d

SERVICES

External plumbing — 10

Rainwater disposal by concealed gutters formed in concrete roofs and cast iron down pipes carried in internal ducts. Copper down pipes in training school behind stanchions. Pipework under building, all cast iron.

Hot and cold water installation — 5 0

Hot water: 2s. 5d.
Cold water: 2s. 7d.
Cold water from main in existing building to 1,320 gal. pressed steel storage tank on roof. Mains supply in kitchens and demonstration room No. 1.
Hot water supply: The water is heated by means of a steam-to-water copper storage calorifier, and the temperature is controlled by a direct acting type steam valve, connected by means of capillary tubing to a bulb in the calorifier.

Heating — 5 9½

The system is connected to two steam-to-water, non-storage pattern horizontal calorifiers, each of which could take 66 per cent. of the total load. Modulating type temperature control valves are fitted on steam lines to calorifiers and are connected in sequence or cascade with each other so that during light load only one calorifier is in operation but on heavy load the other comes into action. The sequence of the valves can also be reversed, this being done by hand every week so that one valve and calorifier will not be doing all the work. The valves are controlled by means of an outside thermostat and a control bulb in the flow main, also a clock controlled day-night changeover switch to lower the temperature at night to some pre-determined point which is adjustable, and a room boost thermostat which will cut out the outside thermostat in the morning, when the clock changes over, thus rapidly increasing the temperature in the building to the point at which control is again taken over by the outside thermostat.

Insulation — 8¼

analysis

	s	d
Ventilation		

Internal temps.: offices, lecture rooms, demonstration rooms, bathrooms, 65 deg. F.
Corridors, lavatories, bedrooms and entrance hall, 55 deg. F.
Air change: training school, three changes per hour.
Nurses' home, two changes per hour.
" U " of walls, 0·3. " U " of roof, 0·52.

Sanitary fittings — 1 s 6½ d

Type of fitting	*No. of each type*
W.c's	12
Lavatory basins	43
Sinks	10
Baths	6
Slop sinks	5
Laboratory sinks	3
Shampoo basins	4

Gas installation — 4½ d

9 points, for 4 cookers, 4 laboratory twin outlets and 1 incinerator.
Gas supply from meter in existing nurses' home.
Copper pipe.

Electrical installation — 3 s 2½ d

The sub and final distribution cables are v.r.i. and the supply cable linking Section Board "A" with the 100 amp. fused switch on the main switchboard in the main block is a 4-core p.i.l.c.s.w.a. cable. All conduit and accessories in this building are flush. In general throughout the building the lighting is tungsten, except for two fluorescent chalkboard fittings in the lecture rooms and strip lights in show cases.
The installation consists of the following:
1. Mains and distribution.
2. General lighting and socket outlets
3. Clocks.
4. Fire alarms.
5. Incinerators.
6. GPO telephones.
7. Small power (motors).

Number of points:

Tungsten lighting points	212
Fluorescent lighting points	2
Strip lighting points	7
Switch points	150
Switch sockets	67

Total of services : 17s 5¼d

Drainage — 1 s 9¼ d

Two pipe system. Drains run in salt glazed stoneware and cast iron under buildings.
Brick built manholes with cast-iron covers.

Other elements not shown above — 2 s 3 d

Installation of sterilizers for instruments, bowls and bedpans in utility rooms and of X-ray viewing panels in lecture rooms.
Landscape planting.
Alterations to gable of existing building, external paving and landscaping, etc.

Shillings per sq. ft. of floor area :
£47,830 (excluding drains and external works)
15,403 sq. ft. (inside external walls).

= 62 0¾

COST COMMENTS

This project owes it modest price mainly to the following factors:
1. Simple structure, construction and detailing.
2. Repetitive detailing both in structural components and finishes (there are 34 identical rooms in the nurses' home).
3. The use of an existing primary source of heating.
4. The use of a calorifier room in lieu of a basement boiler house.

Other cost comments on groups of elements:
Partitions and fittings: With built-in furniture in training school and nurses' home, one might have expected a greater cost emphasis on fittings than 2s. 1½d. per sq. ft. of floor area.
Finishes: The cost of the floor and roof screeds appear to have been included with " upper floors" and " roof construction." Suspended ceilings have been confined to corridors resulting in a cheap but satisfactory ceiling finish overall. (10½d. per f.s. floor area).
Services: The savings previously mentioned are partially offset by the isolation in pairs of the majority of sanitary fittings in the nurses' home. This entails individual supply pipes, waste stacks, vertical ducts and drain runs. The electrical supply has been brought from the existing buildings and this may have been a further factor in economy.
Drainage: The drains are taken into an existing system although certain alterations must have been necessary.

CONTRACTORS

Excavator brick and mason work: Davidson Bros. (Dalkeith) Ltd. *Joiner B.T.S. works:* John Wight and Co. (Edinburgh) Ltd. *Plumber work:* Mackie and Simpson Ltd. *Roofing:* Val De Travers Asphalte Ltd. *Plasterer and roughcast:* Wm. Graham Sons (Edinburgh) Ltd. *Tile and terrazzo work:* Toffolo Jackson & Co. Ltd. *Glazier work:* Robert Neish Ltd. *Painter work:* Phillip Pearson & Sons. *Heating:* The Allied Building Services (Glasgow) Ltd. *Electrics:* James Scott and Co. (Electrical Engineers) Ltd. *Insulation:* The Scottish Insulation Co. Ltd. *Domestic hot water:* Kennedy and Bain Ltd. *Structural steelwork and metal windows:* Fredk. Braby & Co. Ltd. *Precast concrete floors and roofs:* Costain Concrete Co. Ltd. *Glazing:* City Glass Co. Ltd. (Edinburgh). *Bricks:* Proctor & Lavender Ltd. *Metal balustrades:* T. P. Marwick & Co. Ltd. *Flooring:* Korkoid Decorative Floors. *Sliding door gear:* P. C. Henderson Ltd. *Blackboards:* Wilson & Garden Ltd. *Ironmongery:* Bell Donaldson & Co. Ltd. *Sanitary fittings:* Shanks Ltd. & Allied Ironfoundries Ltd. Shires & Co. (London) Ltd. *Wood block floors:* A. M. Macdougall & Sons Ltd. *Internal doors:* John Weston & Co. Ltd. *Tiles:* H. & R. Johnston Ltd. *Vitroslab panels:* Plyglass Ltd. *Acoustic tiles:* William Beardmore & Co. Ltd. *Paints:* British Paints Ltd. *Incinerators:* Wandsworth Electrical Mfg. Co. Ltd. Suggs Ltd. *Handrails:* Marley Tile Company.

