THE ARCHITECTS' JOURNAL

standard contents

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

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THE 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 Ie one week, Ig to Z the next. In all cases where the town is not mentioned the word LONDON is implicit in the address.

AA	Architectural Association, 34/6, Bedford Square, W.C.1.	Museum 0974
AAI	Association of Art Institutions. Secy.: W. Marlborough Whitehead, "Dyneley," Castle Hill Avenue, Berkhampstead, Herts.	
ABS	Architects' Benevolent Society. 66, Portland Place, W.1.	Langham 5721
ABT	Association of Building Technicians. 1, Ashley Place, S.W.1.	Victoria 0447–8
ACGB	Arts Council of Great Britain. 4, St. James' Square, S.W.1.	Whitehall 9737
ADA	Aluminium Development Association. 33, Grosvenor Street, W.1.	Mayfair 7501/8
ArchSA	Architectural Students' Association. 34/36, Bedford Square, W.C.1.	
ARCUK	Architects' Registration Council. 68, Portland Place, W.1.	Langham 8738
BAE	Board of Architectural Education. 66. Portland Place, W.1.	Langham 5721
BATC	Building Apprenticeship and Training Council. Lambeth Bridge House, S.E.1.	Reliance 7611, Ext. 1706
BC	Building Centre. 26, Store Street, Tottenham Court Road, W.C.1.	Museum 5400
BCC	British Colour Council. 13, Portman Square, W.1.	Welbeck 4185
BCCF	British Cast Concrete Federation. 105, Uxbridge Road, Ealing, W.5.	Ealing 9621
BCIRA	British Cast Iron Research Association. Alvechurch, Birmingham.	Redditch 716
BDA	British Door Association. 10, The Boltons, S.W.10.	Fremantle 8494
BEDA	British Electrical Development Association. 2, Savoy Hill, W.C.2.	Temple Bar 9434
BIA	British Ironfounders' Association. 145, Vincent Street, Glasgow, C.2.	Glasgow Central 2891
BID	Building Industries Distributors. 52, High Holborn, W.C.1.	Chancery 7772
BINC	Building Industries National Council. 11, Weymouth Street, W.1.	Langham 2785
BOT	Board of Trade. Whitehall Gardens, Horseguards Avenue, Whitehall, S.W.1.	Trafalgar 8855
BRDB	British Rubber Development Board. Market Buildings, Mark Lane, E.C.3.	Mansion House 9383
BRS	Building Research Station. Bucknalls Lane, Watford	Garston 2246
BSA	Building Societies Association. 14, Park Street, W.1.	Mayfair 0515
BSI	British Standards Institution. British Standards House, 2, Park St., W.1.	Mayfair 9000
BTE	Building Trades Exhibition. 32, Millbank, S.W.1.	Tate Gallery 8134
CABAS	City and Borough Architects Society. C/o Johnson Blackett, F.R.I.B.A., Civic Centre, Newport, Mon.	Newport 65491
CAS	County Architects' Society. C/o F. R. Steele, F.R.I.B.A., County Hall, Chichester.	Chichester 3001
CCA	Cement and Concrete Association. 52, Grosvenor Gardens, S.W.1.	Sloane 5255
CCP	Council for Codes of Practice. Lambeth Bridge House, S.E.1.	Reliance 7611 Ext. 1284
CDA	Copper Development Association. Kendals Hall, Radlett, Herts.	Radlett 5616
CIAM	Congrès Internationaux d'Architecture Moderne. Doldertal, 7, Zurich, Switzerland.	
COID	Council of Industrial Design. 28, Haymarket, S.W.1.	Trafalgar 8000
CPRE	Council for the Preservation of Rural England. 4, Hobart Place, S.W.1.	Sloane 4280
CUC	Coal Utilization Council. 3, Upper Belgrave Street, S.W.1.	Sloane 9116
CVE	Council for Visual Education. 13, Suffolk Street, Haymarket, S.W.1.	Reading 72255
DGW	Directorate General of Works, Ministry of Works, Lambeth Bridge House, S.E.1.	Reliance 7611
DIA	Design and Industries Association. 13, Suffolk Street, S.W.1.	Whitehall 0540
DPT	Department of Overseas Trade. Horseguards Avenue, Whitehall, S.W.1.	Trafalgar 8855
EJMA	English Joinery Manufacturers' Association (Incorporated). Sackville House, 40, Piccadilly, W.1.	Regent 4448
EPNS	English Place-Name Society. 7, Selwyn Gardens, Cambridge.	
FAS	Faculty of Architects and Surveyors. 68, Gloucester Place, W.1.	Welbeck 9966
FASS	Federation of Association of Specialists and Sub-Contractors, Artillery House, Artillery Row, S.W.1.	Abbey 7232
FBBDO	Fibre Building Board Development Organization, Ltd. 47, Princes Gate, Kensington, S.W.7.	Kensington 4577
FBI	Federation of British Industries. 21, Tothill Street, S.W.1.	Whitehall 6711
FC	Forestry Commission. 25, Savile Row, W.1.	Regent 0221
FCMI	Federation of Coated Macadam Industries. 37, Chester Square, S.W.1.	Sloane 1002
FDMA	The Flush Door Manufacturers Association Ltd., Trowell, Nottingham.	Ilkeston 623
FLD	Friends of the Lake District. Pennington House, nr. Ulverston, Lancs.	Ulverston 201
FMB	Federation of Master Builders. 26, Great Ormond Street, Holborn, W.C.1.	Chancery 7583
FPC	The Federation of Painting Contractors, St. Stephen's House, S.W.1.	Whitehall 3902
FRHB	Federation of Registered House Builders. 82, New Cavendish Street, W.1.	Langham 4341
GBPA	Gypsum Building Products Association, 11, Ironmonger Lane, E.C.2.	Monarch 8888
GC	Gas Council. 1, Grosvenor Place, S.W.1.	Sloane 4554
GG	Georgian Group. C/o R. H. Davies, F.R.I.B.A., 16, Hanover Square, W.1.	Mayfair 5454
HC	Housing Centre. 13, Suffolk Street, Pall Mall, S.W.1.	Whitehall 2881
IAAS	Incorporated Association of Architects and Surveyors. 75, Eaton Place, S.W.1.	Sloane 5615
ICA	Institute of Contemporary Arts. 17–18, Dover Street, Piccadilly, W.1.	Grosvenor 6186
ICE	Institution of Civil Engineers. 1, Great George Street, S.W.1.	Whitehall 4577
IEE	Institution of Electrical Engineers. Savoy Place, Victoria Embankment, W.C.2.	Temple Bar 7676
IES	Illuminating Engineering Society. 32, Victoria Street, S.W.1.	Abbey 5215

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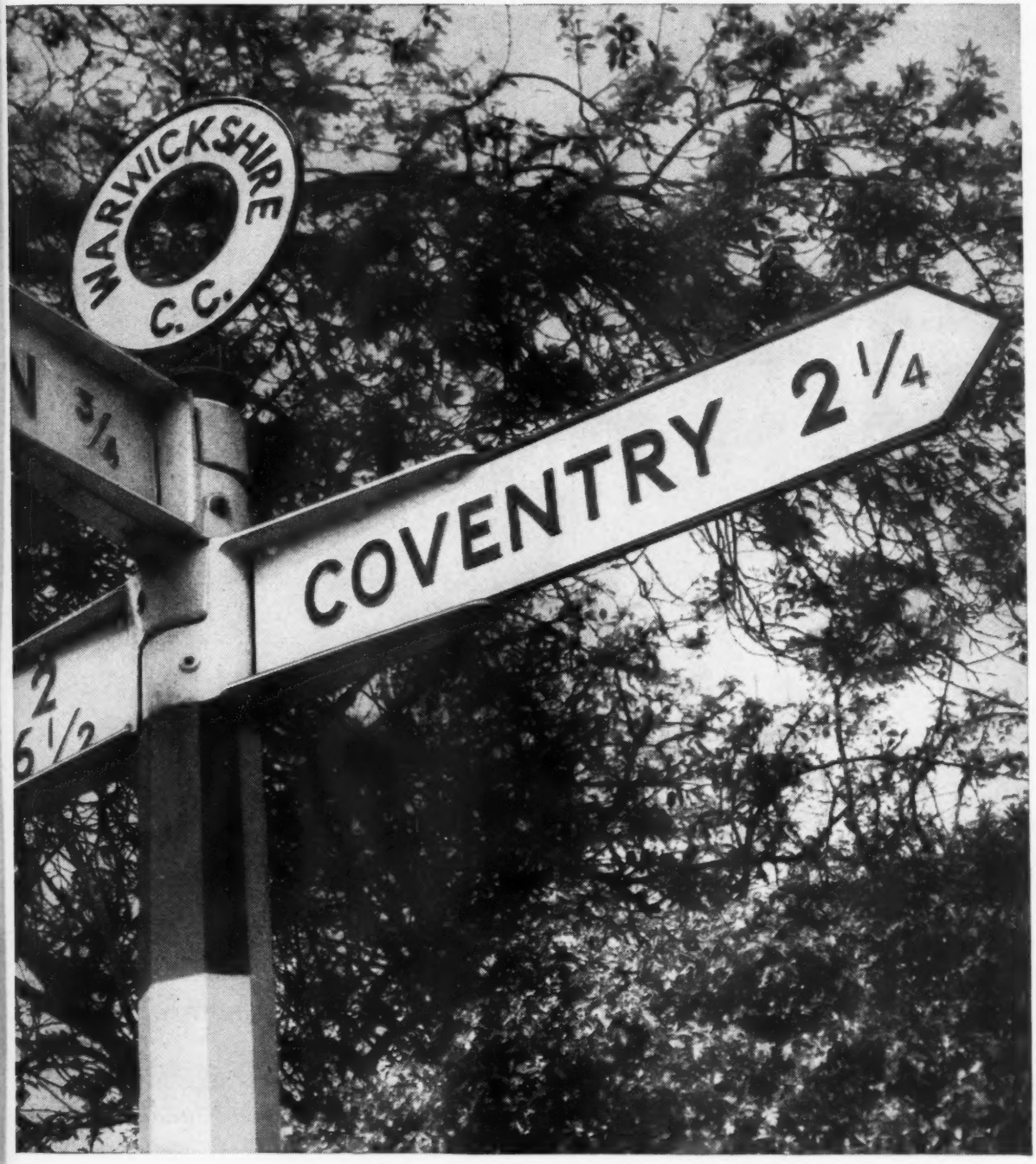
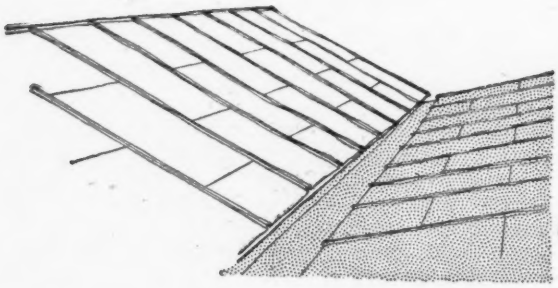
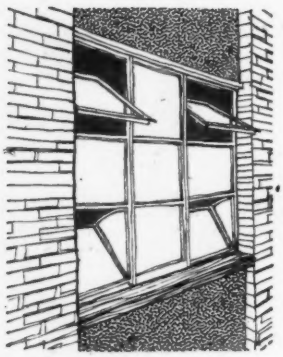


BRABY *metal products*

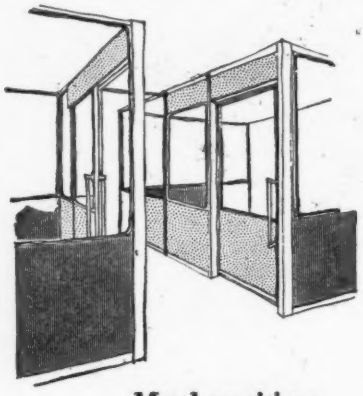
for Building



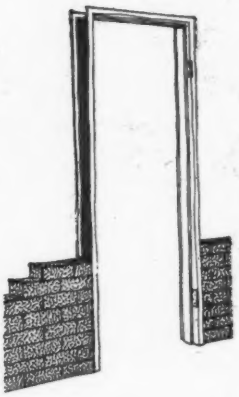
Copper roofing



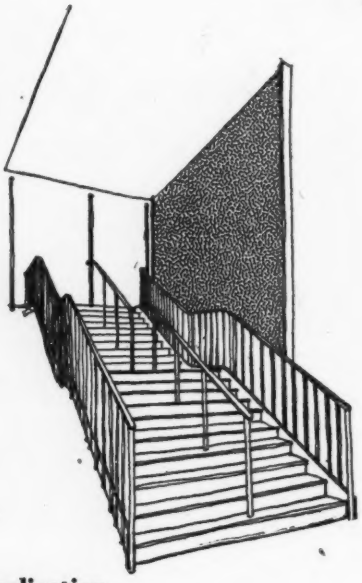
Metal windows



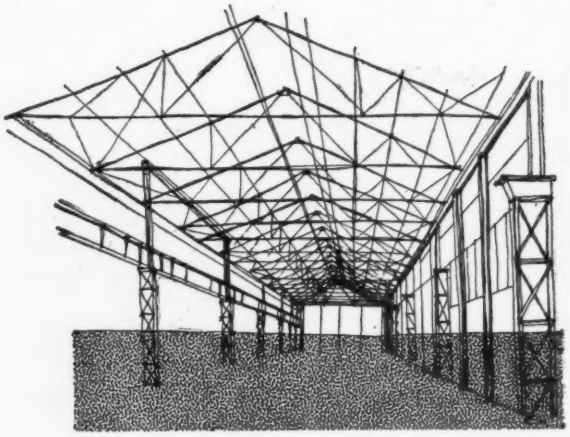
Metal partitions



Pressed steel door frames



Pressed steel stairs



Structural steelwork

Full details on application

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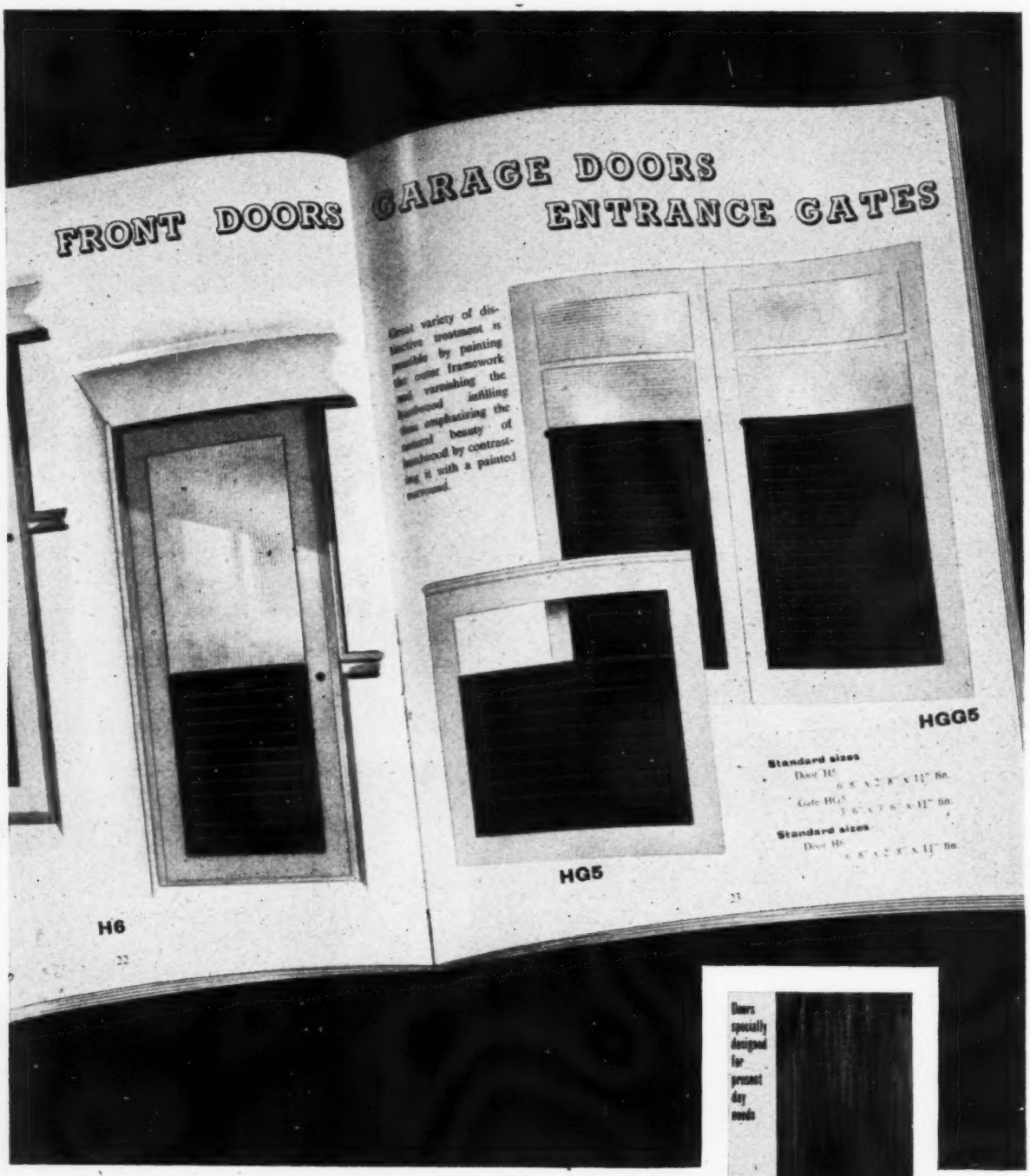

We reproduce here 2 pages from the new Gliksten Door Catalogue. Contained within its 32 pages is useful information on Flush Doors, Veneered Doors, Hardwood Panel Doors, Oak Gates, Softwood Doors and the Gliksten Fitted Door Service.

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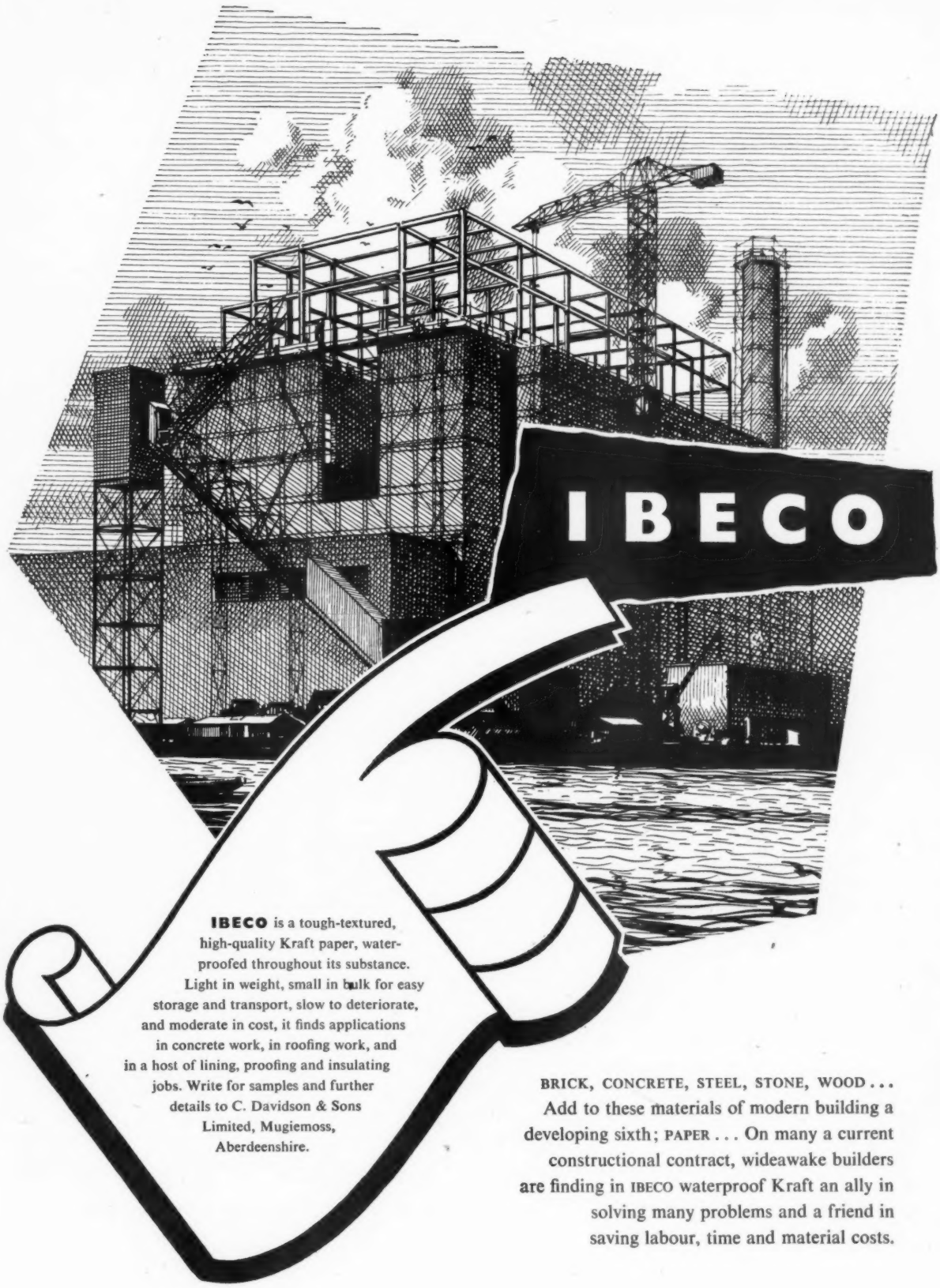

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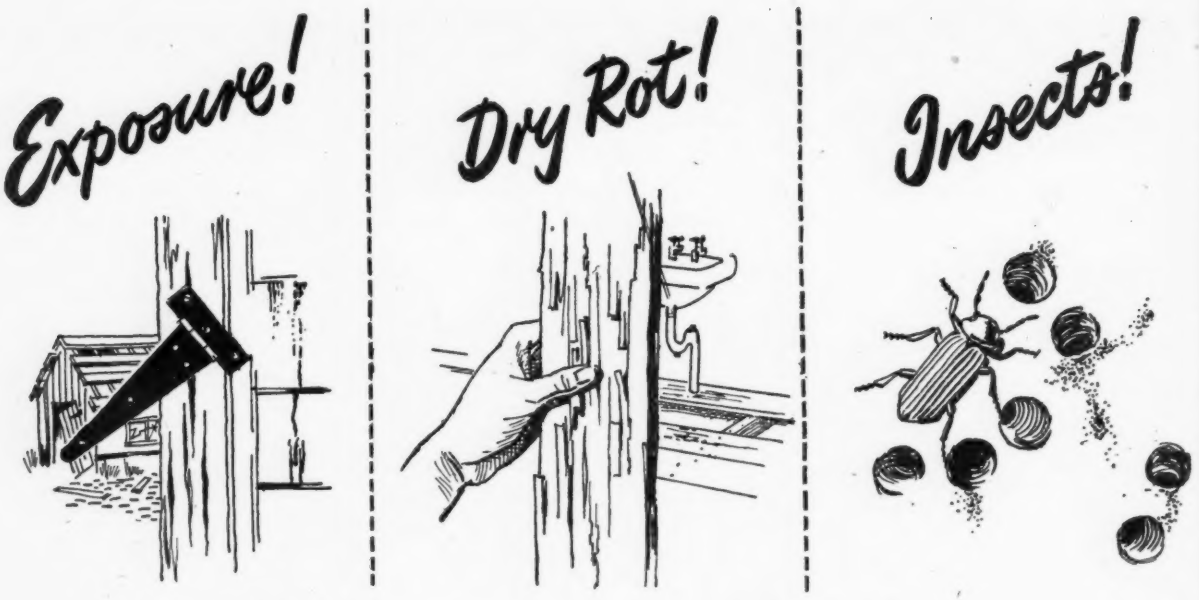

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Presotim is effective against timber decay whether caused by fungi, exposure, or attack by insects such as Death Watch Beetle and Furniture Beetle.

Presotim is recommended for use both outdoors and indoors. Presotim (exterior quality) is suitable for pavilions, outbuildings, fences, gates, boats, barges, and for roof timbers in houses. Presotim (interior quality) preserves panelling, doors, skirtings, etc., without obscuring the natural beauty of the grain.

Presotim is prepared in a special "neutral" grade which makes it especially effective for old and valuable timbers such as church roofs and panelling, where it protects without altering the characteristic colour of the wood.

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HOW PRESOTIM IS SUPPLIED

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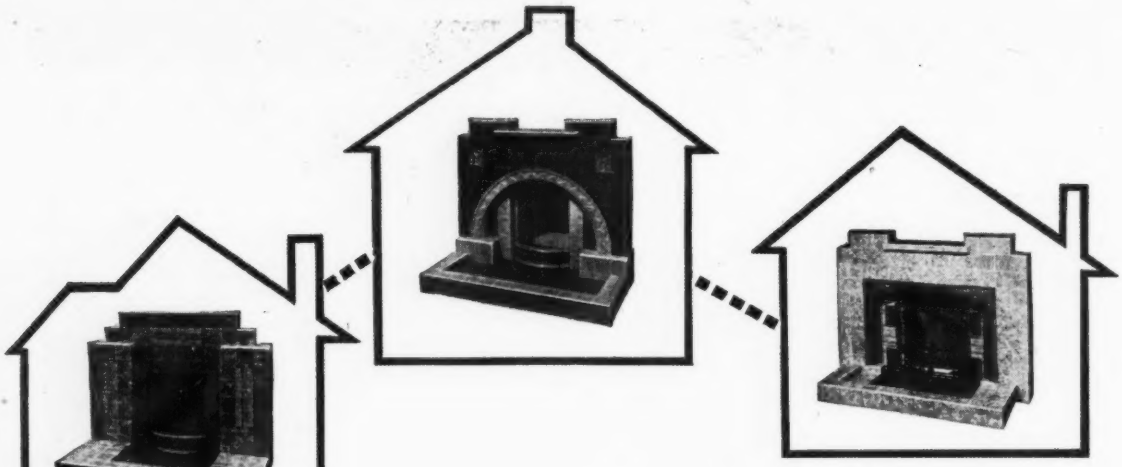
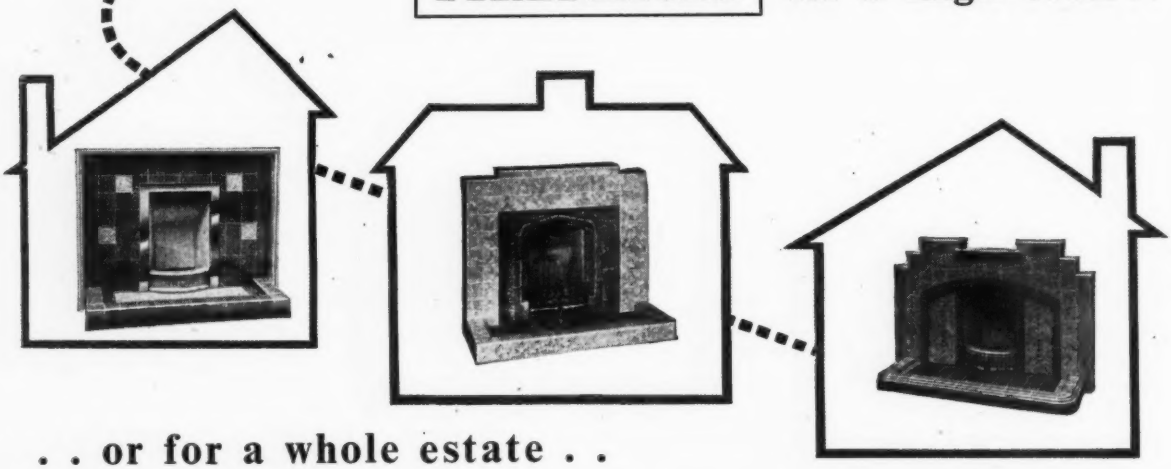


FIREPLACES for a single room . .



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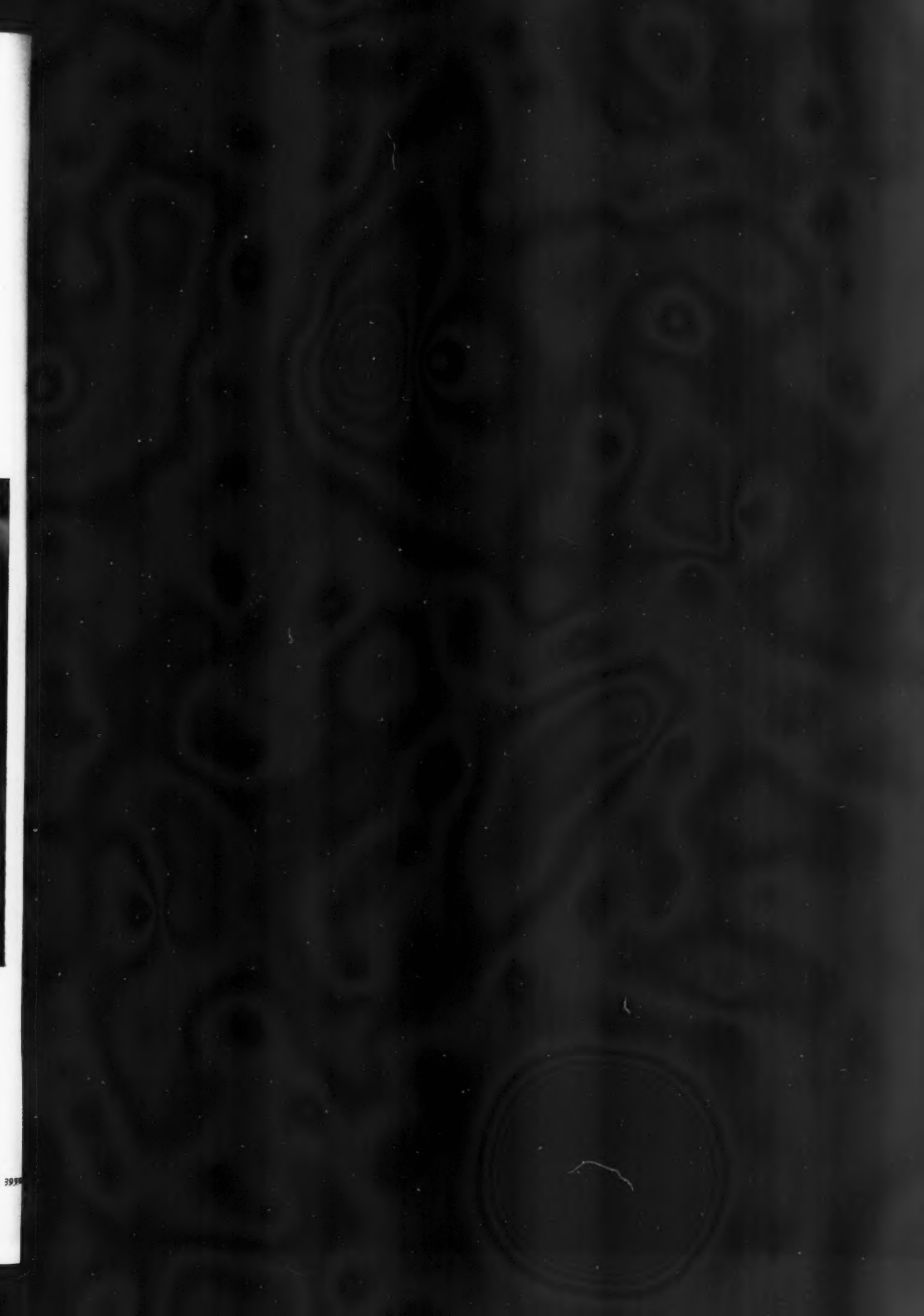
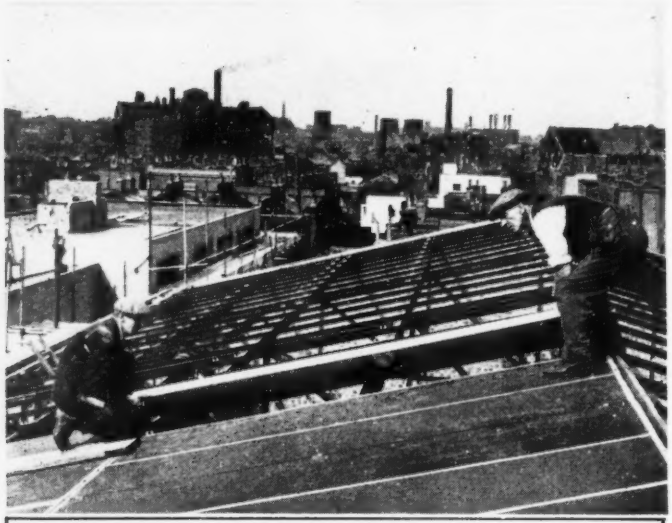
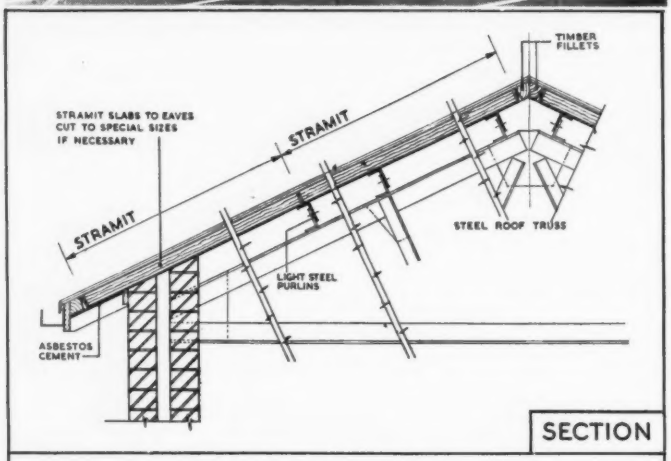
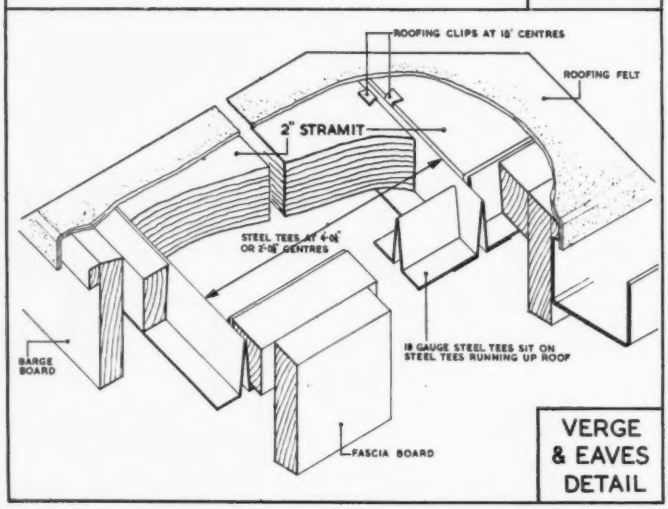



DAMP
DRY





SECTION



VERGE & EAVES DETAIL

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2" BUILDING SLABS
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—the measure of heat-loss through a construction, in B.Th.U's per hour, over one square foot of its area, when the temperature-difference between its two sides is 1° F.

Even in these enlightened times factories are still erected without thermally insulated roofs.

In the majority of cases the disadvantages of unrestricted heat-losses are only realised when the inordinately high fuel bill arrives; with the result that a suspended ceiling has to be erected to minimise the heat-losses—a job which involves additional heavy expense, much inconvenience and interruption of production.

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No other building slab possesses ALL these properties

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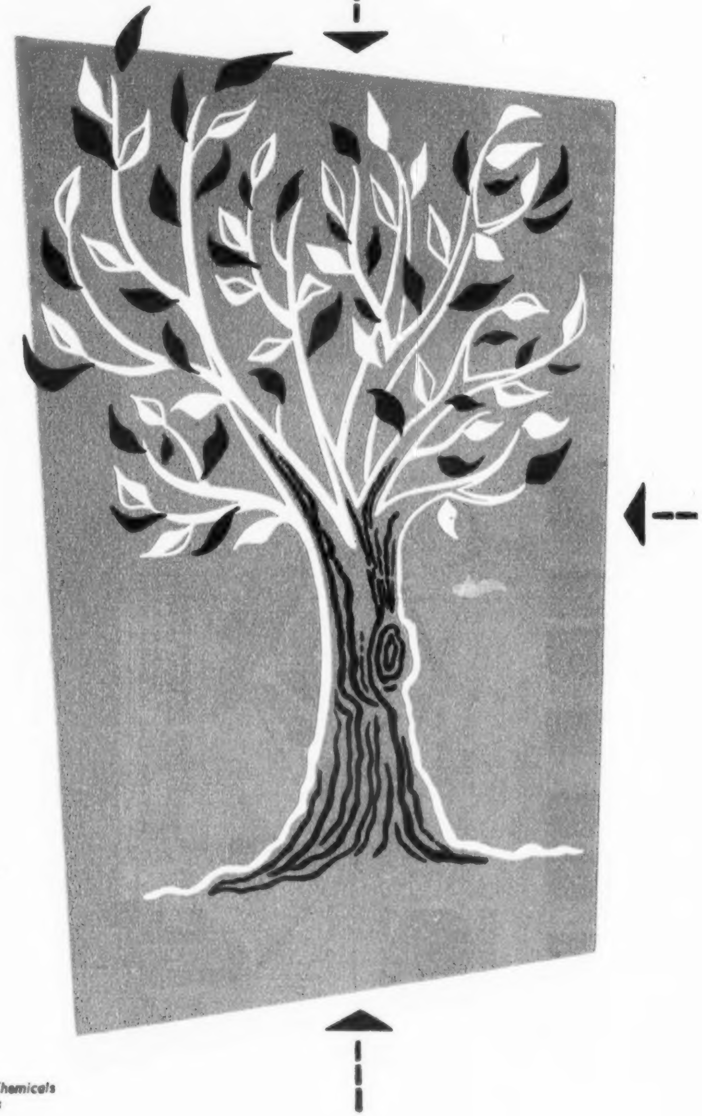
1. In Penta-treated timber, dimensional changes are negligible.
2. Less leaching — safer in ground contact.



for structural timber

with Monsanto's Penta

3. Penta-treated timber is clean to handle, non-staining.
4. Penta-treated timber can be painted.
5. Penta is chemically stable, has negligible volatility, and is virtually insoluble in water.

(Pressure impregnation can now be carried out by Burt, Boulton & Haywood, Ltd.)

Monsanto's range of pentachlorophenol preservatives also includes SANTOBRITE*, the sodium salt of pentachlorophenol; this water-soluble preservative is especially useful in the control of sapstain in newly-converted timber. Write for full information

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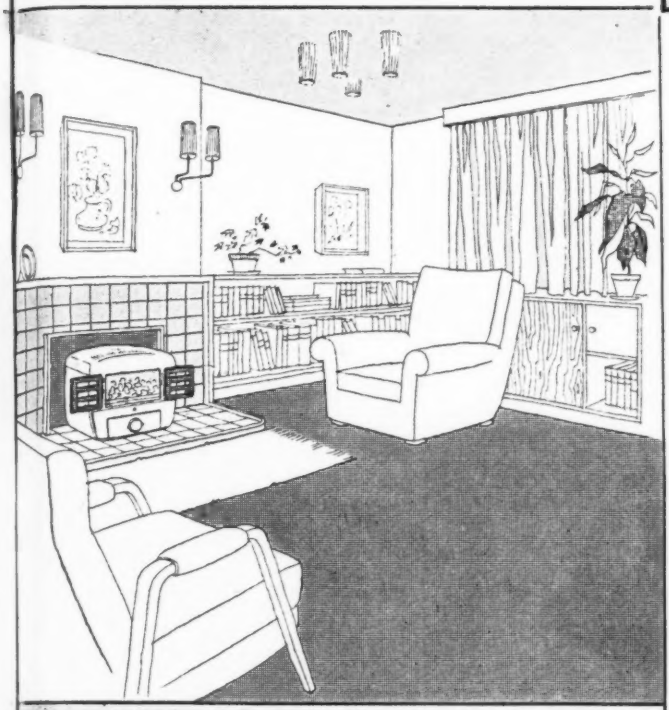


A low lintel and an openable stove are no longer incompatible now there's the PANDA

SPECIFICATION Vitreous enamel cast iron outer casing. Two side hinged fire doors with mica panels. Cast iron lining to firebox. Externally operated shaking bottom grate and removable front bar. Spinwheel air control. Mild steel ashpan. Operating tool.

COLOURS Cream mottle or black, Alisheen black, bramble, copper, bronze or green.

FLUE CONNECTION

Height to top of flue outlet ..	15⅞ ins.
Outside diameter	4¾ ins.

The design and construction of the Panda are to a very high standard. Accurate control over the rate of combustion is a feature which ensures fuel economy.

