o. 2783 Vol. 107 · The Architects' Journal for June 10, 1948 · Registered as a Newspaper

THE ARCHITECTS' JOURNAL

PRICE . NINEPENCE

SCHOOLS NUMBER
2 - Interior Design and Equipment

Furniture for the new schools

One of the classrooms in the prototype school at Weston-Super-Mare, built by the Bristol Aeroplane Co. (Housing) Ltd., in collaboration with the Consultant Architects of the Company :— Richard Sheppard, F.R.I.B.A., and G. Robson, A.R.I.B.A. — and the Northern Aluminium Company, Ltd.

The "Daily Express" Building.
Architects: Herbert C. Ellis & Clarke, F/F.R.I.B.A.
Contractors: The Birmingham Guild Ltd.

This well-known Fleet Street Landmark has a definite character of its own, largely due to the way "BIRMABRIGHT" has been used—

EXTERNALLY—for covering the joints of glass walling panels.

INTERNALLY—for pilaster and beam-casings, entrance surround, lift, etc., in main ground hall, as also for balustrading and handrail of main staircase.

The material has stood up excellently.

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(REGISTERED TRADE MARK)

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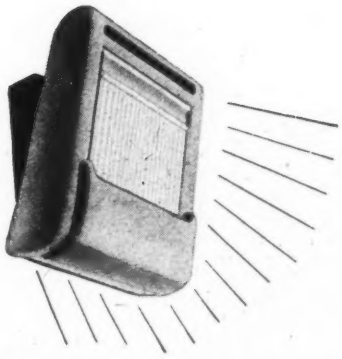
WOODGATE WORKS · QUINTON · BIRMINGHAM 32



Overhead radiant heating by gas

Like the sun, Bratt Colbran Overhead Radiant Heaters radiate their heat *downwards*, providing a comfortable temperature that is invigorating and free of stuffiness. They are also: ECONOMICAL—they direct unobstructed heat *where* it is wanted and only *when* it is wanted. QUICK IN ACTION—they can be switched on and off instantly under individual, grouped or thermostatic control. EFFECTIVE—they can be arranged to give even or directional heat distribution, which quickly gives a measure of comfort even at a low air temperature. Radiant heat is particularly effective in semi-open buildings. SAFE—they are out of reach of accidental contact. SPACE-SAVING—they can be suspended from roof, wall or cross-beam. CONVENIENT—they can be installed quickly and economically, without interfering with the use of the building. SIMPLE—once installed they are good for years with minimum maintenance.

There are four designs of Overhead Radiant Heater: the Luminous Panel Heater (above), the Wedge, the Bowl, and Wall Heaters (shown below). All are noiseless and each has its own special advantages. Between them they solve the heating problems for a wide range of new and existing buildings: factories, workshops, churches, public halls, schools, restaurants, shops, stores, offices.

WALL PATTERN

BOWL PATTERN

WEDGE PATTERN

Consult your local gas undertaking, or write for technical advice on installation to:

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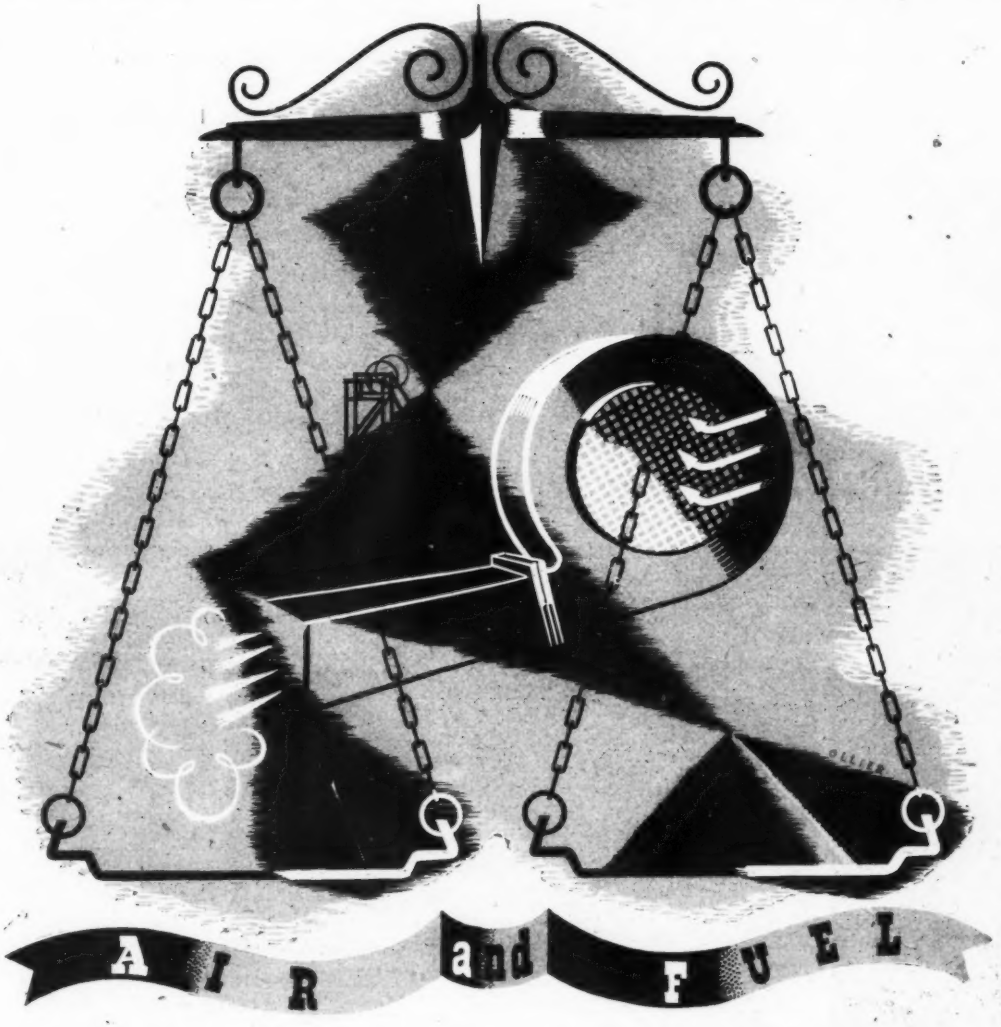
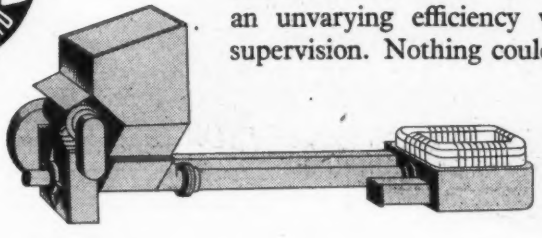
BIGWOOD UNICALOR COAL STOKER



IN EXACT QUANTITIES

In a Unicalor Stoker the air for combustion and the fuel fed to the firebed are always exactly proportioned in predetermined quantities; since the new fuel is introduced below that which is already burning, no smoke is produced and combustion is perfect at all loads. This automatically abolishes the need for a fireman and substitutes an unvarying efficiency without the need for supervision. Nothing could be simpler.

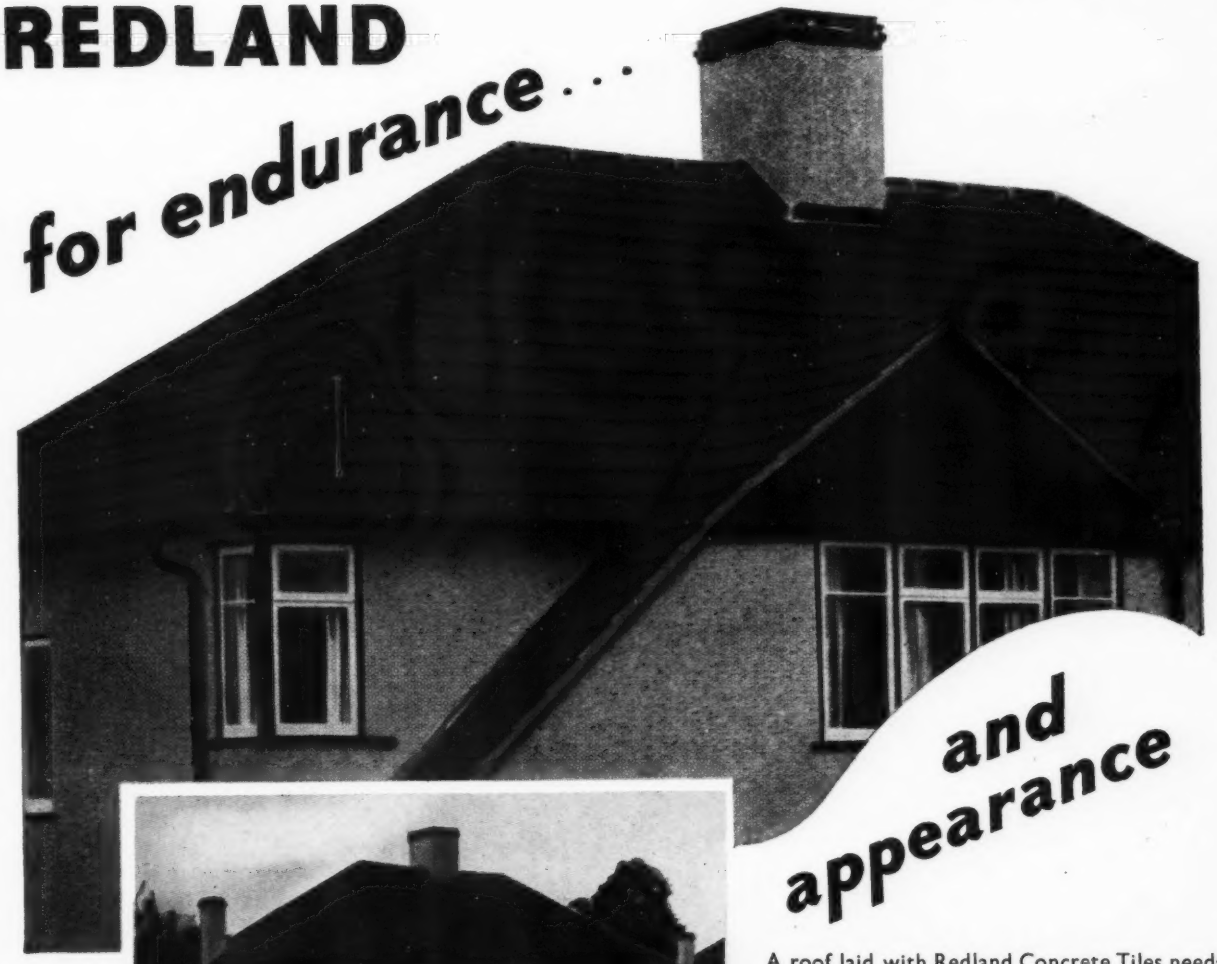


JOSHUA BIGWOOD & SON LIMITED · WOLVERHAMPTON

SK.29

REDLAND

for endurance . . .



and appearance

Architects: Harold Williams & Partners, Croydon. *Builders: West (Redhill) Ltd.*

A roof laid with Redland Concrete Tiles needs neither replacement nor maintenance. The tiles actually increase in strength with age, and are guaranteed against lamination and decay. This is why the Building Industry is so enthusiastic about them, and over 200 Local Authorities have specified or approved "Redland Concrete Roofing Tiles."