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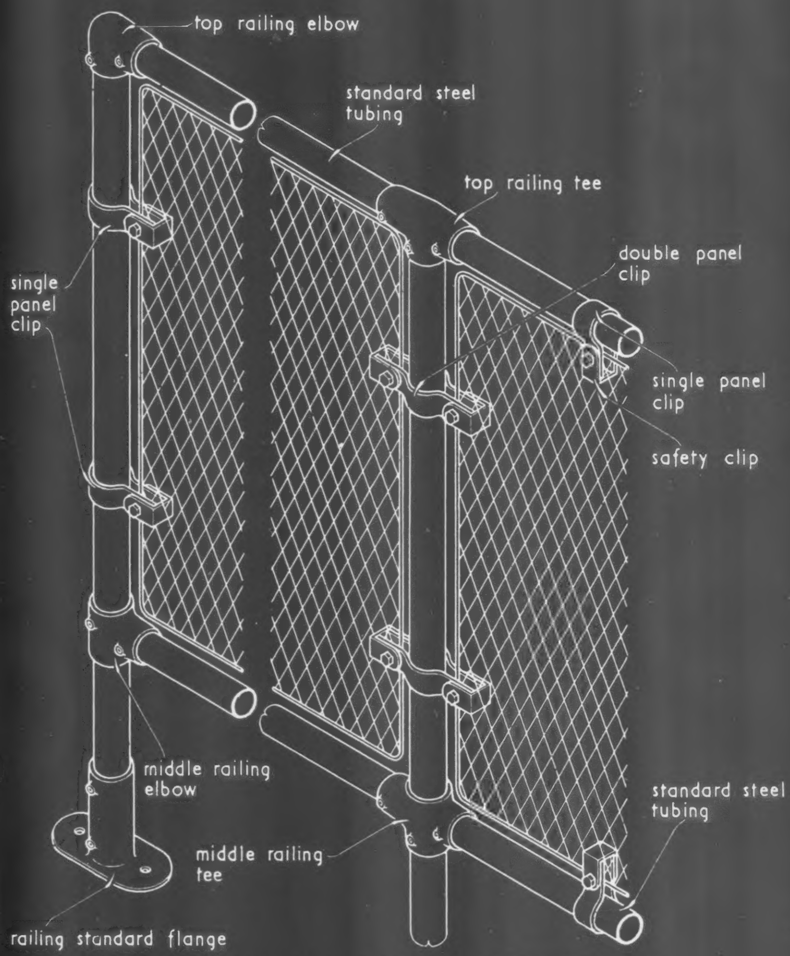
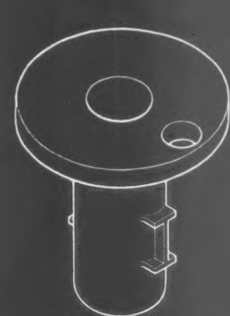
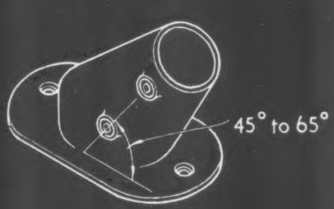


ISOMETRIC SKETCH SHOWING ASSEMBLY OF COMPONENTS.

GROUND SOCKET.

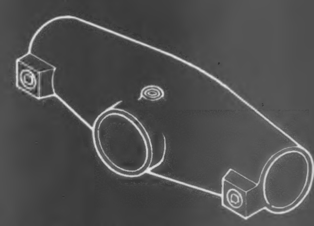


GROUND SOCKET WITH PLUG.

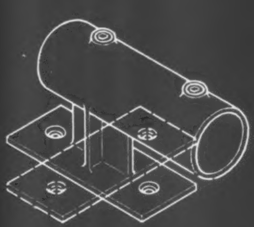


ANGULAR FLANGE.

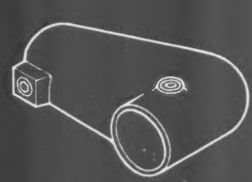
RAIL SUPPORT.



TOP RAILING TEE. (heavy type)



RAILING STANDARD SUPPORT. (vertical or horizontal base)



TOP RAILING ELBOW. (heavy type)

MIDDLE RAILING TEE. (heavy type)

KEE KLAMP FITTINGS FOR TUBULAR STEEL CONSTRUCTIONS : 3 GUARDRAILING.

Manufacturer : Geo. H. Gascoigne Co. Ltd.

26.Z2 ·KEE KLAMP· FITTINGS FOR TUBULAR STEEL CONSTRUCTIONS: 3 GUARDRAILING

This Sheet is the third of a series on Kee Klamp fittings and deals with guardrailing. A wide range of Kee Klamp fittings is available for jointing and fixing steel tubular members to produce various types of structure. Sheet 42.Z1 illustrates the principle of the system and the basic standard components; other Sheets in the series deal with storage racking, cycle racks, staging, etc.

Principle

Each socket on a Kee Klamp fitting is provided with a grub screw fixing. The hexagon-socket grub screw is tightened by a special key so that it grips the tubing. This simple principle has been applied to produce a very wide range of components for accommodating single and multiple junctions, crossovers, base flange fixings, etc., so that the flexibility of the system is almost without limit.

Material and Construction

The fittings are of malleable iron and are for use with standard steel gas, steam and water tubing to B.S. 1387: 1957. The drawing on the face of the Sheet shows a typical pedestrian guardrailing assembly using mesh panels: these are held in the double and single panel clips which are ancillary fittings available from the manufacturer. Alternative types of base flanges and sockets, standard supports and couplings, are also shown.

Sizes

The standard sizes in which the fittings are obtainable vary according to function and the manufacturer should be consulted for details. Where the required sizes for a particular application are not available from stock, they can normally be supplied to special order.

Finish

The fittings and tubing may be left untreated or galvanised.

Further Information

The manufacturer maintains a technical advisory service available to answer questions and prepare schemes for Kee Klamp installations.

Compiled from information supplied by:

Geo. H. Gascoigne Co. Ltd.
Address: Berkeley Avenue, Reading, Berks.
Telephone: Reading 54417-9.
Telegrams: Keklamps, Reading.

FIRE RESISTANCE GRADING OF ELEMENTS OF STRUCTURES USED IN BUILDINGS: 1

This Sheet, together with Sheet 36.A6, gives the fire resistance grading of elements of structures used in buildings. It is determined by tests carried out by D.S.I.R. and J.F.R.O. in accordance with B.S. 476. The information given in the tables is extracted from "Fire Resistance Grading in Buildings" (Nov. 1955) published by the Fire Protection Association.

General

Proprietary names are not given in the tables, but when a number of similar type have been tested the lowest grading of those passing the test is quoted and some may have failed, therefore manufacturers should be approached for full particulars of official tests.

The following classification of aggregates is used in the tables:

Class 1 (*a*); foamed slag, pumice.

Class 1 (*b*); blastfurnace slag, crushed brick and burnt clay products, well burnt clinker, crushed limestone.

Class 2; siliceous aggregates generally, e.g., flint, granite, and all crushed natural stones other than limestone.

For building in London, reference should be made to Schedule VI of "Construction of Buildings in London" published by the L.C.C.

WALLS AND PARTITIONS

Construction and Materials		Minimum thickness in inches exclusive of plaster for period of: 4 hr.	2 hr.	1 hr.	½ hr.
Solid bricks of clay, concrete or sand lime	Solid wall. No plaster	8½	8½	4¼	4¼
	Solid wall. Plastered at least ½ in. thick on both sides	8½	4¼	4¼	4¼
	Cavity wall. No plaster (2-in. cavity)	10½	10½	—	—
Solid concrete blocks	Class 1 (*a*) aggregates No plaster	—	4	3	2½
	Plastered at least ½ in. thick on both sides	4	3	2	2
	Class 1 (*b*) aggregates No plaster	—	4	3	2½
	Plastered at least ½ in. thick on both sides	—	4	2½	2
	Class 2 aggregates No plaster	—	—	4	3
	Plastered at least ½ in. thick on both sides	—	4	3	2
Reinforced concrete* (reinforced vertically and horizontally at not more than 6-in. centres, and reinforcement to be not less than 0·2 per cent. of volume)	Class 1 aggregates	6	4	3	3
	Class 2 aggregates	7	4	3	3
Gypsum blocks	No plaster	—	4	3	2
	Plastered at least ½ in. thick on both sides	—	3	2	2
Woodwool slabs	Plastered at least ½ in. thick on both sides	—	3	2	2
Plasterboard supported top and bottom edges in steel channels	Plastered on both sides at least ⅝ in. thick with gypsum plaster	—	—	¾	—
Glass bricks	In panels not exceeding 64 sq. ft. in area with expansion joints not less than $\frac{1}{10}$ in. per foot width at each side of the panel, and not less than $\frac{1}{10}$ in. per foot of the height of the panel at the top of the panel.	—	—	4	—

* Walls less than 5 in. thick should have a single layer of reinforcement in the middle of the wall. Walls more than 5 in. thick should have two layers of reinforcement, not less than 1 in. from each face.