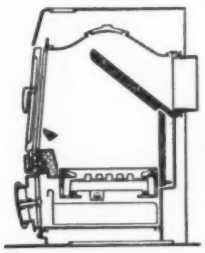
NOTES

Unusual and very attractive 'longways' shape is valuable in long, low fireplaces where a stove of conventional upright design would appear awkward.

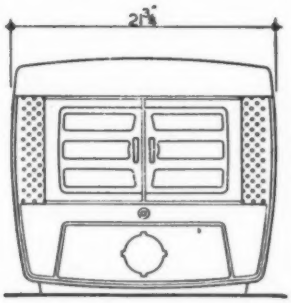
Side hinged fire doors fold back to give a good view of the fire.

Heats from 1,500 to 3,000 cu. ft. by convection and radiation.

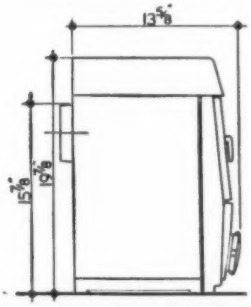
Burns continuously—for 10 hours without attention—on all domestic fuels including coke.



CROSS SECTION



FRONT ELEVATION



SIDE ELEVATION

DIMENSIONS

Width	21¾ ins.
Height	19⅞ ins.
Depth overall	13⅝ ins.
Depth at hearth level ..	11½ ins.

For further details of the Panda Stove write to the Housing Division of:—

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Makers of cookers, boilers, fires, stoves and baths.

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COLRON is made in 12 intermixable shades.

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Much remains to be done, and members of BID are using their skill and resources in helping to put wages into Britain's pockets.

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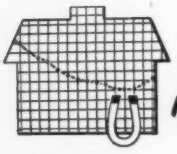
Large stocks of Garage Doors, Gates, Doors, etc. available for immediate delivery throughout the country

Good looking-sturdy-inexpensive

WELL-MADE and well-finished from carefully kilned and air-conditioned timber. Magnet garage doors come to you ready to erect from our large and varied stocks which are held in three strategic centres covering the whole country.

The Magnet service includes doors, window frames and all types of joinery all available direct from extensive stocks and can represent a big saving in costs, as well as cutting time and effort so essential in ensuring completion on schedule. Send for illustrated brochure and current price lists.



MAGNET lowers building costs!

FOR STANDARDISED JOINERY

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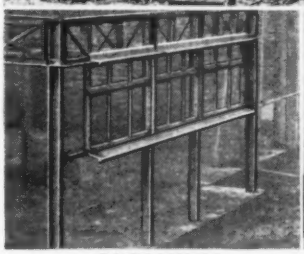
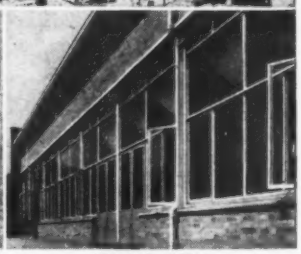
It's an Education . . .

The Thermagard System was originally designed for the construction of primary schools and has now been extended to the construction of multi-storey secondary and grammar schools. This modular form of construction permits considerable flexibility in planning and has resulted in a high degree of simplification and standardisation in the structural components of the building. It halves the time of the Architect and Quantity Surveyor and ensures manufacture and delivery of components to suit requirements at the site.

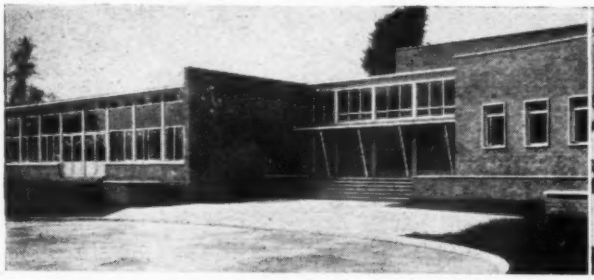
FRAMEWORK



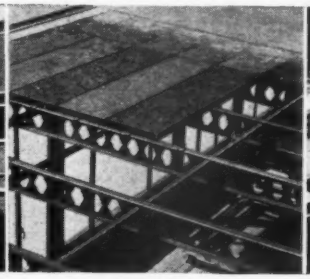
PRESSINGS



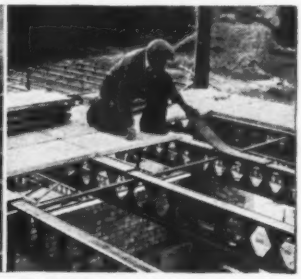
WINDOWS



A main entrance and classroom block

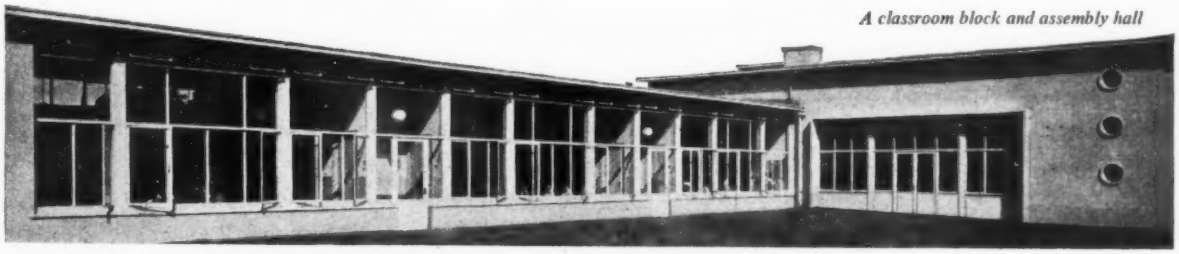


ROOFS



FLOORS AND CEILINGS

A classroom block and assembly hall



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Gardiner, Sons & Co. Ltd., Midland Works, Willway Street, St. Philip's, Bristol 2, and 8 William IV Street, Strand, London W.C.2

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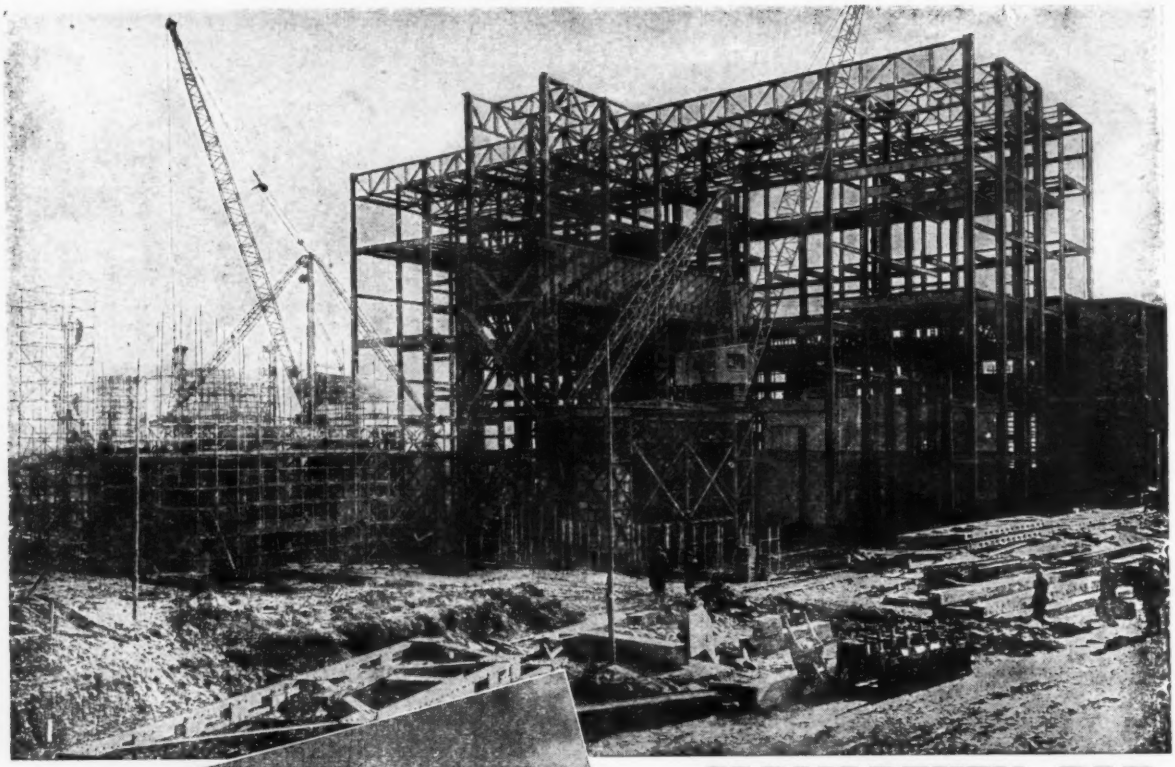
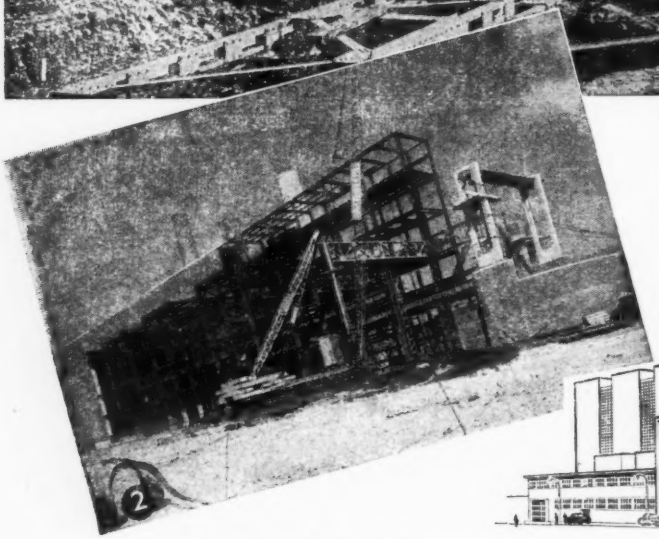
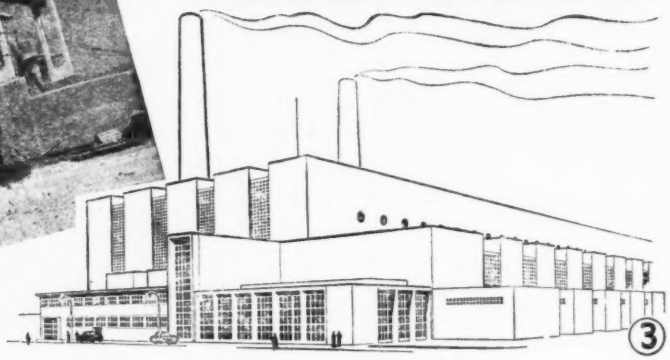




CARMARTHEN BAY POWER STATION



1. View towards South-East across No. 1 Boiler House site showing also No. 1 Chimney Plinth in course of construction.
2. Main Building. General view of No. 3 Turbine Room and tank annexe steelwork from South side, looking North-West.
3. Main building. General view of Station building from foreshore, looking North-East.

Photographs by courtesy of the Central Electricity Authority, South Wales Division.
Engineers and Contractors: Messrs. Balfour, Beatty & Co. Ltd.

STRUCTURAL STEELWORK BY

SOUTH DURHAM

SOUTH DURHAM STEEL & IRON CO. LTD. (incorporating CARGO FLEET IRON CO. LTD.)
Central Constructional Department, Malleable Works, Stockton-on-Tees. Telephone : Stockton-on-Tees 66117.

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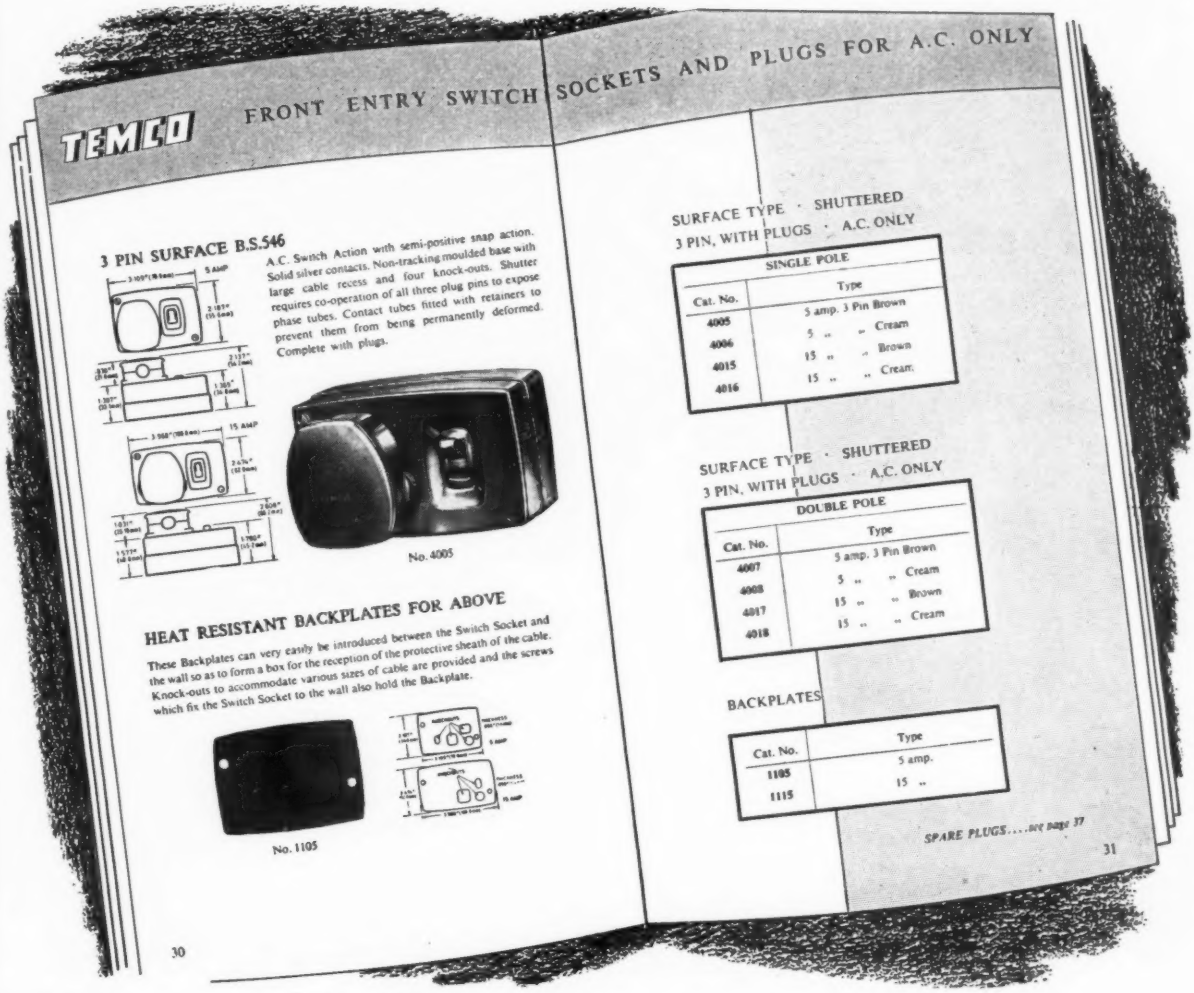

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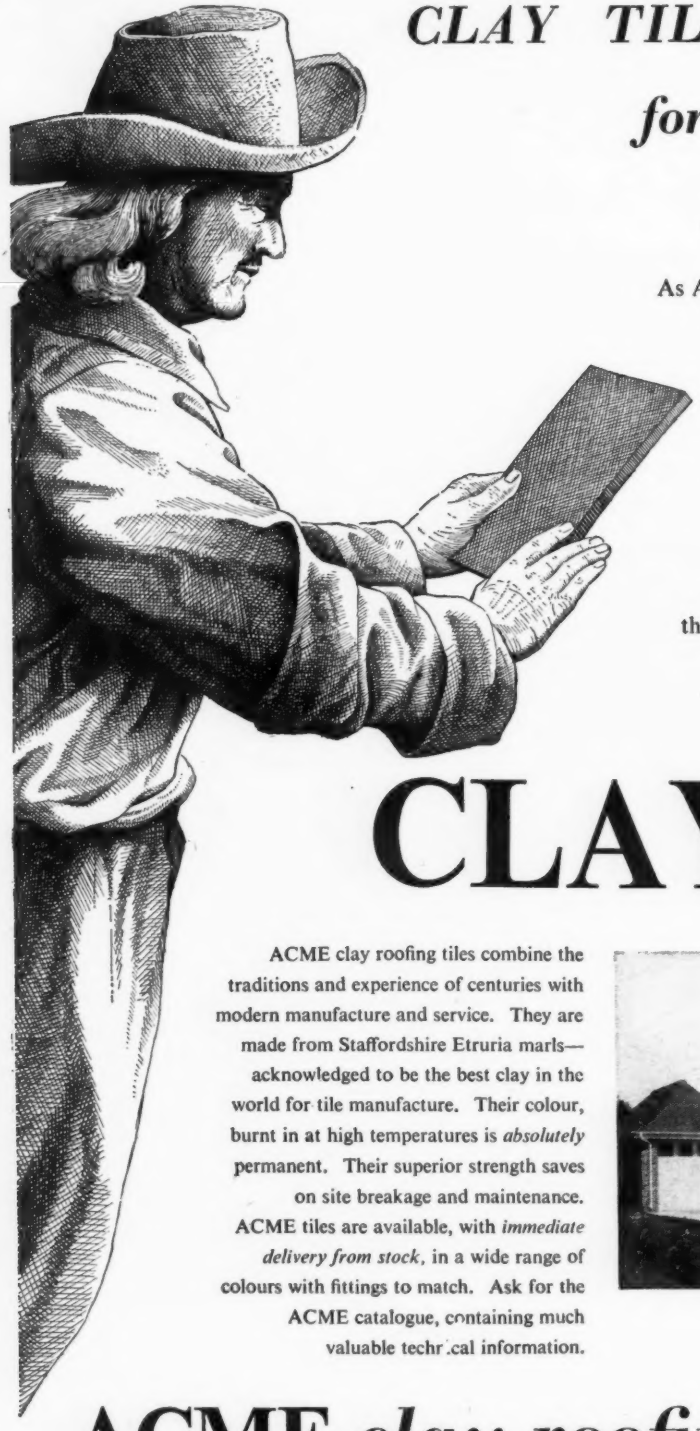

CLAY TILES —

for eight centuries England's roof . . .

As Agricultural Britain changed to a land of industry, new materials, new methods supplanted the old and traditional crafts began to give way to the first stirrings of mass production. A new, blacker, busier country was born, ruled by the new masters of coal and iron. The revolution had begun. Amongst the few unaffected members of the materials aristocracy was the clay roofing tile, for nothing—since the days of the Normans—has been found to take its place . . . for the simple reason that there's no roof like a clay tiled roof.

CLAY lasts

ACME clay roofing tiles combine the traditions and experience of centuries with modern manufacture and service. They are made from Staffordshire Etruria marls—acknowledged to be the best clay in the world for tile manufacture. Their colour, burnt in at high temperatures is *absolutely* permanent. Their superior strength saves on site breakage and maintenance. ACME tiles are available, with *immediate delivery from stock,* in a wide range of colours with fittings to match. Ask for the ACME catalogue, containing much valuable techr .cal information.

Private Residence at Heswall.

ACME *clay roofing tiles*

DOWNING'S *range of roofing tiles includes :—*

ACME M.M. ROOFING TILES
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ACME HAND-MADE SANDFACED & ACME REDFLOOR QUARRIES.

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Telephone : Newcastle-under-Lyme 65381

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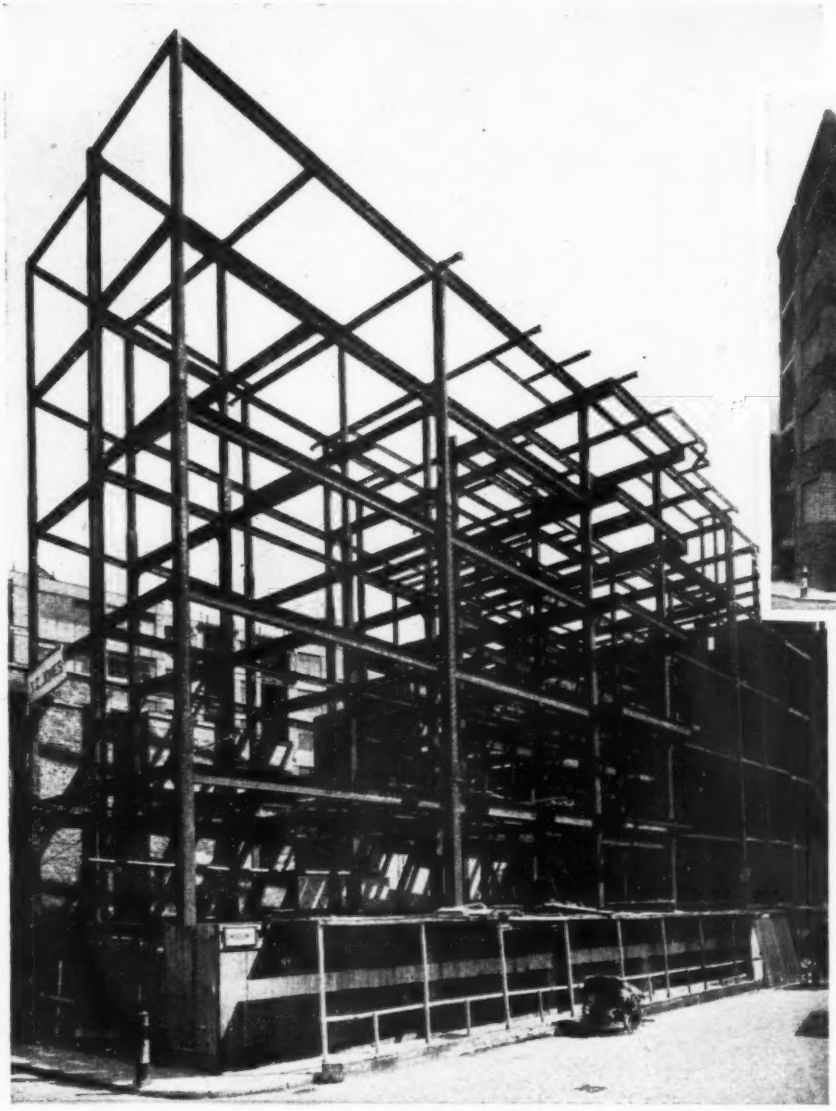


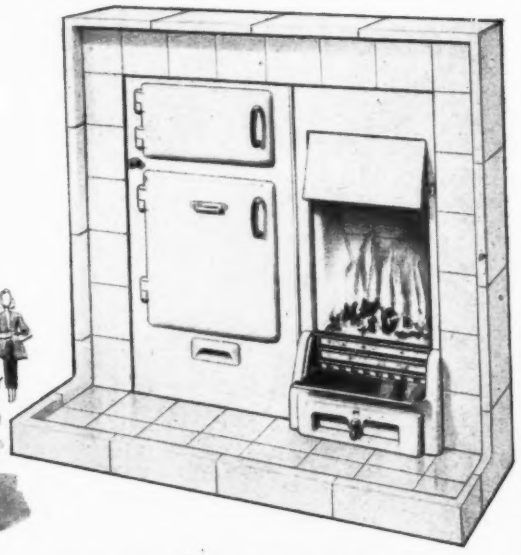
Rebuilding after bomb damage of Benbow Wharf, Bankside, London, S.E.1 for Messrs Beck & Pollitzer Ltd.

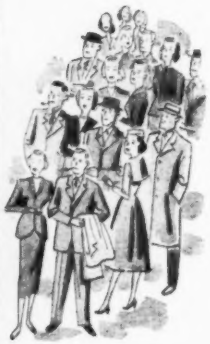
Architect: J. Raworth Hill, Esq. F.R.I.B.A.
Contractor: Beck & Pollitzer Contracts Ltd.

In Constant Demand

Ensign
COMBINATION GRATE

The Ensign Combination Grate has been re-designed to meet current demands and is a first class efficient appliance The 14" all-night burning fire is fitted with a patent drop-down front which enables the whole of the fire to be seen and provides greater room radiation.
The main oven is capacious and gives an even temperature for cooking and baking. The top oven acts as a hot cupboard or slow cooking oven. The unit is right or left-handed as desired.



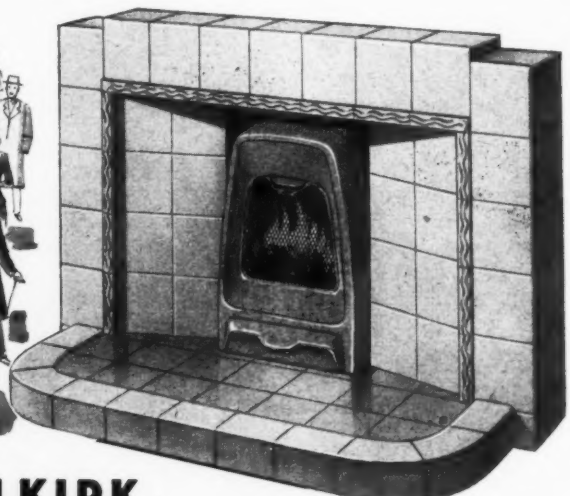


SOFONO
SLOW COMBUSTION STOVE
Nos. 3a, 4a & 5a.

This is a most efficient and economical stove where a large area requires to be heated. It is designed to burn any type of fuel for long periods at a low and cheap rate of burning and needs only the minimum of attention. The appliance is ideal for small halls, community centres, schools, waiting rooms, factory canteens, welfare centres, public houses, etc. Convection side panels are available which give the stove an extra advantage.
Other models are available and full details will be given on application.

The *Swift*
STAND-IN FIRE

The main feature of the Swift Fire is the "restricted throat" which, controlled by a simply operated damper, prevents too much ventilation and heat losses up the chimney and keeps the air changes in the room to a minimum. A removable expanded metal fireguard clips into position over the fire opening. The fire fits into a 16" x 22" or a 16" x 24" fireplace opening without any bricking up or alterations. The Swift Fire is "portable" and may be transferred to another room or house.



GRANGE-CAMELON IRON CO., LTD. FALKIRK

SLIDING DOOR GEAR

FOR THE WORLD'S BEST

Specify

ELLARD

Much valuable space can be secured by the appropriate use of sliding doors in the modern dwelling house. The busy housewife will find her work considerably reduced by having easy access from room to room, as can be seen by the illustration at left. The awkward manoeuvring when " getting around " with cleaning equipment, or at meal times, is entirely removed by the use of sliding doors. In addition, free and complete ventilation of all rooms can be quickly obtained giving a general feeling of light and airiness at all times. There are other advantages which will readily occur to discriminating architects. The all-round efficiency of sliding doors can only be maintained by using first-class door gear. Specify ELLARD " Estate " Sliding Door Gear—it is the best of its kind, competitive in price, smooth and trouble-free in action. ELLARD Door Gear is used on most large housing estates.

Easy access to and from the garage, and unobstructed working space, are valuable assets to the motorist. The illustration at right shows a typical example of ELLARD " Radial " Sliding Door Gear as supplied to numerous private and housing estate garages throughout the country. ELLARD " Estate " and " Radial " Sliding Door Gears can be readily obtained from your nearest ironmonger or merchant.

CLARKE ELLARD ENGINEERING COMPANY LTD

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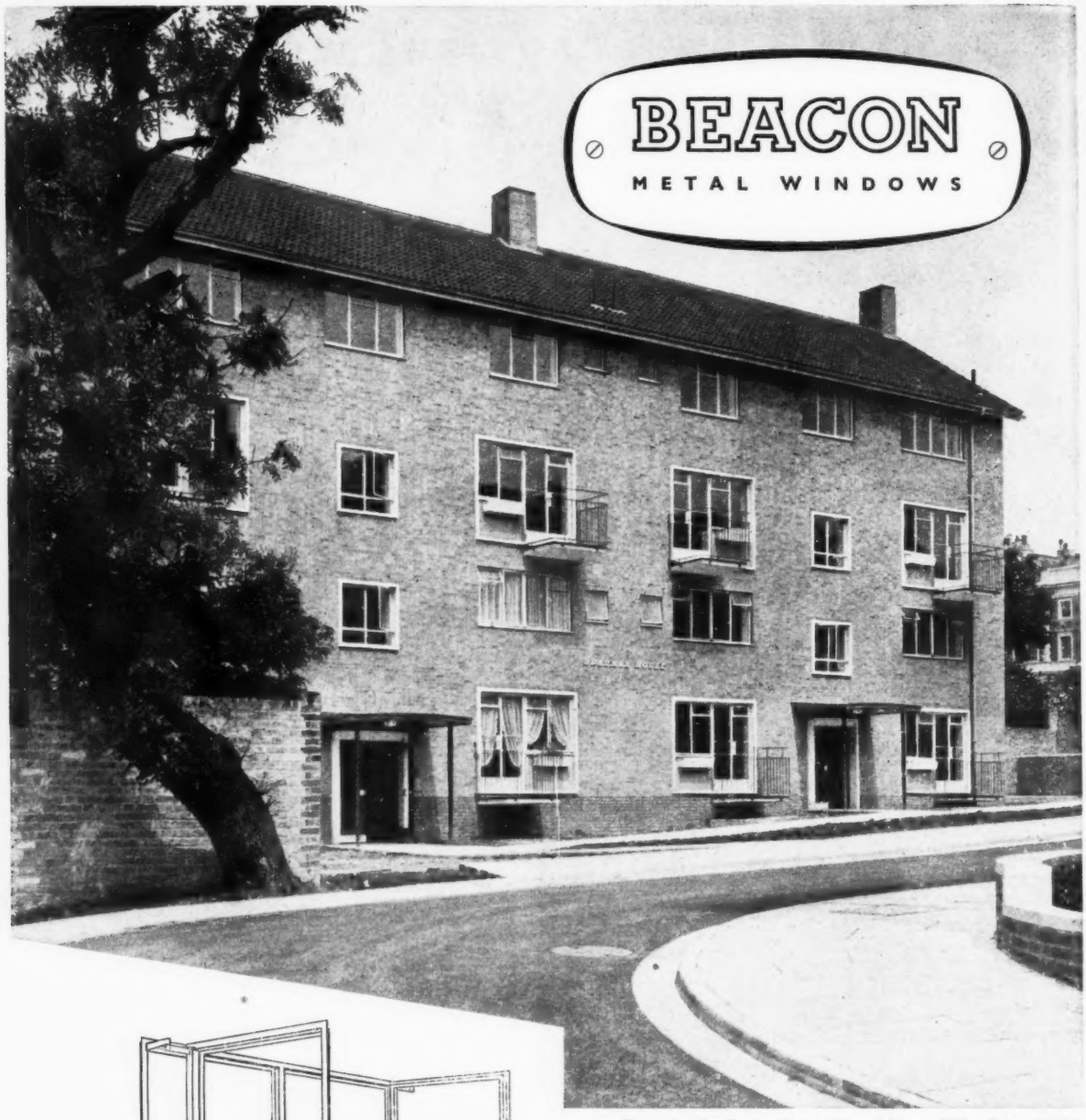
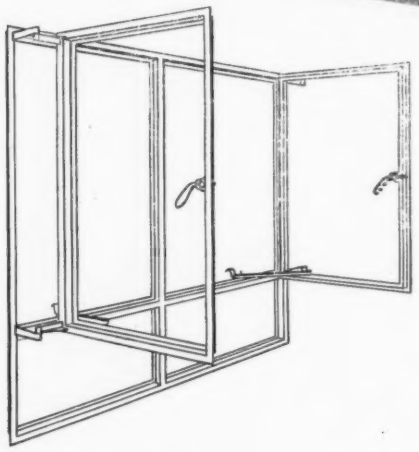


Flats at Hamilton Terrace, Abercorn Place. Architect: Clifford Culpin, F.R.I.B.A.



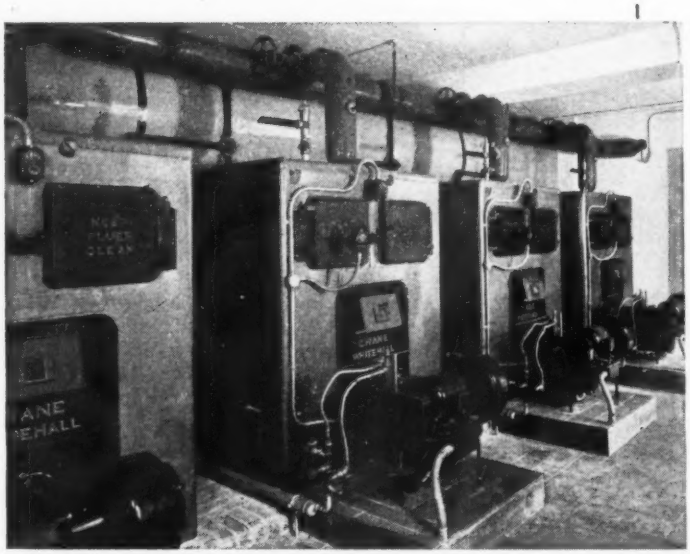
It is a significant fact that to-day more Beacon Windows than ever before are being exported to countries where humidity is high and where rust plays havoc with unprotected metal surfaces. The reason is simple. From Panama to Malaya architects have learned how much more efficient is the Thompson 3-stage Zinc Metallisation Process in combating rust and corrosion. In the hard school of practical experience they have proved that, due to this extra protection, Beacon Windows cost much less for maintenance.

Member of the Metal Window Association

JOHN THOMPSON BEACON WINDOWS LTD · WOLVERHAMPTON

Once again, boilers by Crane...

At Eaton Square, Belgravia, a development scheme is in progress to convert all existing houses—which are arranged in blocks—into luxury flats, while still retaining the partly Georgian architecture. Several blocks have already been completed, and it says much for Crane's fine reputation that they were called in at an early stage by the prominent engineers responsible for the central heating and hot water systems. The boiler house for block Nos. 94-101 is completely equipped by Crane, including 4 Whitehall boilers and all the main control valves. In the adjacent Calorifier Room, Crane Cast Iron and Bronze Valves control the domestic hot water supply. Crane Malleable Iron Fittings are used throughout the block.



These four No. 410.L. Whitehall Sectional Heating Boilers are each rated at 936,000 B.Th.U's per hour.

HEATING ENGINEERS: Norris Warming Co. Limited, London, W.C.1.
ARCHITECTS: Raglan Squire & Partners, London, S.W.1.

CRANE BOILERS, RADIATORS, VALVES AND FITTINGS

When in London please visit our Showrooms at 118 Wigmore Street, W.1, or at the corner of Great West Road and Ealing Road, Brentford, Middlesex and see the comprehensive range of Crane equipment yourself

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A Young *Veteran*

Electric Cables produced by member companies of the Cable Makers Association stand the test of time in long and arduous service. Yet the C.M.A. remains ever young, up to date, fresh in outlook. It is the ready adoption of new ideas, allied with constant research and testing, which has made possible the development of the many modern types of cable available to meet the exacting demands of to-day.

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HOW ASCOT JIGGED FITTING SAVES MONEY

106,000 Ascot Jigged Walled Fittings have now been put into new homes by 183 housing authorities.

How this fitting saves money is revealed by the following figures based on actual costings.

EXAMPLE ONE

Cost of fitting an Ascot 503 sink water heater sold for cash:

Using a Jigged Wall Fitting which had been installed when the property was built ... £1.7.0 — £1.10.0

Normal installation without a Jigged Wall Fitting ... ... £4.0.0 — £5.0.0

CASH SAVING .....say **£3.0.0**

EXAMPLE TWO

The effect of a Jigged Wall Fitting on the hire purchase terms for an Ascot 503/0 sink water heater:

Charge per week when the heater is connected to a Jigged Wall Fitting already installed 1/- -1/10 per week

Charge per week including cost of normal installation without Jigged Fitting ... ... 2/- — 2/5 per week

WEEKLY SAVING .....say **9d**

✳ *Note: These figures may vary from one district to another, but are reliable averages.*

The advantages of the Jigged Wall Fitting to the consumer and to the Gas Undertakings are real. The Fitting is supplied by Ascot to Gas Undertakings at cost. Vigorous efforts are indicated to get it installed in all new houses and flats; the cost of putting it in is trifling.

ASCOT GAS WATER HEATERS LIMITED · 255 NORTH CIRCULAR ROAD · LONDON · NW10
A member of the Parnall Group of Companies
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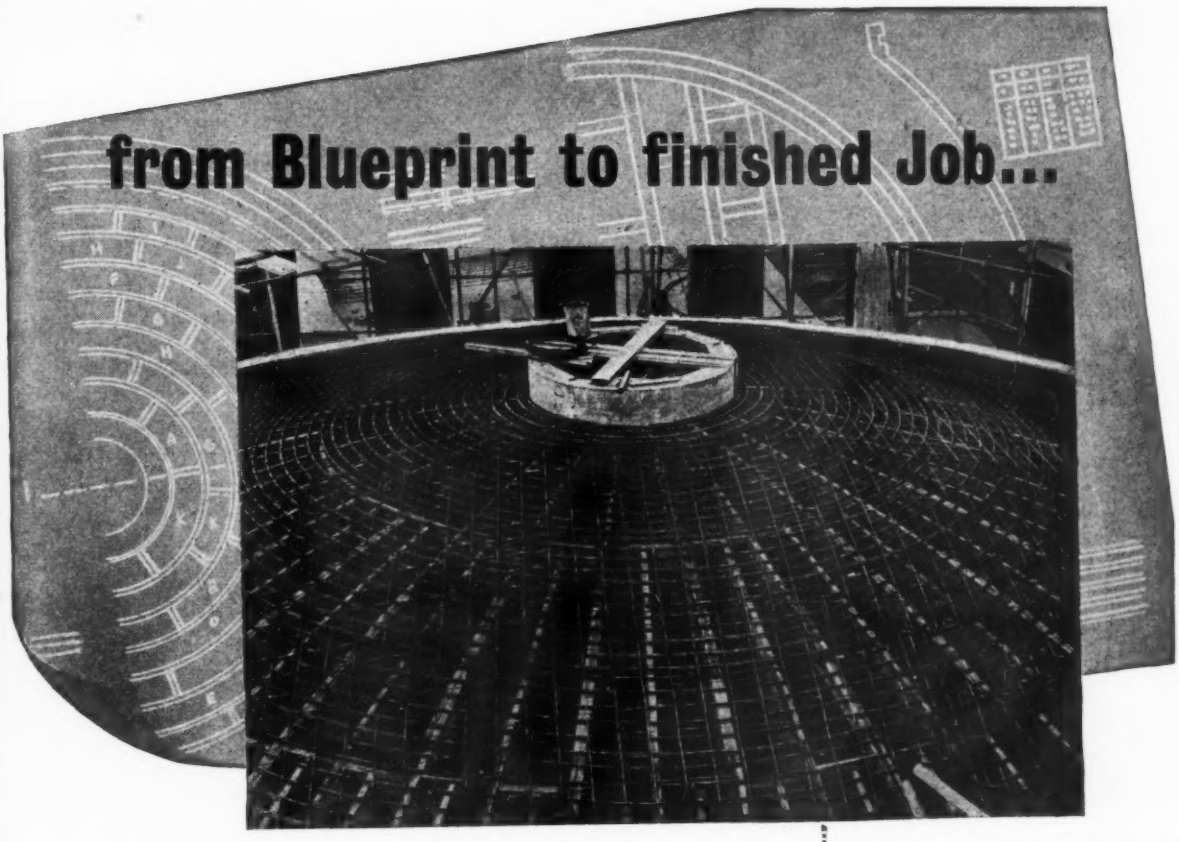

Dome at Barclays Bank, Exeter; showing "Expamet" Welded Fabric reinforcement and "Ribmet" permanent centering. *Engineers:* J. F. Farquharson & Partners, London, W.1. *Contractors:* J. Garrett & Sons Ltd., Plymouth.

Thickness of the concrete shell is 2¾ ins., thickening out to 5 ins., at a distance of 3 ft. 6 ins. from the periphery, plus a 2 in. screed of light concrete. The dome is supported by a reinforced concrete ringbeam of columns, and has a diameter of 3½ ft. 6 ins., a rise of 5 ft. 2½ ins. and a 40 ft. radius of curve. A 5 ft. diameter central dome light is fitted.

A complete concrete reinforcement service

The large range of "Expamet" Reinforcements provide a wide choice to suit all types of concrete construction. There are more than 100 standard variations and weights in "Expamet" Reinforcements from under 2 lb. to over 30 lb. per square yard.

Expanded Steel and Welded Fabric

"Expamet" Expanded Steel Sheet Reinforcement; "Expamet" Welded Fabric; Super "Ribmet" and other specialist materials can be adapted to meet reinforcement problems of all kinds, from solid slab decking and hollow floors, to light shell construction such as barrel vault and dome roofs. They are just as effective reinforcing concrete in precast units as in sea defence works.