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Redland Concrete Interlocking Tiles have been found the most practical and reliable roofing tiles for modern Housing Estates where speed, economy and saving of timber are the foremost considerations. The Interlocking type includes a double water channel which ensures absolute protection from water penetration.

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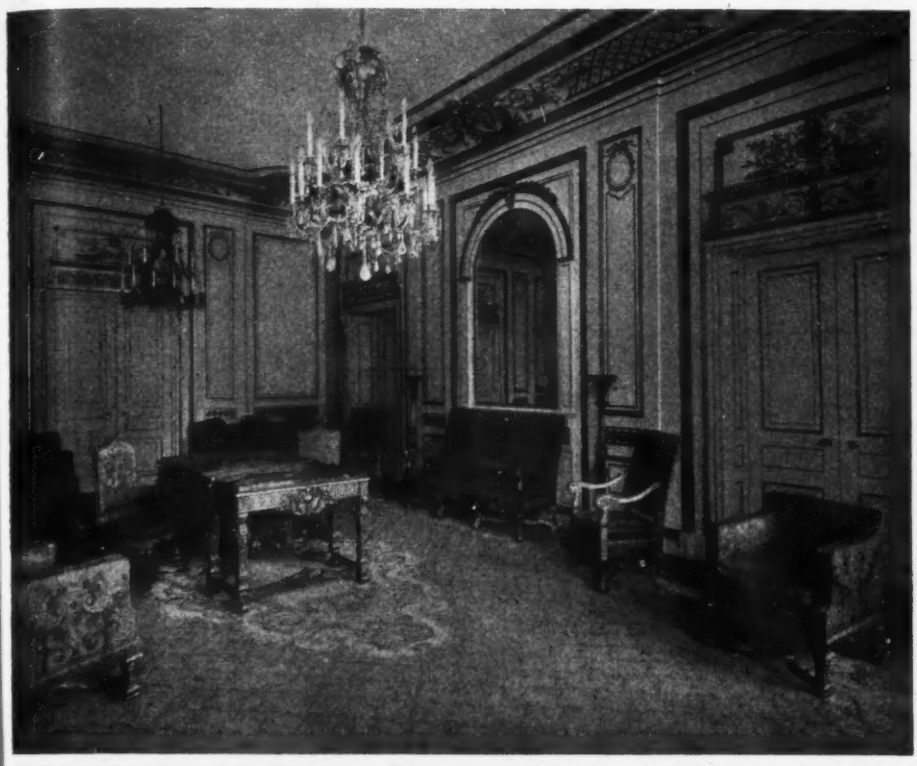

The decoration and furnishing of public and official buildings calls for special knowledge and resources. Waring & Gillow, who have specialised in this work for many years, have a skilled staff and their own extensive manufacturing organization. Enquiries are invited for the decoration and furnishing of hotels, clubs, ships, palaces, etc., in any part of the world.

The photographs of the Royal Egyptian Embassy in London provide an example of the work we did prior to the outbreak of war.

(Architect : M. Fernand Billerey).

Telephone : MUSEUM 5000

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POTTERY THROUGH THE AGES · NO. 13

Specially drawn by Gordon Nicoll, R.I.

ITALIAN MAIOLICA AND TERRA-COTTA

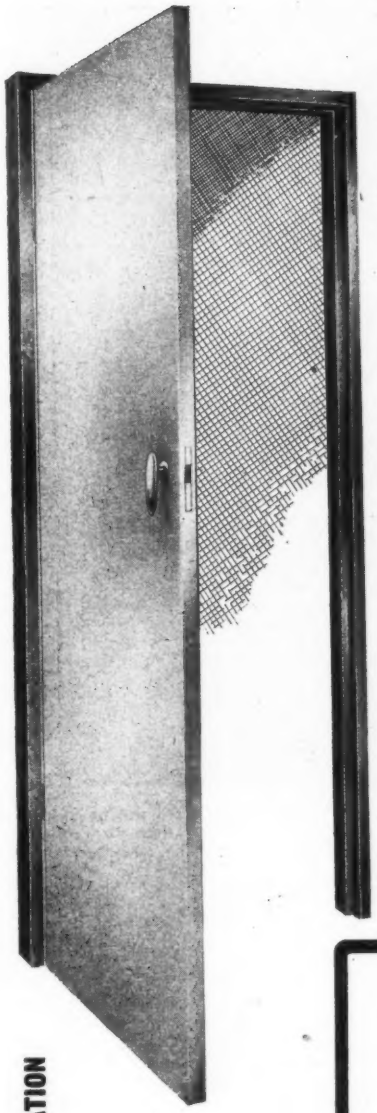
Although tin enamel and lustre colours were used in the 14th century, it was not until the Renaissance that a true tin-enamelled Italian earthenware, comparable with the Hispano-Moresque, was perfected. This development was encouraged by the Medici and other noble families who vied with each other in establishing centres of production in Faenza, Gubbio, Castel Durante, Pesaro, Urbino, Ferrara, Naples, Venice, Florence and many other cities and towns. Several of these developed distinctive styles of decoration but the wares became known generally as *maiolica*—a word probably derived from *Majorca*, whence large quantities of Spanish pottery had previously been shipped to Italy.

"The Three Books of the Potter's Art" written by Cipriano Piccolpasso about 1556 give a wealth of information about the methods of shaping, decorating and firing. The craft was pursued with well-nigh religious zeal, and the position of the moon and planets taken into account to ensure a successful firing. Many of the maiolica painters established great reputations, and their services were constantly in demand.

Paintings of some of the great Italian masters were often reproduced on pottery, besides themes based on Greek and Roman mythology and biblical events. Portraits from life were commissioned for the "bacili amatori" or "lover's gifts" presented to ladies by their courtiers. Some of the chargers, dishes and vases were completely covered with decoration in bright, enduring colours, among which brilliant yellow, orange, indigo, ruby, gold and mother of pearl lustre effects predominated. The characteristic intertwining scrolls of flowers, animals, shells, cherubs, sphinxes, dragons and birds on many maiolica pieces show a wealth of phantasy.

Lucca della Robbia, a famous Florentine goldsmith and sculptor employed by the Medici family, perfected a beautiful opaque creamy-white glaze which he used to cover his bas-reliefs, wall-plaques, altar-pieces and other creations in terra-cotta. His nephew, Andrea, whose entrancing studies of cherubs, babes and Holy Children are still so widely reproduced, carried on the della Robbia tradition after Lucca's death; later the style degenerated and became over-ornate.

Donatello, Alberti, Bramante, Michael Angelo and other great artists made use of terra-cotta both for the interior and exterior adornment of buildings and it has been well said that among all historic precedents for the architectural use of terra-cotta, the Italian Renaissance offers the most fruitful field of study.



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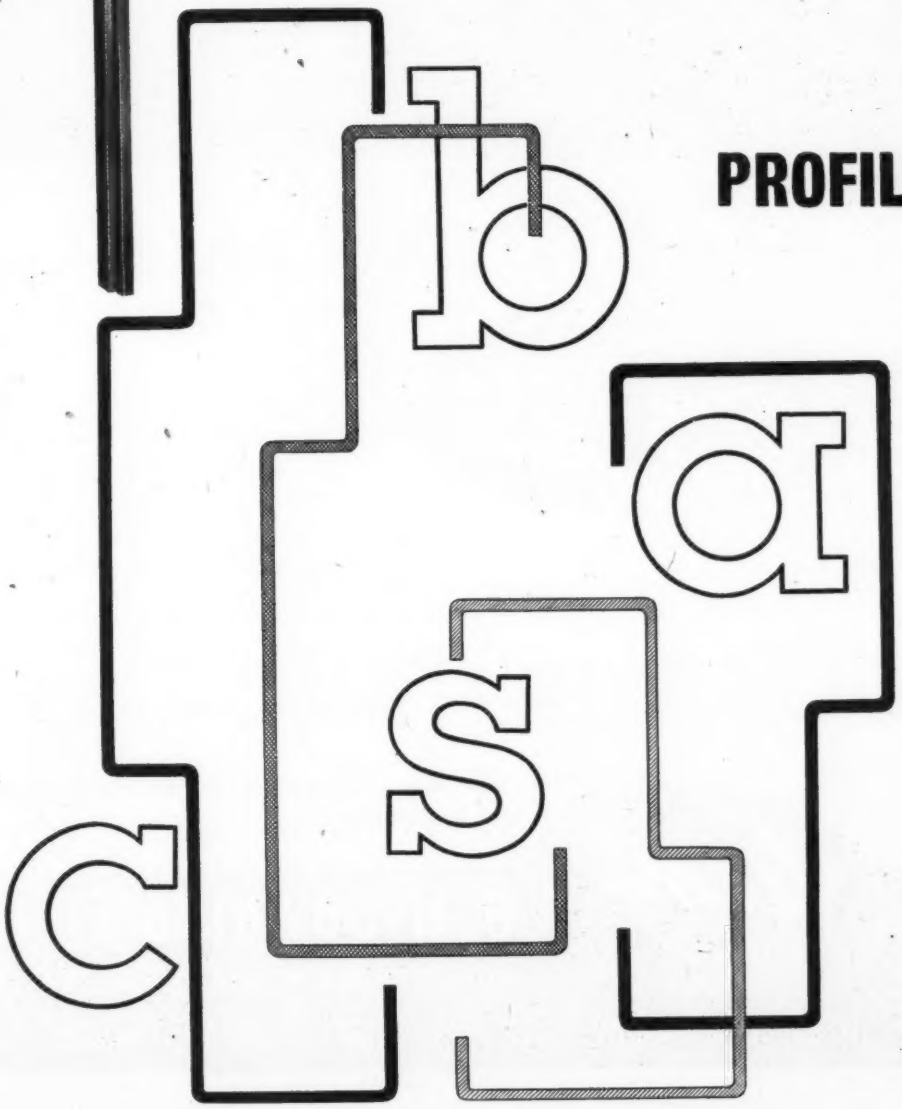