36.A5 FIRE RESISTANCE GRADING OF ELEMENTS OF STRUCTURES USED IN BUILDINGS: 1

WALLS AND PARTITIONS (*continued*)

Construction and Materials		Minimum thickness in inches exclusive of plaster for period of:			
		4 hr.	2 hr.	1 hr.	½ hr.
Hollow clay blocks, shells not less than ¾ in. thick	All plastered at least ½ in. thick on both sides				
	1 cell in each block and each block not less than 50 per cent. solid	—	—	4	3
	1 cell in each block and each block not less than 30 per cent. solid	—	—	6	—
	2 cells in each block and each block not less than 50 per cent. solid	—	8½	4	—
	2 cells in each block and each block not less than 45 per cent. solid	—	—	6	—
Hollow concrete blocks	Plastered at least ½ in. thick on both sides				
	1 cell in wall thickness				
	Class 1 (*a*) aggregates	8¾	4	2½	—
	Class 1 (*b*) aggregates	8¾	4½	3	2½
	Class 2 aggregates	—	—	8¾	3
Hollow blocks of gypsum	Not less than 70 per cent. solid				
	No plaster	—	4	3	2
	Plastered at least ½ in. thick on both sides	—	3	2	2
Compressed straw slabs	3 in. × ½ in. wood cover strips over joint	—	—	—	2

Hollow Partitions

Construction and Materials		Fire resistance in hours
Plaster* on metal lathing on steel or timber studding	Gypsum, portland cement or cement lime plaster	
	½ in. thick on both sides of partition	½
	¾ in. thick on both sides of partition	1
Plaster on wood lathing on timber studding	Gypsum, portland cement or cement lime plaster	
	½ in. thick on both sides of partition	½
Plasterboard with or without gypsum plaster on each side of timber studding	⅜-in. plasterboard with $\frac{3}{16}$-in. neat plaster on both sides of partition	½
	½-in. plasterboard. No plaster	½
	½-in. plasterboard with ⅜-in. plaster on both sides of partition ..	1
	¾-in. plasterboard. No plaster	1
Woodwool slabs on each side of timber studding	1-in. woodwool slab with ½-in. plaster on both sides of partition	½
	1½-in. woodwool slab with ½-in. plaster on both sides of partition	1
Fibreboard on each side of timber studding	½-in. fibreboard with ½-in. plaster on both sides of partition ..	½

* Thickness of plaster measured from outer face of lathing

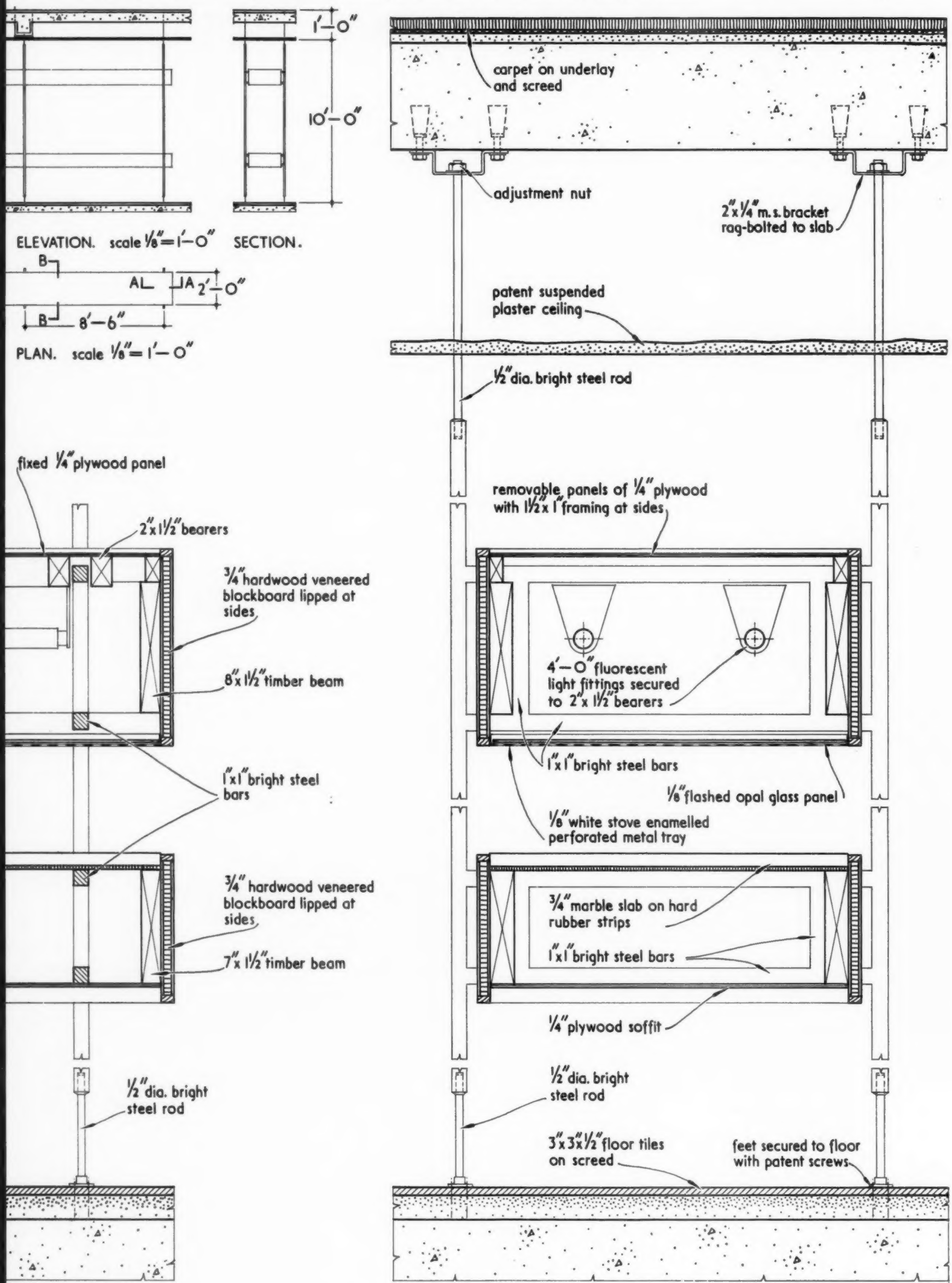
CLOAKROOM COUNTER: THEATRE AT COVENTRY

Arthur Ling, City Architect: Douglas Beaton, principal architect; Kenneth King, group architect

This detail is a good example of the use of a light steel frame to permit a complete visual separation between the horizontal supported parts of the structure and the frames which hold them. The counter top is of marble resting on rubber strips and therefore very heavy. Lengthwise support, both for the counter and for the lighting trough above is provided by deep 1½ in. wide joists which span from frame to frame behind the veneered blockboard sides.