"Expamet" can be of assistance to you. Write or telephone, we shall be pleased to advise in the choice and use of "Expamet" Reinforcements for any job you have in mind.

5-Part Concrete Reinforcement Service

1. Design with Economy.
2. Preparation of working drawings.
3. Supply of Reinforcements (Expanded Steel, Welded Fabric, Super Ribmet.)
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Expamet

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THE EXPANDED METAL COMPANY LTD

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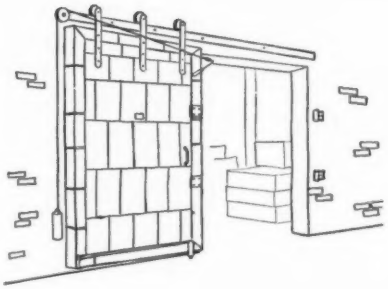
Fire Resisting Doors



Wherever rooms are in communication with one another through doorways, or where floors are connected by means of stairways or lift wells, there are vulnerable points which demand protection against the passage of fire. All should be sealed by the fitting of efficient fire resisting doors.

The above photograph shows a Mather & Platt double-swing folding composite type fire resisting door with wired glass panels at the works of well-known pharmaceutical chemists.

Mather & Platt Ltd.

Write for descriptive literature to:—

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Park Works · Manchester, 10
Park House, Gt. Smith St., London, S.W.1

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There need never be another building destroyed by fire

THE MINERVA NUCLEAR DETECTOR GIVES INSTANT WARNING —AT THE FIRST SIGN OF SMOKE

THE first trace of smoke from anything which is smouldering (before any flame is generated) is instantly sensed by the MINERVA Detector, *which immediately operates an alarm or brings into action automatic fire-extinguishing equipment*. Thus, in buildings and equipment protected by MINERVA, fire has no chance to establish a hold before an alarm is raised. In tests carried out by independent public bodies concerned with fire prevention, the MINERVA Detector has responded up to *an hour earlier* than conventional heat-sensitive devices.

HOW THE MINERVA DETECTOR WORKS

The sensitive element in the MINERVA Detector is an ionisation chamber containing a small quantity of radium compound. This radium compound, which has a theoretical life of more than 1,000 years, continually emits streams of radioactive particles. The interception of these particles in the ionisation chamber by the merest trace of 'live' smoke instantly triggers a relay tube and so gives the alarm. The MINERVA Detector is continually on the watch, 24 hours a day; *yet it consumes no current while on guard.*

HOW THE MINERVA SYSTEM IS INSTALLED

The MINERVA Detector is no larger than an electric light bulb and is no more difficult to instal than an electric light fitting. MINERVA Detectors, suitably

sited about the building which is to be protected (each detector protects up to 1,000 square feet of floor area) or built into equipment for which special protection is required, are connected to a combined control unit and signal panel. A display on the panel indicates the point at which the alarm originates. If required, the alarm can be transmitted automatically to the Fire Station or to a watch office. It can also be arranged to activate fire-fighting equipment on the spot.

WHERE MINERVA SYSTEMS ARE USED

In vital defence installations costing millions of pounds, where 24-hour-a-day protection against fire is essential to the nation's safety; in factories, where fire losses mount tragically if any delay is tolerated; in department stores housing thousands of pounds worth of varied trading stocks; in warehouses where equipment and goods are left unattended for long periods; in museums and libraries where irreplaceable treasures are preserved . . . in hundreds of such installations throughout Britain, MINERVA Detectors are on watch, consuming no power whilst on guard but springing to action and summoning aid the moment smoke is sensed.

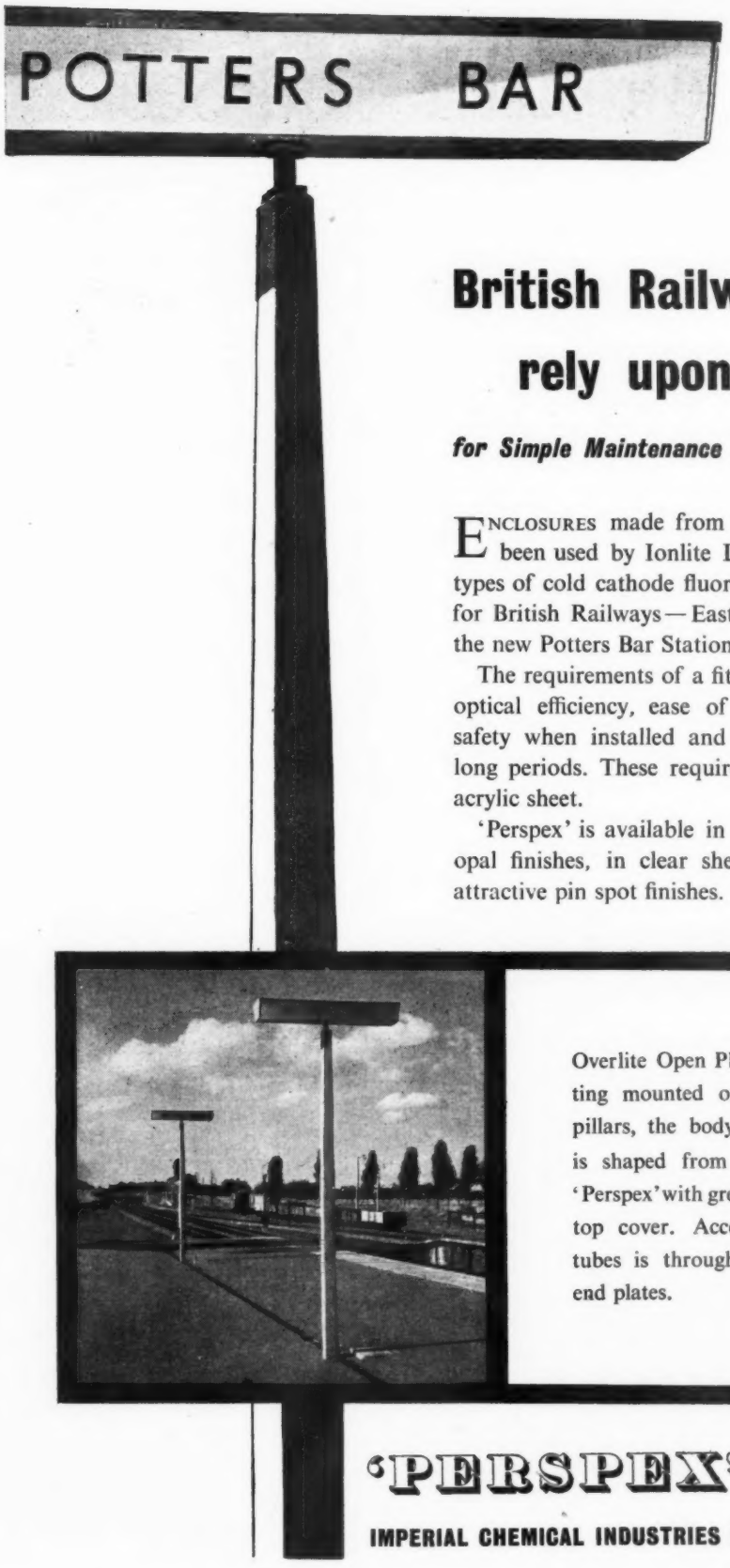
The MINERVA Fire Prevention System has been adopted by the Admiralty, the Air Ministry, the Ministry of Supply, and the G.P.O., as well as by the British Electricity Authority and the London Transport Executive.

WHAT A MINERVA SYSTEM COSTS

MINERVA Detectors and Control Units can be hired at a low annual rental (which includes servicing) or they can be purchased outright, for installation by any competent electrical contractor. As a guide to cost, the rental of MINERVA equipment (including the cost of installation and of servicing) to protect, say, 10,000 square feet of floor area, would work out at approximately 1½d. per square foot per year. The price for outright purchase would work out at about 1/- per square foot.

An illustrated brochure has been produced giving full details of the MINERVA Fire Prevention System. Please write for your copy to : The Minerva Detector Company Ltd., Richmond, Surrey. (*Richmond* 6431.)

THE MINERVA TRADE MARK INCORPORATES AN OWL, SYMBOL OF THE GODDESS MINERVA, PROTECTRESS OF ANCIENT CITIES.



British Railways rely upon 'Perspex'

for Simple Maintenance and High Efficiency

ENCLOSURES made from 'Perspex' acrylic sheet have been used by Ionlite Limited on the four different types of cold cathode fluorescent fittings made by them for British Railways — Eastern Region, and installed in the new Potters Bar Station.

The requirements of a fitting of this type include high optical efficiency, ease of handling and maintenance, safety when installed and unchanging properties over long periods. These requirements are met by 'Perspex' acrylic sheet.

'Perspex' is available in four diffusing and reflecting opal finishes, in clear sheet, a range of colours and attractive pin spot finishes.

Overlite Open Platform fitting mounted on concrete pillars, the body of which is shaped from 030 Opal 'Perspex' with grey 'Perspex' top cover. Access to the tubes is through 'Perspex' end plates.

'PERSPEX' *is the registered trade mark for the acrylic sheet manufactured by I.C.I.*

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1

FP42

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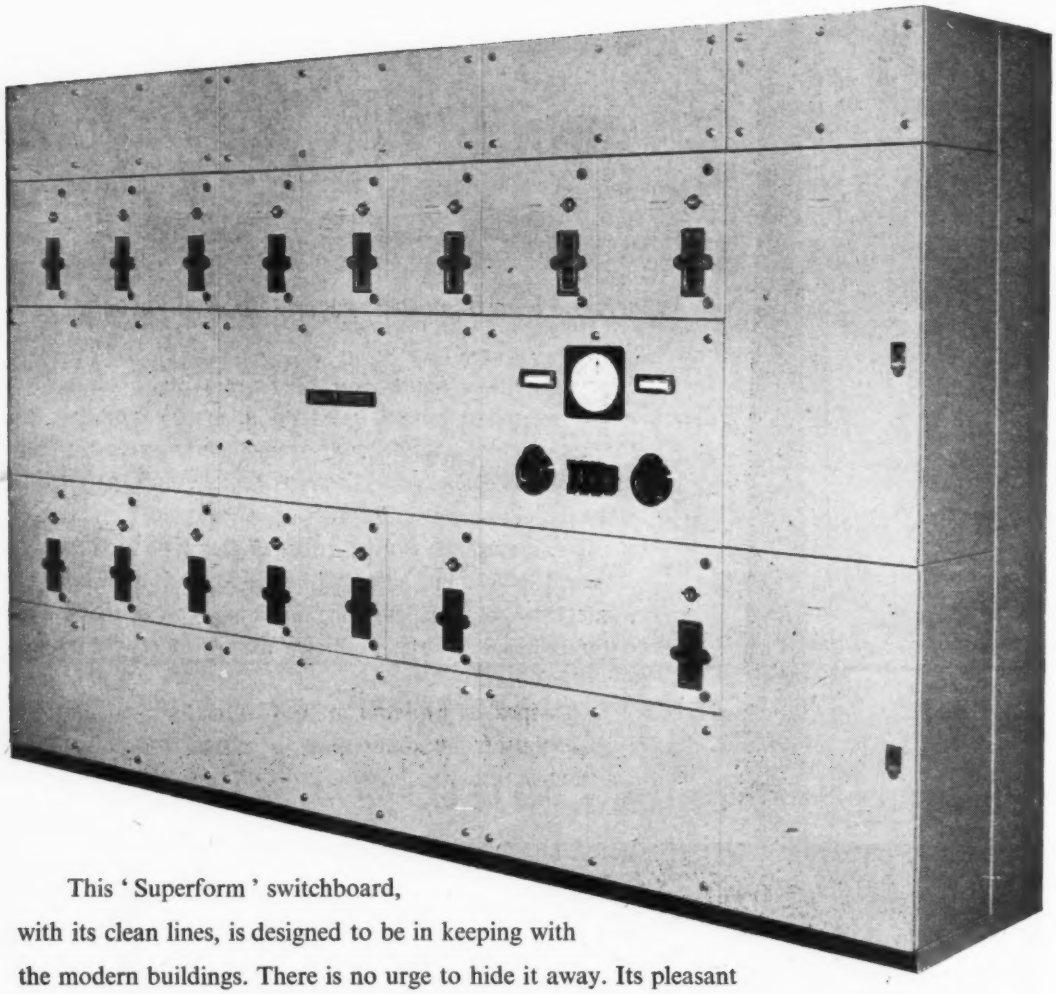

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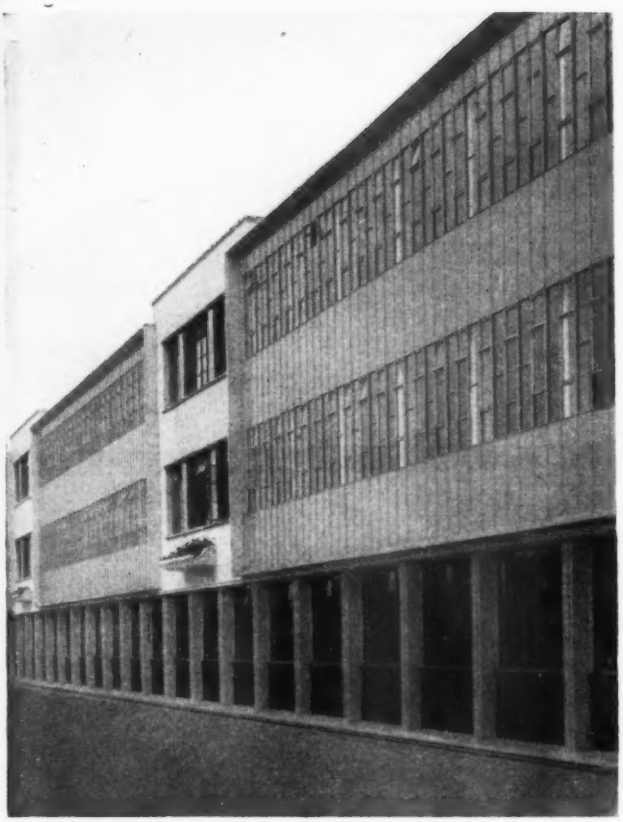

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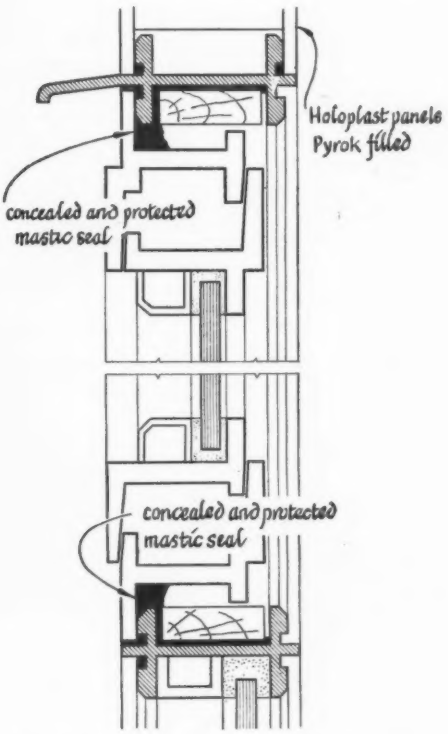

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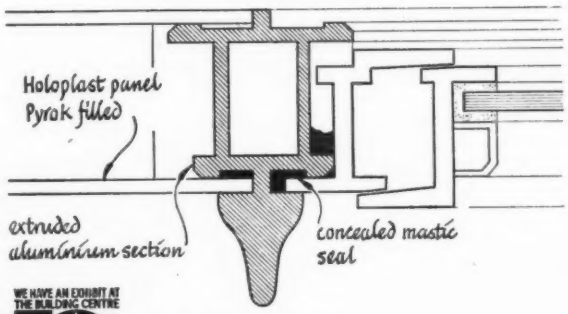

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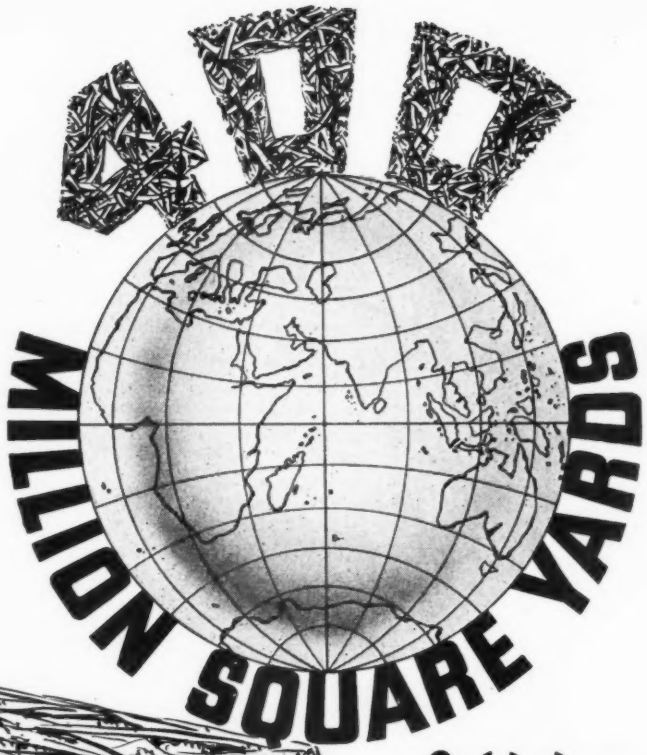

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Bicester
Was hailed by an expert, Hey
Micester!
If you listen to me
I think you'll agree
That PVC makes an effective,
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Father Christmas was
terribly worried
When to package his
presents he hurried
So he spoke to a pal
Who was at Lorival
And learned that PVC
sheeting would be an
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moisture-and-chemical-
proof answer to his
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Some more limericks — from the lively lads at Lorival...

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ragazzo
Was thinking about his
terrazzo
This problem of flooring
Would be very boring
Were it not for the
incontrovertible fact
that PVC makes an
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easy-to-fit and wholly
reliable flooring strip
for use with terrazzo
flooring

Said Dante engulfed in
the fire
Of the Inferno while
plucking his lyre
Six hundred years hence
Any fireman with sense
Will specify PVC
for a remarkably
effective, tough,
durable fire hose
lining

Said the Amp
to the Volt with a titter
No wonder, my dear,
you're so bitter,
This leak they can mend
In a moment, old friend
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an effective, economical
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all sorts of electrical
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PVC, in the hands of Lorival's lively lads, can do a lot of jobs better and cheaper. Why not drop a line to Lorival? Then you can get together with the lively lads and figure out ways and means of using PVC to your advantage.

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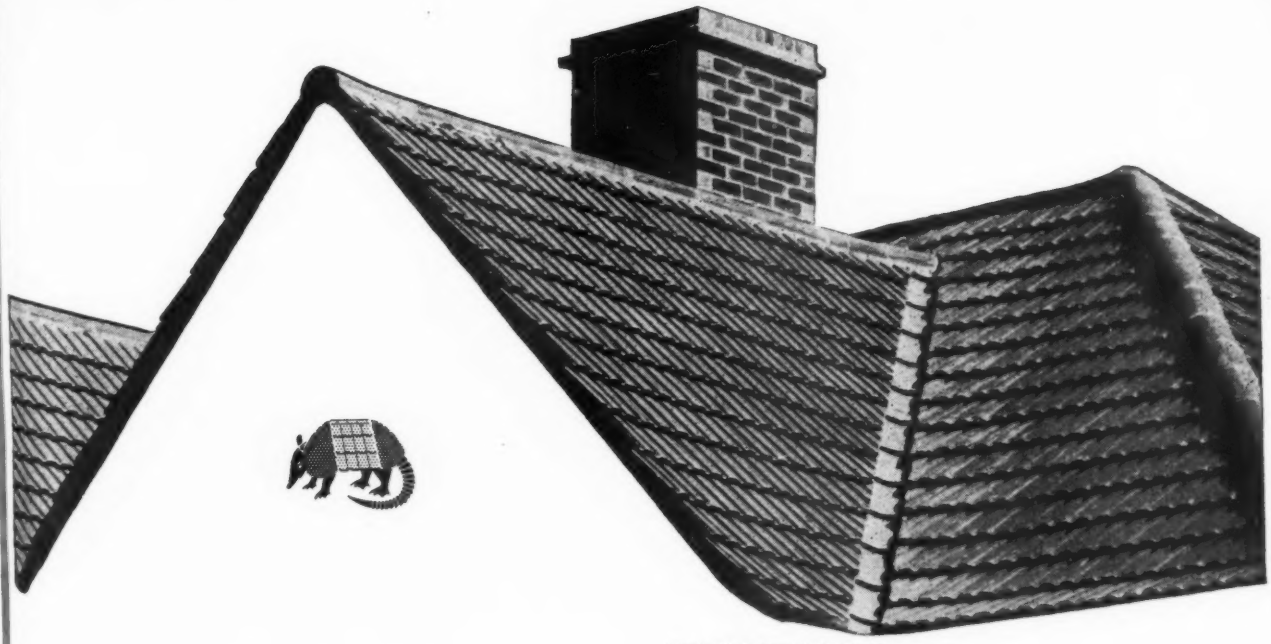

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Redland '49'

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Redland '50'

Redland '50' — roman pattern interlocking tile, for a good-looking roof at a moderate cost. It has the traditional charm of the double roman pattern plus the strength and impermeability of all Redland tiles

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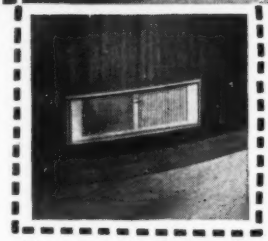
The Curlew, Petersfield Rd., Havant. Proprietors: Messrs George Gale Ltd. Architects: Carter & Salaman F/A.R.I.B.A., Chartered Architects, Lyndum House, High St., Petersfield.



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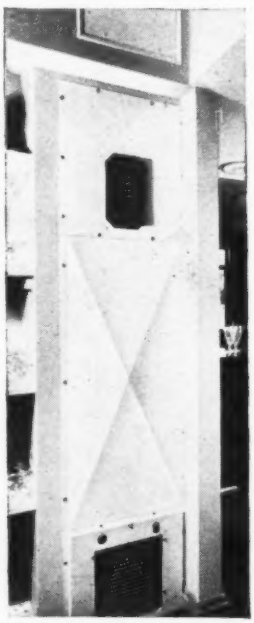
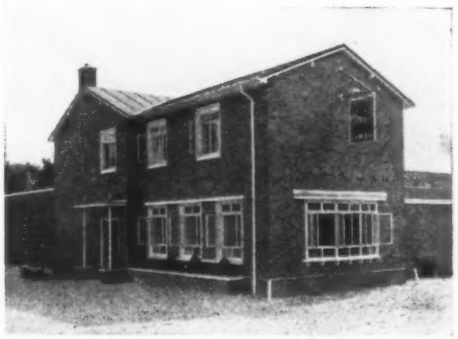


The gas-burning heat unit is compact and unobtrusive.



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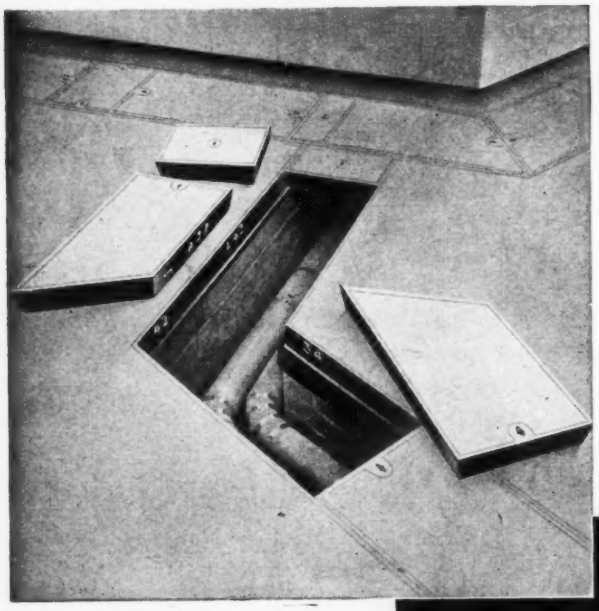

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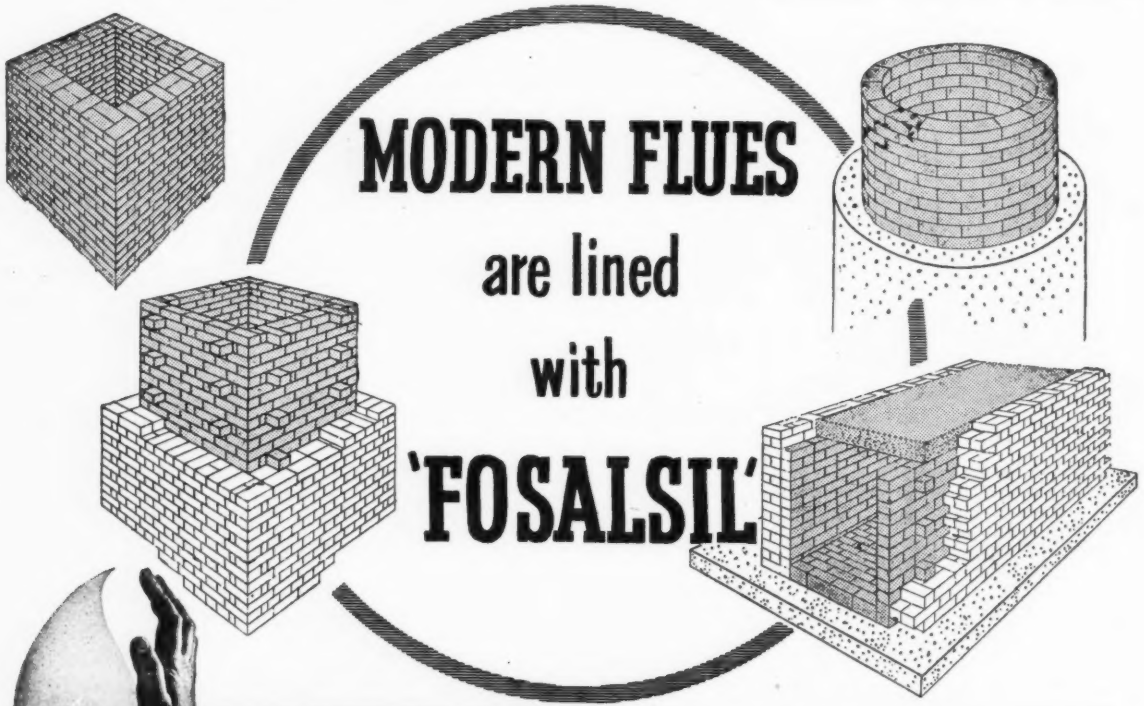

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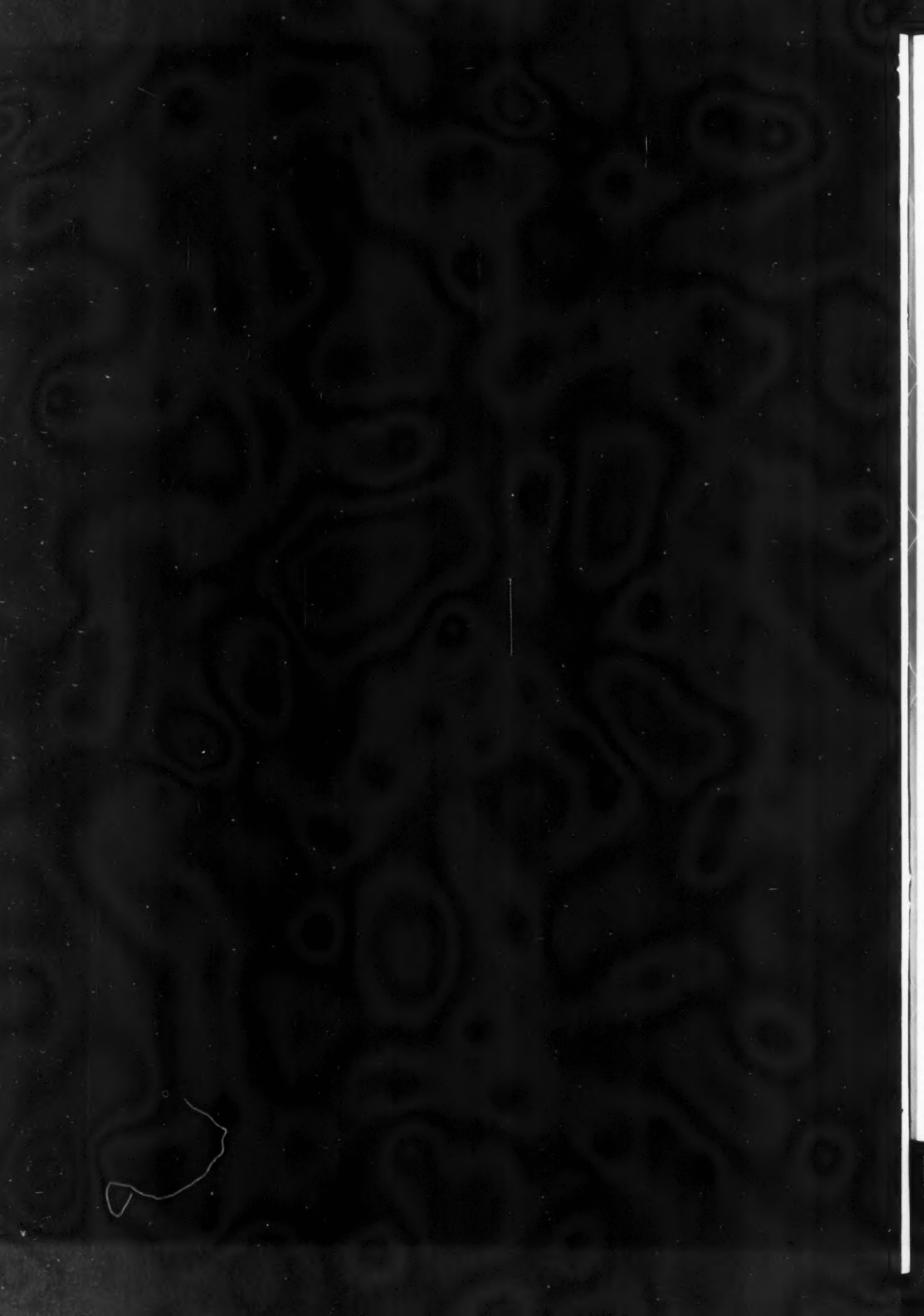

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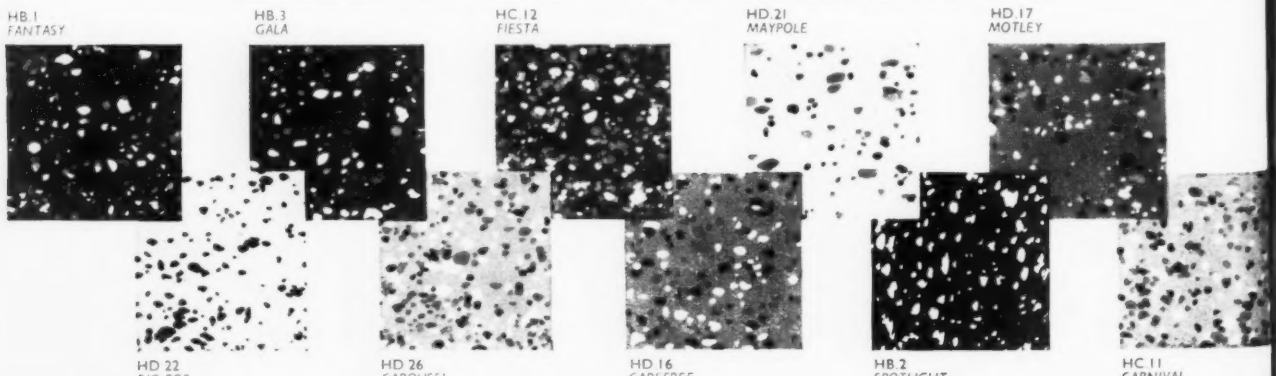

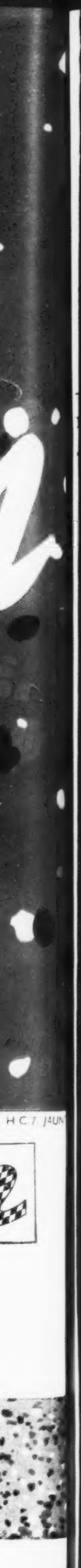
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THE ARCHITECTS' JOURNAL

9, 11 & 13, Queen Anne's Gate, Westminster, London, S.W.1 Whitehall 0611

No. 3171 December 8, 1955 VOL. 122

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BRUSSELS: A QUESTION TO THE RIBA

The next big international exhibition is to be at Brussels, and there are some disquieting rumours about the British pavilion there. The story is that the RIBA were asked to recommend an architect for it, and instead of putting forward the names of one or more of the architects who have designed some of the first-rate exhibition buildings that have been put up in Britain since the war, they recommended a member of their own executive committee, whose only connection with important exhibitions is that he worked on the administrative (specifically not on the *designing*) side of the 1951 Festival.

*

It is surely self-evident that British prestige abroad depends a great deal on a good showing at these international exhibitions, and that in its turn depends on having an architect who is a really forceful and imaginative designer. There is an impression about that the RIBA are getting in the habit of using the opportunities they are given of nominating architects as a means of rewarding dutiful committee members instead of nominating the best qualified man. I hope this is unjust, and that if the RIBA have nominated an architect for Brussels, they will show that it is so by announcing his name and giving their reasons for choosing him, including the exhibition buildings he has already designed.

PLANNING OUTLOOK

To anyone who sees red—in more senses than one—at the mention of the word "planning" (*e.g.*, the critics of the recent Regional Planning Conference at Bedford College) ASTRAGAL would commend *Planning Outlook*, the most admirable little journal of the Town and Country Planning Department of the University of Durham (Oxford University Press).

*

The current issue is packed with sound stuff and no rubbish. An excellent article on Regional Planning by Professor J. S. Allen and C. F. Riley should be read by anyone who is interested in really understanding what the Bedford College Conference was about. Other articles give an account of what is being done in West Africa and Scotland and thus show, despite a lot of obtuseness in the world, that the world does somehow or other get on a little now and again.

FRENCH VICTORIANA

One of the oddest, but most fascinating, of the Christmas season exhibitions to be seen around the London galleries is *Elegances Militaires* at the Redfern, in Cork Street. You don't have to be a militarist to enjoy it, for it consists of an enormous number of prints (plus a few paintings) recording what is already a lost age of primitive splendour—the epoch between, roughly speaking, musket and rifle, the last years of exclusively horse-borne war. Most of the prints are French (hence the show's un-English title) and record that *Mystique de la Grande Armée*, which flourished, mustachio'd, shako'd, plumed and blanco'd through the middle years of the last century in France, until it came unstuck at Sedan. It all makes a nice change from English Puffing-Billy-type Victoriana.

*

What intrigued ASTRAGAL quite as much as the prints, however, were some folding, metal Napoleonic-type camp-chairs which have come over with the exhibition, and look absolutely right in this context. But no one seems to know anything about them—not even which Napoleon they are contemporary with. If the First, then they are pioneers of the Modern Movement, if the Third . . . well, they are still nice Victoriana.

HOW MANY SHOPPING DAYS?

Regent Street's multi-coloured aluminium snow crystals seem to me the right sort of Christmas decoration, and much better than the street's wearisome Coronation effort. The suspension wires are not too visible (or perhaps it's just my astigmatism) and the flakes sway quite happily in the breeze and reflect a cheerful glitter from the shops and street lamps.

One heard, during the Coronation, that it was hard to get leave to hang decorations from wires across the street—probably because it is all too easy to pull the fronts of elderly buildings out if you play around with anything at all heavy. The Westminter City fathers appear to think snow crystals light enough to be safe, but the Regent Street scheme originally included Oxford Circus, which made it more difficult, for the north side of it is Marylebone, and the Marylebone authorities say no. But I hope the Regent Street Association will not be too discouraged, for I'm all in favour of coherent schemes for streets as against overstrident individualism—such as Oxford Street.

OVER-PRUDENT

A few weeks ago ASTRAGAL complained of the way Trinity Square had been spoiled as an open space by the clumsy intrusion of a memorial to merchant seamen. A less important, but nevertheless significant example of bad layout is shown above right, the garden of Staple Inn, Holborn.

*

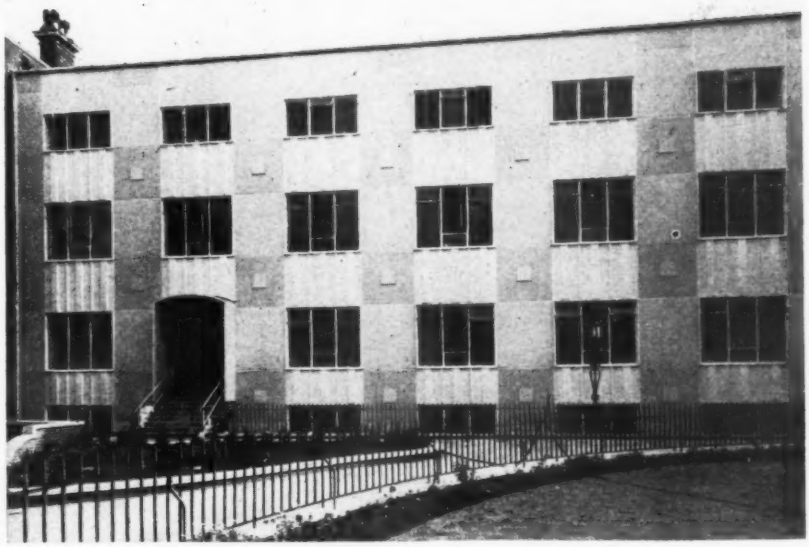
Staple Inn was badly damaged during the war, and the owners, the Prudential Assurance, whose architects have designed the restoration, are to be congratulated on the pains they have taken. With rather pathetic care they have endeavoured—like all dignified institutions—to put the clock back, literally, and metaphorically, to where things were in pre-war days. And of course they have failed, as the sentimental, however good their intentions, so often do. One might forgive the neo-Georgian houses, but one cannot excuse the coarse railings, the dwarf walls, and, worst of all, the circular paved feature making nonsense of the garden. Something like this was there before the war, but that is no excuse for putting back such an unequally unpleasant garden layout.

*

Is ASTRAGAL being harsh? Had the men from the Prudential nothing to go by? On the contrary. The visitor who follows the rat-run round the garden and under the archway (hidden behind a buttress) enters the most perfect of small courtyards, part-paved, part cobbled, filled with plane trees, and silence.

*

The other illustration shows the temporary framed back wall of the Patents Office, on the opposite side to the Inn. This building, designed in 1843 by Wigg and Pownall, is Victorian Jacobean. But the MOW's architect's department, all praise to them, are not slaves to the past. The result, if not first-rate, is a brave attempt.



Top: the garden of Staple Inn, Holborn, which—like the building itself—was designed by Prudential, though too-prudent, architects. Above: the temporary back wall of the Patents Office (opposite the Inn), designed by the MOW architect's department.

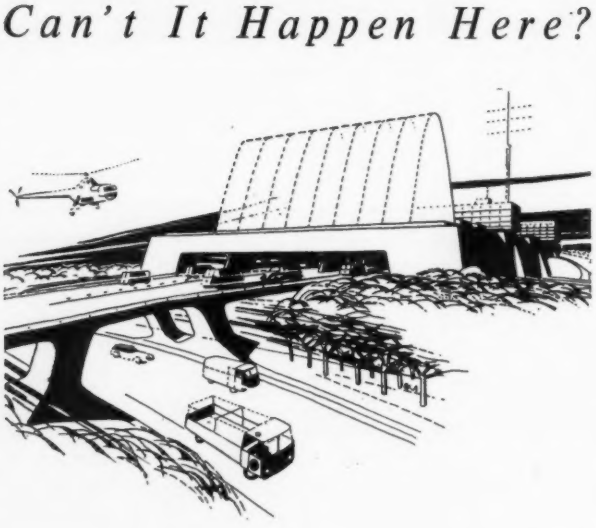
KING'S CHAPEL

It is always a pleasure to hear a great, but utterly unaffected, pundit like Geoffrey Webb in action, and ASTRAGAL made a point of hearing him talk on King's College Chapel, Cambridge, at the Courtauld Institute. The subject is, of course, one on which he speaks *con amore*, and his easy conversational delivery obviously disguised a most profound knowledge. Although there were no carefully-signalled historical sensations, period experts of the audience found plenty to put down in their notes.