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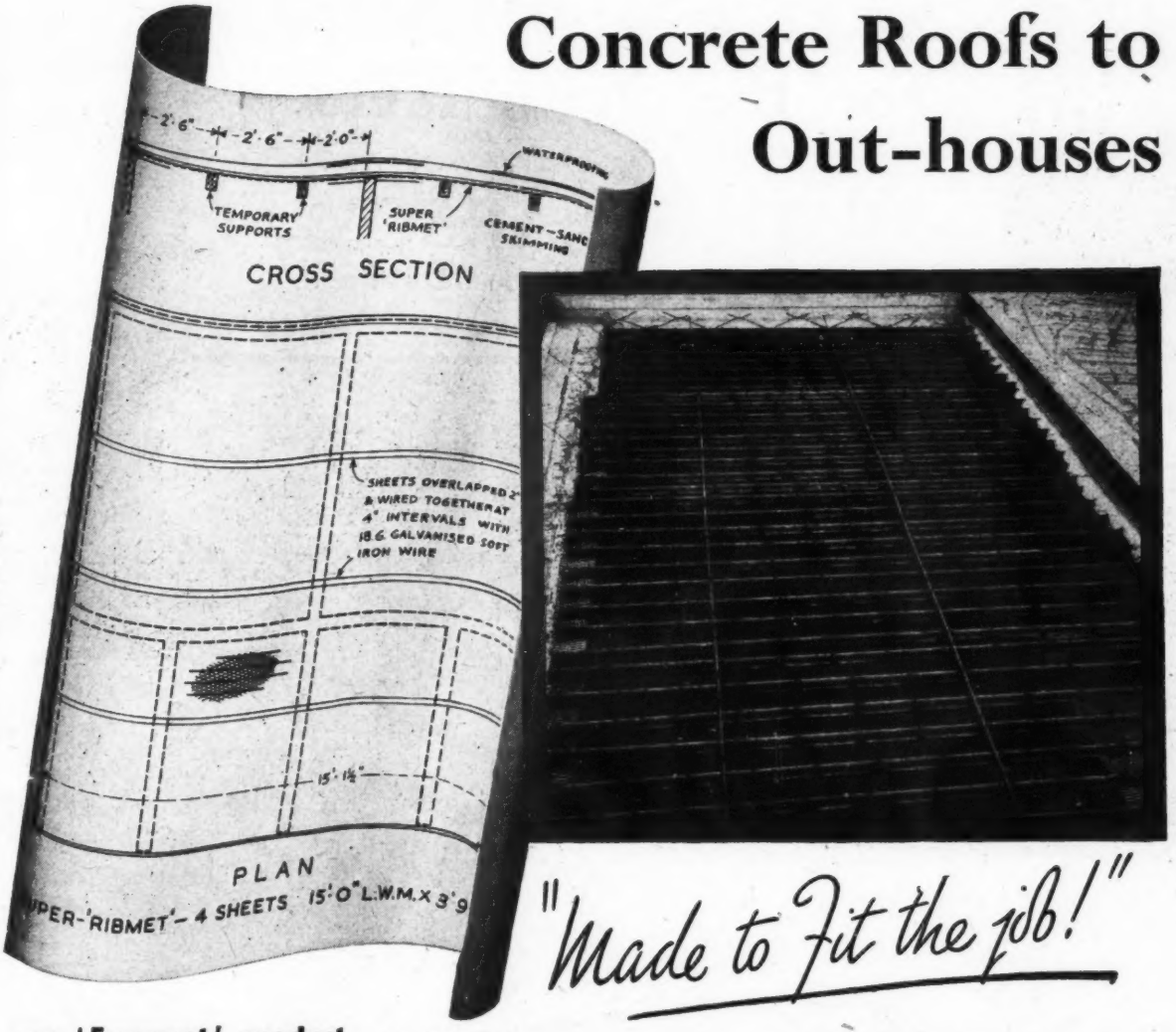

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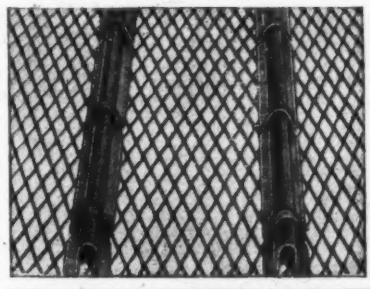

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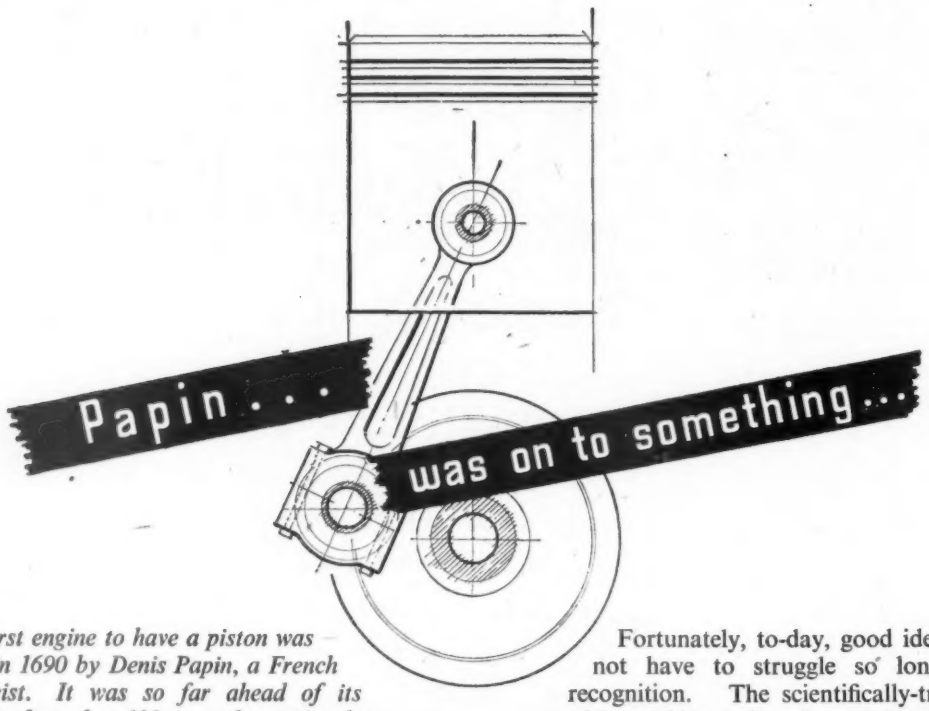
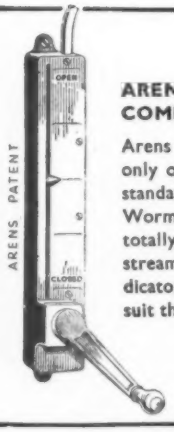


The first engine to have a piston was built in 1690 by Denis Papin, a French physicist. It was so far ahead of its time in fact, that 100 years later Napoleon considered steam-engines, based on Papin's designs, too revolutionary to be of military value.

Fortunately, to-day, good ideas do not have to struggle so long for recognition. The scientifically-trained modern architect plans for ample ventilation and extensive window areas, leaving problems in window control to Arens. The smooth efficiency of Arens Remote Controls and their ease and simplicity of operation accord with the advanced principles of modern building. Their neat, compact appearance harmonises with light, airy interiors.

The range of Arens Controls covers most modern architectural needs, but a wide experience of dealing with individual requirements in window control equips Arens to tackle new problems as they appear.



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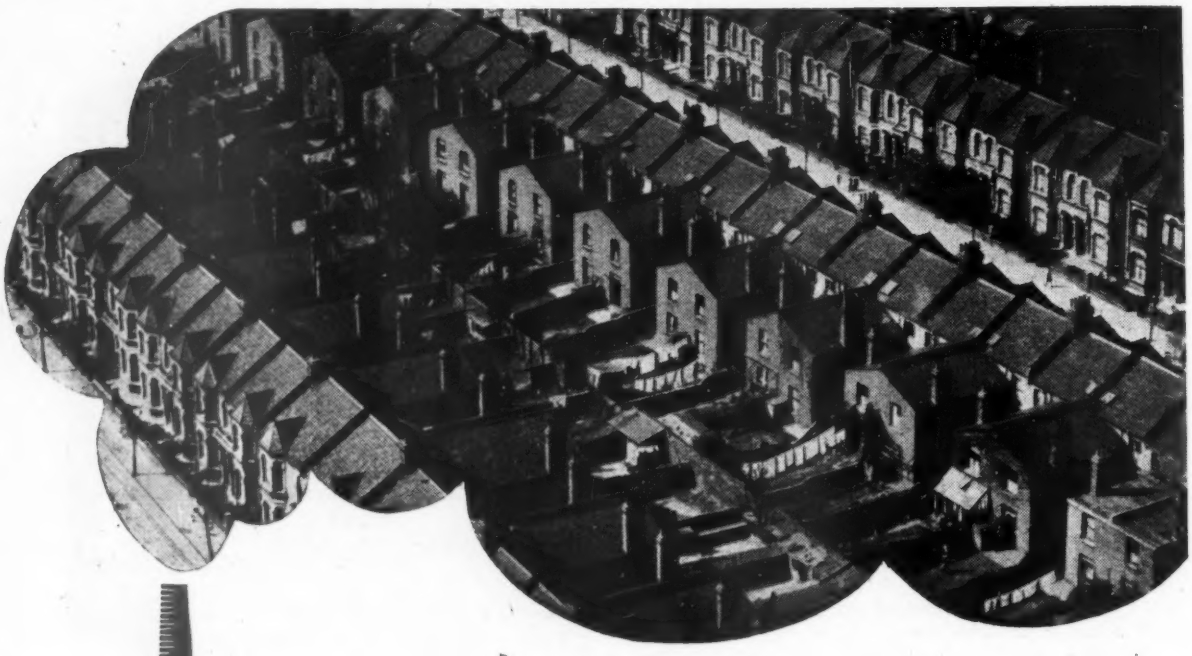

200 HOMES KEPT WARM FOR A YEAR

on the fuel saved by insulating one factory

Every uninsulated building wastes fuel — and will go on doing so, until unnecessary heat losses are overcome by lining the roof and walls with Celotex cane-fibre insulation. The fuel saving which then results is dramatic. In a steel-framed factory with 100,000 sq. ft. of corrugated asbestos roof, it may be as much as 600 tons of coal a year — enough to supply the needs of 200 homes. In buildings of every kind the installation of Celotex quickly pays for itself in terms of lower fuel bills and a smaller capital charge for the heating plant. The table, based on Fuel Efficiency Bulletin No. 12, gives a general picture of the fuel savings which result when steel framed roofs are insulated with Celotex. Our technical department will gladly calculate specific data for your individual needs.