CLOAKROOM COUNTER: THEATRE AT COVENTRY

Arthur Ling, City Architect: Douglas Beaton, principal architect; Kenneth King, group architect



SECTION A—A. scale 1/8 full size

SECTION B—B. scale 1/8 full size

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Contractors

Easthouses Church, Edinburgh (pages 408-410). *Architect:* Alan Reiach, A.R.I.B.A. *Architect-in-charge:* George A. Macnab, A.R.I.B.A. *Assistant:* Ian Hall. *Consultant engineer:* T. Harley Haddow & Partners, A.M.I.Struct.E. *Quantity surveyors:* Reed & Gibson. *Excavator, brick and concrete:* N. H. P. Thomson. *Joiner:* Alex Kent. *Plumber:* Patrick Knox & Son Ltd. *Electrician:* Miller & Tait. *Roof tiler and harling:* Wm. McLean. *Painter:* D. C. Smith. *Central heating:* Taylor & Fraser.

Clermiston Church, Edinburgh (pages 408-410). *Architects:* Basil Spence & Partners, F.R.I.B.A. *Structural consultants:* T. Harley Haddow & Partners, A.M.I.Struct.E. *Quantity surveyors:* Gibson & Simpson. *Mason:* William Black & Son. *Joiner:* Peter Nimmo & Son. *Plumber:* Mackie & Simpson Ltd. *Electrician:* Electric Services. *Plasterer:* D. & J. Borthwick. *Slater and harler:* George Riddell Ltd. *Heating:* Charles Ritchie & Co. *Glazier:* William Marshall. *Painter:* Designers & Decorators (Scotland) Ltd. *Steelwork:* A. & S. Constructors Ltd. *Bell tower:* Concrete (Scotland) Ltd. *Bell hangers:* Stevens & Struthers Ltd. *Ironmongery:* Bell Donaldson Ltd. *Sanctuary furniture:* William Russell. *Furniture:* Findlater Smith Ltd. Scandinavian Furnishings. Finmar Ltd. *Light fittings:* R. & S. Robertson.

Announcements

PROFESSIONAL

Manning and Clamp, A/A.R.I.B.A., have opened offices in Grimsby and 12-15, Great Turnstile, Lincolns Inn Fields, W.C.1, under their associates, R. C. Pratt and A. R. Osborne, respectively. They would be pleased to receive trade literature at these addresses.

Kenneth Scott Associates (Kenneth Scott, M.C., A.R.I.B.A., Geoffrey Spyer, A.R.I.B.A., A.A.Dip., Michael Willis, A.A.Dip.) have changed their London address to 154, Shepherd's Bush Road, W.6 (Riverside 3626). The address of their Ghana office remains P.O. Box 1766, Accra.

The firms Adamson, Gray and Adamson and G. Gordon Stanham have been amalgamated and now practise under the name of G. Gordon Stanham, Adamson, Gray & Partners, F.R.I.B.A., 9/10, Fenchurch Street, London, E.C.3 (Mansion House 5274 and 1010) with a branch office at Dinton, Bucks (Stone 358).

Lavender, Twentyman & Percy, F./A.R.I.B.A., are now practising from 35, Waterloo Road, Wolverhampton.

J. Austen Bent, A.R.I.B.A., F.R.I.A.S., A.M.T.P.I., Dip.T.P., will relinquish his post of Chief Technical Officer and Assistant General Manager of the Scottish Special Housing Association on his appointment from October 1 as Director of Housing to the City of Manchester.

The new officers of the Gloucestershire Architectural Association are: President, A. Saint, A.R.I.B.A., Thomas Street House, Cirencester; Secretary, D. R. B. Broom, F.A.C.C.A., 1, North Place, Cheltenham; Hon. Secretary, P. B. Davenport, A.R.I.B.A., Bibury, Cirencester; Hon. Treasurer, S. S. Careless, F.R.I.B.A., Achards, Woodchester, Stroud.

James Ronald Firth, A.R.I.B.A., has resigned from his post as Lecturer in the Faculty of Architecture, University of Hong Kong, and has been appointed architect to the Hong Kong Housing Authority, General Post Office Building, Hong Kong. Mr. Firth will welcome the exchange of information and literature from organizations connected with low-cost housing, and research on housing problems and economics.

H. G. Eisner, B.A., A.R.I.B.A., is now living at 4, The Close, Nr. Hurds Hollow, Matlock, Derbyshire.

TRADE

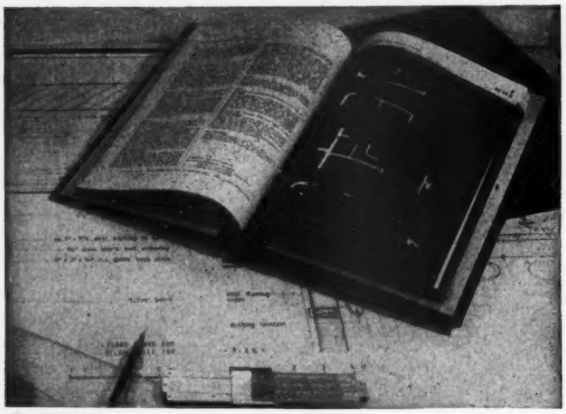
Denton Edwards Paints Ltd., Abbey Road, Barking, Essex, will be exhibiting at the National Housing and Town Planning Council Conference which will be held at Brighton on October 21-23. The exhibition is ticket free.

Versatile Fittings (WHS) Ltd. have made the following changes to the board of directors: D. A. Acland has tendered his resignation; G. R. Armstrong has been appointed a director, and H. H. van Straubenzee has been nominated vice chairman. Mr. Straubenzee will remain managing director of the company.

Peter E. M. Sharp, A.C.G.I., B.Sc.(Eng.), A.M.I.E.E., has been awarded a Ford Foundation travel grant to the United States. Mr. Sharp is personal assistant to A. H. Young, Joint Managing Director of Troughton & Young Ltd., he will be spending two months in the United States in the Spring of 1959 and is hoping to visit many of the leading electrical companies, industrial design schools, and industrial designers during his tour.

Tretol (Scotland) Ltd., has opened its Head Office in Glasgow at 65, Renfield Street, Glasgow, C.2. The Scottish directors are A. B. Oliphant (Sales Director) and William Bell.

The publicity manager of T. & W. Farmiloe Ltd. (Nine Elms Paint Products), K. P. F. W. Morris, M.B.E., has been appointed to the command of 246 (7th London) Field Regiment RA, TA, with the rank of Lieutenant-Colonel.



THE LIBRARY OF INFORMATION SHEETS COMPLETE TO JUNE, 1958

REPRINTS

All Information Sheets published since the new series was started in October, 1947, have been reprinted. Specially-designed binding cases to hold approximately 100 Sheets may be obtained at the price of 6s. 0d. each. (Postage 1s. 1d.)

Individual Sheets may be ordered (3d. each). Readers requiring sets or individual Sheets should fill in the form below. Sets in classified order (without binders) are available as follows:

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D. Anderson & Son Ltd.'s Glasgow Office recently moved to modern offices and stores at 425, Scotland Street, Glasgow, S.1. The sales and contracting offices of D. Anderson & Son Ltd., Old Ford, London, E.3, now have the same telephone number, Amherst 9381.

Roy A. Wykes has been appointed vice-president and managing director of the interests in Canada of the Taylor Woodrow group of building and civil engineering companies. His new responsibilities include the vice-presidency of Monarch Mortgage & Investments Ltd., its subsidiary, Monarch Construction & Realty Ltd., and Taylor Woodrow Ltd. Mr. Wykes has relinquished his directorship of Taylor Woodrow (Nigeria) Ltd.