*

The ironical tone was salutary too; no taxing of royal saints with vain expense, but several cracks like "The House of Lancaster were not all particularly praiseworthy, but they were *immensely* orthodox." This led to something ASTRAGAL hadn't heard before—that King's was re-founded by Henry VI as a bulwark of orthodoxy against Oxford heresy, that the great bulk of the Chapel (vastly bigger than any other college chapel) was probably intended to emphasize the sense of anti-heretical power, and that Eton was intended to act as a "feed" of young fighters for

Can't It Happen Here?



Last week Pilkington Brothers Ltd. triumphantly announced the second of their " new and practical solutions to the future problems of town and country planning." This project is a shopping centre (left), known as High Market, situated on a slab between two hills near Birmingham. Its designers, Gordon and Eleanor Michell, who were commissioned by Pilkington's Glass Age Department Committee, point out that they were asked to plan on the assumption that social and economic surveys had proved that such a centre was both necessary and practicable. There is certainly much that is commendable in this architectural patronage by Pilkingtons. But what do such Utopian schemes mean to a public which is sitting in longer and longer traffic jams, fuming at the apparent disregard of the country's chaotic road system? No social survey is required to show how necessary road improvements are. And no economic surveys should be required to show that such improvements are economically possible. Unlike other countries (see the photograph of Los Angeles above) we have begun to tackle the road problem too late. And statistics given last week at the Town and Country Planning Association's National Conference show that we are tackling it too slowly. Comments on this Conference will be published later.

the Faith to be forwarded to King's when ready for battle-training.

•

One other point of considerable interest brought forward by Professor Webb was about the distinctive decorative style of the western end of the Chapel—completed, more or less, under Henry VII (that end is pretty well his from the floor up). The work was under the direction of his Master-Joiner, who was also the person responsible for royal pageants, and so that curious decorative style which we all know so well, in which large heraldic badges in high relief bulge out from the panels between the structural ribs, probably preserves the style of pageant architecture favoured by the first of the Tudors—otherwise practically unknown to us.

A SIMPLE SLIDE RULE

ASTRAGAL has just heard of a certain provincial architectural society whose members had got tired of a lecture programme that always produced the same old faces and ideas. They decided to make a clean break with tradition, and a newly-appointed bright young lectures-secretary was delighted that his first catch was a top-ranking Brutalist. When this architect commented on a series of slides of Zulu Kraals, Berber cave-dwellings, African mud-huts and the like, his audience were a little puzzled. They were, however, prepared to make allowances for a man occupying an extreme position, especially as the following lecturer was expected to give the viewpoint of the other extreme. But the discourse of the distinguished Beaux-Arts Formalist who was next on the programme proved not to be about axial planning, but about Zulu Kraals, Berber cave-dwellings, African mud-huts. . . .

•

A little baffled by this, and wondering what advanced circles in London could have on their minds, the provincial society turned with relief to their next month's speaker, a man unconnected with any -ism or extreme viewpoint, but known for his distinguished work in London's post-war housing drive. There is no need for me to finish the tale. Let me simply point the moral. Be careful when you take a box out of the AA slide library: you never know where it's been.

ASTRAGAL

POINTS FROM THIS ISSUE

The Editors

THE MISUSE OF STEEL

IT is about time the scandalous misuse of steel in the structures of the new office buildings in central London was halted. In nearly every other street structural steel frameworks rear against the winter sky. Each of these buildings represent a completely unnecessary waste of a material which to the national economy is now nearly as precious as gold. If steel is so precious, why then make the frame for an office building in structural steelwork when at least half of the steel could be saved by using structural concrete?

Does the client prefer structural steelwork because he believes it to be quicker? Does the architect prefer structural steelwork because he finds it easier to understand? Does the consulting engineer prefer structural steelwork because it is easier for him to design? Does the quantity surveyor prefer structural steelwork because he thinks it is cheaper? Is the office building quicker to erect, easier to understand and design or cheaper because it has a structural steel framework? Structural steelwork is neither cheaper nor quicker to build than structural concrete. A short investigation by the Building Research Station would soon confirm this view. Why then is structural steelwork used for so many office buildings? Perhaps it is because it takes such a long time to get reinforcement. Why this should be so it is difficult to decide; is it because there is too much building going on at the moment or because it is more advantageous to the mills to roll joists instead of bars? If the latter reason is correct, it is an appalling outrage that a major part of the country's capital investment programme should be in effect, dictated, limited and controlled by a handful of steel masters.

Whatever the reasons for the shortage there is not much doubt about the consequences. Many projects of considerable importance to the welfare of the nation—hospitals, schools, flats and factories—are being increasingly delayed and, unless some drastic action is taken now, many schemes at present under way will come to a complete standstill.

LETTERS

S. G. Moore,
Andrew Jackson, A.R.I.B.A.
C. R. Vinycomb

House Competition

SIR,—Whilst scanning the pages of the AJ, November 17, with the untrained eye of one whose only architectural qualification is that of having lived in a house, I formed the impression that the prize-winning Tretol house had certain limitations when forming part of the terrace of houses as shown on the drawing.

If the windows on the north and south elevations are built up, the resulting gloom would seem to provide suitable conditions for mushroom growing or photographic processing. On the other hand, retaining these windows as glazed screens would apparently provide conditions for an interesting sociological experiment and also enable the occupants to see that they were, in fact, keeping "up with the Jones's."

S. G. MOORE.

Birmingham.

SIR,—As it has now transpired that "many good designs and one of outstanding merit" have been ruled out on a cost basis, would it not have been more satisfactory to have given a definite price per sq. ft. in the conditions for the competition? Surely, in a simple structure such as a house this could have been done with a cautionary note that if such materials outside the normal range were used: *viz.*, double glazing, stone, etc., then allowance would need to be made for this item by the competitor. To leave this very important point to the competitor's discretion and then to penalize later does not seem to make sense, as it is fairly obvious that the surveyors brought in for costing purposes would base their calculations on a price per sq. ft. After all, it is common knowledge that we can build more cheaply in some parts of the country than in others.

ANDREW JACKSON.

Edinburgh.

Exhibition Pre-view

SIR,—Thank you for your pre-view of the Building Exhibition. Isn't it time that the organizers had the exhibition catalogue "done" by professional journalists?

C. R. VINYCOMB.

Cannock, Staffs.

NEWS

COMPETITION

Old People's Homes

Conditions of the ABS competition for old people's homes, which was announced in last week's JOURNAL, can now be obtained from the Secretary, Architects' Benevolent Society, 66, Portland Place, W.1. Applicants for the conditions should send a deposit of £1 1s. and state their registration numbers. Unregistered applicants for the conditions who have applied for registration should give the date of their application and the number of the receipt issued by the Architects' Registration Council. Firms which apply should give the registration numbers and dates of registration of the architect partner or partners of the firm.

ABT

Subsidies Proposal Ill-Conceived

The ABT considers "that the new proposals on subsidies are ill-conceived."

The Association sums up a long statement it has issued on the housing subsidies Bill by calling for "positive measures of control of building, in the interests of the community as well as the industry itself. The Bill should be amended to ensure that large housing projects can proceed in all parts of our cities which are suitable for development. Unless such measures are taken it is likely that in five years planned reconstruction in obsolete areas will degenerate into haphazard and inadequate building."

CEA

Electricity Utilisation Trials

The Central Electricity Authority has embarked on large-scale trials in 90 houses on one of its recently-completed housing estates adjoining Keadby Power Station in Yorkshire. The tests are designed to establish load characteristics, analyses of cooking consumption and information concerning water heating, supplementary space heating, electric floor heating and larder-cooling heat pumps. In the last two instances six experimental houses have been insulated to give a U value of 1, establishing optimum conditions for testing.

The various set installations and wiring systems were arranged under the direction of P. Schiller, head of the Utilisation Research Committee of the Authority, and it is hoped that the first results will appear in about two years time.

CORRECTION

We regret that on page 738 of our issue for December 1, we stated that Scaffolding (Great Britain) Ltd. "showed a welded tubular lattice barrel vault," and that on the same page we attributed photographs of a tubular spare frame and a lattice barrel vault to the same firm. All these items should have been attributed to the Steel Scaffolding Company Ltd.

This 11-storey block of flats in Robert Street, N.W.1, was designed by Davies and Arnold for the Borough of St. Pancras as part of the Regent's Park Development area. The flats were opened by the Duke of Edinburgh last Thursday.

This week's Costs article (No. 17) is the second to be commissioned by the Guest Editors from O. J. Masterman, Technical Director, Unit Construction Company. He shows how the immense range of present day technical knowledge is in the hands of two teams—that of the architect and that of the builder. He urges the logic of collaboration between these teams, and goes on to indicate the kind of help the builder might give. Since it deals with many issues of importance in contract procedure, the Guest Editors have, with the author's consent, included the article as part of their series on "The Building Contract."

THE COST OF BUILDING

THE BUILDING CONTRACT 3

FROM A BUILDER'S VIEWPOINT

Architect as co-ordinator

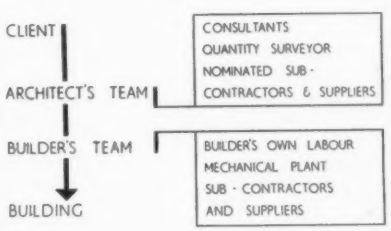
There seems to be a fundamental conflict in that the two main functions which an architect in this country is expected to exercise in the designing and erecting of a building are not commonly found in one man. As a designer he wants to have an artistic approach to his problem, and as the man responsible for seeing his design carried out he wants a businesslike approach. Indeed, this greatly simplifies the case for, unless he has (or can call upon) a fund of knowledge and experience from a wide field of related subjects, his creation will end as a picture and not as a building. It was once possible, as Wren so convincingly demonstrated, for one man to combine in high degree the abilities of architect, engineer, scientist and builder, but today that is not possible, even for an outstanding man. There is now such a mass of accumulated information, and frequently of highly specialized techniques, relating to each branch of building activity, from foundation work to service installations, that even a person of outstanding capacity cannot expect to master all this knowledge and use it to inform his creation. It is, in fact, worse than this, for the information is constantly expanding and the techniques are multiplying. What then can the architect do? He must lean on advisers—people specially trained to safeguard the stability of his building, to know the physical properties and durability of his materials, to ensure that his heating, lighting, ventilation and drainage will be efficient, and to measure the cost of these things before they are assembled. (This, in fact, is what good architects now do.) He must employ engineers and quantity surveyors *at the design stage* and thus get the necessary skilled advice on structure, services and costs. Architects may, and usually do, go to independent consultants, or they may, if their practice is large enough, include these experts on their staffs. Sometimes they go to specialist contractors for technical advice and pay no direct fee for it. This may appeal to clients who dislike paying consulting fees but it may not be in their best interests and is open to other objections which will be mentioned later. In such ways the architect quite properly frees himself from a mass of technical detail so that he can apply himself more fully to his proper function of æsthetic design and planning. The result cannot be quite as good as if he had all the specialist knowledge in his own head when he was working out his design, but it is the nearest that is practicable to this ideal which, in a simpler age, was personified in Wren. However, in thus freeing himself from the necessity of all but a broad understanding of the engineering and scientific skills that enter into his building he has, by the very multiplicity of these skills, been left with the need to exercise considerable co-ordinating and organising powers, faculties not commonly allied to the artistic temperament. He must both direct and be influenced by all his consultants so that their designs correctly provide his client's requirements and conform in detail, in time and in space, to his own overall design. The principle of employing consultants is not abandoned if, in the smaller jobs, they are replaced by specialist sub-contractors provided they also are called in early: but this very common practice has the obvious objection that if such specialists are to be consulted at the design stage, they must be selected, and a competitive price cannot, therefore, be obtained for their work. Many architects do put specialist work out to tender, but although they may thus get a competitive price they deny themselves the opportunity of consultation at an early stage.

Builder at the design stage

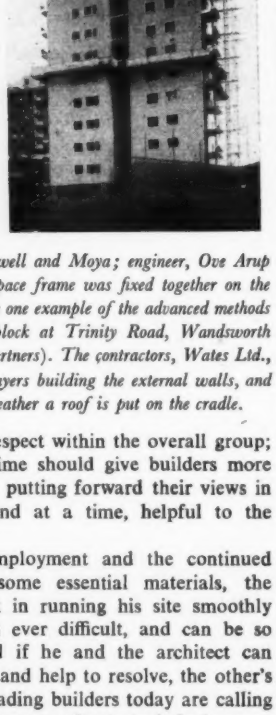
This same dilemma applies to the main contractor, and it is the object of this paper to examine this problem in some detail and to indicate a number of reasons why the building may be more costly or take longer in execution than would be the case if the main contractor were consulted at the design stage. New materials and highly technical processes are coming into use on building sites and mechanization is increasing fast; builders are therefore necessarily becoming more technically minded and more highly organized. While *design* knowledge and skill have increased in extent and complexity, bringing about the need for specialized advice at the design stage, the same thing is now rapidly happening in regard to *erection* knowledge and skill. The architect is no longer sufficiently informed to take adequate account of all the new erection techniques himself when working out his design.

What has already been written in this series of articles indicates a growing awareness of the need to bring the builder into the picture earlier. Many architects have said that they favour it and there are notable cases in this country where it has been done with success. In the United States it is usual, and the Productivity Team in their report commented favourably on it. A special instance in this country where collaboration of the builder and the design team was effective right from the start is the Fawley refinery; in this great project it will be remembered that £37½ million worth of work was carried out in less than 2½ years, the whole of the design details having been completed before building began.

For efficient building in this country today good teamwork is vital, but there are normally two teams. The architect's team comprises himself and his consultants, who will include the engineers for the structure and services and the quantity surveyor. This is the design team which has the task of preparing all the information which will be required by the builder to erect the work. The other team is the builder's team, which includes his own labour, his sub-contractors, his suppliers and his mechanical plant section. If the builder is called in by the architect at the design stage the two teams virtually become one, from the architect's appointment to job completion.



Present contractual procedure: the architect co-ordinates his team to prepare a design and instructions for the builder and his team. But the builder could contribute materially to the economy of the design and completeness of instructions if the two teams combined.



Left: assembly hall roof of the Mayfield School, Putney. Architects, Powell and Moya; engineer, Ove Arup and Partners; structural contractors, Carter Horsley Ltd. The 27-ton space frame was fixed together on the ground and hoisted in one piece, before the stanchions were erected. This is one example of the advanced methods of which some contractors are now capable. Above right: LCC point block at Trinity Road, Wandsworth (Architect to the Council, Dr. J. L. Martin; engineer, Ove Arup and Partners). The contractors, Wates Ltd., devised the suspended cradle which started from ground level with bricklayers building the external walls, and then descended from the top for external painting and glazing. In wet weather a roof is put on the cradle.

Closer collaboration between builder and architect

If this can be achieved the architect obtains, in time to influence his design, the builder's advice on the most efficient way of executing his proposals on the site. The builder can point out from his first-hand experience which proposals are costly or slow in execution, which materials are expensive or hard to get, which designs do not favour mechanization, which details complicate labour control: and he can suggest more favourable alternatives. In this way the architect's team and the builder's team become welded into one to the overall advantage of the job.

The items just enumerated are only some of the obvious advantages which accrue from this closer collaboration. They are some of the tangible ones, but there is the even more important inherent advantage of bringing the two teams into closer relation. In the past the division of the architect's team and the builder's team has been very real, they have become at times almost opposition camps, creating a most unhelpful atmosphere for the smooth and efficient running of the work. In the past the architect has been the controller who have given orders to the builder, and there has been no incentive, indeed no opportunity, for the builder to apply the advantages of modern erection techniques, of better planning or of past experience to the improvement or cheapening of the work, by his intervention at the design stage. As a result, he finds himself often in the position of having to carry out work by methods which he thinks could be improved, but such improvements can only be made at the expense of variation orders and delay. They cannot, in any case, be as effective as if they had been proposed at the outset. The result has been that builders have tended to form the habit of obeying blindly the architect's instructions and so have become inhibited from advising them as pertinently as they might on points of design even when given the opportunity. The inclusion of the builder as one of the experts to be called in for advice (in his own field) at the early stages of design should give him and his team a better standing and greater self-respect within the overall group; and this in time should give builders more confidence in putting forward their views in a manner, and at a time, helpful to the architect.

With full employment and the continued scarcity of some essential materials, the builder's task in running his site smoothly is more than ever difficult, and can be so greatly eased if he and the architect can each discuss, and help to resolve, the other's problems. Leading builders today are calling in management consultants to help improve the efficiency of their businesses and are exploring the possibilities of Work Study for improving their planning and the cost and productivity of their operations on the sites. Some of them have their own research organizations, and others are learning to adopt quickly the results of published research: they are making ever more use of mechanization. In these ways they are becoming specialists with a valuable contribution to make towards design. The further this process continues, the more they will be entitled to consideration on a level with the other consultants and specialists, and the closer will the design group and the building group be co-ordinated, both in action and in mutual esteem. This surely is an aim to foster and one which will eventually weld everyone concerned in the erection of a building into one united team.

It may be a long time before such close collaboration between builder and architect is customary in this country. The sections which follow indicate some of the points which a builder would make to his architect if given the opportunity, with the object of helping to obtain the cheapest possible building and the shortest erection time, even though he may not be called in for consultation at the design stage. If, especially in the earlier sections, these points tend to reiterate exhortations which the architect must be tired of hearing, this is because in analysing actual cases of lost time and money on construction work one is constantly brought back to those very troubles embedded in our building system which it is the object of this series of articles to prise out and overcome.

BUILDERS' SUGGESTIONS TO THE ARCHITECT

Complete information before work starts

The value of doing this was strongly emphasized at Fawley, and the Productivity Team that visited the USA in 1949 said that the early supply of complete and detailed information is a fundamental factor in securing speed of construction. Overheads on a building site are an important item of cost, perhaps 10 per cent. of contract value (the figure varies greatly). With full information a builder can plan for a shorter period of work than otherwise and so save on overheads. Claims for the cost of delays caused by lack of information are so common as to need no quoted examples, but an intangible loss should be mentioned: a job that is dragging for want of drawings will lose tempo, and the efficiency of all the work will suffer. (Cautionary tale: a builder lacking data to start his job was asked to erect site offices so that the client would see that the work was going forward!)

To ensure a steady continuity of work and to enable a fast programme to be set, complete information must be supplied to the builder at the outset. One school contract finishing in the North, planned to be built in two years, is likely to be four months overdue because 250 of the drawings have been dribbled into the builder during the last 18 months. Moreover, the architect and client have not yet agreed about the floor finishes! Inaccuracies or lack of clarity in bills and specifications are common and often lead to extra costs being incurred, especially if the clerk of works is unable to give a ruling. Here is a typical instance of extra cost arising because the architect's detail (supplied too late for tendering) did not accord with the bill description.

Extract from Bill of Quantities:

"*Fuel Store Baffles.* 96 No. 8 gauge mild steel baffles size 1 ft. 5 in. × 1 ft. 9 in. with angle ends at bottom let into concrete with lugs cast on both sides holed and drilled and screwed to coal boards."

At the time of tender, the price obtained from suppliers on this description was 27s. 6d. each. Upon receipt of the architect's details later, suppliers wrote as follows: "We understand that the architect's requirements are for a baffle plate of 8-gauge mild steel consisting of two shaped sides size 9 in. × 25½ in., shaped cover size 15 in. × 17 in. 1½ in. × 1½ in. × ⅛ in. angle at top 17 in. long and two fixing lugs all-welded or riveted together. 51s. each for this article." This unimportant component caused an extra £100 on the contract for 96 flats.

Complaints are heard, too, that bill descriptions and specifications do not keep pace with building practice and give rise to disputes. On a recent job, for example, the plastering specification called for patent plaster ⅝ in. thick in two coats plumbed. It was contended by the builder that good practice calls for three coats for this operation. It has been said that to plan and run his job efficiently, the builder must have complete and correct details before starting work. Logically, if he wants the keenest price, the architect should go further and complete his details before going out to tender. This would really enable the builder to sharpen his pencil.

Nominated sub-contractors

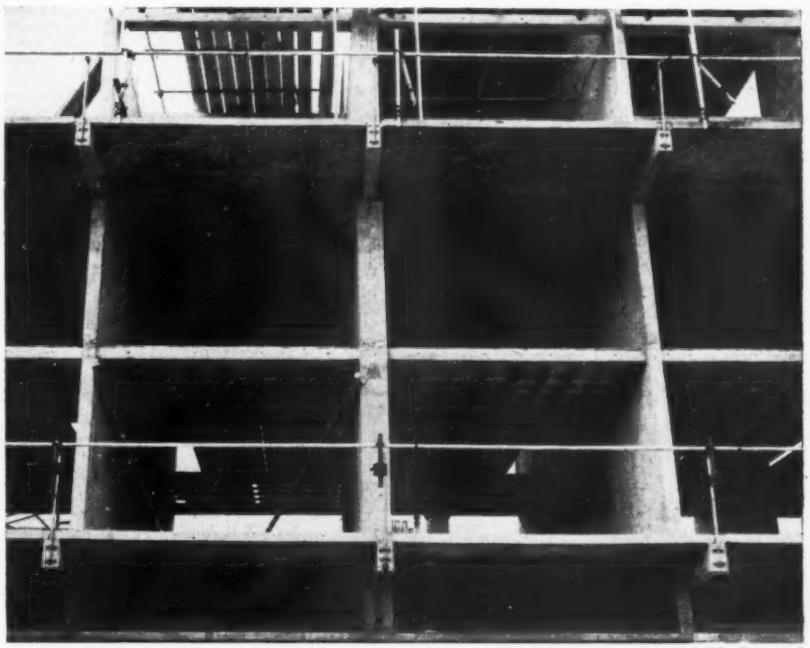
The practice of nominating sub-contractors has grown to such an extent that a main contractor may find himself doing no more than half the work. He is responsible, and should be responsible, for organizing and running the whole of the work, but in practice finds that he has not got effective control of his nominated sub-contractors who tend, in spite of the wording of the contract, to look to the architect as their employer. Moreover, the architect will have conferred with them before the main contractor is selected, and may well have committed him in advance to delivery times and conditions which do not fit his plan. On the other hand, it is not uncommon for the builder to have to tender with P.C. items in the bill for which the sub-contractors have not yet been chosen. How can he be expected to plan realistically and price keenly when he cannot know how these unnamed specialists will affect his work and how they can be fitted into his programme? While there may be good reasons for nominating for a few of the more highly specialized items, it is contended that the builder should be given at least all of the main structure that he is competent to do. A case in point here is the construction of 150 dwellings in three-, five- and nine-storey blocks in cross-wall construction. The architect, while leaving the concrete floors of the nine-storey block to the main contractor, had nominated a specialist sub-contractor for the floors in the three- and five-storey blocks. The size of the nine-storey block is such that five weeks are required to carry out the construction of one complete storey, including cross-walls and staircases. Only two of the five weeks are required for pouring concrete, but as the main contractor cannot turn on to the other two blocks where the nominated specialist is operating for the remaining part of the storey cycle time, he has to find other work for his concreting gang, which is uneconomic. Conversely, the specialist sub-contractor is in just the same position; thus two complete sets of concreting equipment and two concreting gangs are required on the site, both of which will be uneconomically used.

The progress schedule

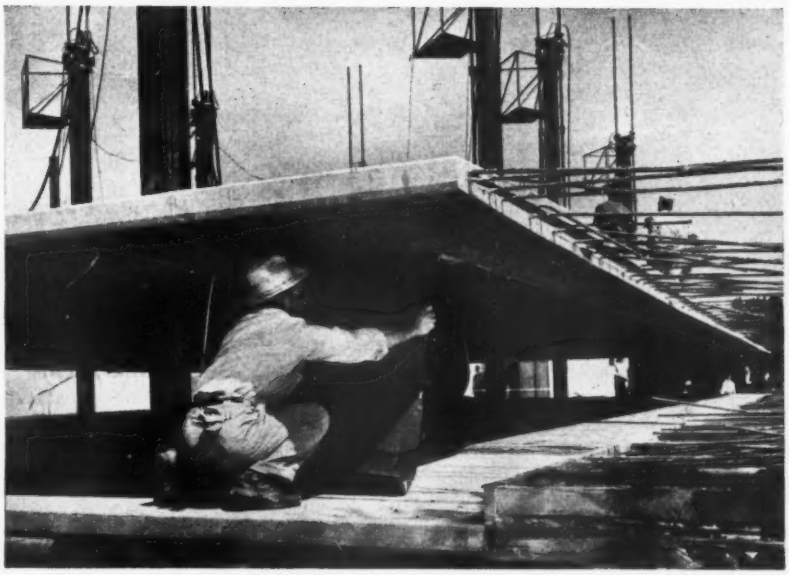
No comment is made here on inadequate time for tendering, although this is a very sore point with builders, because the subject has been exhaustively dealt with in recent articles in this series. Assuming, however, that the builder has been given sufficient time for tendering, then to obtain the keenest price his tender should be based on a fully worked out plan for executing the work, including labour, plant and material allocations, fitted to a time schedule. The architect's backing is of great importance in helping the builder to maintain his schedule, especially where nominated sub-contractors are concerned.

It was said earlier that the architect needs a dual personality—part artist, part businessman—and whereas he has much to do besides designing, in interpreting and guiding his client and in co-ordinating the work of the architect's team, there is no need for him to be occupied with the organizing of the building work. This is the builder's job and, while the architect can and should look to him to do it, there are several important ways in which he can make or mar the success of the builder's programme. Emphasis has already been laid on the need for full information at the outset, and the plans and bills will, of course, be the basis on which the builder will "preplan" (as it is now so oddly called). An early need here is the information that will enable him to deal with all excavation and ground work in one operation instead of piecemeal. This entails the correct siting of all buildings with ground floor and basement levels, correct line and level of all drains, siting of garages and outbuildings, and positions of gates, walls and fences with levels.

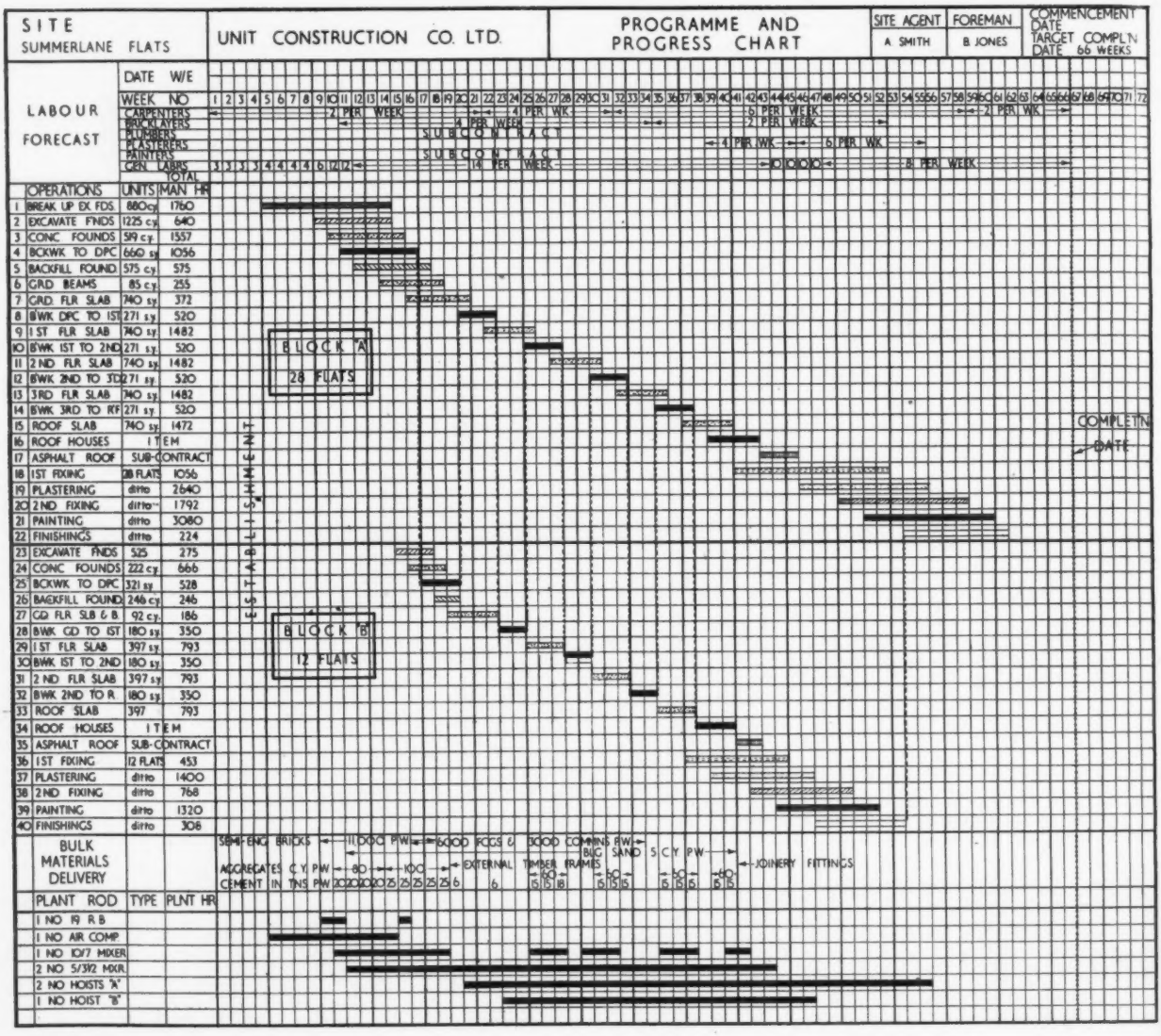
The builder's price is based on his progress schedule, time being for him (as for the client) an expensive commodity. He must have effective control of all work on the site to maintain his schedule, and this implies no nominated sub-contracts or at least, if these are unavoidable, the placing of the orders in sufficient time to fit the schedule and the active support of the architect in



LCC photograph



Above right: the LCC Picton Street housing scheme (Architect to the Council, Dr. J. L. Martin; engineers, Ove Arup and Partners). The architects and engineers co-operated with the builder (John Laing & Son Ltd.) from the design stage. The intermediate timber floors in this cross-wall maisonette block were designed to be crane-hoisted in sections, but to be light enough to manhandle into position. Right: the "lift slab" technique pioneered by O'Neil Ford in America. The columns are erected first, the upper floor slabs are cast sandwich fashion on the ground floor slab, incorporating part of the services and then are hoisted from the column heads by hydraulic jack. It would be impossible to use techniques of this kind within the orthodox competitive tendering procedure.



Progress chart used by the author's firm, which shows the amounts of labour, principal materials and plant requirements, as well as the timing of operations. Some trades (plumbing, etc.) are omitted for clarity. Dotted lines connecting the bricklaying operations indicate the movement of gangs from one block to the other.

seeing that they keep to it on the site. In preparing a builder's progress schedule it is not enough to make a chart showing the starting and finishing dates of all the operations. Planning should be in much greater detail and should, in particular, include dates for the delivery of materials, a section showing what plant will be required for what period, and an analysis of the labour requirements for each week that the work continues, separated for each trade. The progress chart used by the author's firm, which allows for these things, is shown above.

There is another important way in which the architect can support the builder in maintaining his progress schedule, and that is by appointing a competent Clerk of Works or, better still, an assistant architect to the site. Builders do suffer from Clerks of Works who are not up to their job and not able to make correct and quick decisions and so prevent the delays caused when questions have to be referred back to the architect. A poor Clerk of Works can be a drag on the building progress just as a really good one can help it forward.

Variations

Variations, the bane of British building, would be greatly minimized if clients would allow their architects the time to prepare their designs in full before going out to tender. It is in working up the details that so many points come to light which afterwards require variation orders. A second line of defence against variations is for the architect to insist that the client makes up his mind in time, and the completion of the details before going to tender would help to ensure this. A further source of variations comes from the nominated sub-contract where early information is often sketchy and details tend to come through piecemeal. Subcontract work frequently requires the forming of holes, chases, fixings, etc., in other work and if these details are not clearly set out in time for them to be formed properly, other trades must be brought back for cutting the new work and making good again. A frequent source of variations is the joinery section, especially doors; final choice of design and finish for these items tends to be left until the building carcase is done, when it is found that the bill descriptions do not cover the requirements.

Without doubt the greatest reduction of variations would result from collaboration between architect and builder at the design stage. The virtual absence of variations in American work and the very large number almost always associated with British work are in marked contrast and a mounting list of variation orders is a constant annoyance and anxiety both to architect and client; it also upsets the building programme. While some variations result from changes of mind and others from afterthoughts on the client's part, a good many result from improvements which the builder, from his constructional experience, is able to propose, and which could far better have been incorporated at the design stage.

RAILWAY STATION

at POTTERS BAR, MIDDLESEX, for the BRITISH TRANSPORT COMMISSION

designed by M. M. POWELL, architects' department, British Railways, Eastern Region

R. T. WALTERS, principal assistant architect, and JAMES WYATT, architect-in-charge

consulting structural engineer A. E. BEER

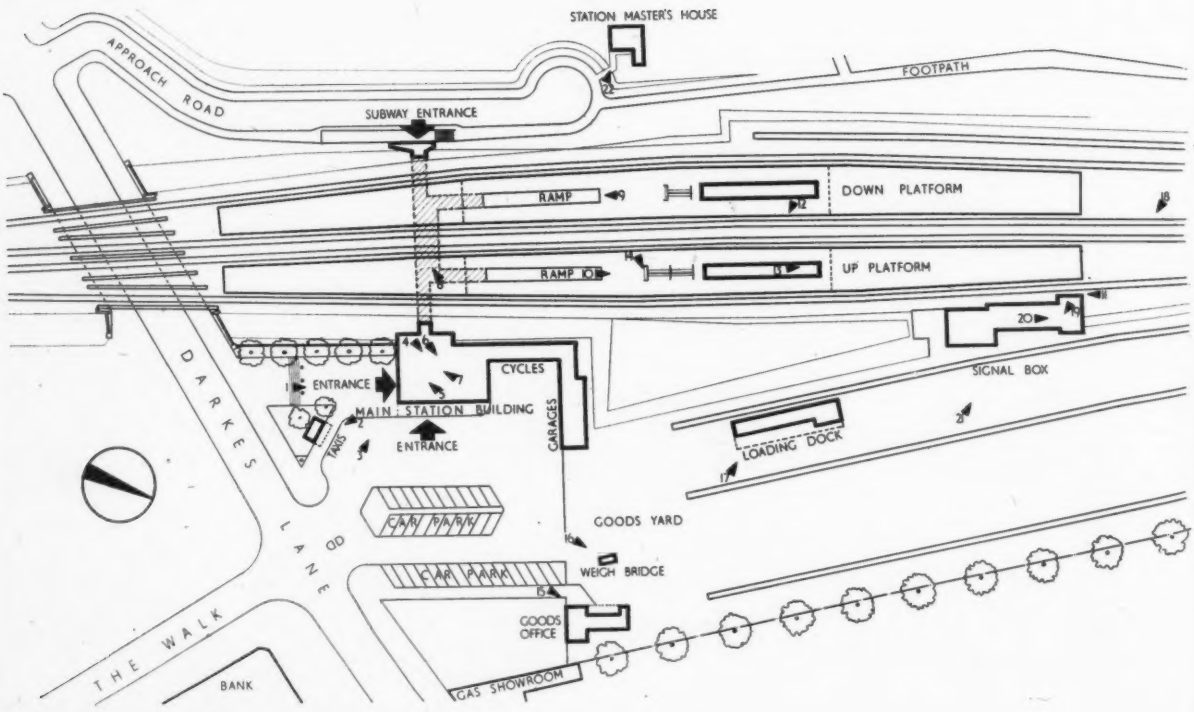
quantity surveyor IRVING TODD

The widening of the main line through Potters Bar made it necessary for the station to be completely reconstructed. The architect's part of this work has been to provide buildings for both passenger and goods traffic, and in addition a new signal box and a house for the station master. This is the first station to be completely rebuilt by the Eastern Region since the announcement of the modernization programme for British Railways, and it is therefore of particular interest to observe the role of the architect in this redevelopment, and the standard of design and detailing that has been achieved within a plan evolved to meet traditional operating requirements. The general contractors were Kirk & Kirk Ltd.; for sub-contractors, see page 790.

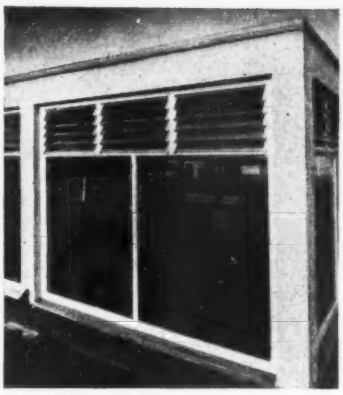
The station approach from the south.

The main station building may be approached by a pedestrian way (viewpoint 1: left) directly from Darkes Lane, or from the station forecourt, which has been laid out to accommodate 35 parked cars. There is also a taxi rank and a small cabmen's shelter (viewpoint 2: below left) in load-bearing brickwork.

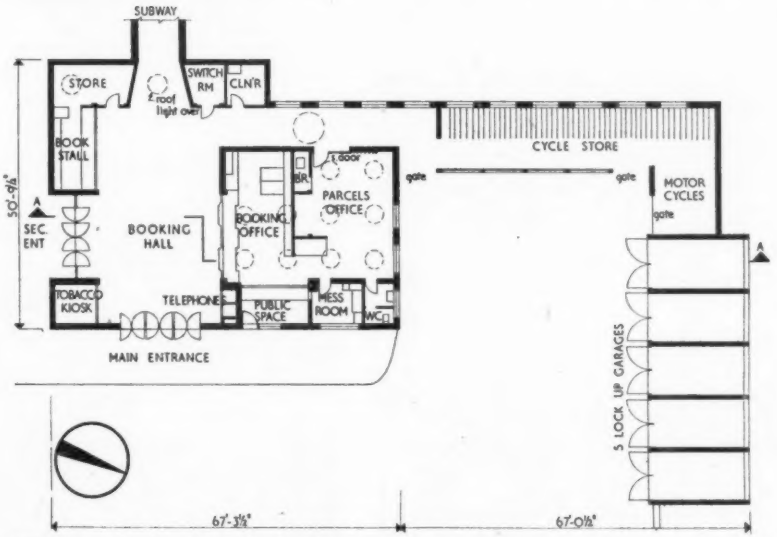
RAILWAY STATION AT POTTERS BAR



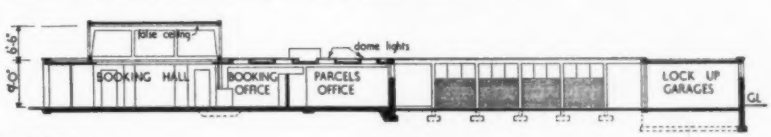
Key plan showing photographic viewpoints



Centrally placed in the main station building (viewpoint 3; above) is the booking hall, lit on four sides by clerestory windows (viewpoint 4: left) which have fixed lights and permanent-glazed ventilating louvres, set directly into the *in-situ* concrete frame. Aluminium flashing has been used generally to form a drip at the eaves. Grouped around the booking hall are a tobacco kiosk and a bookstall for letting, telephone booths, and a booking office and parcel room, planned together as one unit. Beyond the main building there is accommodation, under cover, for bicycles, and five lock-up garages are grouped around an open yard, leading off the station forecourt. The use of an *in-situ* r.c. frame for the main station block has been limited to the wide spans over the booking hall and office, the external panels and cross walls of brickwork forming load bearing supports to the structural roof, which is an *in-situ* slab over the main portion of the building. Precast r.c. beams have been used over the garages.