CONSTRUCTION		Uninsulated		Under-Purlin Insulation		Over-Purlin Insulation			
Corrugated Asbestos Cement		1/4"	-	1/4"	-	1/4"	1/4"	-	-
Corrugated Iron		-	22G	-	22G	-	-	22G	22G
Celotex Insulating Board		-	-	-	-	1/2"	1"	1/2"	1"
Air Space/Purlins		-	-	4"	4"	-	-	-	-
Celotex Insulating Board		-	-	1/2"	1/2"	-	-	-	-
Thermal Transmittance 'U'		1.40	1.50	0.31	0.32	0.35	0.23	0.36	0.24
To make good heat loss per 1000 sq. ft.	Fuel Consumption tons p.a.	7.7	8.3	1.7	1.8	1.9	1.3	2.0	1.3
	Cost of Heating Plant. Cost £'s	88	94	19	20	22	14	22.5	15
Saving in Plant and Fuel due to Celotex Insulation				78	79	75	84	76	84

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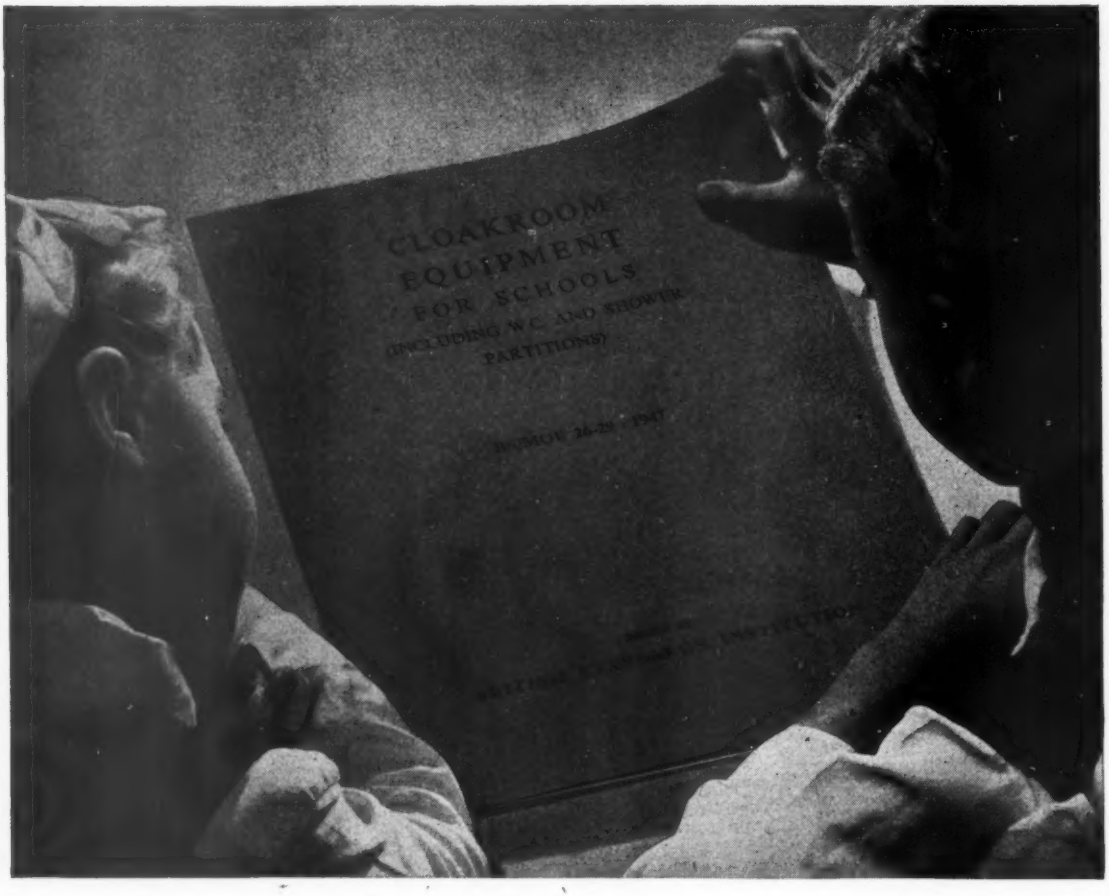

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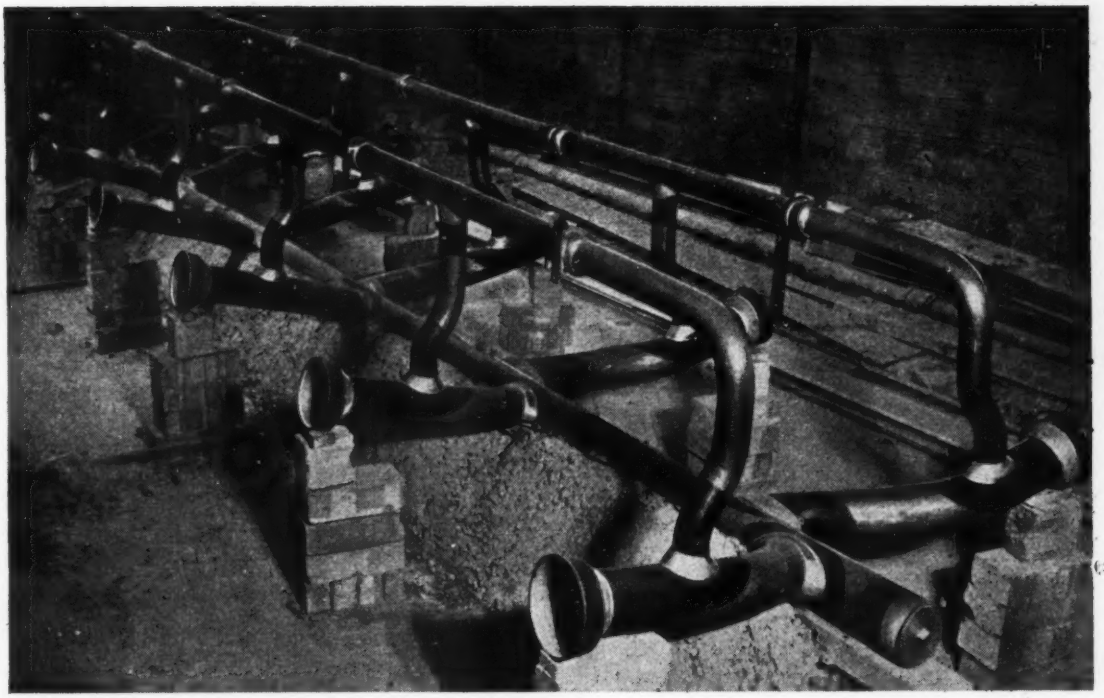
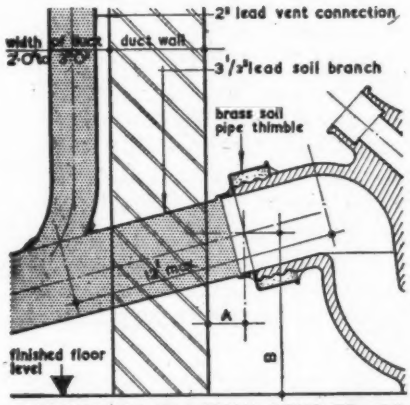


PLUMBING to W.C.'s

in schools, hospitals, factories



ARRANGEMENT OF DISPOSAL PIPING TO "P" TRAP FITMENT ON INTERNAL DUCT WALL

Arrangement of two ranges of W.C.'s set back to back with a separating duct 2' to 3' wide to contain soil and vent pipes, soil stack and other pipe runs if required.

One of the most complicated examples of pipework met with in normal plumbing is the disposal piping to ranges of appliances. LEAD has a great advantage over other materials for this type of work because of its flexibility in small and large diameters, and the ease with which it can be worked and bent by hand.

These characteristics of LEAD are of special value when elements of pipework are prepared in the workshop for rapid assembly on the site. The necessary provision for easy, *in situ* adjustments to meet the dimensional variations of normal building work and sanitary appliances are best made by the use of lead or lead alloy pipe.

LEAD

The Technical Information Bureau of the Lead Industries Development Council, which exists to give assistance on problems relating to the use of lead sheet and pipe in building work, will be pleased to give advice on any questions relating to the uses of the materials.

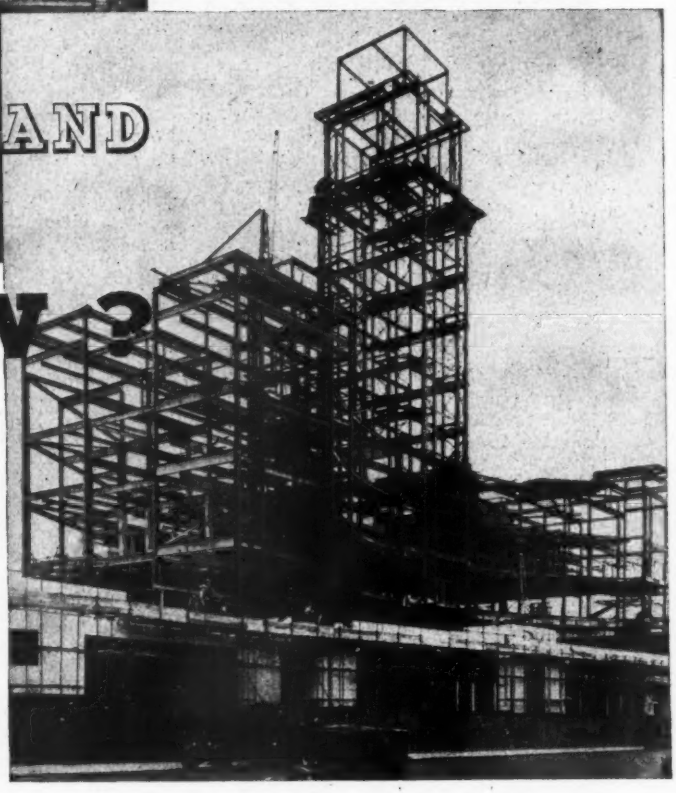
LEAD INDUSTRIES DEVELOPMENT COUNCIL, EAGLE HOUSE, JERMYN STREET, LONDON, S.W.1

LEAD TECHNICAL INFORMATION BUREAU, 23 LOWER BELGRAVE STREET, LONDON, S.W.1. TELEPHONE: SLOANE 0474

YESTERDAY-

AND

TOMORROW?