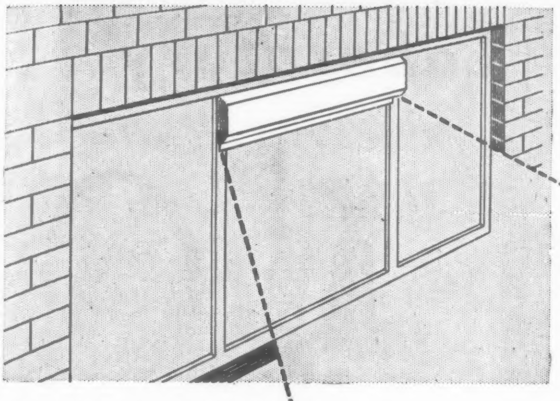
Leaderflush (Doors) Ltd. have appointed Sharpe & Fisher Ltd., Pittville Street, Cheltenham, to act as sole distributors of Leaderflush doors for Gloucestershire, Worcestershire and Herefordshire.

W. L. Baker, manager of the Metal Finishing Division of the Pyrene Company, Limited, retired on September 1 after 30 years' service with the company. He will be succeeded by H. A. Holden, M.SC., A.R.C.S., D.I.C., A.I.M. H. F. Parshall, M.A., T.D., continues as director in charge of the Division.

The Public Relations Department of the Bowater Organisation is now at Bowater House, Knightsbridge, London, S.W.1 (Knightsbridge 7070).

Correction

In the JOURNAL for September 4, the address of the York Institute of Architectural Study was given as St. Anthony's Hall. This is incorrect. The address is: Micklegate, York.



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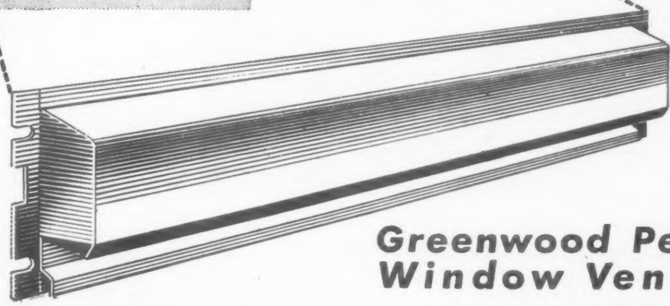

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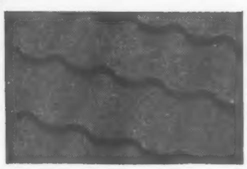
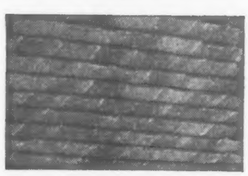
Fifty winters have furrowed his brow...





And still he is quite young, as tortoises go. The storms of fifty years have beaten upon that powerful shell, but it's still as good as ever. As long as nobody covets it for a hairbrush, it should continue to serve him for many years to come.
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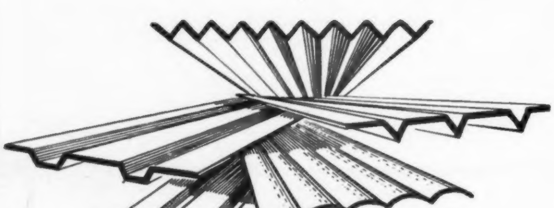

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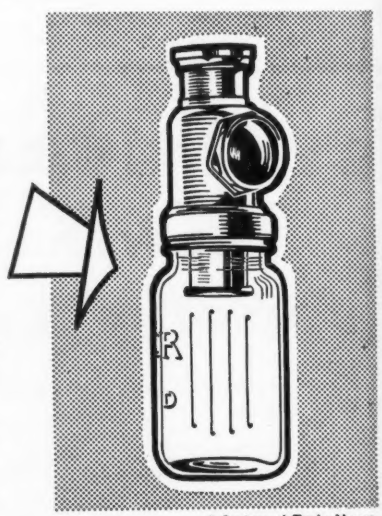

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Advertisements should be addressed to the Advt. Manager, "The Architects' Journal," 9, 11 and 13, Queen Anne's Gate, Westminster, S.W.1, and should reach there by first post on Friday morning for inclusion in the following Thursday's paper.

Replies to Box Numbers should be addressed care of "The Architects' Journal," at the address given above.

AIR-MAIL SERVICE available on request:
In response to requests from a number of Overseas subscribers for air-mail delivery of Public and Official Appointment details and Other Appointments Vacant, we have been pleased to arrange that cuttings of all such classified advertisements appearing in the A.J., shall be despatched by air-mail on Wednesday of each week (one day prior to A.J. publication date). The cost of this special service to Overseas subscribers will be 5s. for four weeks (1s. 3d. for each additional week) and prepayment should be sent by readers wishing to take advantage of this service. The charge we are making represents only the actual cost of the postage involved.

Public and Official Announcements

30s. per inch; each additional line, 2s. 6d.

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
Vacancies for: (1) ARCHITECTS, Grade III, starting salary up to £1,090 a year. (2) ARCHITECTURAL ASSISTANTS, starting salary up to £860.
Full and interesting programme of houses, flats, schools and general buildings.
Application form and full particulars from Hubert Bennett, F.R.I.B.A., Architect to the Council, the County Hall, S.E.1, quoting ref. AR/EK/36/58. (1428) 1074

LONDON COUNTY COUNCIL
ARCHITECT'S DEPARTMENT
Vacancies for: 1. ARCHITECT/PLANNERS. Tasks include three-dimensional planning within London's eight major comprehensive development areas (including Stepney/Poplar, the South Bank and Elephant and Castle) and other redevelopment areas. The work includes the preparation of comprehensive layouts for all important areas of new development throughout the County including areas to be redeveloped in connection with road improvements.
2. TOWN PLANNING ASSISTANTS. Duties include investigation of development proposals, surveys, report writing, preparation of data for public inquiries.
Starting salaries in each case up to £860 according to experience and qualifications. Application forms and further particulars may be obtained from Hubert Bennett, F.R.I.B.A., Architect to the Council, The County Hall, London, S.E.1, quoting Ref. AR/EK/35/58. (1397) 1034

QUANTITY SURVEYING ASSISTANTS required by AIR MINISTRY in LONDON and PROVINCES. Duties include abstracting and billing, site measurement and preparation of estimates. Commencing salary and grading according to age, qualifications and experience. Salary ranges in London: (a) £545 at age 25 rising to £745 for candidates with minimum three years' good experience under Quantity Surveyor or Building Contractor; (b) £695 at age 26 rising to £870 for candidates with O.N.C. (Building) or (Builders Quantities) or equivalent and good experience under Quantity Surveyor or Building Contractor. Approved full time study will count towards period of experience. Salaries somewhat lower in Provinces. Promotion and pensionable prospects. Five-day week, three weeks' leave a year. Appointments carry liability for service anywhere U.K. or overseas. Applicants normally should be natural born British subjects. Write stating age, qualifications and previous appointments including type of work done, to Manager Professional and Executive Register, Ministry of Labour and National Service, Atlantic House, Farringdon Street, E.C.4, quoting reference PE 105/745. No original testimonials should be sent. Only applicants selected for interview will be advised. 1102