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



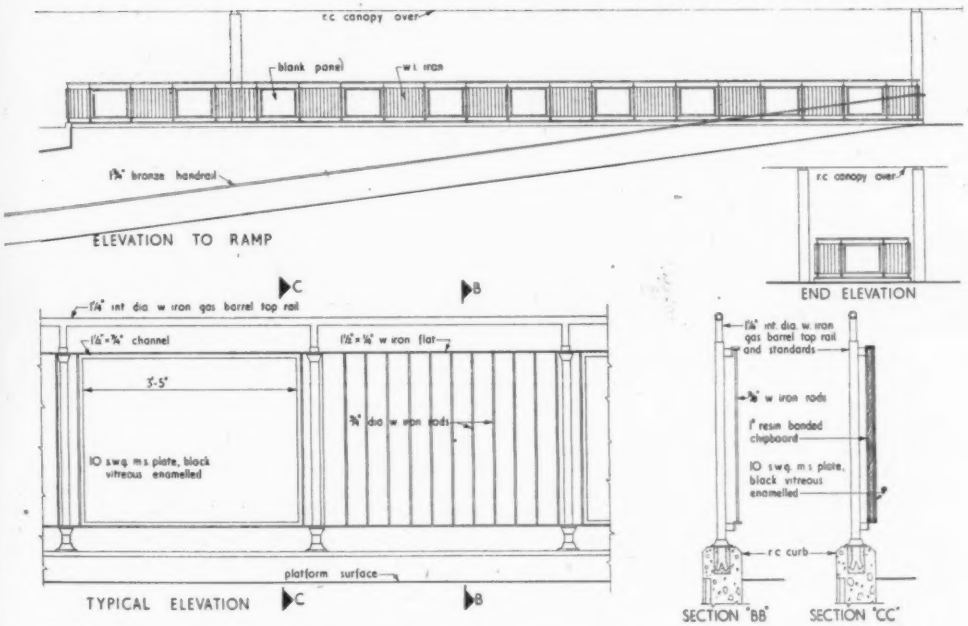
Section A-A

The suspended ceiling of the booking hall (viewpoint 5; above) is formed with perforated acoustic boarding, to offset as far as possible the high noise level that would otherwise have resulted from the general use elsewhere of relatively hard finishes, chosen to minimise maintenance costs. These include blue-glazed wall-tiles up to clerestory level between the openings and 1-inch terrazzo floor tiles. No attempt, however, has been made in this hall or elsewhere in the design to reduce the penetration of noise from passing trains by the provision of any special insulation. Artificial lighting in the hall is by cold cathode tubes behind architect-designed diffusing fittings which are suspended by thin wires from the ceiling. This follows the general use in the design of the more efficient types of sources such as these, or the normal hot cathode fluorescent tubes, which with longer hours of use were considered to more than offset the increased capital cost of installation, in comparison with tungsten lamps. The screen dividing the hall from the booking office, (viewpoint 6; left) together with the associated counter fittings, (viewpoint 7; below) has been carefully detailed by the architect. An attempt has been made to group as many as possible of various elements within easy reach of the booking clerk's position at the counter. This includes a concentration of local tickets at the master window on the right.

Viewpoint 8, above: access from the booking hall to the platforms is by means of a subway to a centrally-placed ticket collector's booth.

Viewpoint 9, below left: beyond the barrier the circulation divides to give access by ramps to the two platforms. Apart from the ticket booth and the barrier, the architect's work in this part of the station has been limited to the provision of finishes. These include non-slip concrete tiles and the blue glazed wall tiles which continue through from the booking hall. Poster positions have been provided by a frame of black tiles. The balustrade to the ramp at platform level is built up of wrought-iron, with poster panels formed by resin-bonded chipboard faced one side with black vitreous enamelled steel plates. On the island platforms (Viewpoint 10; below right), the architect has been responsible for the buildings housing waiting rooms and lavatories for public use. The station master's office, as tradition demands, is on the "up" platform, and there is a staff room on the "down."

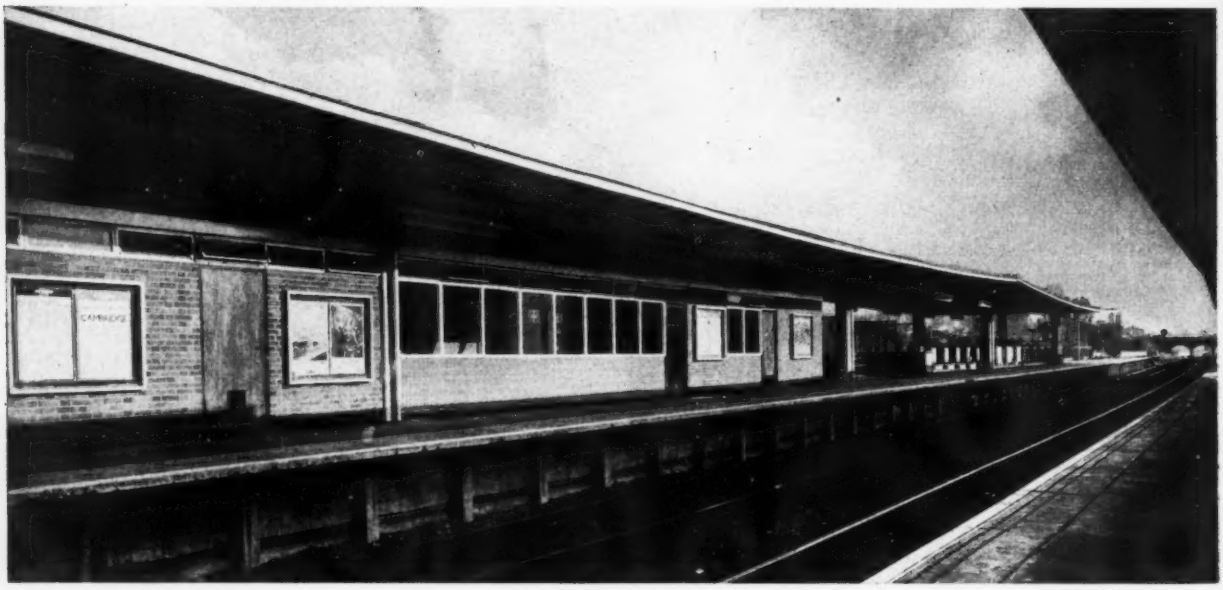
RAILWAY STATION AT POTTERS BAR

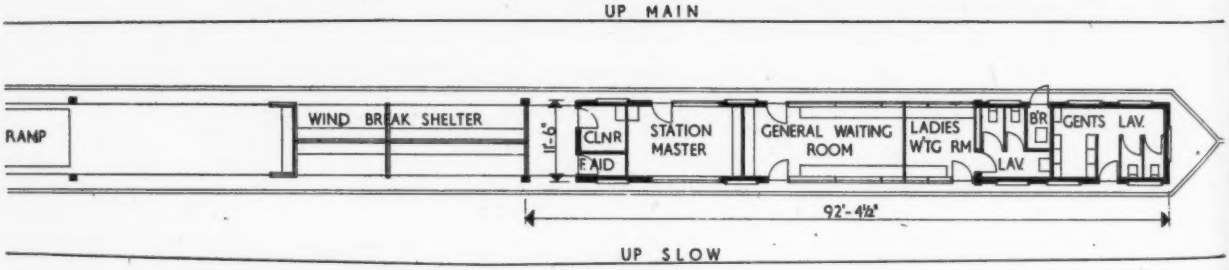


Elevation of ramp and sections of balustrade [Scale: $\frac{1}{16}$" and $\frac{3}{8}$" = 1' 0"]

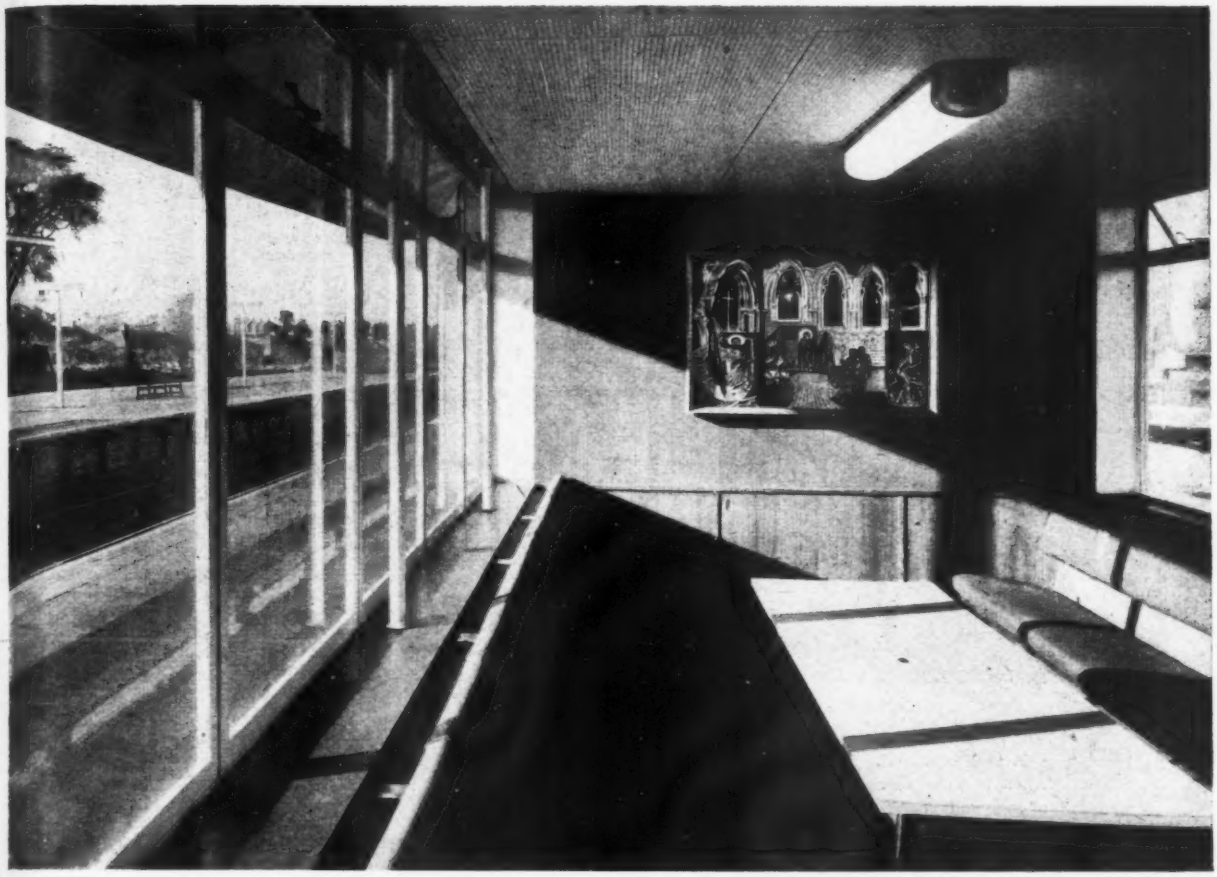
RAILWAY STATION AT POTTERS BAR

The canopies and the platforms themselves (viewpoint 11, left) were carried out under separate contract, and were not under the architect's control. The roofs of the platform buildings (viewpoint 12, below) are built up of light repetitive timber units 3-ft. 4-in. wide, of a stressed skin design, with ¼-in. plywood upper face. A variety of finishes have been applied underneath after positioning, to form the ceilings. These include perforated acoustic boarding to the waiting rooms, asbestos-cement sheeting in the two small boiler rooms (one on each platform) and skim-coated plaster board in the lavatories. The roof units are carried by unpierced panels of load-bearing brickwork, and (over the windows) by light angles supported by steel tubes set back from the face of the buildings. In general the external detailing has been carefully carried out to reduce the maintenance costs of repainting to a minimum. The external doors to the platform buildings, for example, are faced in oiled hardwood, and the poster panels are framed in concrete which has been buffed to expose the aggregate. Glazed tiles are used as a finish to the infillings under the windows. The construction of a typical platform building is illustrated as a Working Detail in this issue.

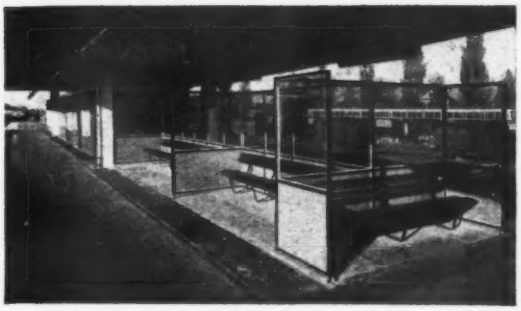




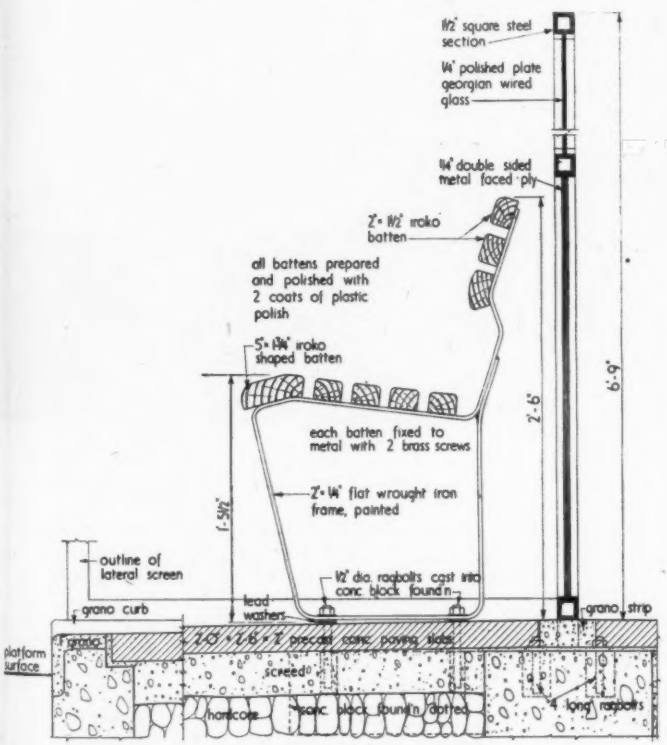
Part of plan of "up" platform [Scale: $\frac{3}{64}$" = 1' 0"]



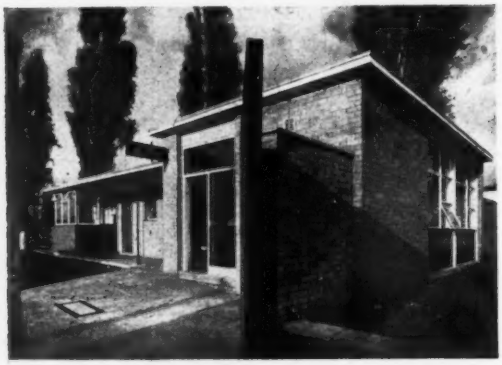
The bench seating in the waiting rooms (seen in viewpoint 13, above) was designed by the architect. A unified colour scheme has been used throughout the design, both for internal and external paintwork. For the interiors, three colours only

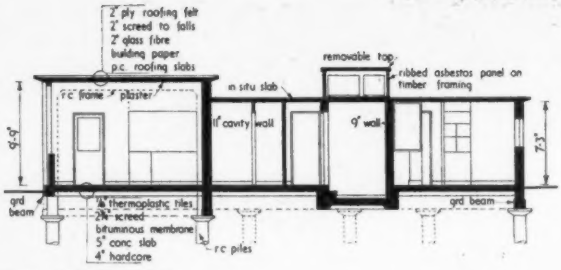


have been taken from the Archrome range; as a general background colour a light neutral grey (Munsell reference N.9) was used, and to provide contrasts in limited and contained areas there is one strong colour—a light green-yellow (Munsell reference 2.5 GY 8/6) and a dark green (Munsell reference 10 GY 3/2). The dark green has been used, for example, on the end wall of the general waiting room and the strong green-yellow has been chiefly used as a ceiling colour in special areas, such as the clerestory roof of the booking hall. This fairly disciplined use of colour has not only quite naturally simplified the contract, but has also been the means of achieving a unity through a wide variety of different spaces. At the same time quite subtle changes in character have been achieved by the manner in which these three colours have been applied. The colour treatment is, in fact, an excellent example of the effectiveness of selecting a very small number of suitable colours from a limited range, and applying them as a carefully considered element of the total architectural expression of the buildings. Additional seating (viewpoint 14, above) is provided for the public on the platforms, grouped round windbreaks. These are built up of 1½-in. square steel sections with infilling of georgian-wired plate glass and metal-faced plywood panels.

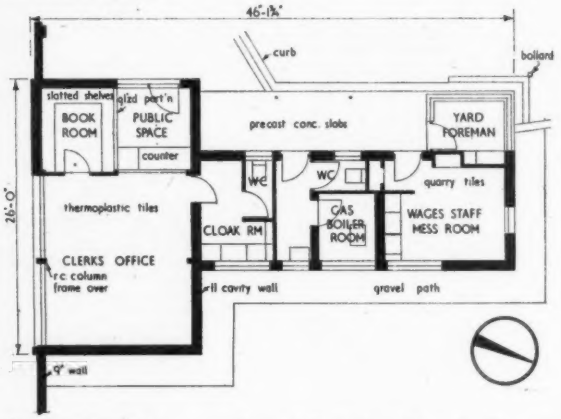


Detail of bench seating and section through wind break [Scale: 1" = 1' 0"]





Longitudinal section

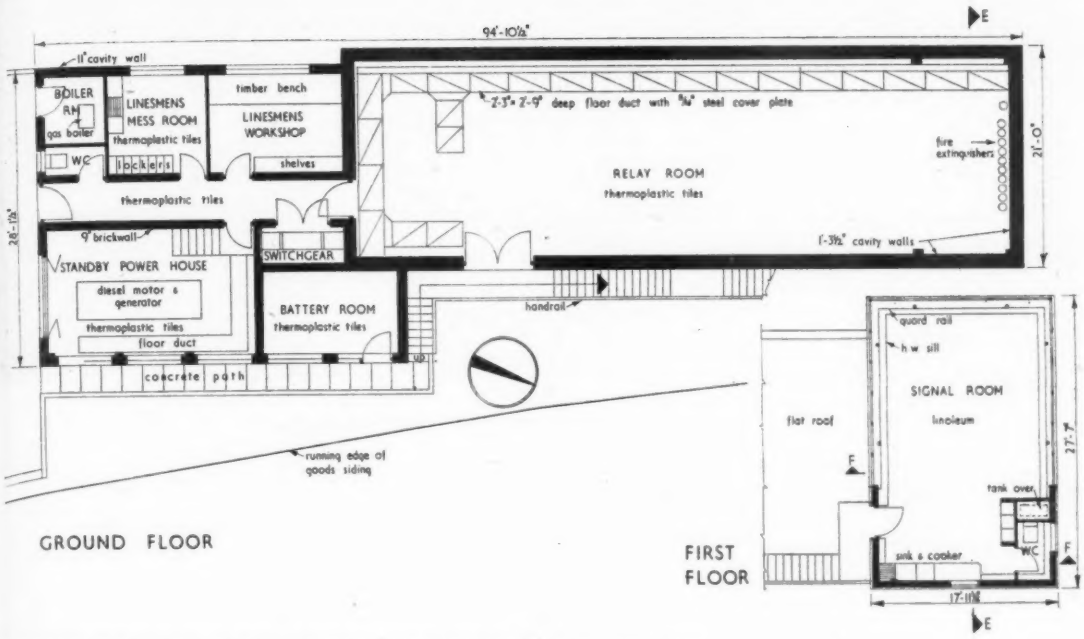


Ground floor plan of goods office [Scale : $\frac{1}{16}$" = 1' 0"]

The goods yard is separated from the station forecourt by a 7-ft. high brick wall, pierced by wrought-iron-framed gates which have been faced in oiled hardwood. At the eastern end of this wall, and farthest from the main line, is the goods office (seen from the south in viewpoint 15; top picture). Because Lombardy poplars line the boundary close to this block, and the subsoil is of shrinkable clay, it was considered necessary to use foundations of short bored piles and r.c. ground beams. The block is partially framed in *in-situ* r.c., the external walls forming load-bearing panels. The canopy and the roof to the foreman's office beyond are supported on steel tubes. The building contains a small enquiry desk, with office beyond, and a mess room and lavatory accommodation for the goods yard staff. Between the goods office and the main line is a weighbridge (viewpoint 16: picture below) with a small enclosed office formed of load-bearing end walls and side walls of timber framing, finished below sill level externally with vertical cedar boarding. There is also a loading-dock (viewpoint 17; above) to facilitate the transfer of goods from wagons to road vehicles. The structure of precast r.c. is protected at low level by metal angles cast into the arrises of the stanchions.

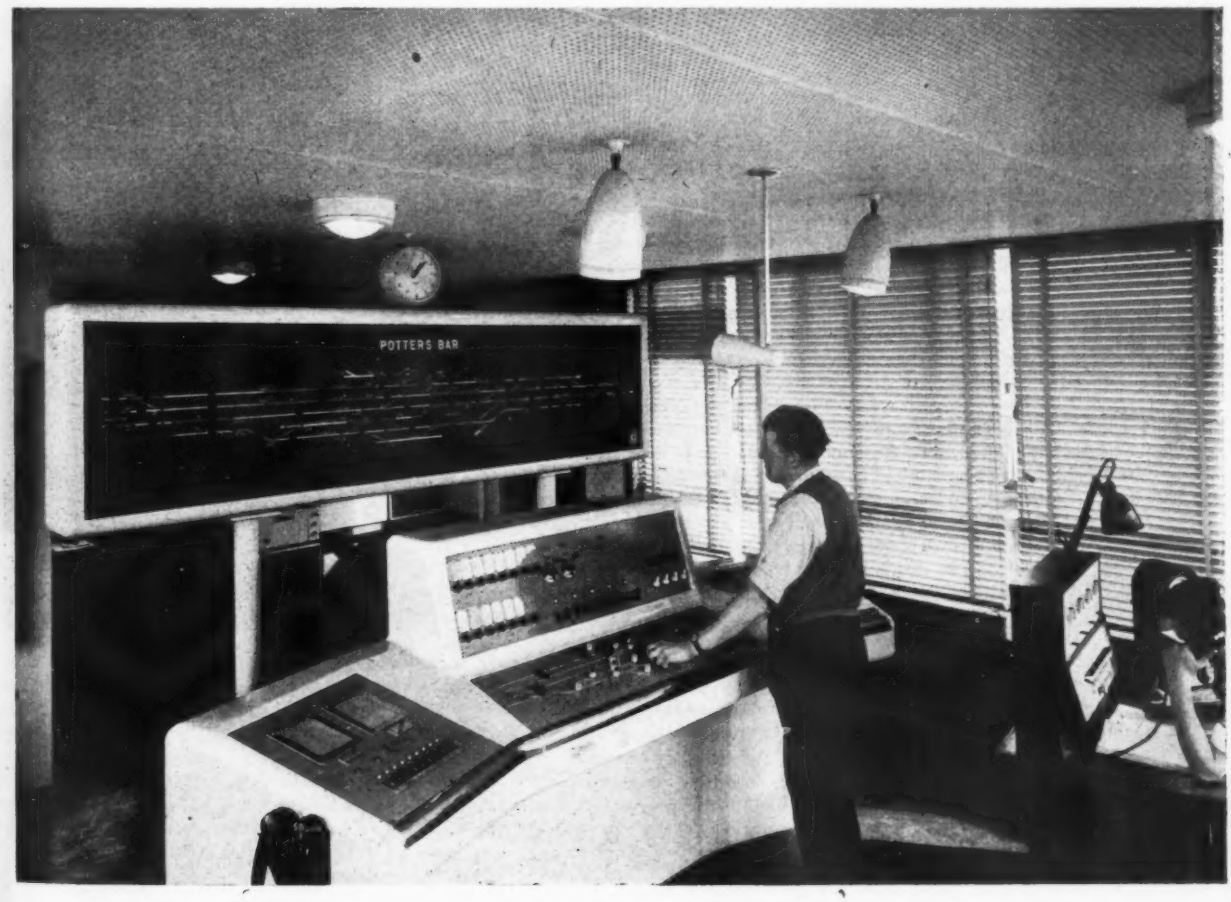
The signal box (on the left in viewpoint 18: below) includes an elevated signal room, a large relay room, a stand-by generator and mess rooms and lavatories for the linesmen. The signal room has a light steel frame which is largely glazed but also has solid parts formed of vertical cedar boarding on

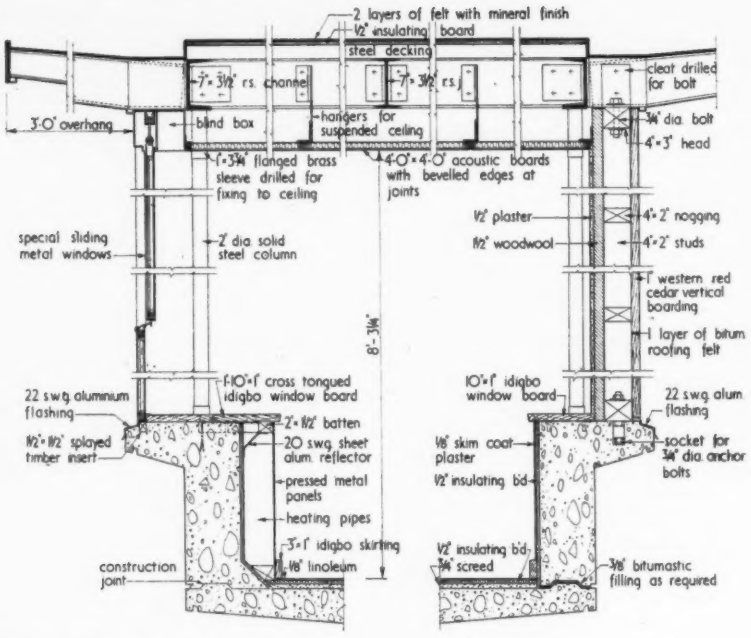
timber studding. This light structure is supported on a r.c. platform cantilevered from r.c. stanchions. The remainder of the block is in load-bearing brickwork with London stocks as facings, carrying prestressed pre-cast concrete beams. Viewpoint 19 (opposite page): the change over to electrical signalling has considerably changed the design requirements. The controls are grouped together on a desk placed in front of a visual display of the lines and the trains that are passing over them. The penetration of sunlight is controlled by venetian blinds, and as elsewhere, perforated acoustic board has been used to reduce the noise level. The sill to the windows is formed by a continuous hardwood seat with heating pipes under. Low-powered lighting provides illumination by night.



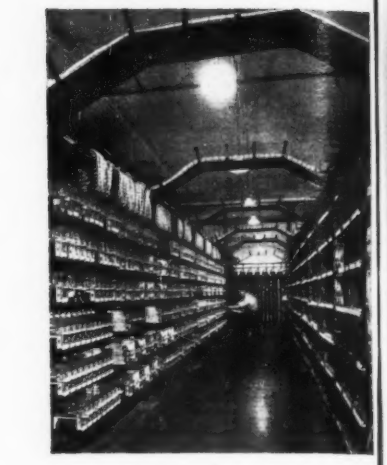
Ground and first floor plans of signal box (sections on page 776) [Scale : $\frac{1}{16}$" = 1' 0"]

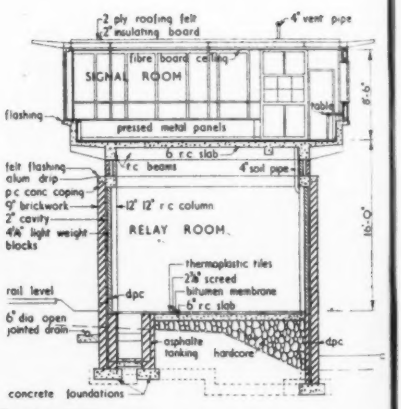
RAILWAY STATION AT POTTERS BAR





Section F-F [Scale: ½" = 1' 0"]





Section E-E [Scale: ⅛" = 1' 0"]

Underneath the signal room the main part of the block is taken up by the relay room (viewpoint 20: above right). In view of the high fire risks associated with this equipment it is divided from the rest of the building by fire-resistant doors, and a built-in extinguishing system is provided of the "total-flood" type. The access staircase (viewpoint 21: above) to the box is formed of pre-cast treads cantilevered from an *in-situ* concrete spine. Throughout the design the metal windows piercing panels of brickwork have been standardised to multiples of 2 ft. 7½ in. in width to avoid unnecessary cutting of brickwork. The original station-master's house was in the path of the new railway lines. Fresh accommodation (seen from the west, viewpoint 22: right) was therefore built as a separate small contract before the main operations were started. The design is based on MOHLG standards: load-bearing walls are faced with London stocks, and there is an interlocking tile roof.

RAILWAY STATION AT POTTERS BAR

CLIENT'S BRIEF: his stated requirements

The widening of the railway line through Potters Bar Station resulted in the complete demolition of the old station buildings. The architect's part of the reconstruction consists of the signal box, loading dock, weighbridge shelter, goods offices, main station building, finishes to subways and ramp, platform buildings and the station master's house.

The signal box was to include accommodation for all electric, coloured light signalling equipment, including standby diesel generator, linesmen's workshops, messroom, etc. The loading dock was to include covered space for the unloading of wagons and loading on to road motor vehicles. The goods offices were to include accommodation for the yard foreman, wages staff messroom and lavatory and an office for the goods clerks, incorporating a public space and counter, book room and cloak room.

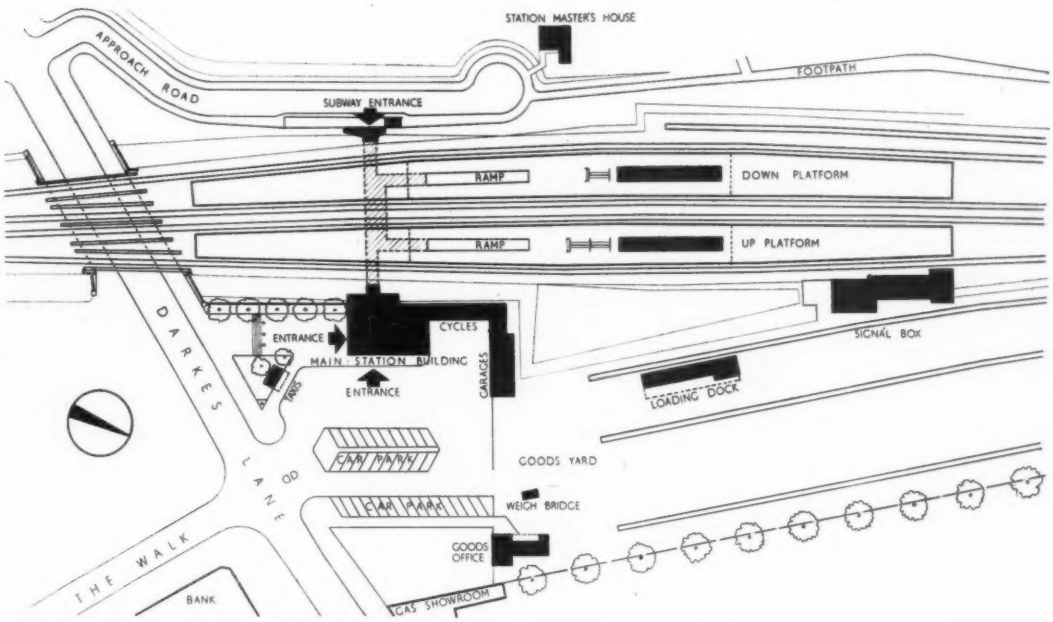
The main station building was to include accommodation for five lock-up garages, a store for fifty bicycles and space for motor cycles, a parcels office for small "to-be-called-for" parcels, together with public space with two ticket windows to the booking hall and ticket counter, together with ticket storage cupboards and two clerks' desks, and booking hall with space for public telephones, tobacco kiosk, bookstall, etc., and a main switch gear room and cleaners' room.

The work in the subway was to include traffic barriers with four collapsible gates and two ticket collectors' boxes. The "up" side platform buildings were to include a cleaners' room and store for first-aid equipment, the station master's office, waiting rooms, and lavatories. The "down" side platform buildings were to accommodate a station store, staff room, waiting rooms, and lavatories. Each platform was to have a wind break shelter and continuous seating.

A cabmen's shelter was to be provided in the forecourt. The station master's house was to conform with MOHLG standards for three-bedroom houses. The schedule of accommodation was laid down by various B. R. departments.

SITE: topography, surroundings, access, planting

The major part of the site is located on the east side of the tracks which are elevated on an embankment and slopes from north to south: the south boundary being formed by Darkes Lane, which forms a subsidiary shopping centre for Potters Bar. Access to the site is from Darkes Lane, on the west side from the approach road to the station master's house via the subway, and on the east side through the station forecourt. The major portion of the site was undeveloped before building began but the site of the main station building and forecourt was occupied by a coal stacking ground. Trees are to be planted alongside the pedestrian way, and the unpaved areas in the forecourt are to be grassed.



Site plan

PLAN: general appreciation

The buildings are all of single storey construction with the exception of the signal box which has the signal room at first floor level, and which is sited at the north and highest point of the site to command the best view. The loading dock is sited at the end of the goods siding in the goods yard. The goods office is linked to the main station building by the goods yard wall and is sited so that the clerks office has a view across the forecourt, and the public space is entered directly from the pavement, the wages staff accommodation forming a wing with the yard foreman's office on the north end commanding a view of the goods yard.

The main station building is sited with the booking hall on the axis of the subway to afford direct entrance to the platform for season ticket holders from either the paved pedestrian way or from motor vehicles via the covered main entrance, the ticket office windows being placed in such a way that queues can form without impeding the main flow of ticket holding passengers. Ticket control is positioned in the subway between the ramps to the "up" and "down" platforms to enable one ticket collector to control both platforms at off-peak hours. The platform buildings are sited as near the centre of each platform as possible and more public accommodation is provided on the "up" platform, used by travellers to London.

MAIN CONSTRUCTION: general appreciation

The signal box is of load-bearing brick construction with pre-cast concrete roof slabs, with the signal room independently supported on a r.c. platform standing on four r.c. columns. The signal room consists of a light steel roof covered with steel decking supported on 2-in. solid steel columns, the walls consisting either of windows or timber cladding. The loading dock is constructed of pre-cast r.c. " Tee " frames with pre-cast pre-stressed concrete roof slabs spanning between frames. The loading platform and lock-up store is of brick construction.

The goods offices are of mixed load bearing brick construction with *in-situ* r.c. slab roof and r.c. portal frames with pre-cast concrete roof slabs with brick panel walls. The main station building is constructed with *in-situ* r.c. beams, slabs, and columns on reinforced ground slab with load bearing external brick walls. The platform buildings are constructed with unpierced brick panels forming piers linked by braced light steel angles supported on tubular columns behind the windows with a light timber roof. All buildings have solid floors.

MAIN CONSTRUCTION

Load bearing element	*Location*	*Beam spans*	*Column grid*	*Reasons*
Tubular steel columns supporting light steel beams	Signal box		9 ft. 3 in.	A variety of techniques was used for two main reasons: (*a*) widely differing functions of buildings, (*b*) economy
	Signal room	9 ft. 3 in. and 16 ft. 1½ in.		
	Platform buildings	6 ft. 8 in. and 10 ft. 0 in.		
Reinforced concrete frames	Goods offices	14 ft. 4 in.	8 ft. 3 in.	
	Clerks office		8 ft. 3 in.	
	Main station building	24 ft. 9 in.	8 ft. 3 in.	
	Loading dock	20 ft. 0 in.	8 ft. 3 in.	
Reinforced concrete columns and beams	Main station building	8 ft. 3 in. × 16 ft. 6 in.	8 ft. 3 in.	
11-in. cavity brick walls with vibrated cellular concrete block inner leaves	Signal box (all lower portions)	Span of pre-cast pre-stressed concrete roof slab 18 ft. 6 in. Span of pre-cast r.c. roof slabs 11 ft. 10 in., 9 ft. 3 in. and 7 ft. 8 in.		
	Goods offices (lower wing)	Span of in-situ r.c. roof slab 9 ft. 6 in.		
	Main station building (outer walls)	8 ft. 3 in. and 16 ft. 6 in.		
	Platform buildings (full height brick panels)			

Foundation type	*Location*	*Sub-soil*	*Depth*	*Reasons*
Normal strip foundation	Signal box	Shrinkable London clay with seams of hogging	Varies from 3 ft. 0 in. to 5 ft. 6 in. according to slope of site	Foundations are kept low when the surrounding ground is unprotected from drying out by paved or tarmac areas
	Loading dock		2 ft. 6 in.	Short bored piles were used on the goods offices because of the proximity of mature poplar trees outside site boundary (nearest tree approximately 10 ft. from building)
	Main station building		1 ft. 9 in. and 3 ft. 9 in.	
Mass concrete column bases	Signal box		5 ft. 6 in.	
	Loading dock		6 ft. 0 in.	
Short bored piles and r.c. ground beams	Goods offices		Depth of piles vary from 12 ft. 0 in. to 7 ft. 0 in. according to load	
R.c. column bases combined with reinforced ground slab	Main station building			
R.c. raft	Platform buildings	Well compacted spent ballast and clinker fill forming part of the platforms of the old station		

Outer wall type	*Location*	*Material*	*Finish*
Load bearing	Signal box, goods offices, main station buildings, platform buildings	London Stock facing bricks	Fair faced, pointed as work proceeds with concave bucket handle joints
Solid panels	Goods offices, platform buildings	Frost-proof glazed tiles on 9 ft. 0 in. brick or vibrated cellular concrete block backing	Not applicable

Outer wall type continued	*Location*	*Material*	*Finish*
Timber framed	Signal box, signal room	T & g Western red cedar vertical boarding	Untreated

Roof type	*Location*	*Material*	*Finish*
All flat	Signal box, signal room	Steel cavity decking	Two layers 2-ply blue mineral surfaced bituminous roofing felt on 1 : 3 cement and screeds to falls
	Signal box (lower portion) and loading dock	Pre-cast, pre-stressed concrete roof slabs 5 in. deep	
	Signal box (lower portion), goods offices, main station building	Pre-cast r.c. roof slabs 5 in. and 4½ in. thick	
	Goods offices and main station building	In-situ r.c. slabs 4 in. and 3½ in. thick	
	Platform buildings	1-in. t. & g. boarding on 5½-in. × 1½-in. joists	One layer two-ply bituminous roofing felt

Floor structure type	*Location*	*Material*	*Finish*	*Comments*
Solid	Signal box, goods offices, main station building, platform buildings	Minimum 6-in. hard-core, 6-in. concrete slab reinforced with mesh, two coats damp proof membrane 1½ in. to 2½ in. 1 : 3 cement sand screed and finish	⅛-in thermoplastic tiles throughout signal box, grease resisting type in standby power house, acid resisting type in battery room ⅛-in. thermoplastic tiles in clerks office in goods office ⅛-in. heather-brown quarry tiles in lavatories and wages staff messroom. 1-in. granolithic in boiler-houses, store rooms, garages and cycle store 1-in. nominal Rhodesian teak wood block in parcels and ticket office and in station master's office, staff room, general and ladies' waiting rooms 1-in. pressed non-slip concrete tiles 12 in. × 12 in. in parts of booking hall and throughout subway 1-in. terrazzo tiles, 12 in. × 12 in. in main area of booking hall	Hardwood blocks receive two coats of plastic floor seal before wax polishing Insulating board was laid under the lino in the signal room for two reasons: i. To provide insulation for the cantilevered portions ii. To relieve the " deadness " of lino laid direct on concrete
Suspended	Signal box, Signal room	6-in. reinforced concrete slab with ½-in. 1 : 3 cement sand screed	½-in. insulating board stuck to screed with bituminous adhesive covered with 4·55 mm. linoleum fixed with lino adhesive	

Internal wall types	*Location*	*Materials*	*Finish*
Clinker block	All buildings	3-in. non load bearing clinker concrete blocks	Plastered both sides and finished in emulsion paint
Clinker block	Main station building, ticket and parcels office	4½-in. clinker blocks	6-in. × 3-in. glazed wall tiles on one side. Plaster and emulsion paint on the other
Brickwork	Platform buildings	4½-in. common brick (non load bearing)	6-in. × 3-in. glazed wall tiles on one side, fair faced and emulsion paint on the other
Brickwork	Signal box and goods offices	9-in. common brick (load bearing)	Plastered both sides and finished in emulsion paint

Ceiling types	*Location*	*Material*	*Finish*
Exposed concrete units	Signal box (lower portion)	Pre-cast concrete roof units, pre-stressed and normal r.c.	Emulsion paint
Plaster on concrete	Generally	Two coat gypsum plaster	Emulsion paint
V-jointed panels suspended	Signal box, signal room	Perforated acoustic board	Emulsion paint
V-jointed panels fixed direct	Platform buildings, waiting rooms, station master's office	Perforated acoustic board	Emulsion paint
Butt jointed panels fixed direct	Platform buildings, boiler rooms	½-in. asbestos cement sheets	Fair faced
Plaster board fixed direct	Platform buildings, generally	½-in. plaster board with ⅛-in. skin coat	Emulsion paint

ARTIFICIAL LIGHTING

Source and fitting type	*Location*	*Illumination level*
Tungsten dispersive	Generally in non-public areas and in lavatories in platform buildings	In accordance with British Railways standards
Tungsten directional	Signal room, lighting control panel, goods offices, public counter	
Hot cathode (fluorescent)	Generally in all public rooms, ticket and parcels office	
Cold cathode	Booking hall and subway and external lighting to platforms	

Wiring and switching types	*Location*	*Reasons and comments*
Sub-circuit in v.i.r. cables in screwed conduits		
Conduit on surface	Relay room, standby power house, signal box	To allow maximum flexibility for additions, etc.
Flush pattern switches in British Standard boxes		

Power supply type	*How distributed*
Public mains	From main switch room to sub-main switches thence to local distribution boards and lighting points, socket outlets, etc.
Batteries (24-volt emergency lighting to signal box only)	

NATURAL LIGHTING

Wall glazing	*Location*	*Reasons and comments*
Metal windows, small standardised to 2 ft. 7½ in. high singly or in multiples to avoid cutting brickwork where allowance is made for sills	Throughout	Large types vary according to function of building Light control in signal room and clerk's office by metal Venetian blinds

Roof glazing	*Location*	*Reasons and comments*
Circular cast-glass domes	Main station building, parcels and ticket office	To give light to areas cut off from normal wall glazing
Rectangular cast-glass domes	Signal box—corridor in lower portion	

THERMAL INSULATION

Type	*Location*	*U-value*
11-in. cavity walls, outer leaf brickwork, inner leaf, 4½-in. clinker blocks	Throughout	0·17
1½-in. woodwool slabs, 4-in. × 2-in. studs, 1 layer roofing felt, 1-in. Western red cedar boarding	Inner lining of timber-clad wall in signal box	0·18
Two layers of 1-in. thick bitumen-bonded glass-fibre quilt	Signal box and goods offices, roof	0·20
1 layer of 1-in. thick resin-bonded semi-rigid fibre-glass sheet	Main station building, roof	0·20

HEATING AND VENTILATION: artificial and natural

Heat exchanger type	*Location*	*Criteria temperature*
Pipe coils	Signal box, signal room, relay room, main station buildings, ticket office, platform buildings, waiting rooms	65° F. generally internally for 32° F. externally. Air changes per hour: two
Cast iron radiators	Throughout	
Radiant panels	Parcels office	
Inset metal permanent ventilators for natural ventilation	Where required	

WORKING DETAIL

WINDOW IN WAITING ROOM: STATION AT POTTERS BAR, HERTS.