'Yesterday' for HORSELEY-PIGGOTT, stretches back 170 years, to the beginnings of the Horseley ironworks at Tipton. An early work was the construction of the Bridge shown above, built by HORSELEY in 1821—126 years ago—which still stands to-day as one of the famous features of the Midlands, carrying more traffic now than it has ever done before.

The right-hand photograph shows part of the structure of one of the Empire's most widely known buildings—completed by HORSELEY-PIGGOTT on the eve of the world war. The toughness of the old Bridge has its counterpart in the supreme strength of the modern structure. The same industry, the same care, the same unremitting attention to detail—the same combination of proved reliability with the latest advances in scientific method, are evident in both these works of HORSELEY—separated in time by 126 years. So yesterday reaches forward into tomorrow, for who can doubt after recent experience that the answer to the air-raider in the cities of the future is the steel-frame building. Here the HORSELEY-PIGGOTT organisation offers its services to Architects and Engineers interested in present-day construction and future reconstruction.

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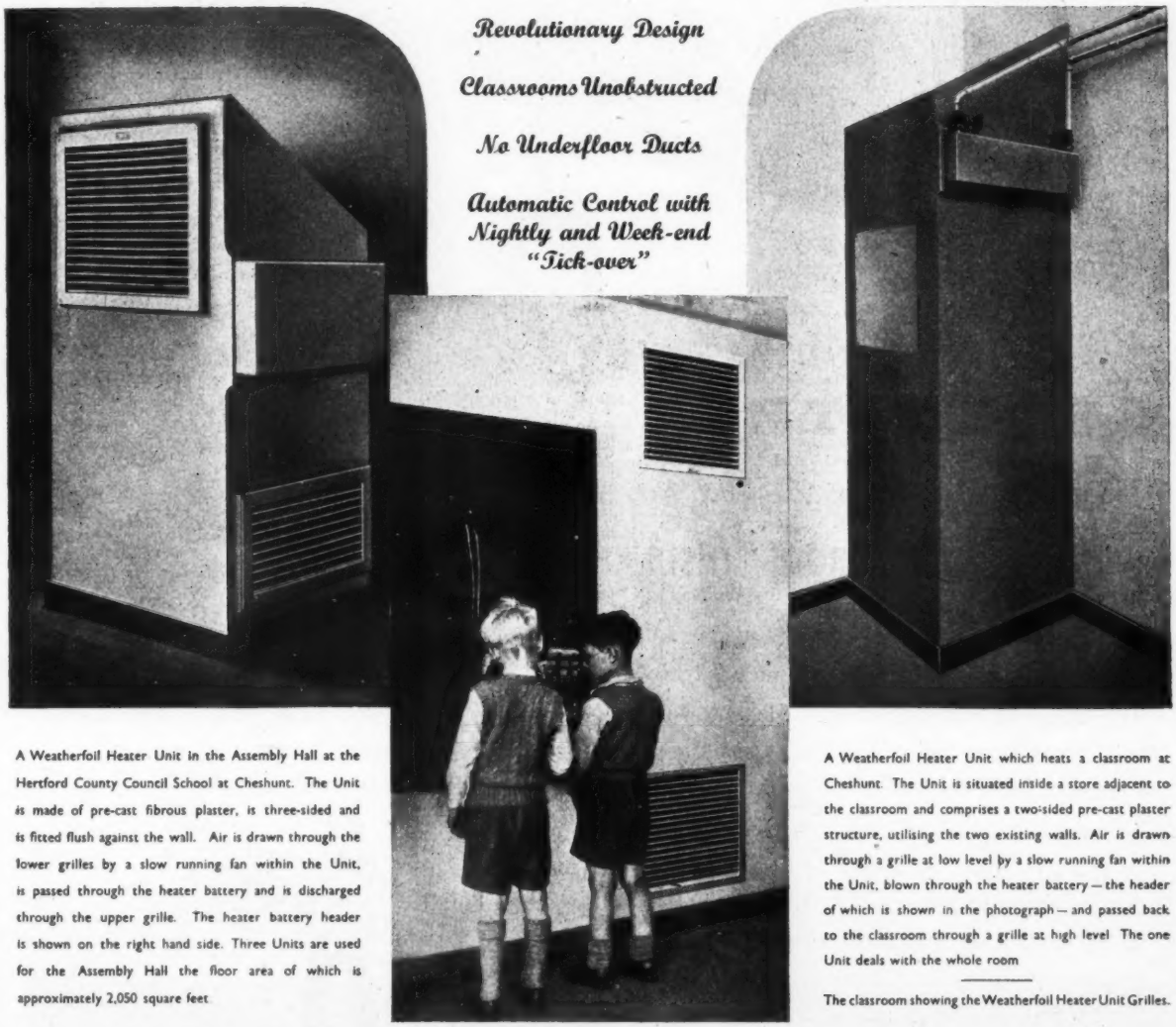

A Weatherfoil Heater Unit in the Assembly Hall at the Hertford County Council School at Cheshunt. The Unit is made of pre-cast fibrous plaster, is three-sided and is fitted flush against the wall. Air is drawn through the lower grilles by a slow running fan within the Unit, is passed through the heater battery and is discharged through the upper grille. The heater battery header is shown on the right hand side. Three Units are used for the Assembly Hall the floor area of which is approximately 2,050 square feet.

A Weatherfoil Heater Unit which heats a classroom at Cheshunt. The Unit is situated inside a store adjacent to the classroom and comprises a two-sided pre-cast plaster structure, utilising the two existing walls. Air is drawn through a grille at low level by a slow running fan within the Unit, blown through the heater battery — the header of which is shown in the photograph — and passed back to the classroom through a grille at high level. The one Unit deals with the whole room.

The classroom showing the Weatherfoil Heater Unit Grilles.

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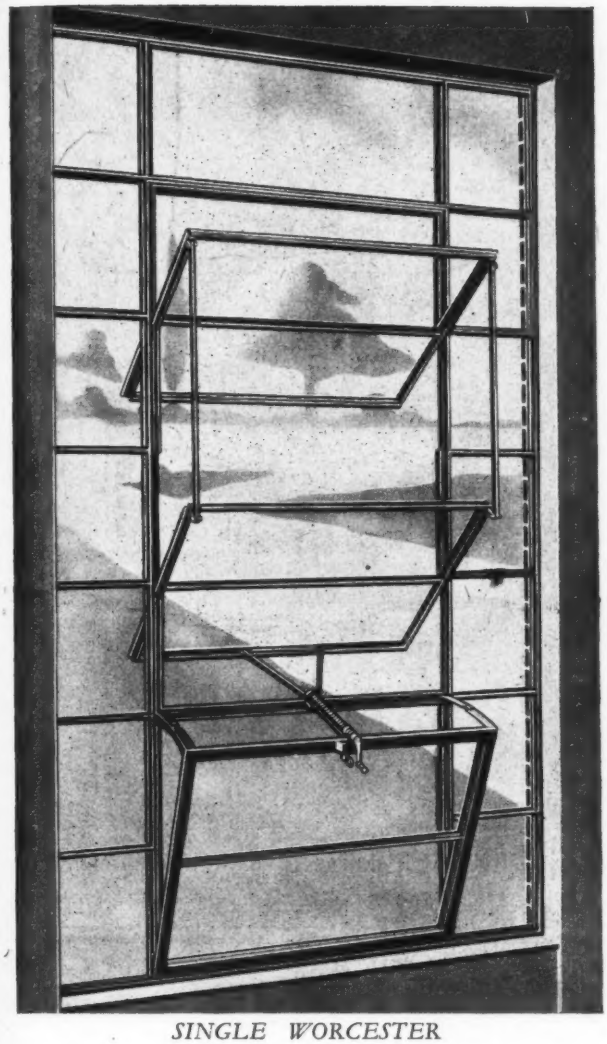
G.K.10.



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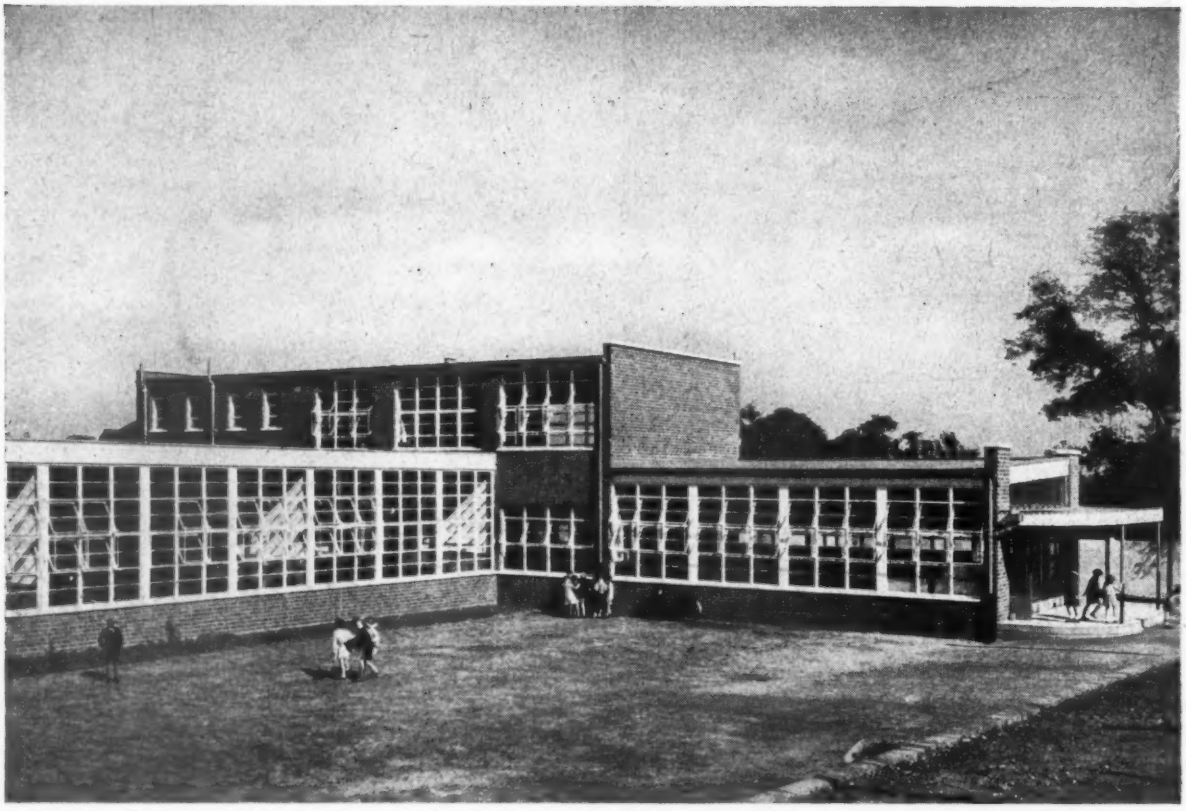