BOROUGH OF SOLIHULL
BOROUGH ENGINEER & SURVEYOR'S DEPARTMENT
ARCHITECTS
(a) SENIOR ASSISTANT ARCHITECT, Grade A.P.T. IV (£1,025 × £50—£1,175).
(b) ASSISTANT ARCHITECT, Special Grade (£750 × £40—£1,030).
Applicants for appointment (a) should be fully qualified and have had adequate experience. Applicants for appointment (b) should have passed parts 1 and 2 of the R.I.B.A. Final or Special Final examination or the equivalent at one of the recognised schools of architecture, and have had at least five years' experience including period spent on theoretical training.
Commencing salary according to experience. Usual local government conditions. In appropriate cases housing accommodation will be made available as soon as possible and half removal expenses paid.
Applications with names of two referees to the Borough Engineer and Surveyor, 90, Station Road, Solihull, Warwickshire, by Friday, October 3rd, 1958.
W. MAURICE MELL,
Town Clerk.
1456

COUNTY BOROUGH OF SOUTH SHIELDS
Applications are invited for the following appointments in the Borough Engineer's Department.
ASSISTANT ARCHITECTS
Salary in accordance with the special scale £750 × £40—£1,030. Placing within this scale will be in accordance with experience.
Housing accommodation will be available to successful applicants if necessary.
The successful applicants will be required to pass a medical examination for superannuation purposes.
Application forms can be obtained from the Borough Engineer's Department, Town Hall, South Shields, and should be returned by 10.0 a.m. on Monday, 29th September, 1958.
R. S. YOUNG,
Town Clerk.
1415

CITY OF SHEFFIELD
CITY ENGINEER & SURVEYOR'S DEPARTMENT
PLANNING ASSISTANTS
Applications are invited from suitably qualified persons for the following appointments on the permanent staff of the City Engineer & Surveyor & Town Planning Officer (H. Foster, M.A., M.I.C.E., M.I.Mun.E.).
SENIOR PLANNING ASSISTANTS, Grade A.P.T. V (£1,175—£1,325 p.a.).
GENERAL PLANNING ASSISTANTS, Grade A.P.T. III (£845—£1,025 p.a.).
Candidates for the senior posts must possess both Planning and Architectural experience and will be required to be Members of either the Town Planning Institute or the Royal Institute of British Architects.
Qualifications required for the post of General Planning Assistant is A.M.T.P.I.
Superannuable posts, N.J.C. Conditions of Service, Medical Examination.
Applications, stating age, education and training, qualifications, experience, present and past appointments (with dates and salaries) and quoting the names of two referees should be submitted to the undersigned by the 3rd October, 1958.
JOHN HEYS,
Town Clerk.
Town Hall,
Sheffield, 1. 1377

CITY OF NOTTINGHAM
ESTATES DEPARTMENT
Applications are invited for the following appointments in the Chief Architect's Section:—
(1) ASSISTANT ARCHITECT at a commencing salary within the Special Scale (£750 × £40—£1,030). Applicants should have passed Parts 1 and 2 of the Final Examination of the R.I.B.A.
(2) JUNIOR ARCHITECTURAL ASSISTANT at a commencing salary within the General Division Scale (£200—£560).
There is a large programme of interesting and varied work covering redevelopment schemes and estate development, which includes housing, shops, hostels, etc.
The appointments will be subject to the National Joint Council's Scheme of Conditions of Service.
Applications stating age, qualifications, experience, present appointment and salary, and naming two referees, should be sent to the Estates Surveyor and Valuer, Guildhall, Nottingham, by Friday, 26th September, 1958.
T. J. OWEN,
Town Clerk.
Guildhall,
Nottingham. 1376

BOROUGH OF THORNABY-ON-TEES
ASSISTANT ARCHITECT
Applications are invited from candidates who have passed the Intermediate R.I.B.A. for this appointment in the Borough Engineer's Department in accordance with the National Scheme of Conditions of Service on Grade A.P.T. II (£727 × £30—£845).
Housing accommodation will be provided if required, and half removal expenses paid.
Applications stating qualifications and experience and giving names and addresses of two referees should be delivered to the Borough Engineer, Town Hall, Thornaby-on-Tees, not later than 30th September, 1958.
A. STOCKWELL,
Town Clerk.
1418

COUNTY BOROUGH OF SOUTHAMPTON
BOROUGH ARCHITECT'S DEPARTMENT
Applications are invited for the following permanent positions:—
(a) ASSISTANT PLANNING OFFICER, Special Grade (£750—£1,030).
(b) PLANNING ASSISTANT, Grade A.P.T. II (£725—£845).
Candidates should possess appropriate qualifications and should state their housing needs.
Application forms from the Borough Architect, Civic Centre, Southampton. Closing date 4th October 1958. 1457

SLOUGH CORPORATION
ASSISTANT ARCHITECT needed for housing and re-development schemes and general municipal building works. Applicants should have good experience in design and supervision of works. Salary within Grade for Special Classes (£750 × £40—£1,030). Must be A.R.I.B.A. Housing would be provided for married candidates.
Confidential applications, giving names of two referees, age, qualifications and experience, should reach the Borough Engineer, Town Hall, Slough, Bucks, by Monday, 6th October, 1958. 1455

CORBY DEVELOPMENT CORPORATION
ASSISTANT ARCHITECT
Applications are invited for an appointment as an Assistant Architect within the salary grade A.P.T. V (£844—£1,029) of the Whitley Council scales for New Towns staff; the commencing point within this grade will depend upon experience and qualifications.
The appointment will be subject to superannuation under the Local Government Superannuation scheme.
The work of the Corporation offers wide experience in the design and construction of houses, town centre buildings and factories, both in large schemes and in individual buildings.
Housing is available and assistance with removal expenses will be provided.
Applications, stating age, education, training, qualifications, experience, present and past appointments and salaries, together with the names of two referees, must reach the undersigned by Monday, 29th September, 1958.
R. F. BROOKS GRUNDY,
General Manager.
Spencer House,
Corby,
Northants. 1448

STEVENAGE DEVELOPMENT CORPORATION
CHIEF ARCHITECT'S DEPARTMENT
Applications are invited for appointment to posts as ARCHITECTS and/or ARCHITECTURAL DRAUGHTSMEN.
Applicants should have experience of planning and construction of modern buildings.
Work is of a varied and interesting nature, relating to the building of a New Town and includes Shopping Centres, Housing and Multi-storey Flats, Commercial and Industrial Buildings and Offices.
Salary according to experience within range £753 rising to £1,029.
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, near Stevenage, Herts, not later than 30th September, 1958. 1439

BOROUGH OF WIMBLEDON
ARCHITECTURAL ASSISTANT, Grade Special Classes, £750—£1,030, plus London Weighting. Form of application from Borough Engineer and Surveyor, Town Hall, Wimbledon, S.W.19, returnable by 3rd October, 1958. Canvassing disqualifies. 1446

ROYAL FINE ART COMMISSION: DEPUTY SECRETARY. Post for man at least 30 and normally under 45 on 1.9.58 with administrative ability and good knowledge of the arts, particularly of architecture and of town planning. Professional qualifications in architecture or town planning an advantage. Salary £1,500-£1,700. Post may become permanent in two years. Write Civil Service Commission, Burlington Gardens, London, W.1, for application form, quoting 4885/58. Closing date 1st October, 1958. 1447

COUNTY BOROUGH OF NEWPORT
Applications are invited for the post of PLANNING ASSISTANT Special Grade (£750—£1,030). Applicants must have passed the Final Examination of the Town Planning Institute and have had practical experience with a local Planning Authority. Applications with copies of three recent testimonials should reach the Borough Engineer, Civic Centre, Newport, Mon., by the 3rd October, 1958. 1476