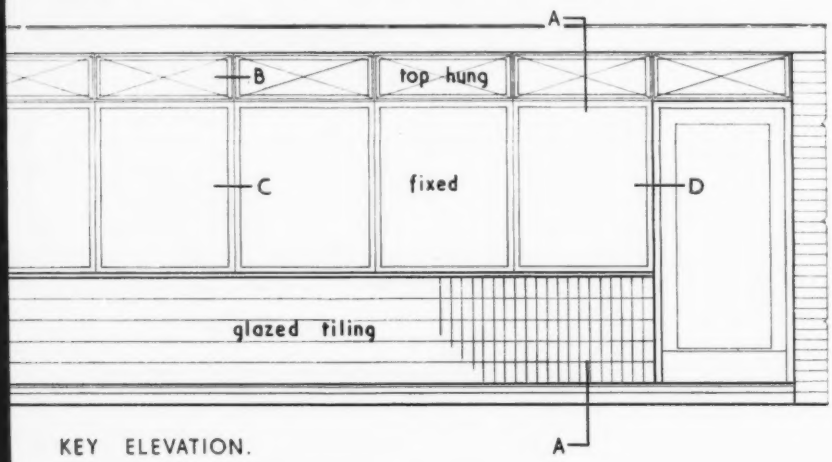
H. H Powell, chief architect, Civil Engineer's Dept., British Railways; R. T. Walters, principal assistant

As the waiting room stands under the main station canopy, weatherproofing is less elaborate than would otherwise be necessary. Heating pipes are fixed behind the row of seats in order to prevent down-draughts from striking waiting passengers in the back of the neck.

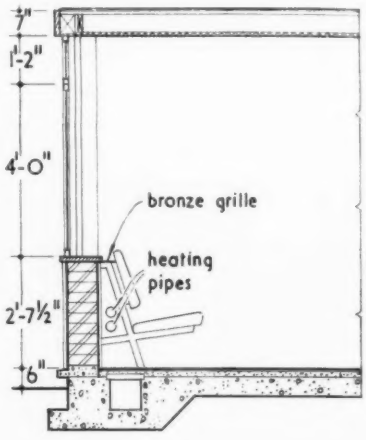
WORKING DETAIL

WINDOW IN WAITING ROOM: STATION AT POTTERS BAR, HERTS.

H. H. Powell, chief architect, Civil Engineer's Dept., British Railways ; R. T. Walters, principal assistant

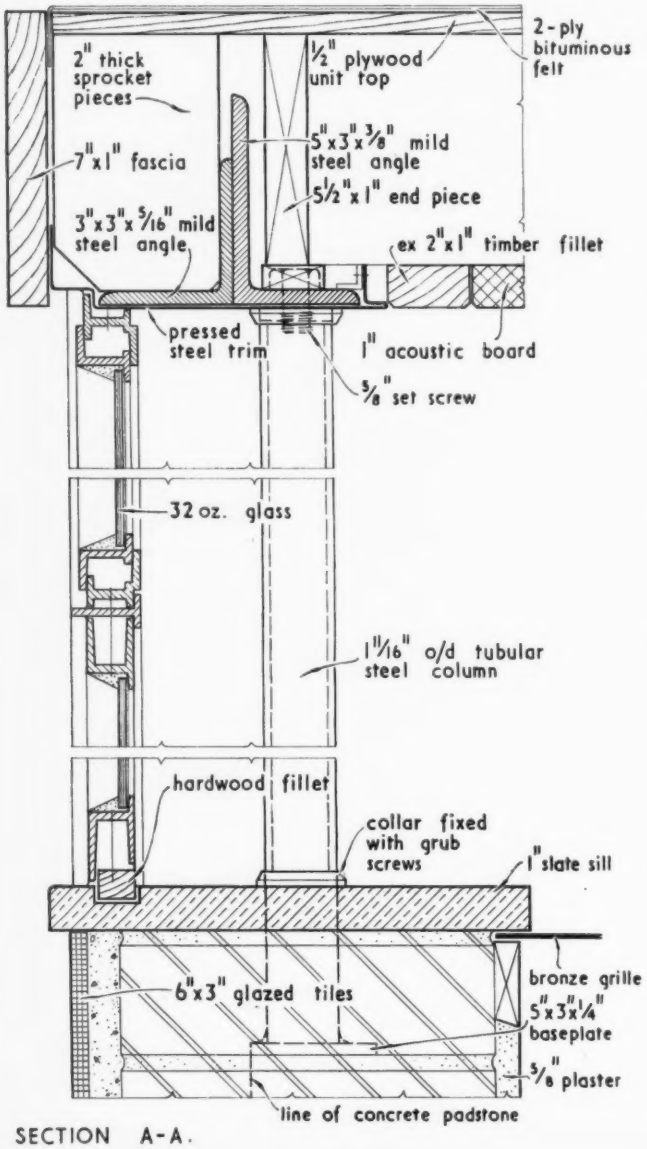


KEY ELEVATION.

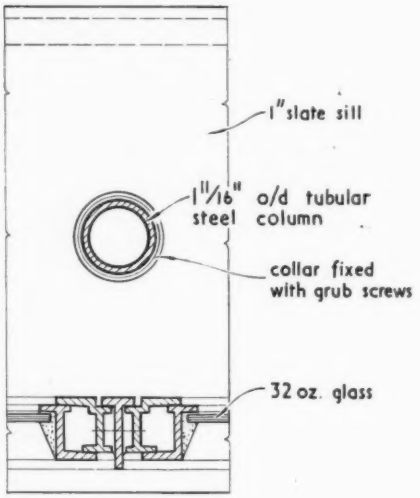


KEY SECTION.

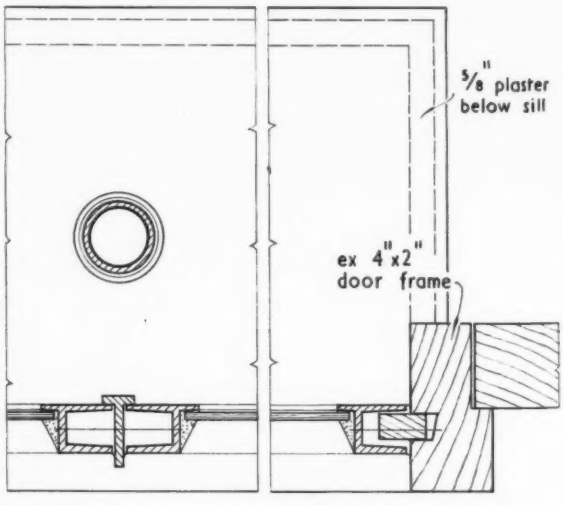
KEY PLAN OF WINDOWS. scale ¼" = 1'-0"



SECTION A-A.



DETAIL AT 'B'.



DETAILS AT 'C' AND 'D'. scale ¼ full size

DEMONSTRATION BENCH: SCHOOL AT HERNE BAY

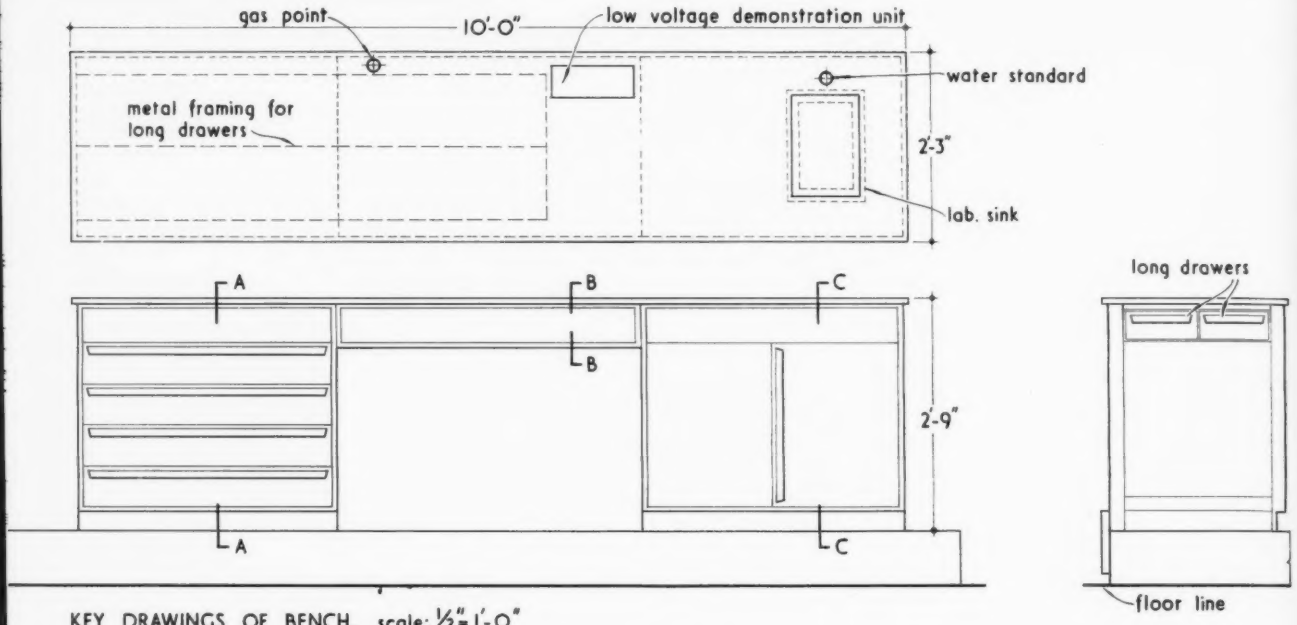
Lyons, Israel and Ellis, in collaboration with S. H. Loweth, architect to the Kent County Council

The design solves the difficult problem of where to store the long glass tubes which are a standard part of laboratory equipment. The 1½-in. teak boards which form the desk top are jointed with ¼-in. solid wood cross grain tongues. When the sink is not in use the well is closed in with a gaboon-faced blockboard cover in which a hole has been cut to prevent damage by drips.

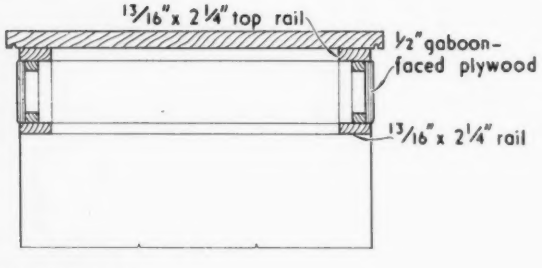
WORKING DETAIL

DEMONSTRATION BENCH: SCHOOL AT HERNE BAY

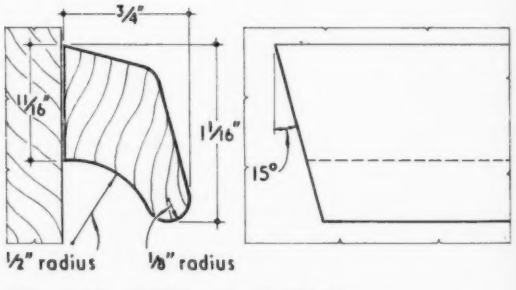
Lyons, Israel and Ellis, in collaboration with S. H. Loweth, architect to the Kent County Council



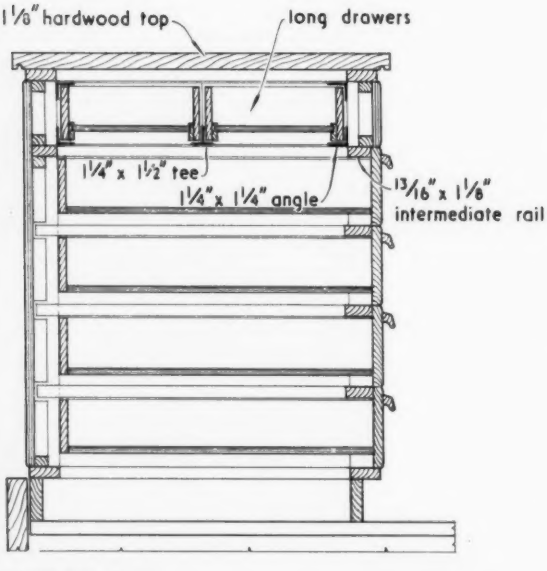
KEY DRAWINGS OF BENCH. scale: ½"=1'-0"



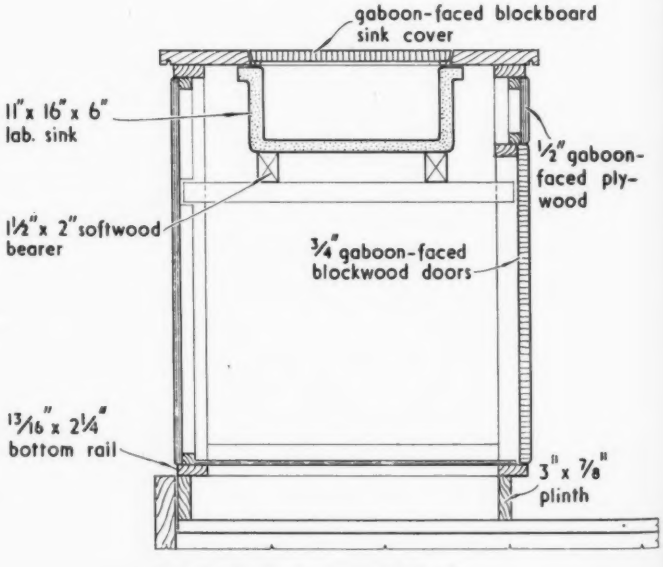
SECTION B-B.



FULL SIZE DETAIL OF HANDLES.



SECTION A-A.



SECTION C-C. scale: 1"=1'-0"

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Boiler type	*Location*	*Output*	*Fuel type*	*Stoking method*	*Reasons*
Cast iron sectional	Signal box Goods offices Main station buildings	118,000 B.Th.U./hr. 49,000 B.Th.U./hr. 72,000 B.Th.U./hr.	Gas	N/A	Separate installation for each building was chosen because of the scattered nature of the scheme which would have resulted in high losses in pipe lines if a central boiler house had been used. The choice of gas for fuel was dictated by lack of staff available for stoking solid fuel boilers and economy over electrical heating
	"Up" platform buildings	72,000 B.Th.U./hr.			
	"Down" platform buildings	72,000 B.Th.U./hr.			

Water heater type	*Location*	*Reasons*
Gas sink heaters	Throughout	Preferred to storage units because of intermittent use
Gas multipoint heater	Goods offices, cleaners' rooms	

Pipes and jointing type	*Location*	*Materials*	*Electrical installation method*
Heating pipes	Throughout	BSS1387 Class B mild steel with malleable iron fittings	Screwed conduit and v.i.r. cable to pumps
Hot and cold water supply	Throughout	Copper tube and compression fittings	

Cold water storage	*Location*	*Materials*	*Capacity*
Individual tanks	Goods offices	Galvanized steel	75 gallons
	Main station building		50 gallons
	Platform buildings		600 gallons each platform

SPECIAL ACOUSTICAL TREATMENT

Sound absorption material	*Location*	*Absorption coefficients*	*Comments*
Perforated acoustic board	Signal room, booking hall, waiting rooms and station master's office	250 c/s 0·15 500 c/s 0·60 1000 c/s 0·80 2000 c/s 0·75 4000 c/s 0·25 6000 c/s 0·20 8000 c/s 0·15	Applied in areas where excessive noise would affect either operational efficiency or the comfort of passengers

SOIL WASTE

Type of system	*Location*	*Materials*	*Methods and comments*
Separate system	From buildings to existing drains	C.i. under buildings, 1st quality s.g.w. elsewhere	Traditional

Drain types

Soil and surface water only

Rainwater disposal types	*Location*	*Materials*
Roof sumps	Throughout	Cast iron internally in ducts
Gutters	Signal box	Aluminium externally

FIRE

Structural precautions	*Grade of protection*	*Apparatus, sprinklers, etc.*
9-in. internal brick walls to standby power house in signal box	No specific period laid down	CO_2 built-in fire extinguishing system in relay room and signal room
4½-in. brick walls to boiler houses		CO_2 fire extinguishers (hand operated type)
Fire resisting doors to electrical switch-gear rooms, boiler rooms		Fire buckets

Planning precautions, access for fighting	*Means of escape*
Adequate road access	Not applicable as all buildings are single-storey

COLOUR

Paint types	*Where used*	*Colour treatments*
Oil paint gloss	Externally on metalwork and softwood, internally on softwood	It was decided to apply a unified colour scheme throughout the interior of the buildings based on the use of a neutral general wall colour with the addition of a dark restful green where necessary to emphasize the shape of rooms combined with a bright yellow/green ceiling. Polished hardwood has been used extensively to reduce repainting costs as much as possible. Accents of brighter colour are provided by equipment or upholstery. All internal applied colours are from the Munsell Archrome range. The external colour scheme has been based on the use of two colours chosen from the British Standard colour range together with black or white
Emulsion	Internally on plaster and acoustic board	
Linseed oil	Externally on hardwood doors to signal box, loading dock and goods offices	
Wax polish	Internally on hardwood in signal box, loading dock and goods offices	
Plastic polish	Internally and externally on hardwood in main station building and platform buildings	Colour reference: Off-white: Munsell ref. N.9 Dark Green: Munsell ref. GY 10.0 3/2 Yellow-green: Munsell ref. GY 25 8/6 Light grey: B.S. 381C Lead: B.S. 381C White Black
Concrete paint	On all fair faced concrete externally	

COST ANALYSIS

Main station building

Total ground floor area of superstructure	5,036 ft. super
Tender date	21.5.54
Tender cost of superstructure	£15,494
Tender cost of foundations	£2,673
Gross total of work	£18,167
Cost per foot super of floor area	72s. 2d.
Cost per foot cube	4s. 7¾d.
Fittings and equipment included above	£3,250

Element	*Cost per sq. ft.*	*Element*	*Cost per sq. ft.*
	s. d.		s. d.
Preliminaries and insurances	4 9·19	Built in fittings	12 10·82
Contingencies	3 1·44	Ironmongery	0 8·44
Work below ground floor level	9 3·40	Plumber (external)	0 7·05
External walls and facings	2 8·23	Plumber (internal)	0 4·27
Internal load bearing walls	1 3·13	Sanitary fittings	0 2·02
Internal partitions	0 8·41	Gas installation	0 4·91
Frame	2 1·55	Electrical installation	0 5·96
Roof construction	6 5·18	(Attendance only)	
Roof coverings	1 4·89	Heating	1 7·14
Roof lights	2 0·56	Drainage	0 7·95
Floor finishes	3 1·28	Decoration	1 3·89
Windows including glazing	3 1·00	Special sound insulation	0 8·07
Doors (external)	7 5·26	Special thermal insulation	0 9·15
Doors (internal)	0 8·99	Display panels, etc.	0 4·01
Wall and ceiling finishes	2 11·83		
	51 2·33	Total	72 2·01

COST COMMENTS

It is not commonplace to have before one the cost analysis of a new station, but the break-down given here should well give a useful pointer for future projects and work of a similar nature. Only figures for the main station building are at present available for analysis and the first impressions of cost show that the keynote in planning is economy.

The structural cost, taking the element "external walls, facings, internal walls, frames, roof construction, external windows and doors" amounts to only 28s. per foot super, which compares favourably with other forms of construction previously cost-analysed.

The maximum use of polished hardwood has resulted in a narrow initial cost outlay (see element "decoration") yet ensured that maintenance costs are kept to a minimum. Other points of interest peculiar to this type of building are: (*a*) The heating installation, incorporating individual gas heating to each block of buildings appears to have a narrow initial cost, but the running costs are anticipated to be higher than for solid fuels or oil heating. (*b*) The high cost of built-in fittings will be seen to represent some 16 per cent. of the gross cost. (*c*) The cost of work below ground level is fairly high, partly due to soil conditions, and also the necessity of providing subway-access at low level.

TECHNICAL SECTION

In the last fortnight two discussions* have taken place in structural engineering which may well have a decisive effect on the framing of design Codes of Practice. The first was the culmination of three years' work by a Committee of the Institution of Structural Engineers, dealing with the safety of structures, and presented a completely revolutionary approach based on ultimate load factor design in place of the present emphasis on limiting stresses. The second was convened at short notice to present test results on axially-loaded structural steel stanchions encased in concrete, in an attempt to influence the redrafting of BS. 449 to permit greater allowable load on encased struts. We welcome these attempts to encourage design towards a more rational and logical solution, because in doing so we expect to have structures more economical both in cost and in materials. It must not, however, be overlooked that the experience of the engineer is vital in load factor design, and we trust that alterations in the present Codes will be made only after engineering opinion has been sought on the widest possible basis.

* These discussions will be described in greater detail in a future issue of the JOURNAL.

This week's special article

7 PRACTICE
modular co-ordination in Hertfordshire school design

The number preceding the week's special article or survey indicates the appropriate subject heading of the Information Centre to which the article or survey belongs. The complete list of these headings is printed from time-to-time. To each survey is appended a list of recently-published and relevant Information Centre items. Further and earlier information can be found by referring to the index published free each year.

Two years ago BRS embarked on a research programme on Modular Co-ordination which was placed under the direction of William Allen, A.R.I.B.A. *Inevitably, much of the BRS investigations have centred round the schools' programme of the Hertfordshire County Council (County Architect, C. H. Aslin,* P.R.I.B.A.*), the early phases of which have been described in a series of articles appearing in these columns. This week, John Kay,* A.R.I.B.A., *a member of the BRS research team, describes the effects of the use of modular co-ordination in this programme and, in particular, lists the tangible advantages which have accrued to client, manufacturer and architect.*

Last year Britain entertained a group of European architects, engineers and other technicians who are taking part in an OEEC operational study of modular co-ordination in building. During their visit they were shown buildings which represent Britain's particular contribution to the subject since 1945. Apart from a variety of prefabricated housing, mainly for export, most British modular work has been in the field of school building. The visitors were particularly impressed with what they saw, for here was a use of modular co-ordination which was new to most of them, as on the Continent the theory and practice of modular co-ordination had sprung from traditional brick and block construction. Our post-war shortage of traditional materials and craftsmen encouraged us to use new types of components made in factories and assembled on site. It was chiefly this which made us take a different path of development from our European colleagues, and gave our ideas on modular co-ordination

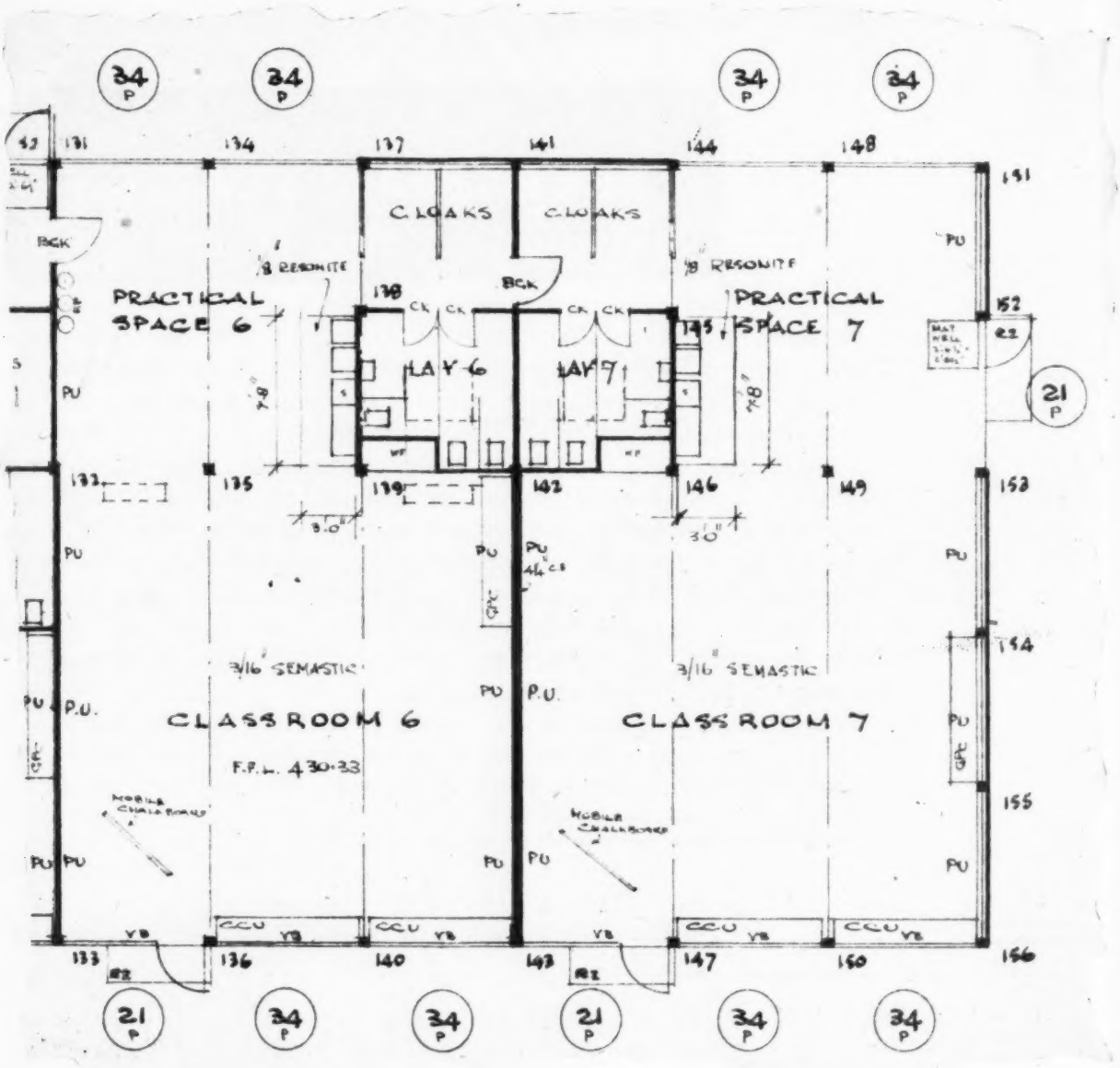

Fig. 1. Fragment from a ⅛ in. scale assembly drawing for a Herts CC Junior Mixed Infants' School. The ringed numbers relate to window drawings, the smaller un-ringed numbers to stanchion drawings.

KEY
VB. Venetian blind
CB. Chalkboard
PU. Pin-up
W/F. Weatherfoil unit
FP. Firepoint
GPC. General purpose cupboard
CCU. Cill cupboard unit

in the past decade their particular emphasis. One of the main aims of the present international project in each country is to bring these two sides of the building industry—traditional load-bearing construction and lightweight prefabricated components—together round one simplified and rational system of dimensions.

The use of a planning grid is now an accepted part of our building technique, although the usual growing pains have been felt. The aim of this short article is to set down some conclusions drawn from a field survey by the BRS of buildings whose layout and construction have been related to a dimensional grid, and to suggest some ways in which this could be developed for wider application. The survey is a part of the BRS Research Programme on Modular Co-ordination started in 1953 and led by William Allen.*

Most of the examples will be drawn from the work of the Architect's Department of the Herts County Council. More than one hundred schools have now been built in Hertfordshire since the war and they have proved a fruitful field for study, for the advantages of modular co-ordination are most apparent in a steady and continuous building programme such as the Herts CC has usually enjoyed. The research group at BRS is grateful to C. H. Aslin, the Herts County Architect, and his colleagues for the generous way in which they were given the time and experience of the office.

Perhaps the first point to establish is that the work done in Hertfordshire did in fact involve modular co-ordination, even although we were told that the idea was not consciously applied in the early days. As we see it, the need to co-ordinate the component parts of the schools round one dominant dimension or module arose logically during the solving of problems with which architects were faced at the end of the war. There was, in Hertfordshire, an exceptional demand for school places, with an initial emphasis on primary schools; a programme for building 175 schools in 15 years was laid down. There was also a shortage of traditional materials and craftsmen. The consequence of this, which has been described in the JOURNAL by the County Architect,* resulted in the change in emphasis from traditional work to the factory production of standard components

* *Modular Co-ordination Research: The Evolving Pattern*, by W. A. Allen in the *RIBA Journal*, April, 1955.

* AJ, May 12, 1955, p. 643.

assembled on site with the minimum of labour.

Standardization appeared economically desirable, but it then had to satisfy the need to provide all types of educational building, from infants' playrooms to technical school workshops, on a wide variety of sites. The standardization of the whole school, of a classroom unit, or even of a sectional bay, was rejected as being too constricting to be architecturally or educationally desirable. The flexible solutions reached were described in articles which appeared in the JOURNAL on May 12, May 26 and August 11. In this system, many variations in plan and section were sought while still using a relatively small number of standard parts. This interchangeability could only be achieved by co-ordinating the sizes of the main components (stanchions and beams, wall and roof cladding blocks, windows, etc.) on a fixed module, which was at the same time a grid on which the building was planned (Fig. 1). The sizes of the modules used eventually varied from 3 ft. 4 in. to 8 ft. 3 in.; the reasons for choosing them will be discussed below.

It was in this way that the use of modular co-ordination emerged as an essential part of the Herts. CC work, for without it the interchangeability required for design could not have been realized.

It is worth noting that while the various components were developed in close co-operation with the manufacturers, it was the architect who co-ordinated the building systems and kept the whole under constant examination and revision. The co-ordination on a module had to take place almost entirely outside the existing range of British Standards.

ADVANTAGES ASSESSED

The value of the use of modular co-ordination can be judged in terms of its advantages and disadvantages in time, cost and quality for the three parties concerned: the client, the architect, and the building contractor and component manufacturer.

The Client: The client in the case of the Herts. CC is the Education Committee, and through it the teachers and children on the one hand and the ratepayers on the other.

The client's chief gains were that many of the shortages of the period were by-passed and the schools were built quickly, the time on the site often being half that of conventional construction. The client also received some of the advantages of the bulk factory production of standard components, while at the same time modular co-ordination ensured that standardization did not result in inflexible school plans. In one of the later systems this interchangeability was taken to the point of being able to demount partitions and re-arrange the internal layout at will on the grid.

To show savings in cost was considered crucial. It appears that schools of good quality can be provided within the MOE cost ceiling. Beyond this it is difficult to go; a limit on cost per place tends to become a norm, regardless of construction. Direct comparisons in cost cannot easily be made between building systems which differ so widely, but the systems used by Herts. need be no more expensive than prefabricated systems not using modular co-ordination, and which at the same time have the other educational advantages suggested. Had it been possible to apply the same modular principles to traditional brick construction, evidence from abroad* indicates that the savings might have been even more striking.

The Architect: The Herts. office estimates that the cost of the architects' part in each completed school can be about one third less than under the RIBA Scale of Fees for individual buildings. These savings arise in the main from the use of standard drawings in a design group system. The workings of the Primary School Group will illustrate this.

The primary programmes have averaged 10 schools a year. Each year's programme uses a standard building system which has been developed from the previous year but is not changed in the course of the year, except in emergencies. Members of the group have worked previously on the standard component drawings for that programme, which are then used in all the designs for the year. There are usually about sixty drawings in the set, covering—with the manufacturer's own standard drawings—structure, cladding, finishes, and equipment. In addition, each job will have about fifteen assembly drawings, which are usually just simple visual schedules on ¼-in. scale prints without dimensions, and referring back to the standards (Fig. 1). About twenty sheets of special details complete the working drawings for each job. When the standard drawings are spread over the whole year the number of working drawings for each school will be less than half the number which would have been required had each school been designed individually.

This high level of productivity in the drawing office is not won at the expense of the quality of professional work. The County Architect has said: "It is difficult to assess the saving in drawing office time achieved by the rationalization which a programme procedure permits. Records indicate that where this has been adopted architects spend *about half as long* on the drawing board as they would were each job treated as a separate structural problem. This means that a great deal more time is available for the analysis of clients' requirements, development and research, decoration and colour treatment—aspects of an architect's work which are normally skimped or omitted altogether."†

Another advantage which is difficult to assess in terms of cost is the flexibility in the drawing office which this system permits: any member of the group is able to do most of the drawings of any job as easily as another. Sickness and rush periods can be coped with more easily.

It must be added that many of these advantages can also be enjoyed by private architects' offices who draw upon the same pool of standard drawings for the design of even one school. While some of these advantages might arise from any system using standard drawings and details, the distinctive contribution of modular co-ordination is in the flexibility which it can add to the other benefits deriving from standardization.

Manufacturer and Erector: The greatest gains to the manufacturer spring from the reduction in the variety of the components he is called upon to make. The bulk orders which the local authority could place for as much as a whole year's programme are an obvious advantage to the manufacturer of the standard components, as they enable him to plan batch production well ahead, and encourage the use of jigs. Furthermore, the limited range of products can be stockpiled against the influx of orders in the spring. From this it would be possible to meet small orders as easily as large ones, thus benefiting the individual architect and client as well.

Most manufacturers of such components with whom the matters have been discussed found that estimating and costing were simplified. In the design and drawings offices of two manufacturers of modular light steel frames productivity was at least twice that of comparable "one-off" steelwork. It was noted, however, that "specials" could cause a disproportionate amount of trouble, and there was considerable economic pressure for the architect to use only the standard system. Thus it is most important for such building systems to be flexible enough to meet the architect's reasonable needs.

Many of the manufacturers do their own site erection and assembly, and have found that teams could be easily trained and could work swiftly. However, these advantages were not so significant for the general building contractor. In the years after the war craftsmen were few, and contractors were glad to accept work which they could not otherwise have undertaken. More recently, however, the contractor's labour force has returned to a more normal balance of craftsmen and labourers. The trend to move building operations from the site back into the factory tends to upset this balance by limiting the work of the general contractor, in an extreme case, to preliminaries and site supervision.

LIMITATIONS OF GRID PLANNING

Choice of the grid: The size of the planning grid used does not in principle affect the advantages obtained in the lightweight frame-and-panel construction used in the schools, but it is useful to know the reasons for the choice of some of the most popular grids.

The 8 ft. 3 in. grid, which has been used for the bulk of the primary schools in the Herts CC, LCC, and many other counties, was recommended at first as a "unit dimension" by the Wood Committee* in 1944. Its report gives as its reason for doing so that

* *Modular Co-ordination in Germany: Rationalised Brick and Block Construction*, by D. Foster, A.R.I.B.A., in Modular Quarterly. Autumn, 1955.

† *School Building in Hertfordshire*, by C. H. Aslin, P.R.I.B.A., in *Education*, April 27, 1951.

* *Standard Construction for Schools.* Post-war Building Studies No. 2, 1944.

this dimension was a sub-division of "one of the most generally accepted measurements occurring in a school plan . . . the length of a classroom," this being given as 24 ft., plus. a 9 in. brick wall (para. 19 of the Report). The report did not suggest that this dimension was suited to any particular type of school construction. Indeed, it stated that "we recognise that further investigation may suggest some more convenient alternative" (para. 20). However, time was too pressing to allow the Herts office to do further research, and some manufacturers had already set up production lines with jigs based on 8 ft. 3 in. In practice, it proved sufficiently flexible for the single-storey primary schools, given some ingenuity on the part of the architect.

Among other systems used by the Herts office, the Derbyshire County Council, and others, is the "Derwent" system using a timber frame and cladding on a 6 ft. 4 in. grid. This was chosen to avoid cutting, its timber frame using 4 in. square posts between two standard 3 ft. wide sheets of plasterboard, which formed the internal lining. The system had rather more flexibility in planning than the larger 8-ft. 3-in. systems.

The systems based on a 3 ft. 4 in. module are now the most numerous, and it is interesting to look at the origins of the dimension. After 1947 the secondary school programmes were assuming increasing importance, and required multi-storey buildings of greater complexity. It was generally realised that a smaller dimension than 8 ft. 3 in. would give greater flexibility and would enable the designer to plan nearer to the then statutory 480 sq. ft. secondary school classroom. The Technical Working Party on School Construction* considered the matter, and concluded in its report published in 1948 "that 3 ft. 4 in. is likely to be more suitable than any other as a grid dimension for educational building." This was selected because it was considered to meet most closely with four requirements: *(a)* Adequate flexibility in planning in schools, *(b)* the space standards required by Building Regulations, *(c)* an economic spacing of structural members, *(d)* suitability for other building types. Elsewhere it was argued that the dimension of 3 ft. 4 in. had advantages because it was "human-scale," and because it approximated to the metre (39·37 in.).

The 3 ft. 4 in. planning grid has been adopted by a considerable number of manufacturers and architects for schools, export housing, curtain walling, and other uses, and there should now be sufficient experience of it to assess its validity and economy. It clearly has greater flexibility in planning than the larger grid sizes; architects designing secondary schools have found in general that the 3 ft. 4 in. increment permits sufficient flexibility in plan form. However, they make two important provisos. The Technical Working Party considered that the optimum spacing for columns (at right angles to the main span) would be 10 ft., and 3 ft. 4 in. was chosen as it was held to be the most convenient sub-division of this. In practice, it has been found that an economic bay size for light steel and timber has been about 13 ft. 4 in. by 26 ft. 8 in. To use a smaller bay can often mean higher costs per square foot of floor area. Furthermore, the difficulty and extra expense of forming salient and re-entrant corners in the external wall of some of the systems makes departure from a plane surface more costly, and therefore can limit the designer to certain forms. Thus the architect is restrained from using the full flexibility of the 3 ft. 4 in. grid because of economic reasons arising from the design of the building system concerned.

In considering the suitability of 3 ft. 4 in. for other building types the evidence about its use for housing is conflicting. It has been found to be a useful aid by some firms designing and manufacturing prefabricated houses for export. The space standards abroad, although often stringent, are not usually fixed to an exact figure as they are in Britain. The report of the Bailey Committee* is interesting on this point, for after considerable comparative study of different grid sizes (3 ft., 2 ft., 3 ft. 4 in.), it concludes that 3 ft. is probably the one best suited to the small house, and to existing product sizes. However, the use of the 3-ft. grid in the plans shown includes half-grid sizes, and allows the placing of partitions on either side of the grid line. Apparently a need for further flexibility was felt, and the same point was mentioned also in the Technical Working Party report which tentatively recommended further study of the use of a 4-in. module with the 3-ft. 4-in. grid, although it considered that "the use of a small module of this kind is not an essential element in a grid system." The case for this extension of modular co-ordination will be examined further below, but one further example of the trend was the introduction into the Herts. 1951 programme of an 8-in. module for vertical dimensions where a smaller increment was essential.

The "Thickness" Problem: Closely related to this need for further flexibility is the question usually described as the "thickness" problem. This is discussed in the first number of *The Modular Quarterly*. It commonly arises in the two forms shown in Fig. 2.

Any solution that does not include the use of a square connector in a standard width panel (Fig. 3)—usually an expensive device—must involve the use of at least two different widths (Fig. 4). Clearly it would be an advantage in such a system where $a + b = c$, to have a, b, and c related in a way which would ensure the greatest number of possible combinations of components.

The "thickness" problem will exist in any modular system whatever its scale. In systems based on a single large planning grid, to which most components are related, the difficulty is accentuated by the tendency for joints to pile up on grid intersections, often resulting in complex and costly details. The Herts. architects made several attempts to simplify this type of detail: at one time by separating the structural grid from the cladding grid, and later by running panel walls on grid lines but past grid intersections, where the simplest butt or spline joints were used. This also enabled standard 4-ft. wide sheets to be used on a 3-ft. 4-in. grid without cutting and waste, but led to other difficulties and has not been pursued.