CHERRY ORCHARD ROAD SCHOOLS for the City of Birmingham Education Committee
Architect: W. T. Benslyn, A.R.C.A., F.R.I.B.A. J. R. Deacon Ltd., *Building Contractors*

In common with every other periodical, this JOURNAL *is rationed to a small part of its pre-war consumption of paper. Circulation is therefore temporarily restricted but would-be subscribers are advised to have their names put on the waiting-list. Their names will then be added to the subscription list as soon as possible. Subscription rates : by post in the U.K. or abroad, £1 15s. 0d. per annum. Single copies, 9d. ; post free, 11d. Special numbers are included in subscription ; single copies, 1s. 6d. ; post free, 1s. 9d. Back numbers more than 12 months old (when available), double price. Volumes can be bound complete with index, in cloth cases, for 15s. each ; carriage 1s. extra.*

DIARY FOR JUNE JULY AND AUGUST

Titles of exhibitions, lectures and papers are printed in italics. In the case of papers and lectures the authors' names come first.

CHATHAM. *Visit to Fort Luton School.* (Sponsor, S.E. Society of Architects, Maidstone Group.) JULY 10

GATESHEAD. *RSI Gateshead Sessional Meeting.* Lt.-Col. G. Perry. *The Planning of Industrial Estates.* Afternoon visits to Queen Elizabeth Hospital and Sheriff Hill Isolation Hospital, Gateshead, Shipcote Baths and the Team Valley Trading Estate. At the Greenesfield Health Centre, Mulgrave Terrace, Gateshead. (Sponsor, RSI.) JUNE 26

HULL. *One-Day School on the Town and Country Planning Act,* 1947. W. A. Wood of MOTCP will lecture on (1) *Compensation and Development Charges,* (2) *The Planning Machine,* (3) *Land Purchase.* At the Council Chambers, Guildhall, Hull. (Sponsor, TCPA.) 10.30 a.m. JULY 3

LAUSANNE. *First Congress of the International Union of Architects.* At Lausanne. (Sponsors for British Section, RIBA.) JUNE 29 TO JULY 1

LONDON. *Darkness into Daylight Exhibition.* At the Science Museum, South Kensington. (Sponsor, Science Museum.) UNTIL SEPTEMBER 30

Coalite Exhibition. At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, HC.) UNTIL JUNE 14

New Schools Exhibition. At the RIBA, 66, Portland Place, W.1. (Sponsor, RIBA.) Weekdays 10-6, Saturdays 10-5 UNTIL JUNE 19

Exhibition of Metropolitan Housing Layouts. At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, HC.) UNTIL JUNE 26

Arnold Whittick. *Beautiful and Ugly Housing.* At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, HC.) Buffet lunch 12.45-1.15 p.m., 2s. 6d. Lecture 1.15-2.15 p.m., 6d. JUNE 15

R. B. Hounsfield. *Are Railways the Key to Planning?* At the Planning Centre, 28, King Street, W.C.2. (Sponsor, TCPA.) 6.15 p.m. JUNE 16

RIBA Council Election Results. Charles Woodward and Sydney Redfern. *Questions and Answers in Practice.* At the RIBA, 66, Portland Place, W.1. (Sponsor, RIBA.) JUNE 22

Cynthia Wood. *Housing in Rural Wales.* At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, H.C.) Buffet lunch 12.45-1.15 p.m., 2s. 6d. Lecture 1.15-2.15 p.m., 6d. JUNE 22

Desmond Heap. *Town and Country Planning Act,* 1947. At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, HC.) Buffet lunch 12.45-1.15 p.m., 2s. 6d. Lecture 1.15-2.15 p.m., 6d. JUNE 29

J. F. Adburgham. *Report on the 19th International Congress for Housing and Town Planning.* At the Housing Centre, 13, Suffolk Street, S.W.1. (Sponsor, HC.) Buffet lunch 12.45-1.15 p.m., 2s. 6d. Lecture, 1.15-2.15 p.m., 6d. JULY 6

Opening of the Annual Exhibition of Work of the AA School of Architecture. At the AA, 34/6, Bedford Square, W.C.1. (Sponsor, AA.) JULY 9

Annual Prize-giving of the AA School of Architecture. At the AA, 34/6, Bedford Square, W.C.1. (Sponsor, AA.) 3.30 p.m. JULY 9

SHEFFIELD. *One-Day School on the Town and Country Planning Act,* 1947. W. A. Wood of MOTCP will lecture on (1) *Compensation and Development Charges,* (2) *The Planning Machine,* (3) *Land Purchase.* At the Central Library Theatre, Sheffield. (Sponsor, TCPA.) 10.30 a.m. JUNE 12

ST. ALBANS. *Old English Tools.* Exhibition from the collection of R. A. Salaman. At the Hertfordshire County Museum, Hatfield Road, St. Albans. UNTIL JUNE 19

TORONTO. *Canadian International Trade Fair.* At the Exhibition Grounds, Toronto. (Sponsor, Canadian Government Exhibition Commission.) UNTIL JUNE 12

COMPETITIONS

Art Competition and Exhibition of the XIV Olympiad, London, 1948. Designs eligible: (*a*) Town planning, (*b*) Architectural designs. Entries will be limited to designs for sports grounds and to buildings intended for use in connection with sport only, and must be received before June 11, 1948. Full particulars from the Organizing Committee for the XIV Olympiad, London, 1948, 105, Victoria Street, London, S.W.1. JUNE 11

Royal National Eisteddfod of Wales Architectural Competitions, 1948. Competition 192 for a county college. Competition 193 for a neighbourhood unit layout. Assessors: C. F. Bates and T. Alwyn Lloyd. Premiums: £50 in each case. Conditions and entry forms from Rev. W. J. Samuel, General Secretary, 38, Dunraven Place, Bridgend. Entries to be submitted by June 14. UNTIL JUNE 14

NEWS

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Though no feature in the JOURNAL *is without value for someone, there are often good reasons why certain news calls for special emphasis.*

★ *means spare a second for this, it will probably be worth it.*

★★ *means important news, for reasons which may or may not be obvious.*

Any feature marked with more than two stars is very big building news indeed.

★

The Minister of Town and Country Planning, Mr. Lewis Silkin, has appointed Mr. John Corina VICE-CHAIRMAN OF THE STEVENAGE NEW TOWN DEVELOPMENT CORPORATION in place of Mrs. Monica Felton, who recently resigned.

Mr. Corina, who has been a member of the Development Corporation since January this year, is 37 years of age, and has been for thirteen years a director of Royal Arsenal Co-operative Society and of Progress Estates Limited. He is a member of the National Council of Labour, deputy-chairman of Co-operative Union Limited, and member of its national authority. He was educated at Ruskin College, Oxford.

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SECOND SCHOOLS ISSUE. This issue of the JOURNAL supplements the first schools issue which appeared on May 20 and dealt with the large issues of school design and the contemporary planning approach. In this issue the technical aspects of design problems have been similarly treated. The issue begins with a survey of constructional considerations which is followed by articles on noise and acoustics, lighting, internal finishes, heating, sanitary equipment, kitchen equipment, and furniture. It ends with an article on school costs and a selected bibliography covering educational services and school planning.

★

Models for a NEW TOWN AT KIRBY, for 48,000 inhabitants, planned by Sir Lancelot Keay, the Liverpool city architect and his staff, have been laid before the Liverpool Housing Committee.

The estate, approximately 1,350 acres, lies north-east of the proposed new Outer Circle Road, and west of its junction with the East Lancashire Road, six miles from the centre of Liverpool. It will be divided into four substantially self-contained sub-units, and 680 acres of land adjoining will be reserved for regional open space. Layout has been largely governed by the Outer Circle Road, a major traffic road, the railway, and the canal. Each sub-unit of 12,000 population will have its own shopping centre and community buildings, but prominence is given to the geographically central unit lying immediately west of the railway. Here, some amenity buildings will serve the township as a whole. Dwellings will be of all kinds, ranging from old folks' paying 3s. 6d. a week rent to superior classes of flats costing £150 a year. Industrial development will proceed on a section of the township, separated by a green belt and 120-ft. road, and must cater for all types of residents. Garage accommodation will be provided for 50 per cent. of the residents. The gateway to the township will be flanked by blocks of flats of seven storeys, served by lifts. The avenue will lead to a vast oval, the central feature of which will be an alfresco sports stadium, rectangular in shape, to accommodate 25,000 people.

Beyond will be a town hall, with tower and cupola, flanked by a theatre and cinema, or two cinemas. There is ample provision for churches. The historic Kirkby church is not interfered with, nor is the village.

The Government's decision to appoint a Working Party to inquire into the ORGANISATION AND EFFICIENCY OF BUILDING OPERATIONS has been criticised by contractors as untimely.