BUCKINGHAMSHIRE EDUCATION COMMITTEE
HIGH WYCOMBE COLLEGE OF FURTHER EDUCATION
(Principal: W. J. Davies, J.P., B.Sc.)
Required as soon as possible LECTURER to teach Interior Design. It is hoped that by arrangement with the County Architect the College will have opportunities of undertaking live interior decoration projects on County buildings.
Salary will be paid in accordance with the appropriate Burnham Report, i.e., £1,200 × £30 rising to a maximum of £1,350.
Further details and forms of application may be obtained from the Principal at Queen Alexandra Road, High Wycombe, to whom completed application forms should be returned within ten days of the date of the appearance of this advertisement. 1475

COUNTY BOROUGH OF DERBY
BOROUGH ARCHITECT'S DEPARTMENT
(1) SENIOR QUANTITY SURVEYOR, A.P.T. Grade IV (£1,025—£1,175 per annum). Qualifications: A.R.I.C.S. (Quantities) or A.I.Q.S. or A.I.A.S. with appropriate experience.
(2) SENIOR ASSISTANT ARCHITECT, Special Grade (£750—£1,030 per annum). Qualifications: A.R.I.B.A.
(3) ASSISTANT/JUNIOR ARCHITECTS—
A.P.T. Grade II ... ... (£725—£845 per annum).
A.P.T. Grade I ... ... (£575—£725 per annum).
Higher General Division (£230—£560 per annum).
Commencing salary according to qualifications and experience.
Permanent superannuable appointments, subject to one month's notice and to medical examination. National Conditions of Service.
Application forms obtainable from and to be returned to the Borough Architect, The Council House, Corporation Street, Derby, not later than Monday, 29th September, 1958.
G. H. EMLYN JONES,
Town Clerk.
5th September, 1958. 1425

CITY OF BIRMINGHAM PUBLIC WORKS DEPARTMENT
REDEVELOPMENT SECTION

Vacancy for PLANNING ASSISTANT (Research).

Salary Grade, Special Scale (£750—£1,030 per annum), according to qualifications and experience.

Applicants should be Associate Members of the Town Planning Institute and/or hold a University degree in Economics or Geography.

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 the 11th October, 1958.

Canvassing disqualifies.

HERBERT J. MANZONI,
City Engineer and Surveyor.

Civic Centre,
Birmingham, 1. 1445

Poplar Borough Council invite applications for permanent appointment of PRINCIPAL ASSISTANT ARCHITECT, A.P.T. IV (£1,055/£1,205). Applicants must have passed R.I.B.A. Final Examination. Application forms obtainable from Borough Engineer and Surveyor, Poplar Town Hall, Bow Road, E.3, for return by first post on 29th September, 1958. 1438

CITY OF LEICESTER
CITY ARCHITECT'S DEPARTMENT

Applications are invited for the following appointments:—

(*a*) CHIEF ASSISTANT QUANTITY SURVEYOR, salary Grade A.P.T. V (£1,175—£1,325 p.a.).

The appointment entails control and organisation of the Quantity Surveying Section of the City Architect's Office, which is responsible for all public work, including educational building and housing. Applicants must be A.R.I.C.S. (Quantities sub-division) and have experience of organisation of all aspects of Quantity Surveying work on major and minor projects.

Previous local government experience is not considered essential.

(*b*) ASSISTANT ARCHITECT, salary Special Grade (£750—£1,030 p.a.).

Applicants must have passed Parts I and II of the Final Examination of the R.I.B.A. The successful applicant would be engaged on an interesting programme of new works of educational or civic character.

The appointments would be subject to the National Scheme of Conditions of Service and one month's notice on either side.

Applications, stating age, qualifications and details of experience and also giving the names of two referees should be sent to the undersigned not later than 30th September, 1958.

No housing accommodation is provided.

J. H. LLOYD OWEN,
City Architect.

10, Loseby Lane,
Leicester. 1478

BOROUGH OF TOTTENHAM

Applications are invited for the following posts:—

SENIOR ASSISTANT ARCHITECT (Estab.) A.P.T. Special Grade, £750—£1,030 p.a. Applicants must hold a final professional qualification.

ASSISTANT ARCHITECT (Unestab.) A.P.T. Special Grade, £750—£1,030 p.a. Applicants must hold a final professional qualification.

ARCHITECTURAL ASSISTANT (Estab.) A.P.T. II, £725—£845 p.a. Applicants must have at least passed R.I.B.A. intermediate examination or equivalent.

ARCHITECTURAL ASSISTANT (Estab.) A.P.T. I, £575—£725 p.a. Applicants must have at least passed R.I.B.A. intermediate examination or equivalent.

London Weighting allowance of £20 or £30 p.a., according to age.

Commencing salaries within grades according to ability and experience.

Application form and Conditions of Appointment from Borough Engineer (AJ), Town Hall, Tottenham, N.15. Applications to be delivered by Thursday, 2nd October, 1958. 1481

ANGLESEY COUNTY COUNCIL
COUNTY PLANNING DEPARTMENT

Applications are invited for the post of PLANNING ASSISTANT, Grade A.P.T. I (£575—£725).

Applicants should have had a sound training in a planning office, be competent draughtsmen, and capable of undertaking survey work. Further particulars from the County Planning Officer, Shire Hall, Llangefni.

Applications, giving names and addresses of two referees, to the Clerk of the County Council, Shire Hall, Llangefni, by Friday, the 26th September, 1958. 1426

SOUTH-EASTERN REGIONAL HOSPITAL BOARD, SCOTLAND
ARCHITECT'S DIVISION

Applications are invited for the following superannuated posts, headquarters in Edinburgh:

ARCHITECTURAL ASSISTANTS: £525 (at age 21 or over) to £730.

DRAUGHTSMAN: £425 (at age 21 or over) to £635.

Commencing salary dependent upon experience. Applications giving details of age, qualifications and experience, to the Regional Architect, 8, Drumsheugh Gardens, Edinburgh, 3, within seven days. 1424

PERTH AND KINROSS JOINT COUNTY COUNCIL require ARCHITECTURAL ASSISTANTS for work on New Schools. Salary scale £820-£955 with placing. Applicants should hold the A.R.I.B.A. and have had some experience since qualification. A house will be available. Particulars of appointment and forms of application from the County Clerk, P.O. Box 15, County Offices, York Place, Perth. Applications to be lodged by 6th October, 1958. 1479

COUNTY BOROUGH OF WEST BROMWICH

Applications are invited for the appointment of an ASSISTANT ARCHITECT. Salary, Special grade, £750—£1,030.

Housing accommodation will be made available. N.J.C. Conditions of service.

Applications, naming two referees, to Borough Surveyor, Town Hall, West Bromwich, by 27th September, 1958. 1480

HERTFORDSHIRE COUNTY COUNCIL
COUNTY ARCHITECT'S DEPARTMENT

ASSISTANT ARCHITECTS (Special Class, £750—£1,030) required. Previous Local Government experience not essential.

Applications, with names of two referees, to County Architect, County Hall, Hertford, Herts, not later than 27th September, 1958. 1477

Architectural Appointments Vacant

4 lines or under, 9s. 6d.; each additional line, 2s. 6d. Box Number, including forwarding replies, 2s. extra

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CO-OPERATIVE WHOLESALE SOCIETY LTD.
ARCHITECT'S DEPARTMENT, MANCHESTER

APPLICATIONS are invited for the appointment of ASSISTANT ARCHITECTS with experience of work on commercial and industrial projects, capable of preparing working drawings from preliminary details. Five-day week in operation. Applications stating age, experience, qualifications and salary required to G. S. Hay, A.R.I.B.A., Chief Architect, Co-operative Wholesale Society, Ltd., 1, Balloon Street, Manchester, 4. 9585

C. B. PEARSON AND SON require a SENIOR ASSISTANT in their Lancaster Office. Apply stating qualifications and salary required to 18, Dalton Square, Lancaster. 1326

YOUNG Single ASSISTANT of about Intermediate standard for Country Office near Norwich. Experience of Local Authority Housing and Surveying essential. Apply Box 1350.