* *Report of the Technical Working Party on School Construction.* MOE, 1948

* *Quicker completion of House Interiors.* HMSO 1953.

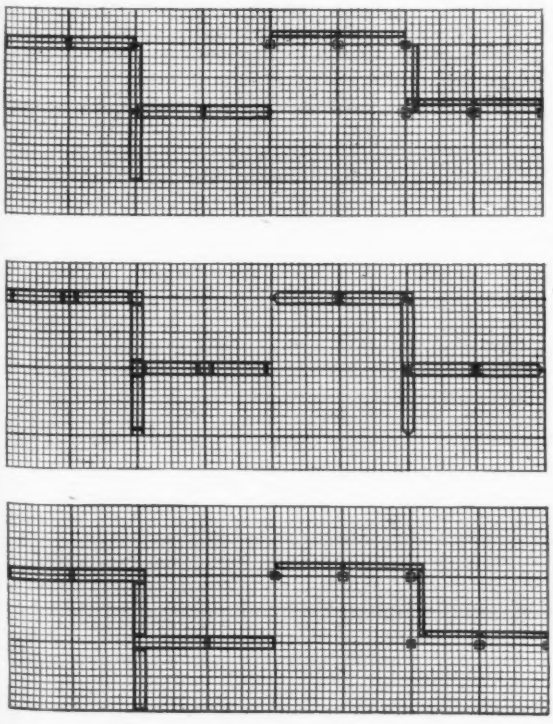

Diagram showing the thickness problem in modular planning

Fig. 2, extreme left: wall centrally placed on grid line Left: wall offset from grid line. Panels of constant length and thickness overlap or fall short at salient and re-entrant corners and junctions.

Fig. 3: solutions based on a square connector placed symmetrically on grid intersections, "usually an expensive device."

Fig. 4: solutions in which the varying panel lengths and widths could be related through a number pattern such as that described.

Meet 'Butch' Bartholomew

He's just dropped a brick — or two or three. It was the leaning tower of Pisa. Then the atom bomber came . . . zo—om ! Now it's just another headache to Mr. and Mrs. Greenholsch in the flat below. Just one among many.

Crash, bang, thump : are these noises really necessary ? Fibreglass in the floor would reduce them all. Shouldn't *all* blocks of flats be insulated between floors with this inexpensive, easily-applied, ever-lasting material ! Flat-planning architects, please note !

wrap those flats in FIBREGLASS TRADE MARK

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These measures would not be necessary if a wider range of panels were available in standard related sizes.

As an aid to planning and design: From what has been said, it seems unlikely that any one planning grid, even with its multiples, can suit the planning requirements of all building types, the needs of different structural systems, and the reasonable demands of the architect for variation in scale and proportion. Where the size of the grid is well suited to the planning needs of the building, then the use of a grid can be helpful. One of the Herts' architects gave as his opinion that "At its best the grid system has proved a valuable discipline for the planner and, although it cannot redeem a bad plan, it may lend coherence to a mediocre one."

The æsthetic implications of the use of a single planning grid as the basis for co-ordinating components are, quite rightly, controversial. There are architects today who find that a planning grid can give coherence and rhythm to their designs. There are others who find that a number of the systems based on 3 ft. to 4 ft. range of modules give a repetitive elevational character which can be tiresome and a restriction on their freedom of design. Some of the systems used by the Herts. office have introduced cladding panels in multiples of the grid which allow external walls to read, say, 1.1.2.1.3.1 . . . and so on, as a variation on 1.1.1.1.1.1 . . . *ad. inf.* Much of the discussion amongst architects about modular co-ordination revolves around this point as "modular co-ordination" and "grid planning" are sometimes thought mistakenly to be synonymous. However, this type of "domino" design is only one aspect of modular co-ordination. Similarly, a system which only permits the use of a very limited range of proportions would not find favour with many designers.

This leads us to fundamental questions of architectural theory and philosophy which may seem out of place here, but they do arise directly from the subject. An interesting theory has been advanced* which suggests that in a modular system "design consists simply in the putting together of prefabricated units. The design of the unit itself is therefore critical. Unless the units are neutral, that is, totally divested of intrinsic formal interest, they will not be satisfactory when put together in varying numbers and unpredictable relationships." The authors then say that the use of a large grid dimension, and thus of a large basic panel unit, makes this aim of "neutralism" difficult to achieve. If this is one's approach to the design of prefabricated units, then greater flexibility of a smaller module would help. At present, however, we expect modular co-ordination will not reduce but, on the contrary, will allow a greater flexibility and variety than is at present usual to the *character* of standard components as well as their size. The author has a personal feeling that many of the current systems can lead to designs in which one aspect, rhythm, is over-emphasized at the expense of other qualities.

Summary: To summarise this brief review of modular co-ordination based on a large module or planning grid, the four chief advantages appear to be that (*a*) it enabled large factory-made components outside BS ranges to be standardized in a way which allowed flexible interchangeable assembly, and this meant that the architect would agree to some reduction in product ranges; (*b*) it encouraged the batch production of these components with the subsequent advantages to the manufacturer and to his client; (*c*) it allowed the architect to have the benefits of standard working drawings without unduly limiting his freedom of design; (*d*) components could be assembled more swiftly on the site and with a minimum of cutting and waste.

Each of these advantages can, and should, reduce the cost of building.

We can see that the achievements of grid planning in the past 10 years have been considerable, and represent a big step forward in technique in the building industry. Its limitations seem to arise chiefly from the fact that it is not part of a wider scheme of dimensional co-ordination which could add greater flexibility while retaining the simplicity of the principle on which it is based. This is now generally accepted, the question before us is—how can this be achieved?

BEYOND GRID PLANNING

Can our requirements be met by the modular systems based upon a single small module such as have been initiated in Sweden, Germany, North America, and some other countries? Most of them admit as modular components those made in nominal sizes of *any* multiple of a basic module of between 3 in. and 5 in., which itself in most cases derives from the hand-span width of a brick. In practice, however, it has been found that this does not give designers or manufacturers sufficient guidance about the choice of component sizes in the "planning grid" range. A basic module of 4 in. by itself could lead to an architect being faced with the problem of combining 3 ft. 4 in. cladding blocks with windows made 3 ft. 0 in. wide, and sheet linings in 4 ft. widths. The selection of larger sizes therefore needs some overall direction. For example, in Schleswig-Holstein, where modular work in Germany is most advanced, a planning grid of 62·5 cm. is used to select the larger components in their 12·5 cm. system; Denmark, Belgium, Poland and Norway all use 30-60-90-120-cm. as a basis for preferred dimensions in their 10-cm. systems. It will be noted that these multiples by-pass the metre grid, which is little used, and come close to our foot intervals.

Further, it has been found in practice that a module of about 10 cm. is too large for detailed design. Wall thicknesses need a smaller increment of size, and it is helpful for this to bear a simple relationship to the basic module. In France, for instance, 10 cm. is halved and halved again to give 5 cm. and 2·5 cm., which come very near to 2 in. and 1 in.

Practical experience in many countries is establishing the need for a modular selection of dimensions which will give even more flexibility in the smaller sizes than current systems based on a single basic module of about 10 cm. (4 in.), while at the same time showing simplicity and giving guidance in the larger component ranges. This must be combined with the overall property of "meshing," that is, being able to add and combine the smaller numbers in a variety of simple ways to equate with larger numbers. To meet these requirements a modular number pattern has been developed. The background to the pattern, and the conditions which it had to satisfy, are described in William Allen's paper to which reference has been already made. The sequence of whole numbers up to 100 produced within this pattern is:

1	2	3	4	5	6	—	8	9	10	—	12
—	—	15	16	—	18	—	20	—	—	—	24
—	—	27	—	—	30	—	32	—	—	—	36
—	—	—	40	—	—	—	—	45	—	—	48
—	—	—	—	—	54	—	—	—	—	—	60
—	—	—	64	—	—	—	—	—	—	—	72
—	—	—	—	—	—	—	80	81	—	—	—
—	—	—	—	—	90	—	—	—	—	—	96

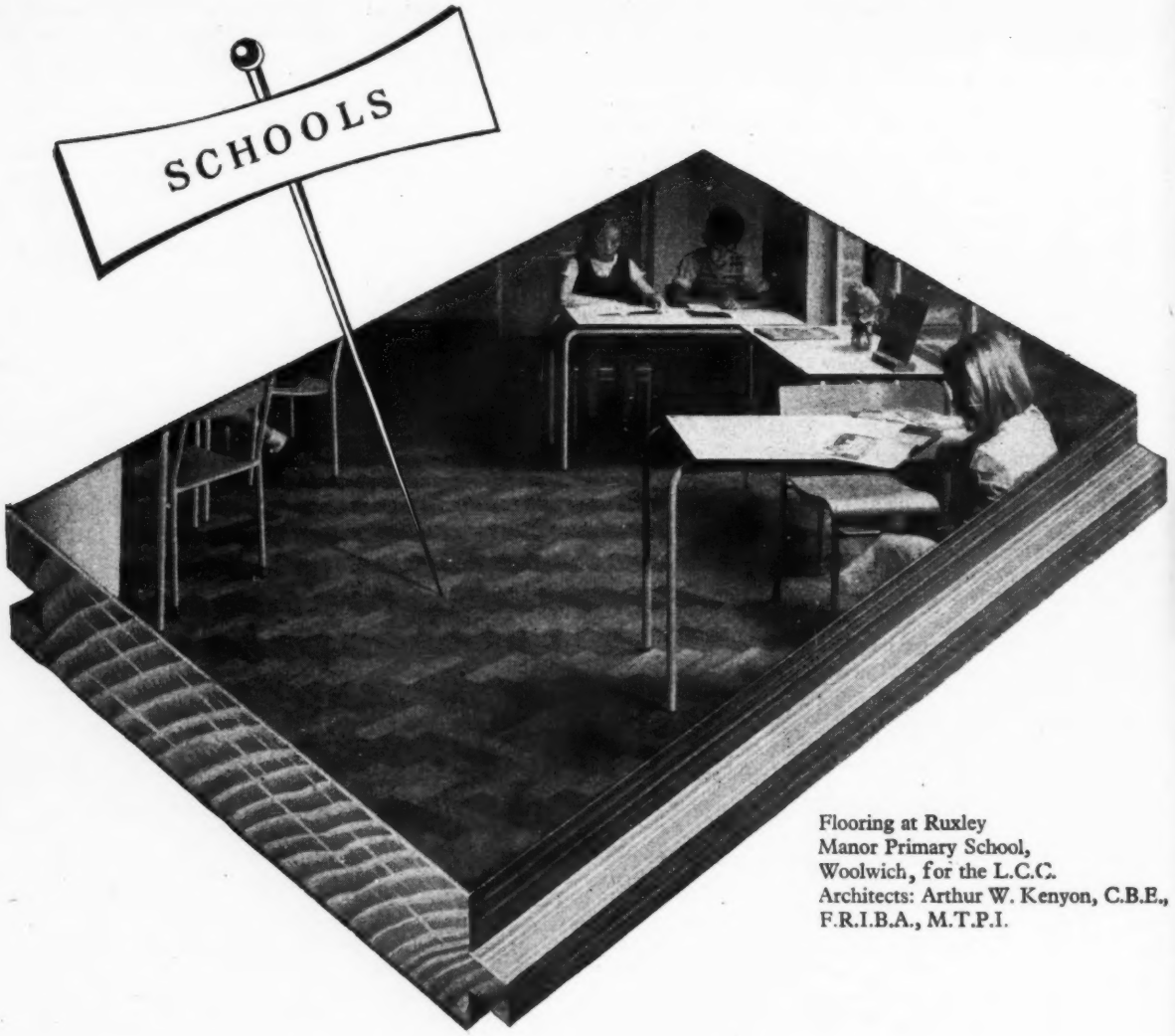
(and so on, to as high a figure as required).

In this series there are a few numbers added to the sequence given in Mr. Allen's paper which have been produced by multiplying the two wings of the original pattern together. The pattern is flexible as each number has as its lowest factor 2, 3 or 5: higher prime numbers and their multiples have been excluded. We must add that the number pattern is still in the course of development, and that comment and criticism will be welcomed.

In this type of pattern, in which 1 may be taken to equal 1 in., the basic module of, say, 3 in. or 4 in. now becomes a resting place in the sequence of numbers, with related sizes above and below. From the whole pattern shorter interlocking series would be selected for ranges of components such as windows, panels, or floor joists. These ranges would perhaps be limited to multiples of, say, 9 in. or 12 in., of 3 ft. 4 in. or 4 ft., which can be found on the pattern, and would thus be related through it to other larger and smaller components in a way that ensures the most possible combinations. In this way the component parts of a building could be assembled with the minimum of cutting and waste without the use of a grid as a framework. On the other hand, the designer of a building or of a system of construction which could benefit by the use of a planning grid would be free to use any grid size found on the pattern and at the same time know that a wide range of related components was available.

Experience from abroad shows that the process of selection of ranges of components from within the overall number pattern cannot be left to chance but should be led by an appropriate national standards body. One merit of the number pattern as conceived at present is that it provides a logical framework within which many product sizes existing at present can be co-ordinated. However, closely bound up with the selection of nominal sizes is the more complex process

* *The Hertfordshire Achievement*, by Richard Llewellyn Davies and John R. Weeks, *Architectural Review*, June, 952.



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of establishing design conventions for jointing conditions, the use and placing of tolerances, and the relation of "specials" to the standards. This process, and the testing in practice of the hypothesis, is bound to take some time, and the full benefits may not be realized for many years. But modular co-ordination will mean for the designer an exciting increase in the range of standard products and in the variety of their use, as well as a simplicity and economy which will be appreciated by any architect who has worried over fitting standard window sizes into brick walls.

Acknowledgments: The work recorded in this article was carried out as part of the research programme of the Building Research Board of the Department of Scientific and Industrial Research, and is published by permission of the Director of Building Research.

INFORMATION CENTRE

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10.138 design: building types

NEW CINEMAS

The Cinema and the New Techniques by the Construction Department of Twentieth Century-Fox Film Corporation. (Obtainable from the Chief Engineer, Twentieth Century-Fox Film Co. Ltd., Soho Square, W.1.)

This 50-page brochure is described in a subtitle as "some notes and suggestions on designing cinemas to accommodate the new techniques, including an elementary description of such techniques as they appear to exist in May, 1955." The techniques so described are CinemaScope (both magnetic and optional sound versions), Perspecta Sound, VistaVision, Superscope, Todd-A.O., and the technique described irreverently as "Blowups." Although it is written in a style of English which is grotesque to the point of being funny, and although it assumes its readers to know the meaning of too much film world jargon, it is a useful booklet and gives precise data on how to determine the angle of throw, how to relate the seating to screen width and projection throw to maintain good sight lines, and how to locate speakers. The optics of the new techniques are also discussed—the projection lenses, the calculation of the focal length and the various types of anamorphic attachment used to expand the image—but briefly and, in the main, intelligibly. There is no doubt that the new techniques have altered the nature of the cinema interior as fundamentally (though in an opposite sense) as was the theatre interior by the intervention of the proscenium arch. This change requires closer collaboration between the architect and the film engineer, since the correspondence between planning and techniques has become more intimate.

15.133 materials: applied finishes, treatments

PAINTING STEELWORK

Painting of Structural Steelwork. British Iron and Steel Research Association. 5s.

This is the third interim report of a joint Technical Panel set up by BISRA and including representatives of the Protective Coatings (Corrosion) Sub-Committee of BISRA, two organizations from the paint industry, and the Admiralty. It is concerned with four exposure tests initiated between 1945 and 1948 at testing stations in Derby and Brixham. Two of these were concerned with priming paints, a third with painting over metallic coatings on steel, and a fourth with protective paints based on tars or bitumens. Points drawn from the conclusions are:

(*a*) in priming paints not containing metallic pigments, a linseed stand oil/alkali-refined linseed oil proved the best of the media tested;

(*b*) coatings of non-ferrous metals over steel and beneath the painting schemes gave considerably increased protection;

(*c*) film thickness is what matters most: a thickness of four to five mils. is required in an industrial, three to four mils. in a marine atmosphere. This means three to four coats of paint.

23.215 heating: ventilation

SCHOOL HEATING

Experimental and Field Studies of School Heating. J. B. Dick. (Journal IHVE. June, 1955.)

Further results of the BRS investigation of methods of school heating.

The paper deals first with the results of two years' operation of heating systems installed in a school at Abbots Langley. There were six classrooms, two with forced warm air heating systems, two with radiators and two with floor heating by embedded hot water pipes. It was found that with fully intermittent operation (no heat input at night or at weekends) the quantity of heat required to give an air temperature of 62 deg. F. during school hours was lowest with the thermostatically controlled forced warm air system. The radiator system required some 25 per cent. more heat, and the floor panels some 50 per cent. more than the warm air system. The author suggests that these results can be taken to apply for schools when the heat is supplied from a boiler which is shut down completely at night as could be done with oil or gas firing. With solid fuel boilers, however, some fuel must be consumed for banking with manual firing or by the kindling mechanism with an automatic stoker and allowance must be made for this consumption. The author shows that with a banking fuel consumption of 15 per cent. of the maximum, the warm air and radiator systems would require much the same amount of fuel, and the floor panels would consume some 25 per cent. more; for lower banking rates the consumption with the warm air systems would be lowest. It is pointed out that the rate of consumption during the night may be determined by the night settings of automatic controls, which may call for more heat than that delivered by manual banking or automatic kindling, and it is shown that this may increase fuel consumption with radiators or floor panels by a further 25 per cent. It is recommended that night settings of automatic controls should be as low as possible and that attention should also be given to minimizing the fuel consumption during banking.

The second part of the paper is concerned with the results of a survey of fuel consumption for space and water heating in post-war schools throughout the country. The data are expressed in terms of heating load and also in terms of the floor area of the schools. The annual running cost per 1,000 sq. ft. of floor area is given in the table below; it was found that this cost was lower for larger schools (with floor areas greater than 30,000 sq. ft.) and results for small and large schools are given in the table.

It will be seen that the systems using solid fuel or oil are lowest in running cost; gas-fired boilers and off-peak electrical systems are two to three times more expensive. The prices of some fuels have risen sharply since the table was prepared and estimates of annual running costs will have to be increased proportionately.

The author recommends that for maximum economy, heating systems in schools should be designed for fully intermittent use and that attention should be paid to reducing fuel consumption during the standby period. It is pointed out that if cold floors are to be avoided with intermittent heating, the surface covering should be an insulating material which can quickly respond to change of air temperature.

25.117 water supply: sanitation

CONCRETE SEWER PIPES

Internal Corrosion of Concrete Sewer Pipes by Effluents Containing Sulphates. BRS Digest No. 79 (part of). (HMSO, July, 1955. 3d.)

An earlier Digest (No. 31) dealt with attack on concrete by sulphates in soils and ground waters. Some indications were given of safe levels. It appears that these earlier data have been misinterpreted in some cases. Good quality and especially well matured precast units will withstand quite considerable concentrations of sulphates, probably 1,000 parts per million. So also with asbestos cement pipes. It is possible, however, to get attack from inside sewers under certain conditions and the Digest gives brief notes on this.

26.117 services and equipment: miscellaneous

COOKERS

Electric Cookers. (Electrical Review. 2.9.55.)

Tabulated list of cookers with name of maker, name of appliance, sizes, loading and other information including price. Useful as a collected catalogue of all makes and as an office reference on sizes.

Annual Fuel Costs, £ per 1000 sq. ft. Floor Area See item 23.215.

	Forced warm air		Radiators		Floor Panels	
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Oil (11*d.* per gallon)	—	—	23	23	—	—
Electricity	—	—	—	—	—	60

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Buildings Illustrated

Railway Station reconstruction, Potters Bar, Middlesex, for the British Transport Commission (Pages 767-782), Clients Departments, Chief Operating Superintendent, Chief Commercial Manager, Signal Engineer, Estate and Rating Surveyor, British Railways, Eastern Region. *Architects:* H. H. Powell, B.ARCH., F.R.I.B.A., Architects' Department, British Railways, Eastern Region, R. T. Walters, A.R.I.B.A., A.M.I.STRUCT.E., Principal Assistant Architect, and James Wyatt, A.R.I.B.A.; *Consulting Structural Engineer,* A. E. Beer, A.C.G.I., M.I.STRUCT.E., E.M.CONS.E. (main station building). *Quantity surveyor:* Irving Todd, F.R.I.C.S. *General contractors:* Kirk & Kirk Ltd. (signal box, covered bench, goods offices, main station building, platform buildings, finishes to subway and ramps, external works), and Samuel Worboys Ltd. (Station Master's house). *Subcontractors: concrete blocks:* Broad Manufacturing Co. Ltd. *Bricks:* Sydney A. Hunter Ltd. *Structural steel and pressed metal:* Henry Hope & Sons Ltd. *Pre-cast concrete roof beams:* Concrete Ltd., Shockcrete Ltd. *Slate sills:* The Bow Slate & Enamel Co. Ltd. *Special roofings:* D. Anderson & Son Ltd. *Roofing felt:* Highways Construction Ltd., D. Anderson & Son Ltd. *Glass:* Aygee Ltd., The Crittall Manufacturing Co. Ltd. *Wood block flooring:* Hollis Bros Ltd. *Patent flooring:* The Marley Tile Co. Ltd. *Cast glass dome lights:* T. & W. Ide Ltd. *Central heating and gas fitting:* W. Richardson & Co. Ltd., Matthew Hall & Co. Ltd. *Gas cookers:* General Gas Appliances Ltd. *Gas water heater:* Ascot Gas Water Heaters Ltd. *Boilers:* Auto-Control Boilers Ltd., Ideal Boilers & Radiators Ltd. *Electric wiring, telephones:* British Railways. *Electric light fixtures:* Falk Stadelmann & Co. Ltd., The General Electric Co. Ltd., The Merchant Adventurers of London Ltd., Hume Atkins & Co. Ltd., Ionlite Ltd. *Door furniture:* James Gibbons Ltd. *Furniture and ticket office fittings:* A. J. Binns Ltd. *Collapsible gates:* Potter Rex Ltd. *Plumbing:* J. H. Shouksmith & Sons Ltd. *Sanitary fittings:* Rownson Drew & Clydesdale Ltd., William E. Farrer Ltd. *Pressed metal lockers:* G. A. Harvey & Co. (London) Ltd., James Gibbons Ltd. *Pressed metal doors:* Williams & Williams Ltd. *Sunblinds:* J. Avery & Co. Ltd. *Metal windows:* Henry Hope & Sons Ltd., The Crittall Manufacturing Co. Ltd., Aygee Ltd. *Plaster:* Pollock Bros. (London) Ltd. *Joinery:* hardwood doors, Beves & Co. Ltd. *Tiling:* Carter & Kernahan Ltd., St. James Tile Co. Ltd. *Furniture:* Conran Furniture, Leabank Office Equipment Ltd., George Parker Ltd., Beves & Co. Ltd. *Leather cloth for seating and paint:* Imperial Chemical Industries Ltd. *Office fittings, ticket office:* D. Burkle & Sons Ltd. *Clocks:* Gent & Co. Ltd. *Water supply:* Barnet Water Co. *Vitreous enamelled signs:* Mead McLean & Co. Ltd. *Ticket collector boxes and traffic barrier:* Holland & Hannen & Cubitts Ltd. *Neon signs:* Claude-General Neon Lights Ltd.

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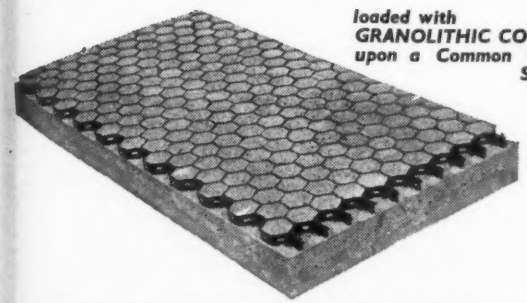

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Applications are invited for the following appointments:—

(a) SENIOR ASSISTANT QUANTITY SURVEYOR, A.P.T. V-VI (£750—£1,000).

(b) ARCHITECTURAL ASSISTANT, SPECIAL CLASSES, A.P.T. I (£500—£580); II (£560—£640); Special Grade (£650—£775).

(c) ASSISTANT ARCHITECT, A.P.T. III (£600—£725).

(d) PLANNING ASSISTANT, SPECIAL CLASSES, A.P.T. I (£500—£580); II (£560—£640); Special Grade (£650—£775).

(e) ASSISTANT BUILDING INSPECTOR, A.P.T. I-II (£500—£640).

Applicants should have the following qualifications and experience:—

(a) A.R.I.C.S. or similar appropriate qualification, with considerable experience in preparing Bills of Quantities and settling Contractors' accounts.

(b) Final or Intermediate R.I.B.A., with experience in design of houses and other public buildings. Progress through appropriate salary grades automatic on satisfying conditions regarding qualifications and experience.

(c) Architectural training completed and in process of qualifying experience of municipal housing an advantage.

(d) Recently qualified or in process of qualifying and experience with a Planning Authority. Progress through appropriate salary grades automatic on satisfying conditions regarding qualifications and experience.

(e) Trained in the building trade, with knowledge of procedure under Building Byelaws.

The appointments will be subject to (i) the Scheme of Conditions of Service for A.P.T.C. Staff; (ii) any other general conditions of employment in operation within the Corporation from time to time; (iii) one month's notice on either side; and (iv) to the Local Government Superannuation Acts, for which purpose the successful candidates will be required to pass a medical examination.

In approved cases, assistance will be given in obtaining housing accommodation, and 50 per cent. of removal expenses will be paid.

Applications, stating appointment applied for, age, present and previous appointments with dates, qualifications, experience, etc., together with the names of two persons for reference, should be addressed to the Borough Engineer, Town Hall, Barnsley, to reach him not later than Friday, 16th December, 1955.

Canvassing will disqualify.

A. E. GILFILLAN,
Town Clerk.

Town Hall, Barnsley.
November, 1955. 3971

NORTHAMPTON Borough Architect and Town Planning Officer's Department:—
SENIOR TOWN PLANNING ASSISTANT. A.P.T. IV (£675—£825).

Full details and application form returnable by 19th December from Brian Bunch, A.R.I.B.A., A.M.T.P.I., Borough Architect and Town Planning Officer, Guildhall, Northampton.

C. E. VIVIAN ROWE.
Town Clerk.
4946

METROPOLITAN BOROUGH OF CAMBERWELL.
DEPARTMENT OF DIRECTOR OF HOUSING AND BOROUGH ARCHITECT.

(a) ASSISTANT ARCHITECT. National Scale A.P.T. IV (£705—£855, inclusive of £30 London weighting). Qualification required: A.R.I.B.A.; (b) JUNIOR ARCHITECT. A.P.T. II (£590—£670 inclusive). Qualification required: A.R.I.B.A. Intermediate examination or its equivalent followed by a minimum of one year in an architectural office. Work of department includes design and construction of public buildings, housing estates, including multi-storey construction. (c) BUILDING SURVEYOR, A.P.T. III (£630—£755 inclusive). Qualification required: A.R.I.C.S. (Building). No housing provided. Application form from Town Clerk, Town Hall, S.E.5. Closing date Wednesday, 21st December, 1955. 4915

METROPOLITAN BOROUGH OF FULHAM.
BOROUGH ARCHITECT'S AND HOUSING DEPT.

(i) ASSISTANT ARCHITECT, A.P.T. III or IV. £600/£725 or £675/£825 per annum plus £30 per annum London weighting. Applicants must be at least Inter.R.I.B.A. Standard, have experience in handling jobs in progress, dealing with contracts and in planning and designing schemes of multi-storey flats.

(ii) ARCHITECTURAL ASSISTANTS, A.P.T. I or II, £500/£580 or £560/£640 per annum, according to experience plus £20/£30 per annum London weighting, according to age. Applicants must have had at least two years' drawing office experience.

Application Forms from Town Clerk, Town Hall, S.W.6. Closing date, 19th December. 4919

CITY OF WAKEFIELD.
CITY ENGINEER'S DEPARTMENT.
PRINCIPAL ARCHITECTURAL ASSISTANT—GRADE A.P.T. V.

Applications are invited for the above superannuable appointment on Grade A.P.T. V (£750—£900).

Applicants, who must be A.R.I.B.A., must have experience in Municipal Housing and General Municipal work.

Applications giving age, qualifications and full particulars of experience and previous appointments together with the names of two referees, to be sent to the undersigned not later than Wednesday, the 21st December, 1955.

Housing accommodation will be provided if necessary.

W. S. DES FORGES,
Town Clerk.

Town Hall,
Wakefield. 4925

CORPORATION OF GLASGOW.
ARCHITECTURAL AND PLANNING DEPARTMENT.
PLANNING ASSISTANTS.

Vacancies for ASSISTANTS in the following Sections: Development Plan; Development Control; Redevelopment.

Applicants should have the Intermediate or Final Examination of the Town Planning Institute or equivalent. Commencing salary according to age and experience, up to £660 per annum with Intermediate qualification; £915 with Final qualification.

Application form may be obtained from Principal Administrative Officer, 20, Trongate, Glasgow, C.1.

A. G. JURY,
City Architect and Planning Officer.
4926

WESTERN AUSTRALIA.
STATE PUBLIC SERVICE—PUBLIC WORKS DEPARTMENT—ARCHITECT. Gr. 3 (PERMANENT).

Salary range: A£1,118—A£1,363 (gross) p.a. Commencing salary in accordance with experience

Qualifications: Associate of Royal Institute of British Architects or qualifications which will admit to membership without further examination

Duties: Preparation of sketches, working drawings and specifications—field surveys—inspection and supervision of minor buildings. Preparation of sketches, minor working drawings of major works under supervision of Senior Architect.

Transport: Fares and other reasonable transport expenses incurred by appointee and dependent family in travelling to Western Australia will be payable by the State provided appointee enters into Bond to serve State for period of at least three years.

Conditions of Appointment: Subject to Bond, arrangements will be made regarding housing.

Conditions of Service: Superannuation benefits, long service leave (3 months after each 7 years of continuous service) sick leave and other conditions applicable to permanent public servants.

Applications in duplicate stating age, marital condition, qualifications and experience, should be addressed by 23rd December, 1955, to Official Secretary, Agent General for Western Australia, Savoy House, 115—116, Strand, London, W.C.2. 4927

PERTH AND KINROSS JOINT COUNTY COUNCIL require an ASSISTANT ARCHITECT in their County Architect's Department. At present the work is in connection with school improvements but the person appointed may be transferred subsequently to other work. Salary Scale A.P.T. IV/V (£615—£715) with placing according to experience and qualifications. A house may be made available, if required. Further particulars may be obtained from the County Clerk, County Offices, York Place, Perth, with whom applications on the prescribed form should be lodged by 19th December. 3987

LINDSEY (LINCOLNSHIRE) COUNTY COUNCIL.
ARCHITECT'S DEPARTMENT.

Vacancy on the permanent staff for :—
ASSISTANT ARCHITECT, A.R.I.B.A., or Registered Architect, Grade V, £750—£900. Starting salary not more than two steps up grade may be granted in special circumstances.
N.J.C. Conditions of Service. Canvassing will disqualify. Candidates must disclose in writing whether to their knowledge they are related to any Member or Senior Officer of the Council.
Applications giving age, qualifications, experience and names of two persons to whom reference can be made, to be sent to the undersigned not later than Friday, 16th December, 1955.

A. RONALD CLARK, A.R.I.B.A., A.M.T.P.I.,
County Architect.

County Offices,
Lincoln. 4905

EAST ANGLIAN REGIONAL HOSPITAL BOARD.

Department of the Regional Architect (Guy Aldis. A.R.I.B.A., A.A.Dipl.) for planning of a scheme for the major development of a General Hospital which the Board is about to undertake.
(1) ASSISTANT ARCHITECTS.—Candidates must be qualified and registered architects and possess good general experience in design, construction and specification writing. Knowledge of hospital work desirable. Salary £640—£930 per annum.
(2) ASSISTANT ENGINEER (Mechanical)—Candidates to be experienced in design and installation of heating, ventilating, steam boiler plant and services, etc., and should be A.M.I.H.V.E. or Graduate Members of I.H.V.E., or equivalent. Salary £640—£930 per annum.
(3) ASSISTANT ENGINEER (Electrical)—Candidates to be experienced in design and installation of electrical engineering services and should be A.M.I.E.E., or Graduate Members of I.E.E., or equivalent. Salary £640—£930 per annum.
(4) ENGINEERING ASSISTANTS—Candidates to be experienced in work described above and possess Ordinary National Certificate (Mechanical or Electrical). Salary £480 (at age 21 or over)—£670 per annum.
(5) DRAUGHTSMEN (Engineering).—Candidates to have had suitable training and experience. Salary £390 (at age 21 or over)—£580 per annum.
Additional increments within the scale based on experience and age may be granted in respect of posts (1), (2) and (3). Commencing salary for post (4) may be fixed at point above minimum but will not exceed £560 per annum.
Applications indicating appropriate post and stating age, qualifications, experience and details of present position with names of three referees, to Secretary of Board, 117, Chesterton Road, Cambridge, by 23rd December, 1955. 4932

CARLTON URBAN DISTRICT COUNCIL.
APPOINTMENT OF ARCHITECTURAL ASSISTANT.

Applications are invited for the above appointment at a salary in accordance with A.P.T. Grade IV, viz.: £675 × £30—£825, the point of entry to be determined having regard to the applicants' experience.
Qualifications: Final R.I.B.A. or Registered Architect.
The appointment will be subject to the provisions of the Local Government Superannuation Act, 1937. National Scheme of Conditions of Service and to satisfactory passing of a medical examination.
Applications stating age, qualifications and details of experience, together with names of three referees, to be forwarded to the Engineer and Surveyor by 10 a.m. on Monday, 19th December, 1955.
Housing accommodation will be made available and removal expenses will be paid by the Council.

A. E. F. WALKER,
Clerk of the Council.

Council House,
Burton Road, Carlton,
Nr. Nottingham.
25th November, 1955. 4934

COUNTY BOROUGH OF WEST HAM.
BOROUGH ARCHITECT AND PLANNING OFFICER'S DEPARTMENT.

There are vacancies on the permanent staff for:—
(*a*) SENIOR ASSISTANT ARCHITECTS—V (£750—£900).
(*b*) SENIOR ASSISTANT ARCHITECTS—IV (£675—£825).
(*c*) ARCHITECTURAL ASSISTANT—I/II (£500—£640).
(*d*) CHIEF ASSISTANT, PLANNING—VII (£900—£1,100).
(*e*) SENIOR ASSISTANT, PLANNING—IV (£675—£825).
(*f*) PLANNING ASSISTANT—I/II (£500—£640).
London allowance in addition.
Post (*a*) and (*b*) applicants should be A.R.I.B.A. or Registered Architect; (*c*) Inter. R.I.B.A. standard with office experience; (*d*) must be A.M.T.P.I. and additional qualification—A.R.I.B.A. or A.R.I.C.S.—an advantage. Responsible for Planning Administration generally. Experience in replanning of blitzed or obsolete urban areas required; (*e*) Architect/Planner; (*f*) experienced in general planning work.
Application forms and details from Borough Architect and Planning Officer, Thomas E. North, O.B.E., F.R.I.B.A., Dist. T.P., M.T.P.I., 70, West Ham Lane, Stratford, E.15. (Returnable by Tuesday, 20th December, 1955.) 3985

NEW SOUTH WALES, AUSTRALIA.

Permanent appointments in the New South Wales Government Service are available to ARCHITECTS, ARCHITECTURAL DRAUGHTSMEN.
Salary: Commencing salary according to qualifications and experience, between £A996 per annum and £A1,450, with promotion to considerably higher salaries. Superannuation.
Qualifications: University Degree, Technical College Diploma, or equivalent.
Location: Sydney or country district offices in New South Wales.
Fares to Sydney: Appointee's contribution to fare is £10 sterling per adult.
Application form and further information may be obtained from the New South Wales Government Offices, 56/57, Strand, London, W.C.2. 4900

MIDLANDS ELECTRICITY BOARD.

ASSISTANTS required in the Architectural and Constructional Section of the Engineer's Department of the Birmingham and District Sub-Area.
Applicants should be capable of assisting in the preparation of working drawings and in the design of Offices, Depots, Service Centres and Substations.
Salary within the range of £510/£630 or £640/£740 per annum (N.J.B. Schedule "D" Grade 6 or 5) according to qualifications and experience. Superannuable.
Apply by letter, within fourteen days, stating age, experience, present salary and position to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

A. STEPHENS,
Secretary.
4931

NORTH THAMES GAS BOARD.

An ARCHITECTURAL ASSISTANT is required in the Drawing Office of the Chief Engineer's Department, Westminster.
Applicants should have passed the R.I.B.A. Final Examination, should be capable of preparing working drawings and specifications, and supervising the work on contracts. Experience in design and planning of industrial buildings would be an advantage.
Starting salary, depending on age and qualifications, will be within the range £730—£830 per annum, and the successful candidate will be required to join the Staff Pension Scheme.
Applications to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, W.8, quoting reference 666/278. 3996

COUNTY BOROUGH OF SWANSEA.
BOROUGH ARCHITECT'S DEPARTMENT.
SENIOR ASSISTANT QUANTITY SURVEYOR.

Applications are invited from Associates of the R.I.C.S. (Quantities) for the above post, salary—Grade A.P.T. V (£750 × £30—£900 per annum). Considerable experience in the "Taking off" of large building contracts is essential and candidates must be under 45 years of age unless in Local Government Service
The appointment will be subject to the provisions of the Local Government Superannuation Acts, and may be terminated by one month's notice on either side. The successful candidate will be required to pass a medical examination.
HOUSING ACCOMMODATION will be made available to the successful candidate (if married).
Forms of Application may be obtained from the Borough Architect, The Guildhall, Swansea, and must be returned, with the names of two referees, to the undersigned not later than Monday, 19th December, 1955.
Canvassing disqualifies.

T. B. BOWEN,
Town Clerk.

The Guildhall,
Swansea.
24th November, 1955. 3991

CITY OF LEICESTER.
EDUCATION COMMITTEE.
COLLEGE OF ART.
SCHOOL OF ARCHITECTURE.

Applications are invited for the post of full-time INSTRUCTOR. Candidates should be registered architects holding a Degree or Diploma of a recognised school.
Subject to the usual conditions relating to full-time service the person appointed will be given opportunities to continue his professional practice.
Salary: Burnham Scale, Grade B, £525 × £25 to £820, with appropriate allowance for approved professional and teaching experience, war service and graduate training.
Applications (no form) should be sent to the Registrar, College of Art, The Newarke, Leicester, within two weeks of the appearance of this advertisement.

E. THOMAS,
Director of Education.
4945

UNIVERSITY COLLEGE OF NORTH STAFFORDSHIRE.

Applications are invited for the post of ASSISTANT ARCHITECT on the staff of the Buildings Officer & Architect. Salary in the scale £685 × £20—£725 p.a. The post is superannuable. Duties may include work on buildings for teaching and research, students' hostels, staff residences, general purpose buildings and services. Applicants must be Registered Architects. Further particulars may be obtained from the Registrar, The College, Keele, Staffs., to whom 3 copies of application giving full details of age, qualifications, experience, etc., and names of three referees should be sent within 10 days of publication of this advertisement. 4968

URBAN DISTRICT COUNCIL OF BASILDON.
Population estimated at 56,000. *Area* 27,000 *Acres.*
ENGINEER & SURVEYOR'S DEPARTMENT.

Applications are invited for the appointment of ARCHITECTURAL ASSISTANT, Special Scale £650—£775 p.a., commencing salary according to experience. Applicants should be Associates of the R.I.B.A. Housing considered.
Full particulars and application forms from and returnable to Mr. S. A. Wadsworth, A.M.I.C.E., A.M.I.Mun.E., Council Offices, High Street, Billericay, Essex. Closing date, 23rd December, 1955. 3989

BOROUGH OF SOLIHULL.

ASSISTANT ARCHITECT: A.P.T. Grade IV (£675—£825).
Applications are invited for the above mentioned post in the Borough Engineer and Surveyor's Department.
Solihull has a population of 75,000 which is to increase to over 100,000 during the next few years, and the appointment is primarily in connection with the large programme of schools and capital work schemes, including libraries, crematorium, corporation depot, etc., which are in hand as a result of the rapid expansion of the Borough.
No application forms are being issued, but the Borough Engineer will be pleased to answer specific questions regarding the position.
Applications, giving the names of two referees must be sent to Mr. C. R. Hutchinson, B.Sc., A.M.I.C.E., Borough Engineer and Surveyor, 90, Station Road, Solihull, not later than 21st December, 1955.
The appointment is subject to the Local Government Superannuation Acts, the National Scheme of Conditions of Service and one month's notice.
In appropriate cases housing accommodation will be made available as soon as possible.