A statement by the National Federation of Building Trades Employers pointed out that from all points of view the decision could hardly have been worse timed. "The building season of 1948 has just begun. The record house-building figure recently announced by Mr. Bevan has given encouragement to all concerned, including those who are waiting for houses. Industrial relations are good, and systems of incentives which are being tried out in the industry for the first time by agreement with the operatives are beginning to show promising results. Given confidence, therefore, all-round improvement seemed likely despite the general economic position. The Government's decision will create uncertainty and destroy confidence and the necessary team spirit. Production generally will be adversely affected by the dissipation of energies which should be used in getting on with the actual job of building, and conditions are still so unsettled that the Working Party will find it difficult to make recommendations which will be of any real value in less abnormal times. The decision is the Government's, however, and the National Federation will co-operate with the Working Party. They are confident of the outcome of any impartial investigation." A spokesman for the Amalgamated Union of Building Trade Workers has stated: "We welcome the appointment of this committee. There has been dissatisfaction and unrest among building workers for a long time, and we have already demanded a public inquiry into such anomalies as 100,000 bricklayers in the country and 140,000 building firms."

A DELEGATION FROM THE UNIVERSITY OF PARIS arrived in London on June 3 to spend a week in Britain under the auspices of the British Council.

Members were Messieurs J. Sarrailh, Rector of the Sorbonne; J. Toutee, Deputy President of University City; A. Desclos, Director of the College Franco-Britannique; L. Bechman, Chief Architect, 4th Reconstruction Zone; A. Laprade, Chief Architect, National Palaces; J. Vernon, Architect; and Mlle. J. Thomas, Director of Social and Cultural Activities, University City. They inspected facilities for undergraduate accommodation and welfare in British Universities, visiting Oxford and Reading (June 4-6), Bristol June 6-7), and Birmingham (June 7-8), after which they returned to London for the remainder of their stay. On June 4 they attended the opening ceremony of the Maison Francaise at Oxford, and M. Sarrailh received an honorary degree.

CHELSEA BOROUGH COUNCIL has been asked to approve resolutions asking the LCC to promote legislation on behalf of the council to enable it to provide STUDIOS FOR ARTISTS.

The law and parliamentary committee recommends that the L.C.C. be asked to seek these powers under the London County Council (General Powers) Bill to be promoted in the 1948-49 session of Parliament. In making its recommendations the committee points out that of the 316 known studios in use in 1939, designed and built for the purpose, 47 were totally destroyed by enemy action and 42 made unfit for occupation. Many are used as private residences, leaving only 76 in reasonably good repair and used for the practice of the arts—24 per cent. of the pre-war total.

Opening the Building Trades Exhibition at Manchester, Mr. Charles W. Key, the Minister of Works, declared that the limitations on NEW HOUSING were temporary, and the ban on NEW INDUSTRIAL BUILDING could not last indefinitely.

Preliminary work on schemes of all kinds should be going forward so that the main work should be tackled when the opportunity arose.

Bristol Museum officials examining the tessellated floor of the Roman villa uncovered by workmen clearing the new Lawrence Weston housing site at Shireworth. Work on this section of the site has been postponed until it has been decided what to do with the remains.

A Kindergarten in the USA

In the first schools issue of the JOURNAL, published on May 20, examples of English schools only were illustrated, since the issue was concerned primarily with the effects on planning of the 1944 Education Act. In this second issue, which deals with the narrower technical problems of school design, foreign examples are more relevant. The photograph above is of a classroom at Laurel Creek Elementary School at San Mateo, California, by Franklin, Kump and Falk. It makes an interesting comparison with the English solution to similar problems of internal finish, equipment, and lighting. The emphasis is upon lightness and a plentiful use of glass, but in England a similar treatment would be modified by climatic considerations and the structural requirements of the Education Act.

★★

THE QUALIFICATIONS NEEDED BY TOWN PLANNERS WILL BE EXAMINED BY A COMMITTEE

appointed by the Rt. Hon. Arthur Woodburn, M.P., Secretary of State for Scotland, and the Rt. Hon. Lewis Silkin; M.P., Minister of Town and Country Planning.

The Chairman of the new body will be Sir George Schuster. The Committee's terms of reference are as follows:—"To take account of the present and prospective scope of Town and Country Planning, and to consider and report what qualifications are necessary or desirable for persons engaged in it and to make any recommendations affecting those persons which appear to the Committee to be relevant." Members of the Committee are:—

Sir George Schuster, K.C.S.I., K.C.M.G., C.B.E., M.C., the Chairman. Sir George is a member of the Government's Committee on Industrial Productivity, and has been chairman and member of numerous other Government Committees. M.P. for Walsall from 1938 to 1945 and a member of the Select Committee on National Expenditure during the war, he is a director of the Westminster Bank and on the board of many other companies.

Mr. Gerald Barry, lately Editor of the *News Chronicle*.

Dr. Leonard T. M. Gray, PH.D., B.SC., A.R.I.C., Chairman and Managing Director of Miller and Co., Ltd., London Road Foundry, Edinburgh. Dr. Gray is also Director of Edinburgh Chamber of Commerce and Director of Welwyn Garden City, Ltd., and associated organizations.

Mr. W. O. Hart, General Manager of the Hemel Hempstead New Town Development Corporation.

Dr. R. M. Jackson, M.A., LL.D., Chairman of the Planning Committee, Cambridge County Council. Dr. Jackson is a Fellow of St. John's College, Cambridge, and a Lecturer in Law.

Alderman Byng Kenrick, of Birmingham.

Councillor Thomas Paterson, Chairman of the Education Committee, Ayr County Council.

Miss E. A. Sharp, Deputy Secretary, Ministry of Town and Country Planning.

Sir Robert Wood, K.B.E., Principal of University College, Southampton, and formerly Deputy Secretary of the Board of Education.

Secretary: Mr. H. R. Pollitzer, Ministry of Town and Country Planning.

In announcing the setting up of the new Committee the Ministers stated that with the passing of the recent Scottish and English Planning Acts much greater responsibilities have been placed on planners. They have therefore decided that the successful working of the new legislation necessitates a re-examination both of the planners' field of activity and of the qualifications desired of them. Consideration of the new aspects of planning will be only part of the Committee's tasks. The traditional spheres of architecture, engineering and surveying which have for over 30 years been so ably co-ordinated by the Town Planning Institute will also be examined.

★★

PRINCESS ELIZABETH as president of the Royal Society of Arts, presided in London on May 31, at the first meeting of the council of the Festival of Britain, 1951.

Princess Elizabeth said: The festival will not be confined to London but will be spread throughout the kingdom. It will be designed to display to our own people and to visitors from all over the world what a wealth of ideas and achievements Great Britain has produced in the realm of art and science. I hope 1951 will be a summer of festival which the whole nation can enjoy and in which as many as possible can share. To keep our freedom to live and think as we believe best we have made heavy material sacrifices in recent years, but we have certainly not forfeited our opportunities of leadership in the world of ideas. The present places a greater obligation upon us than ever before to concentrate on quality, in things of the mind no less than in what our factories produce. I hope also that, in emphasizing our achievements of the past and present, you will stress no less sharply our responsibilities to the future. Then the Festival of Britain, 1951, may prove to be not simply an end in itself but a beginning of many good things, and it may be an event which, by its excellence, permanently raises the regard in which British artists, scientists, craftsmen, and technicians are held. Mr. Herbert Morrison, Lord President of the Council, and the Minister responsible for the festival as a whole, said that the British Industries Fair would stage a special display to present the achievements of industry in the centenary year. He looked forward also to the spontaneous organization all over the country of other events within the field of the festival or complementary to it. Mr. Herbert Morrison had previously announced on May 30 that two councils have been appointed to advise the organizers of the Festival of Britain. One council will advise on the arrangements for the exhibition of science and technology and the other council, under the chairmanship of Mr. H. V. Lobb (chairman of the RIBA Exhibitions Committee) has been appointed to advise on architecture, town planning, and building research. The members of the council are:—Professor H. V. A. Briscoe, Mr. F. J. Forty, Mr. Robert Matthew, Mr. Roland Nicholas, Sir George Pepler, Mr. J. M. Richards, Mr. Howard Robertson.

STANDARDS IN SCHOOL EQUIPMENT

THE nation is spending over £20,000,000 a year on educational building. Much post-war building is so controlled that the architect's freedom of expression is severely limited, but, by contrast, the educational programme offers a unique opportunity for creative work. If architects are prepared to adopt new methods, they can demonstrate that the conditions of today can be inspiring rather than restrictive.

The programme has a far wider significance than the mere provision of components and equipment to satisfy educational demands ; rather it should be regarded as a framework for developing techniques for the broad field of architecture which must expand as the country emerges from its period of stringent economy. Unlike so many post-war building requirements, the demands of education are for the best buildings that can be devised in the light of present-day conditions. Requirements of space standards and equipment are high, and clearly cannot be attained by pre-war methods ; it is the task of the architect, in collaboration with manufacturers, to devise new techniques which can overcome the problem, both from the point of view of design and cost. We already have sufficient evidence to show that this can be achieved, but under the complex conditions of today, neither the architect nor the manufacturer can, by his individual efforts, produce the answer. Only by the closest collaboration between architects, users and scientists can the fundamental data of performance and quality standards be translated into good design. Present-day work is characterised by a multiplicity of individual efforts by manufacturers, architects, committees and scientists whose activities now require co-ordination by their formation into working teams under the guidance of the Ministry of Education. The potential members of such teams operate in central and local government, in private practice and in industry, and there is no administrative machinery within which they can come together. The duty of all who are concerned with educational advancement should be the creation of such an administrative framework.

The architect's contribution to the provision in schools of appropriately designed services, furniture and equipment (with which this issue of the JOURNAL is concerned) will lie in establishing a satisfactory compromise between ideal requirements and the conditions of production. The designer's attitude must be sufficiently flexible to accommodate itself to numerous techniques. In order to obtain the best results from widely differing manufacturing techniques there is no doubt a need for standard specifications, but it is essential that their function should be limited to guidance on dimensional and performance standards. If the Ministry of Education and Education Authorities wish to avoid a monotonous uniformity of design of school equipment, they

should beware of the increasing tendency to publish specifications in the form of designs. The present series of standard specifications for school equipment demonstrates the danger of this method, a method which can only tie the designer's hands and discourage the evolution of new techniques.

The best pattern of procedure would put the architect in a central position between the client and scientist on the one hand and the manufacturer on the other, engaged in the well-tried sequence comprising research, the production of a prototype, small production for user trials, and finally the full production run. Production runs, if kept to the economic minimum, will enable not only production, but development to be a continuous process, and qualified groups working over the whole industrial field, could do much by this method to lay the foundations of a new contemporary vocabulary of everyday design.

This article discusses the broad problems of construction in new schools in the light of recent developments and the current shortage of labour and most building materials. It is followed by articles on various specialized aspects of technique and equipment.