SENIOR ASSISTANT required urgently by London Architects, preferably with some knowledge of tropical architecture. Salary £850—£1,000 according to experience. Phone: COV 2629. 1461

ARCHITECTURAL ASSISTANT of R.I.B.A. Intermediate standard required for private office with varied and interesting work. Applicants must be capable draughtsmen, able to make surveys and produce working drawings, and details of modern buildings. Write details and salary required to W. J. Lewis & Sons, 68, Cranbrook Road, Ilford, Essex. 1314

DAVID ROBERTS requires by November, ARCHITECTURAL ASSISTANT, school trained with one to two years' experience. Reply, stating age and Salary required to 31B Magdalene Street, Cambridge. 1413

QUALIFIED (or nearly so) and experienced ARCHITECTURAL ASSISTANT required for position of responsibility in varied London practice. Box 1406.

ARCHITECTS (City) require ASSISTANT with experience of Industrial and Commercial projects. Salary £600—£800. Box 1420.

WANTED in London office of A.R.I.B.A. engaged on work for Housing Company, ARCHITECTURAL ASSISTANT, Inter. R.I.B.A. standard. Experience in preparation of Sketch Designs, Working Drawings and Specifications essential. Salary according to experience and capabilities. Box 1384.

S. P. JORDAN & PARTNERS require a recently qualified ASSISTANT for general practice and exhibitions. Salary by arrangement. Write to 1, Bloomsbury Court, Barter Street, W.C.1. 1460

ASSISTANT required in London Office, capable in design work and working drawings. Salary according to experience. Reply Box 1390.

ARCHITECT BRANCH MANAGER required for East Midland Office. £1,000 offered for year's contract, followed by offered Partnership if satisfaction on both sides. Some maturity desired and industry, energy and good personality essential. Good opportunity for right man. Apply Box 1374.

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ARCHITECT ASSISTANT. Harrods Ltd. have a vacancy for an Architectural Assistant of Intermediate standard to carry out work comprising design, working drawings and supervision of work in the Store and Factories. Permanent and pensionable position. Apply in writing giving full particulars to M. Kenfield, A.R.I.B.A., House Architect, Messrs. Harrods Ltd., 42, Hans Crescent, S.W.1. 1466

ARCHITECTURAL ASSISTANT (Intermediate) required for country practice at New Forest branch, Lyndhurst. Apply stating age, experience and salary required to: Hill & Allum, F.R.I.B.A., A.R.I.C.S., 21, Carlton Crescent, Southampton. 1465

ARCHITECTURAL ASSISTANTS, Final standard, required for private Birmingham practice to work on large and interesting developments where initiative and drive would be welcomed. Five-day week. Salary range £900 to £1,100 according to experience. Box 1462.

ARCHITECTURAL ASSISTANTS required. Starting salary £750. Box 1316.

ARCHITECTURAL ASSISTANTS, Intermediate standard, required for private Birmingham practice to work on large and interesting developments where initiative and drive would be welcomed. Five-day week. Salary range £550 to £700 according to experience. Box 1463.

ARCHITECTURAL ASSISTANTS (final standard) required for private practice in Halifax. Applicants must be conscientious and capable of accepting responsibility. Apply in writing to Richard Pickles & Partner, A/A.R.I.B.A., 1, Harrison Road, Halifax. 1482

SCHERRER & HICKS, 19, Cavendish Square, W.1, require immediately ARCHITECTURAL ASSISTANTS of Intermediate standard with at least three years' office experience on industrial buildings. 1459

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ARCHITECTURAL ASSISTANT (Intermediate standard) housing experience. Good working conditions, superannuation, possibility of house. Applications stating experience and salary required to Chief Architect, Bournville Village Trust, Estate Office, Oak Tree Lane, Birmingham 30. 1449

ARCHITECTURAL ASSISTANT. George Wimpey & Co. Ltd., have a vacancy for a Senior Architectural Assistant of suitable experience in the Architect's Department of their Midland Regional Office. Write for application form to: George Wimpey & Co. Ltd., Building and Civil Engineering Contractors, Chester Road, Birmingham, 24. 1429

CAPABLE ASSISTANT, with initiative and able to take responsibility, to prepare drawings and do paper work for tricky conversion. Short term from middle October with possible extension of engagement. Write brief details and salary required to Musman & Cousens, 12, Upper Berkeley Street, W.1. 1441

JAMES & BYWATERS urgently require capable and experienced qualified ASSISTANT. Salary to be agreed after interview. Apply in writing to 5, Bloomsbury Street, W.C.1. 1440

ARCHITECTURAL ASSISTANT required for varied work on housing and industrial building. Applicant should be in early twenties with at least two years' experience in an Architect's Office and capable of undertaking projects with a minimum of supervision. Write giving full particulars of experience and salary required to Shepperdson & Dixon, 2, Museum Street, Ipswich. 1434

JUNIOR ASSISTANTS, passed Intermediate, required urgently for West End Office. Please write stating salary required to Box 1431.

ARCHITECTURAL DRAUGHTSMAN required, preferably with experience of timber construction. Good canteen facilities. Pension Scheme. Salary according to experience and qualifications. Write Medway Buildings & Supplies, Ltd., Phoenix Wharf, Rochester, Kent. 1433

TWO SENIOR ARCHITECTS required immediately in busy and varied practice in the West Riding of Yorkshire. Applicants should be Associate Members of the R.I.B.A. and have had considerable experience, preferably some pre-war experience. Salary up to £1,700 per annum according to experience. Non-contributory pension scheme in operation and good prospects for promotion. Apply, giving full particulars of experience, qualifications, etc., to Box 1392. Closing date for applications 24th September, 1958.

BOISSEVAIN & OSMOND require SENIOR ASSISTANTS who have a genuine and creative interest in Architecture and a sound understanding of organizational problems. The practice is varied and new constructional techniques are being developed by a complete building team. Experience of pre-fabricated schools would be an advantage. This is a Senior appointment offering wide scope for a man with initiative and ability.
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SENIOR and INTERMEDIATE standard ASSISTANTS required immediately. Extensive and varied practice. Please apply, giving full particulars to: George Brown & Partners, Brunel House, College Green, Bristol, 1. 1450

ASSISTANT ARCHITECT required for the London office of a major oil company. Applicants must be A.R.I.B.A., capable of administration, supervision of staff, and controlling work through all stages of development. Must hold a current driving licence. Five-day week. Good pension and Insurance Scheme, sickness benefit and luncheon vouchers. Apply to Box 1427 quoting ref. AAL.9405 A.

Architectural Appointments Wanted

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CO-OPERATIVE WHOLESALE SOCIETY LTD. Architect's Department, London. WORKER-UP. Applications are invited from suitably qualified and experienced persons. Salary according to age, qualifications and experience. The post is superannuable, subject to medical examination. Five-day week in operation. Applications, stating age, experience, qualifications and salary required to:—W. J. Reed, F.R.I.B.A., Chief Architect, Co-operative Wholesale Society Ltd., 99, Leman Street, London, E.1. 1204

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