W. MAURICE MELL,
Town Clerk.

28th November, 1955. 4947

MOUNTAIN ASH URBAN DISTRICT COUNCIL.
APPOINTMENT OF ASSISTANT ARCHITECT.

Applications are invited for the above appointment in the Department of the Council's Architect, Mr. Trevor Hill, Dip. Arch., A.R.I.B.A.
The conditions of employment will be in accordance with the National Scheme of Conditions of Service, and the appointment will be remunerated within Grades A.P.T. I and II (£500—£580 and £560—£640), according to qualifications and experience.
The appointment will be superannuable, and will be terminable by one month's notice on either side. The successful applicant will be required to pass a medical examination.
Applications stating age, qualifications and experience, accompanied by copies of two recent testimonials must reach the undersigned not later than Thursday, 29th December, 1955.
Housing accommodation will be provided if required.

R. GWYNNE RICHARDS,
Clerk of the Council.

Town Hall,
Mountain Ash.
30th November, 1955. 4940

BOROUGH OF NEWCASTLE-UNDER-LYME.
BOROUGH ENGINEER AND SURVEYOR'S DEPT.
QUANTITY SURVEYORS.

Applications are invited for the following appointments:—
(*a*) ASSISTANT QUANTITY SURVEYOR—Grade A.P.T. IV (£675—£825 p.a.).
(*b*) ASSISTANT QUANTITY SURVEYOR—Grade A.P.T. III (£600—£725 p.a.).
Applicants are required for taking off in connection with New Schools and Housing Contracts.
Commencing salaries will be in accordance with qualifications and experience.
Favourable consideration will be given to the provision by the Council of housing accommodation in suitable cases.
Application Forms may be obtained from the Borough Engineer and Surveyor, Lancaster Building, High Street, Newcastle, Staffs., and must be returned to him not later than Monday, 19th December, 1955.

C. J. MORTON,
Town Clerk.

District Bank House,
High Street,
Newcastle, Staffs. 4951

COUNTY BOROUGH OF BURY.

Applications invited from suitably qualified persons for position of ARCHITECTURAL ASSISTANT, Borough Engineer's Department, Special Grade (£650—£775).
Applications, stating age, details of training, qualifications and experience, together with the names and addresses of two referees must reach me not later than 17th December.

EDWARD S. SMITH,
Town Clerk.

Town Hall,
Bury.
3rd December, 1955. 4966

SURREY COUNTY COUNCIL.

Applications invited for appointment of ASSISTANT QUANTITY SURVEYOR, GRADE IV, £675 × £30—£825 p.a., plus London allowance. Should be Associate Member R.I.C.S.
Full details and present salary, with three copy testimonials to County Architect, County Hall, Kingston, as soon as possible. 4907

SOUTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD.

Applications are invited for the following appointments on the permanent staff of the Regional Architect.

ASSISTANT ARCHITECT. The commencing salary (fixed by reference to experience at full professional standard as a practising architect and to age) will be within the scale £640 × £25 (4) × £30 (4) × £35 (2) to £930 plus London allowance. Applicants must be Associate Members of the Royal Institute of British Architects and capable of preparing working and detailed drawings and specifications and supervising work on individual projects. Experience of hospital planning and construction an advantage.

ASSISTANT QUANTITY SURVEYOR. The commencing salary (fixed by reference to experience at full professional standards as a practising Quantity Surveyor and to age) will be within the scale £640 × £25 (4) × £30 (4) × £35 (2) to £930 plus London allowance. Applicants must be Associate Members of the Royal Institute of Chartered Surveyors (Quantity Surveying Branch) and have had sound practical experience in the estimating and analysis of prices, working up and taking off of quantities for small contracts and also of checking contractors' accounts.

ARCHITECTURAL ASSISTANTS. The commencing salary (fixed by reference to practical experience since passing one of the examinations below, and to age), will be within the scale £480 (age 21 or over) by £20 (7) × £25 (2) to £670 plus London Allowance. Applicants must have passed the Intermediate Examination of the Royal Institute of British Architects or an examination recognised by the Institute as equivalent, have had a good architectural training and general experience and be capable of preparing working and detailed drawings. Applications stating age, experience, qualifications, present appointment and salary and names and addresses of three referees should be sent to the Secretary (S.2), 11a, Portland Place, W.1, by not later than 22nd December, stating appointment for which applying on application and envelope. 4965

CITY OF BIRMINGHAM.
CITY ARCHITECT'S DEPARTMENT.

Applications are invited for the appointment of a SENIOR ASSISTANT ARCHITECT as Group Leader in the Housing Design Section, which is carrying out a large Housing programme in suburban and central redevelopment areas, including multi-storey flats in both traditional and new-traditional construction, garages and large shopping centres.

The appointment will be within Grade A.P.T. VI (£825/£1,000 per annum), commencing at a salary according to experience.

Applicants must be Associate Members of the R.I.B.A., or hold an equivalent qualification, and, as the Architect appointed will be primarily responsible for the basic designs of redevelopment areas, the possession of a Town Planning qualification will be an advantage.

The post is permanent, superannuable, subject to a medical examination and to one month's notice on either side.

Applications, stating age, present position and salary, qualifications and experience, together with the names of two persons to whom reference can be made, should reach the undersigned not later than 28th December, 1955.

Canvassing disqualifies.

A. G. SHEPPARD FIDLER,
City Architect.

Civic Centre,
Birmingham, 1. 4906

SUDAN GOVERNMENT.

Sudan Railways require an ARCHITECTURAL DRAUGHTSMAN for service in the Sudan for the preparation of drawings and designs as required and instructing subordinate staff in Draughtsmanship.

Applicants must have technical knowledge of the standard of National Certificate or have had at least three years training in Architect's or Consulting Civil Engineer's Office and wide experience of drawing office work in the preparation of working drawings and details and be capable of taking out and preparation of specifications and estimates for various types of Civil Engineering structure, preferably allied to Railway or Harbour work. Preference will be given to those with experience of reinforced concrete design. Candidates should be betwen 25 and 40 years of age.

Appointment will be on Short Term Contract (with bonus) for up to three years in the salary scale £E.800 to £E.1,350 per annum. A Cost of Living Allowance which is reviewed quarterly is also payable. Outfit allowance of £E.50 and free passages on appointment and annual leave after the first tour. (£E.1 = £1 0s. 6d.)

Further information and application form will be sent on receipt of a postcard only addressed to The Sudan Agent in London, Sudan House, Cleveland Row, St. James's, London, S.W.1, quoting "Draughtsman/1913" and name and address in block letters. 4913

CORPORATION OF LONDON.

ARCHITECTURAL ASSISTANT, Intermediate R.I.B.A. standard.

Good draughtsmanship essential together with sound knowledge of general construction and specification writing including repairs, alterations and maintenance of existing buildings.

Salary up to £728 according to qualifications and ability.

Applications in writing to the City Surveyor, 55/61, Moorgate, London, E.C.2. 4964

LIVERPOOL REGIONAL HOSPITAL BOARD.

Applications are invited by the Board for appointments to established and temporary posts in the department of the Regional Architect.

The work of the department is primarily concerned with the Board's capital building programme comprising new works and works of alteration at existing hospitals throughout the area of the Board which extends from Southport in the north to Warrington in the east, Wirral and Chester to the south. The Board is at present engaged on the construction of a new mental deficiency hospital (1,000 beds) and other new, large scale hospital building is also contemplated.

The work of the department offers experience in the varied and interesting aspects of hospital building. The vacancies existing are as follows and the minimum qualifications and/or experience required are as indicated.

ASSISTANT ARCHITECTS, £640 p.a. to £930 p.a. Applicants must be Registered Architects having passed the requisite examinations and must have had experience.

ARCHITECTURAL ASSISTANTS—£480 p.a. at 21 years or over to £670 p.a. Applicants must hold Inter. R.I.B.A.

DRAUGHTSMEN—(Male and Female)—£390 p.a. at 21 years or over to £580 p.a.

Applicants must have had suitable training, including three years' technical experience in architectural drawing.

JUNIOR ASSISTANTS (Male)—£170 p.a. at 15 years to £400 (max.) at 25 years; Female, £165 p.a. at 15 years to £400 (max.) in accordance with "equal pay" transitional scales.

Applicants should, if appointed, intend to acquire technical qualifications whilst holding the post.

Starting salaries dependent on age and/or experience.

Further details may be obtained from the Regional Architect, T. Noel Mitchell, B.Arch., A.R.I.B.A., at 88, Church Street, Liverpool, 1. Otherwise, applications stating age, experience, qualifications, present and previous appointments and salary and names and addresses of three referees (two technical) to me by 15th December, 1955.

VINCENT COLLINGE,
Secretary to the Board.

19, James Street,
Liverpool, 2. 4917

CITY OF PETERBOROUGH.
CITY ENGINEER'S DEPARTMENT.

(*a*) ARCHITECTURAL DRAUGHTSMAN (male or female). General or (with G.C.E.) Higher General Division.

Applicants should be capable of tracing working and detail drawings, layouts and site plans, and electrical plumbing and drainage layouts, and colouring prints.

(*b*) QUANTITY SURVEYOR'S CLERK (male or female). General or (with G.C.E.) Higher General Division.

The successful applicant will be required to assist generally in all branches of Quantity Surveying. Speed and accuracy with figures are essential requirements, and the appointment offers scope to those who wish to take up Quantity Surveying as a profession.

Salary according to age and educational qualifications. Males: Minimum £290 at 21, £320 at 23, rising to £400 (respective figures £300, £350 and £475 with appropriate G.C.E.). Females: Minimum £242 at 21, £266 at 23, rising to £330 (respective figures £250, £290 and £390 with appropriate G.C.E.).

Applications, stating age, experience, details of qualifications, together with copies of three recent testimonials, should be sent in envelopes endorsed as to the respective appointment to Mr. L. H. Robjohn, M.B.E., A.M.I.C.E., City Engineer and Surveyor, Town Hall, Peterborough, to reach him not later than 17th December, 1955.

Canvassing, directly or indirectly, will disqualify. Candidates must disclose whether they are related to any member or senior officer of the Council.

C. PETER CLARKE,
Town Clerk.

Town Hall,
Peterborough.
December, 1955. 4932

SURREY COUNTY COUNCIL.

Applications invited for appointment of ASSISTANT ARCHITECT, GRADE III, £600 × £25—£725 p.a., plus London allowance. Preference given applicants who have passed Inter. R.I.B.A.

Full details and present salary with three copy testimonials to County Architect, County Hall, Kingston, as soon as possible 3889

PEAK PARK PLANNING BOARD.

Applications are invited for the appointment under N.J.C. service conditions of two JUNIOR PLANNING ASSISTANTS, salary scale A.P.T. Grade I (£500—£580); consideration will be given to placing the successful applicants within the range of the scale, according to merit. A varied experience in planning work, including draughtsmanship, is desirable. The main part of the work is connected with the preparation of Development Plans and other projects for the National Park and of urban schemes for the areas outside the Park administered by this office as an Area Planning Office of Derbyshire County Council. Apply on forms obtainable from the undersigned, to be returned by the 23rd December, 1955. Canvassing disqualifies. JOHN FOSTER, *Planning Officer*, Aldern House, Bakewell, Derbyshire. 3981

BOROUGH OF LEYTON.
(Non-County Borough in County of Essex.
Population 103,200. R.V. £784,110.)

Applications are invited for the following permanent appointments at salaries in accordance with the National Scales indicated:—

(*a*) TWO ASSISTANT ARCHITECTS, A.P.T. Grade V (£780—£930 per annum).

(*b*) GENERAL ARCHITECTURAL ASSISTANT, A.P.T. Grade III-IV (£630—£855 per annum).

The above salaries are inclusive of London Weighting (£30) which is reduced according to scale where the age of the successful applicant is less than 26 years. The commencing salaries will be fixed at a point in the scale according to the qualifications and experience of the successful candidate.

Candidates for appointments (*a*) must be Associates of the Royal Institute of British Architects and must have considerable experience in contemporary design and the construction and supervision of multi-storey flats. Candidates appointed will be employed in connection with the Corporation's extensive programme for Redevelopment Areas.

Candidates for appointment (*b*) must be Registered Architects and should have good experience in the design, construction and erection of public buildings. The successful candidate will be primarily engaged on the completion of a project for a Central Library.

Housing accommodation may be made available if required.

Alternate Saturday mornings are free of duty and canteen facilities are available in the Town Hall.

Details of the above appointments and forms of application may be obtained from Mr. H. D. Peake, M.Sc.(Eng.), Borough Engineer and Surveyor, Town Hall, Leyton, E.10, to whom they should be returned not later than Wednesday, 28th December, 1955.

D. J. OSBORNE,
Town Clerk.

Town Hall,
Leyton, E.10. 4954

CARDIGANSHIRE COUNTY COUNCIL.

Applications are invited for the undermentioned vacancies in the County Architect's Department, County Hall, Aberaeron:—

(*a*) SENIOR QUANTITY SURVEYOR (A.P.T. Grade VI, VII—£825—£1,100).

(*b*) ASSISTANT ARCHITECT (A.P.T. Grade IV —£675—£825).

(*c*) ARCHITECTURAL ASSISTANT (A.P.T. Grade II—£560—£640).

(*d*) ARCHITECTURAL ASSISTANT (A.P.T. Grade I, II—£500—£640).

Candidates for (*a*) should be Associate Members of the R.I.C.S., (*b*) Associate Members of the R.I.B.A., (*c*) and (*d*) have passed the Intermediate Examination of the R.I.B.A.

Commencing salary according to qualifications and experience.

Application forms and conditions of appointment can be obtained from the County Architect and must be returned to the undersigned not later than 31st December, 1955.

J. E. R. CARSON,
Clerk of the Cardiganshire County Council.

Swyddfa'r Sir,
Marine Terrace, Aberystwyth. 3964

WAR OFFICE.

Vacancies exist for ARCHITECTURAL ASSISTANTS in the Architectural branch of the Directorate of Fortification and Works, Chessington, Surrey.

Candidates must have at least three years' architectural training, experience in an architect's office, and be of Intermediate R.I.B.A. standard.

A varied programme of design is undertaken, including married quarters, barracks, hospitals, schools, clubs, layouts of estates and cantonments, for Home and Overseas.

Applicants must be British of British parentage.

Salary range is £453 (at 21)—£710, plus overtime. Starting pay according to age, qualifications and experience, with annual increases subject to satisfactory service. Prospects of promotion and establishment. Canteen facilities.

State age, full details and experience, to Secretary of State for War, War Office (C.5.D), R.558, Northumberland House, W.C.2. 3473

COUNTY BOROUGH OF STOCKPORT.

SENIOR ASSISTANT ARCHITECT required. Salary £750—£900 per annum. Should be member of R.I.B.A. Applications, giving names of two referees, to Borough Architect, Town Hall, Stockport, by 24th December, 1955. Post pensionable, subject to medical examinaton. Canvassing disqualifies. Applicants must disclose if related to any member or senior officer of Council. 4930

COUNTY BOROUGH OF SOUTHAMPTON.—Appointment of SENIOR QUANTITY SURVEYOR Grade IV (£675—£925). Application forms from Borough Architect, Civic Centre, Southampton. Candidates should state their housing needs. Closing date 14th December 1955. 3990

METROPOLITAN BOROUGH OF FULHAM.
SENIOR ASSISTANT QUANTITY SURVEYOR, A.P.T. V, BOROUGH ARCHITECT'S AND HOUSING DEPARTMENT.

£750 × £30—£900, plus £30 per annum London weighting. Applicants must be members of a recognised professional body, qualified by examination. Preference will be given to candidates experienced in all aspects of Quantity Surveying work for multi-storeyed flats and public buildings. Application forms from Town Clerk, Town Hall, S.W.6. Closing date, 19th December. 4939

METROPOLITAN BOROUGH OF FULHAM.
ARCHITECTURAL TRAINEE.
Borough Architect's and Housing Dept.: Excellent opportunity for boy, 16/17 years, to become articled pupil and qualify as an Architect Commencing salary during training £200/£220 p.a. Details from Town Clerk, Town Hall, S.W.6. Closing date, 19th December. 4918

BASILDON DEVELOPMENT CORPORATION.
ASSISTANT PLANNERS required to assist in implementation of Master Plan. Experience planning, design, statistical analysis. A.M.T.P.I. required for Grade IVA, posts superannuable and housing accommodation on rent available in approved circumstances. Salary ranges Grade IVA, £715—£845, grade VB, £580—£650, VA, £520—£580. Applications on special form (obtainable from Chief Architect) to General Manager, Gifford House, Basildon, Essex, by Friday, 30th December. 4952

LONDON COUNTY COUNCIL.
ARCHITECT'S DEPARTMENT.
BUILDING SURVEYORS required (salary up to £783, according to experience) for the following:—
1. BUILDING REGULATION DIVISION;
2. DISTRICT SURVEYOR'S SERVICE;
for the statutory control of buildings in London.
3. MAINTENANCE DIVISION. To deal with inspections and surveys of all types of council buildings for maintenance repairs and minor alterations.
4. VOLUNTARY SCHOOLS SECTION.—For preparation of specifications and estimates for minor improvements, repairs and painting to voluntary schools.
Application forms from Architect (AR/EK/BS/2), County Hall, S.E.1 (1970). 4936

STAFFORDSHIRE COUNTY COUNCIL
EDUCATION COMMITTEE.
Applications are invited for STRUCTURAL DRAUGHTSMEN to assist the Senior Structural Engineer (Salary within the range of £560—£725 per annum) according to qualifications and experience with at least two years' experience in reinforced concrete and/or structural steel.
Forms of Application from: The County Education Architect, "Green Hall," Lichfield Road, Stafford (Ref.A/Staff/201/MMW); to be returned not later than ten days after the date of this advertisement.
T. H. EVANS,
Clerk of the County Council.
4914

CAERNARVONSHIRE COUNTY COUNCIL.
APPOINTMENT OF QUANTITY SURVEYOR.
Applications invited for appointment of QUANTITY SURVEYOR in County Architect's Department. Salary within A.P.T. IV (£675—£825).
Applicants must be experienced in preparing bills of quantities and estimates, valuation of works in progress and settlement of final accounts, and preference will be given to those who have passed the final examinations of a recognised professional body.
Application forms from Clerk of County Council, Caernarvon. Closing date 31st December. 4967

Architectural Appointments Vacant

4 lines or under, 7s. 6d.; each additional line, 2s.

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive or a woman aged* 18-59 *inclusive unless he or she or the employment is excepted from the provisions of the Notification of Vacancies Order,* 1952.

ARCHITECTS' CO-PARTNERSHIP require unmarried, qualified, experienced ASSISTANT in their Lagos office. Maximum tour 14 months. Flat provided. Write 44, Charlotte Street, London, W.1, or telephone Langham 5791. 3274

ARCHITECTS' CO-PARTNERSHIP require qualified ASSISTANT with experience. Write 44, Charlotte Street, London, W.1, or Telephone Langham 5791. 3275

ARCHITECTURAL ASSISTANT required in busy London Office with varied practice. Good salary and prospects for suitable applicant. 5-day week. Write giving particulars of age, qualifications, experience, etc., to Box 736, c/o 7, Conduit St., W.C.1. 3626

VACANCIES occur in busy and varied medium sized London architect's practice for JUNIOR ASSISTANTS, salaries varying from £400 to £700 according to experience. Good prospects for the right person. Reply with full particulars to H. & H. M. Lidbetter, F/F.R.I.B.A., 2, Verulam Buildings, Gray's Inn, W.C.1. 3735

SENIOR SHOPFITTING DRAUGHTSMAN required by leading London Shopfitters. Salary £800 to £1,000, plus bonus and pension scheme. Box 3018.

WANTED urgently: Capable DRAUGHTSMEN for preparing working drawings of industrial buildings from sketch designs. Salary according to experience. Write or telephone to Percy Bilton Ltd., 113, Park Street, W.1. Telephone number MAYfair 8240. 3437

ARCHITECT'S ASSISTANT for interesting varied work, qualified or near-qualified. Good opportunity for gaining experience. Accommodation available. Apply Saunders & Partners, 24, Castlegate, Newark. 3947

BUSY London Office requires two ARCHITECTURAL ASSISTANTS, approximately Intermediate standard or upwards. Also requires one ASSISTANT with considerable perspective experience, particularly able to do quick interior colour sketches. Five-day week, good salaries. Lewis Solomon, Son & Joseph, 21, Bloomsbury Way, W.C.1. HOL 5108 or 7082. 3483

ARCHITECTURAL ASSISTANTS, Senior and Junior required, preferably with London practice experience, office and factory buildings. Write, giving particulars of experience, etc., to Messrs. Bates & Sinning, 89, Chancery Lane, W.C.2. 2508

THE BAHRAIN PETROLEUM CO., LTD.,
BAHRAIN, PERSIAN GULF.
APPLICATIONS are invited from JUNIOR QUANTITY SURVEYORS for position in the Engineering Department. Position open is in Building and General Construction work, involving industrial buildings of steel frame and concrete block or asbestos sheeting construction; dwellings; steel, wood-frame and concrete structures; and other projects in the civil engineering field.
Overall scope of work involves preparing estimates of and requisitioning, material requirements for new projects; checking drawing lists of material for field issue; advising on construction materials and materials availability, etc.
Opportunities for advancement are good and the position offered is a career position in an expanding international organisation.
Salary and position offered on basis of qualifications and experience, with starting salary ranging from £55 to £75 per month, with free air conditioned accommodation, plus adequate living allowance, medical attention being provided in addition. Pension Plan and kit allowance also provided. Periods in Bahrain are of two years' duration, with paid local and home leaves. Apply in writing, with full particulars, to Caltex Services, Ltd., Thames House (entrance No. 3), Millbank, London, S.W.1. 3880

ROBERT SHARP & SON, A./L.R.I.B.A., require a SENIOR ARCHITECTURAL ASSISTANT, A.R.I.B.A., with office experience, and a JUNIOR ASSISTANT of at least Intermediate standard. Apply in writing, stating qualifications and experience, to 13, Lower Belgrave Street, S.W.1. 3821

SENIOR and Intermediate standard ARCHITECTURAL ASSISTANTS / DRAUGHTSMEN required by North & Partners, Maidenhead. Generally large-scale work. Initial ability essential, with salary to suit. Telephone Maidenhead 3131. 3834

ARCHITECT ASSISTANT required by well-known Brewery for work in connection with Bottling Store alterations, maintenance, etc. State age, experience, salary required. Brewery experience not essential. Reply Box 3824.

ARCHITECTURAL ASSISTANT, of R.I.B.A. Intermediate standard, required in Architect's Department of Estate Developers, in the outer London South-Eastern area, engaged on private residential development, shops, etc. Salary in accordance with experience. Write, stating age, experience, and salary required, to Box 3826.

EDINBURGH.—Senior and Intermediate ASSISTANTS required. Write, giving particulars of experience and salary required, to Messrs. David Carr & Stuart Matthew, 14, Lynedoch Place Edinburgh, 3. 3123

JUNIOR ASSISTANT, competent to make measured surveys and prepare working drawings, required by Wallis & Smith, Chartered Architects, Basingstoke. Apply by letter, stating salary required. 2533

ARCHITECTURAL ASSISTANTS, one Intermediate and one junior standard, required for office in St. Albans, Hertfordshire. Write giving brief details to Box 3965.

LOUIS DE SOISSONS, PEACOCK, HODGES AND ROBERTSON have vacancies in their London and Welwyn Garden City offices for SENIOR and JUNIOR ARCHITECTURAL STAFF. The work is varied and covers Ecclesiastical, Schools, Offices and Housing (Cottages and Flats). Write stating age, salary and experience to Louis de Soissons, Peacock, Hodges and Robertson, 3, Park Square Mews, Upper Harley Street, London, N.W.1. 3936

ARCHITECTURAL ASSISTANTS (2) required in City Office with a wide and comprehensive range of commissions. Salary range £611—£767. Seely & Paget. CENtral 0321. 3939

D. C. DENTON-SMITH AND PARTNERS, Chartered Architects, Surveyors: Require additional experienced ARCHITECTURAL ASSISTANTS at 40, Regent, Street, Cambridge. Excellent opportunities in varied practice covering a very wide area. Salaries, by arrangement, according to capabilities. Written applications, giving full details, should be sent to the above address. 3940

ARCHITECTURAL ASSISTANTS, approaching Intermediate stage, required. Up to £500 p.a. SENIOR ASSISTANTS also required. D. Plaskett Marshall, F.R.I.B.A., 59, Gordon Square, W.C.1. MUS 7176/7. 3978

LANCHESTER & LODGE urgently require male ARCHITECTURAL ASSISTANTS of all grades up to £700. Five-day week and lunch vouchers. Write full particulars, 10, Woburn Square, London, W.C.1. 3961

ARCHITECTURAL ASSISTANTS, with approx. 5 years' office experience, required for West End Architect's office engaged on large office building and cinema contracts. Commencing salary £625. 'Phone Whitehall 1624 for appointment. 3561

ARCHITECTURAL ASSISTANTS wanted, private practice S.W.1 district. Junior Assistants, £450 (Inter. standard, some experience); Assistants, £600 (Final standard); Senior Assistants, £750 (Final with good experience). Box 3930.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, Dyestuffs Division, requires an ARCHITECTURAL DRAUGHTSMAN of Intermediate R.I.B.A. Standard, possessing a sound knowledge of structural framework design and building construction, together with experience in the preparation of working drawings and details for industrial and commercial buildings. Applications with brief details of experience to Staff Department, Hexagon House, Blackley, Manchester, 9. 3924

ARCHITECTURAL ASSISTANT required of Intermediate standard for interesting and varied work of contemporary character in small and busy London office. Opportunity for initiative and responsibility. Salary by arrangement. Please write to Box 3920.

CHARTERED Architects with large and varied practice (not houses) in Home Counties require PERSONAL ASSISTANT to Partner. General ability and initiative essential. Salary £500/£750. Box 3919.

IMPERIAL CHEMICAL INDUSTRIES, LTD.,
METALS DIVISION,
invites applications from
DRAUGHTSMEN
to fill the following permanent positions:—
(1) SENIOR DESIGN DRAUGHTSMAN, with experience of heavy hydraulics, *e.g.*, design and installation of extrusion presses, pumps, accumulators, pipework, valves, etc., operating at working pressures of up to 5,000 p.s.i. H.N.C. qualifications preferred, but sound practical knowledge essential.
(2) SENIOR DESIGN DRAUGHTSMAN, with good general knowledge of layout and design of mechanical plant, *e.g.*, rolling mills and ancillaries, drawbenches, special purpose plant, materials, handling equipment, etc. Work is widely varied and interesting. H.N.C. qualifications preferred, but sound design experience essential.
(3) SENIOR DESIGN DRAUGHTSMAN, with experience of the layout and design of heating and ventilation installations for industrial buildings, including offices. A.M.I.H. & V.E. or equivalent qualification preferred.
(4) SENIOR DESIGN DRAUGHTSMAN, for interesting layout and design work connected with instrument installations applied to a wide range of plant producing non-ferrous metals. Experience to include working knowledge of electronics, electric and pneumatic control systems. H.N.C. qualifications preferred.
(5) SENIOR DESIGN DRAUGHTSMAN, Electrical, experienced in layout of industrial power distribution, automatic control gear, and substation design. Knowledge of lighting installations an advantage. Work is interesting, covering a wide range of plant and buildings connected with the production of non-ferrous metals. H.N.C. qualifications preferred.
(6) ARCHITECTURAL ASSISTANT, with good practical experience, required for design and detail of widely varied technical and administrative projects. Minimum qualification: Inter. R.I.B.A. preferred.
These positions carry good commencing salaries, and there are excellent prospects for advancement for men with initiative and ability.
Financial assistance towards removal expenses are available for married men. Excellent conditions of employment include Staff Pension Fund, Employees' Profit Sharing Scheme, etc. Application forms may be obtained from the Staff Manager, I.C.I. Metals Division, Kynoch Works, Witton, Birmingham, 6, quoting DR/2. 4955

ARCHITECTURAL ASSISTANT, of Intermediate or Final standard, required. Work consists mainly of hospital, industrial and departmental store buildings. Good prospects and salary for suitable applicant. Apply, with full particulars, to Swannell & Templeman, 6, Raymond Buildings, Gray's Inn, W.C.1. 4956

JAMES & BYWATERS urgently require ASSISTANT, of Intermediate standard or higher, for detailing various types of buildings. Salary according to experience and qualifications. Apply in writing to 5, Bloomsbury Street, W.C.1. 4963

ARCHITECTURAL ASSISTANT required. Final standard. London experience an advantage. General commercial practice. Apply Waite & Waite, 35, Cavendish Square, W.1. Mayfair 4912, Ex. 12. 4960

ARCHITECTURAL ASSISTANTS required immediately. Pre-Intermediate to Final stage. Interesting work. Alternate Saturdays. Bonus scheme. Salary according to ability. Expenses paid for interview. Write full details with age. J. Roland Sidwell, A.R.I.B.A., 27, Union Street, Coventry. 4959

INTERMEDIATE grade ASSISTANT required: interesting and varied work of contemporary character; modern offices; attractive salary. J. Seymour Harris & Partners, 4, Greenfield Crescent, Edgbaston, Birmingham, 5. 3513

THE London Hospital, Whitechapel, E.1, requires JUNIOR ARCHITECTURAL ASSISTANT. Salary £440 to £650 p.a. according to experience, plus London weighting. Post superannuable. Applications stating age, present salary and brief particulars of experience to be sent to the House Governor. Accommodation is available in Kensington if successful candidate is a woman. 2677

WESTWOOD, SONS & HARRISON, F./F.R.I.B.A., require a SENIOR ARCHITECTURAL ASSISTANT, A.R.I.B.A. standard, with office experience, also JUNIOR ASSISTANT. Apply in writing, giving brief outline of experience and qualifications, to 46, Baker Street, W.1. 3709

ARCHITECTURAL ASSISTANTS urgently required for detailed planning work. Intermediate and Junior. Salary according to experience. Please apply to L. O. L. Hannen & John H. Markham, 7, Victoria Street, Westminster, S.W.1. Tel. Abbey 5861. 3115

RONALD WARD & PARTNERS require several capable ARCHITECTURAL ASSISTANTS, with contemporary outlook and willing to use own initiative. Salary range £400 to £800. Interesting and varied work, home and abroad. Congenial working conditions. Apply 29, Chesham Place, Belgrave Square, S.W.1. Telephone Belgravia 3361. 3855

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

APPLICATIONS are invited for the following appointments:—

(*a*) SENIOR ASSISTANT ARCHITECTS, with experience of work on commercial and industrial projects.

(Salary range £820 to £975 per annum.)

(*b*) ASSISTANT ARCHITECTS, capable of preparing working drawings from preliminary details.

(Salary range £550 to £820 per annum.)

There is a five-day week in operation, and both appointments offer prospects of upgrading.

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. 3871

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

ASSISTANT ARCHITECTS, WORKER-UP AND SHOP FITTING DRAUGHTSMAN. Applications are invited from suitably qualified persons. Salary on a scale £485—£945 inclusive of L.W., with placing according to age, qualifications and experience. The posts are 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. 2824

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

APPLICATIONS are invited for the following appointments in a newly formed Branch Office. Interesting and varied commercial and industrial projects.

(*a*) SENIOR ASSISTANT ARCHITECT, with experience in Store and Shop Design.

(Salary range £820 to £975 per annum.)

(*b*) ASSISTANT ARCHITECTS, capable of preparing working drawings and details from preliminary sketches.

(Salary range £550 to £820 per annum.)

Both appointments offer prospects of upgrading.

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. 3872

ASSISTANTS required by Architects with extensive London and Provincial practice, including large reinforced concrete and steel-framed structures. Box 3804.

ARCHITECTURAL ASSISTANCE required for interesting and varied work with small but expanding firm in rural area of North Essex. Box 3795.

ASSISTANTS required, with experience in contemporary design. Intermediate and Final R.I.B.A. standard. Good working conditions. Five-day week. Interesting and varied work. Applications, stating age, experience and salary required, to be sent to William Blair, B.Arch. (Lvpl.), A.R.I.B.A., Burton House, 83, Burton Road, Derby. 4929

ARCHITECTURAL ASSISTANTS, both Senior and Junior, are required for interesting work on a variety of schemes, including licensed premises, industrial development, schools and civic buildings. First-class salaries and opportunities offered to suitably experienced applicants. Write or 'phone for appointment to Gornall, Kelly & Partners, 155, The Albany, Old Hall Street, Liverpool, 3. 'Phone Central 9694. 4933

COMPETENT ARCHITECTURAL ASSISTANT, Intermediate standard, required in small London office. Able to take charge of small contracts. Reply, stating experience and salary required, to Box 4948.

ARCHITECTURAL ASSISTANTS of all grades urgently required. Five-day week. Lunch vouchers. Apply to Allan Johnson, F.R.I.B.A., Lanchester & Lodge, 10, Woburn Square, London, W.C.1. 4943

RHODESIA.—Established firm of Chartered Architects require TWO ASSISTANTS, with several years' good experience; one for Salisbury and other for Ndola. Single men preferred. Salaries from £700 p.a. on 3-year contracts, with small and increasing bonus each year. Further details, quoting OSS.22/5, from Overseas Technical Service, 5, Welldon Crescent, Harrow, Middx. 4944

APPLICATIONS are invited for the following appointments:—

Young qualified ARCHITECT, able to take charge of large contemporary building schemes throughout the country. Excellent opportunity for capable designer.

ARCHITECTURAL ASSISTANT, of Intermediate standard, capable of preparing working drawings and details for contemporary shops.

Good salaries. Applications, stating age, qualifications and experience, to C. H. Barnett, M.A., Architect, Prices, Tailors, Ltd., Cardigan Crescent, Leeds, 4. 4938

NORMAN & DAWBARN require ARCHITECTURAL ASSISTANTS, at or above R.I.B.A. Intermediate standard, with not less than 3 years' continuous office experience. Salaries will be in accordance with age, training, length and type of experience. An interesting and varied programme of work is available. Apply by telephone or letter to 5, Gower Street, London, W.C.1. Langham 5341. 4935

CELOTEX, LTD., the largest manufacturer of Fibre Building Boards in the U.K., require first-class REPRESENTATIVE, resident London, aged 25-35, to fill new post in expanding sales force. Position has real future, carries excellent remuneration, superannuated, for man with drive and ambition. Building experience desirable but not essential. Write, giving details of career, past earnings, etc., to Sales Manager, North Circular Road, Stonebridge Park, London, N.W.10. 4953

ASSISTANTS of Intermediate standard required by West of England firm. Applications, with details of experience and salary required, to Eric & Partners, 12, Bath Road, Swindon, Wilts. 4950

LONDON Architects, doing interesting work in England, Africa and Middle East, require ASSISTANTS of varying experience at salaries ranging from £400 to £800. Bonuses will be paid for really satisfactory work. Five-day week. Luncheon vouchers. Reply Box 4949.

SENIOR and INTERMEDIATE ASSISTANTS required for West End Architect's office engaged upon various projects, including housing, offices, factories, etc. Apply in writing, stating age, qualifications, experience, and salary required, to Box 4902.

BRITISH RAILWAYS, LONDON MIDLAND REGION. — ARCHITECTURAL ASSISTANTS required in the Regional Architect's office. Should be Associates of the R.I.B.A., must have keen interest in contemporary design, and knowledge of modern structural technique. Salary £815—£850 per annum. Five-day week. Residential and other travelling facilities available. Apply in writing, giving particulars of age, qualifications and experience, to the Chief Civil Engineer, British Railways, London Midland Region, 5A, Euston Grove, London, N.W.1. 4920

ARCHITECTURAL ASSISTANT required by firm in Home Counties. General practice. Apply, stating experience and salary, to Manning & Steel, F.R.I.B.A., 3, George Street West, Luton, Beds. 4923

ARCHITECTURAL ASSISTANT required for responsible position in expanding private practice. Previous office experience essential. Write, stating experience, and salary required, to Edwin H. Earp & Badger, Chartered Architects, Scholars Lane, Stratford-on-Avon. 4924

BRITISH RAILWAYS, EASTERN REGION.—ASSISTANT ARCHITECTS required in the office of the Architect, Eastern Region, King's Cross Station, for work in connection with the Modernisation Plan. Salary ranges: (1) £815—£850; (2), £720—£780. Applicants for (1) should be qualified, with practical experience, and for (2) should preferably be qualified or have passed Inter. R.I.B.A., with practical experience. Responsibility and prospects for entrants with ability in contemporary design and administration. Five-day week; concessionary rail travel and permanency after probationary period. Apply in writing to Chief Civil Engineer, British Railways, Eastern Region, King's Cross Station, London, N.1, giving full particulars as to age, education, training and experience, quoting Post 1280. 4904

ARCHITECTURAL ASSISTANTS required. Please reply, stating age, experience, and salary required, etc., to Locke, Son & Newcombe, L./A.R.I.B.A., 2, St. Paul's Road, Newton Abbot. 4910

ARCHITECT, fully qualified for Property Development Company. Exceptional opportunity for ambitious man. Must be capable of taking full responsibility of building schemes from inception. Negotiating experience essential. Only fully experienced man will be considered, but to such an applicant the question of salary will be secondary to ability and initiative. Superannuation scheme. Headquarters West End, London. Write, giving age and experience, to Associated Suburban Properties, Ltd., 38, Upper Grosvenor Street, London, W.1. 3997

ASSISTANT ARCHITECT required by Forte's & Co., Ltd., the famous Catering Concern. Age 24/30. Inter. R.I.B.A. standard preferred. Exceptional opportunity to work under qualified executive. Starting salary up to £600, plus 4s. 9d. per day luncheon vouchers. State age, experience, etc., to Senior Personnel Officer, 22, Denman Street, W.1. 3986

ARCHITECTURAL ASSISTANTS, up to Final standard, required for Design Work on Home and Tropical Buildings. Salary according to experience. Apply E. J. D. Mansfield, A.R.I.B.A., Sir William Halcrow & Partners, Stanhope House, 47, Park Lane, London, W.1. 3999

WE are a busy but cheerful London office, and need an ASSISTANT of Inter. to Final standard. He must be able and reasonably experienced. Five-day week. Salary according to capability. Box 3995.

ARCHITECTURAL ASSISTANTS required, all grades, for contemporary office. Salary according to experience. C. H. Elsom, F.R.I.B.A., 44, Catherine Place, S.W.1. Victoria 4304. 3994

ARCHITECTURAL ASSISTANT, Intermediate standard, required for General Practice. Capable of taking charge of small jobs. Good conditions and salary to suitable applicant. Apply Cessford Ball, 205, Lavender Hill, S.W.11. 3993

ARCHITECTURAL ASSISTANT, of Intermediate standard with general all-round ability required. Write Eldred J. Stevens, A.R.I.B.A., 8, Dome Buildings, The Quadrant, Richmond, Surrey. 4922

ARCHITECTURAL ASSISTANTS, £600 to £1,000. Knapton & Deane, 123/4, Newgate Street, E.C.1. MON. 9080. 4921

ASSISTANT ARCHITECT required for Cowes, I.O.W. office. Final standard or qualified, preferably with office experience. Schools, industrial and miscellaneous works. Apply: Howard V. Lobb & Partners, 16, Bath Road, Cowes, I.O.W. 4916

BASIL WARD requires an ARCHITECTURAL ASSISTANT, between Intermediate and Final standard, preferably with not less than one year's office experience. Salary to be agreed. Apply 32, Wigmore Street, London, W.1, or telephone WELbeck 1409. 4912

REQUIRED at Company's Head Office, Guildford: ARCHITECTURAL ASSISTANT, A.R.I.B.A., varied work, mainly factory. Five-day week. Salary by arrangement. Box 4961.

OLIVER LAW & PARTNERS (Chartered Architects), 36, Ebury Street, Westminster, require Two or Three additional ARCHITECTURAL ASSISTANTS (DRAUGHTSMEN). Architectural School or office experience essential. Salaries £600 to £800 per annum, according to experience. 3992

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL

has vacancies for

ARCHITECTS

in its New Works Group, under the control of the Chief Architect.

Duties will include the design and construction of all kinds of buildings, many being of a complex and specialised nature; the preparation of specifications and the arranging of contracts, and working in conjunction with consultants.

Applicants should be associated members of the Royal Institute of British Architects or have equivalent qualifications and should have had wide experience of the duties outlined above.

Salary will be assessed, according to age, qualifications and experience within one of the following scales:—

Senior Architect: £1,490—£1,685 per annum.
Architect: £1,130—£1,435 per annum.

Contributory superannuation scheme.

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