STRUCTURAL PROBLEMS

IN SCHOOL BUILDING

By Denis Clarke Hall and L. W. Elliott

FRAMED STRUCTURES

THE framed structure either in steel or concrete is the most satisfactory method, but owing to the steel scarcity the structure must be economically designed. Designs which achieve economy in materials are those based on the treatment of the frame as a monolithic one, but this method would pre-suppose the use of *in situ* concrete or site welding. This is usually undesirable, so methods must be used which simplify site erection but still retain a high degree of continuity. This is possible by designing the frame as a rigid one where under static loading reversals of stress take place at certain points, making it possible to break the continuity of the structure, thus permitting a site joint, which need only be strong enough to resist shear and wind stresses. This method of framing makes it possible to shop-fabricate a rigid frame.

The traditional pitched roof construction using steel trusses is reasonably economical in the use of steel, especially if knee braces are introduced to resist wind forces instead of taking down the stanchions on to separate concrete foundations. From the functional point of view it is difficult to achieve high standards of daylighting with pitched roofs, while the roof area for covering is greater than with a flat or mono-pitched roof and secondary purlins are necessary to carry the ceiling.

In conclusion, we consider that the rigid framed structure is superior to other methods. It is economical in the use of materials and permits of unorthodox shapes to achieve the maximum daylight with minimum window areas.

STRUCTURAL PANELS

It is, of course, quite possible to combine the frame and the infilling panels into a structural panel. The system of framing employed within the panel must be such that provision can be made for glazing and still provide rigidity against handling. The structural panel can either have a composite infilling composed of external sheeting, anti-drumming insulation, moisture barrier and wall or ceiling lining, or a frame infilled with a lightweight concrete at works or on site, and suitably finished after erection.

Whichever method is adopted, it becomes necessary to embark on a large production programme to justify the making of jigs and tools ultimately to reduce costs. Furthermore, as it becomes necessary to standardize both plan and vertical dimensions, the system of structural panels is not for general application and must be sponsored by a large manufacturing concern as a complete system of prefabrication. In turn, the manufacturing concern must be assured of a continuous demand in order to plan production and achieve the maximum economy.

The diagram illustrates the principle of framed construction with panel walls referred to in the article.

INFILLING TO FRAMED STRUCTURES

Infilling walling, where it is wholly attached to the frames, must be as light as possible to reduce the dead-weight carried by the structure. This is particularly important in two or multi-storey structures. Good thermal insulation and weathering and low maintenance are also essential requirements. The weight should, if possible, be kept down to about 10 lb. per sq. ft., for both walls and roofs. With large window areas the suction and pressure within the building is likely to reach 10 lb. per sq. ft. and anything lighter must be firmly attached to the structure. It is quite possible to design a structural roof and wall panel spanning, say, 10 ft., with a "U" factor of 0·2 and fixing designed to withstand a 50 per cent. overload, or 5 lb. per sq. ft. of area in the case of roofs.

In the case of single-storey structures, where the walling is not attached to the framing, it may be more economical to support the walling on the slab as the edge of the slab is normally turned down to provide a protection against frost. It is also good practice lightly to reinforce this edge against local stresses. The weight of walling even if carried out in brickwork would not be greater than 250 lb. per ft. run up to cill height on classrooms or 1,000 lb. per ft. run for a single-storey height and on reasonable soils, the slab should be capable of sustaining these loads.

The end walls of buildings present problems, if light wall panels are used as intermediate framing and bracing members have to be introduced to provide fixing and resist wind stresses induced in the structure. It is possibly more satisfactory to employ here some type of solid wall, such as brick, concrete or stone of sufficient weight

to resist wind, and, if necessary, to save a structural frame. A further advantage where standardized systems are used is that the *in situ* wall gives some relief to the architectural treatment.

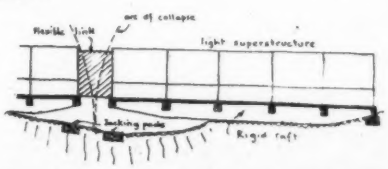
FOUNDATIONS

With normal ground the foundations for lightweight single or double-storey buildings can be a ground slab of 6 in. thickness if suitably reinforced with steel mesh. It is not necessary with rigid framing for the columns to be carried through the slab to independent foundations as the loads are of a low order and can be carried directly on to the slab with suitable reinforcement and fixings to resist horizontal movement.

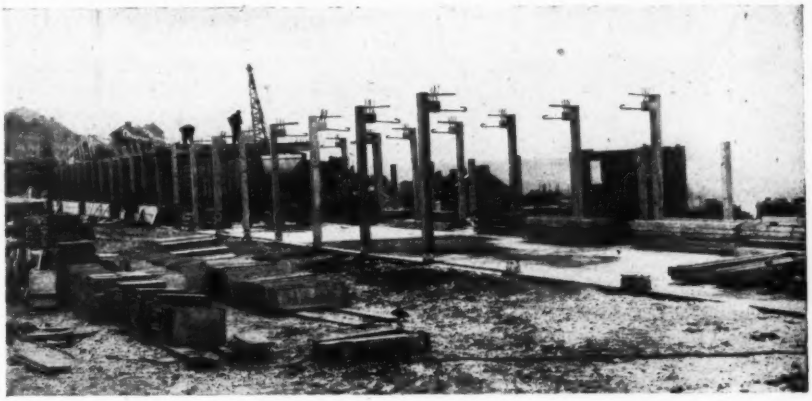
On poor ground and in areas subject to mining subsidence it would be necessary to reinforce the slab with beams and ribs designed against collapse of the surface formation. The worst possible conditions have to be allowed for and the deadweight of the buildings has to be carried by the structural resistance of the slab or raft foundations against bending either as a beam or cantilever together with torque.

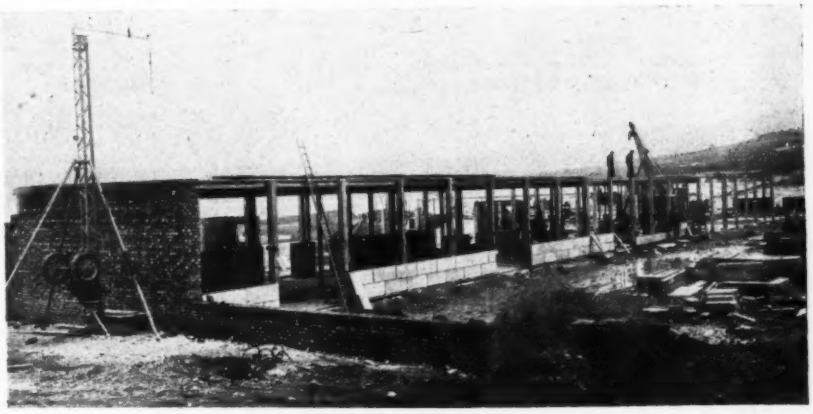
This method of designing against subsidence is probably the simplest, but the other method is to treat the building blocks as rigid beams with the roof and slab becoming flanges of a box girder. This implies a heavier type of construction of reinforced concrete and although it is still necessary to split the building into blocks the connections need be no more than an expansion joint. Any tendency to crush adjacent blocks during collapse would be resisted by solid construction. It would, however, for repair work, be simpler to space the blocks apart as in the previous method. The danger of subsidence is nevertheless increased with this type of structure as the ground is loaded with a heavier building.

It is important that in designing any foundation system for subsidence, some form of provision be made by concrete pads or the inclusion of jacks between the floor and the raft for jacking the subsiding building back to its normal position. Furthermore, joints in service pipes should provide for movement and flexure. In fact, the whole building can be considered as a corridor train with the rigid building blocks as coaches, the flexible links as the connections between coaches, and the couplings for air and steam as service pipes.



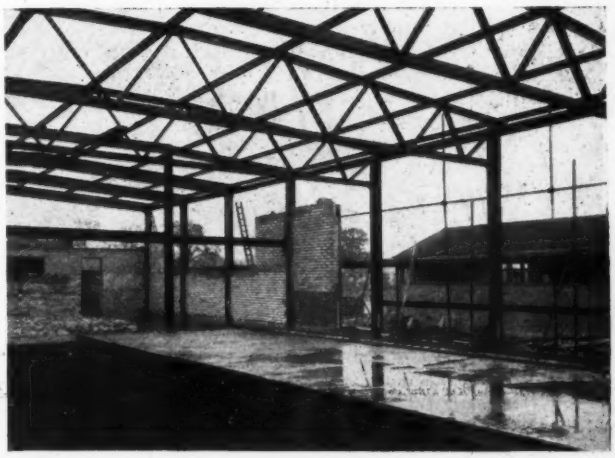
Foundation system designed for subsidences, the flexible link between the rigid rafts provides for flexure in the service piping.

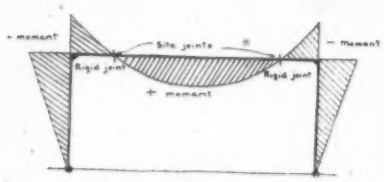




Above, two photographs of Hollingbury Primary School in course of construction. The framework is in reinforced concrete, with pre-cast concrete slab panels and end walls of brick.

Right, two stages in the construction of a steel framed school with brick panelled walls. The centre photograph is of the assembly hall at Bourne School, Middlesex, the lower shows the dining block at Field End Road School, Middlesex. Both were designed by H. V. Lobb.





The basic frame analysis.

FRAME ANALYSIS

The following description of the various framing methods is based on the use of a 10 ft. bay width with a maximum span of 25 ft. Furthermore, only the teaching area has been considered as this is the important structural unit. The corridors, when attached to this unit, are assumed to be in a light sub-framing of a beam and post construction.

Steel.—The riveted R.S.J. framing has been, up to now, the most widely used method. It has a variety of forms. The beam and stanchion construction for flat roofed buildings is the most extravagant way to consume steel. The beam has to span the whole distance and is cleated to the stanchion which is embedded into the foundation to provide rigidity against wind. The only possible saving in steel is to provide a semi-rigid riveted connection to the stanchion, but the resulting structure does not present a pleasing appearance and more fabrication is necessary.

Both these methods are extremely uneconomical in the use of steel and should be avoided at all costs. If it is desired to employ a riveted form of construction, then the normal built up truss of angle sections supported on stanchions is reasonably economical, although this method necessitates a pitched roof and a lower standard of daylighting than is possible with other methods.

There has recently been a greater use of cold rolled or pressed sections fabricated from strip steel of from 12 to 18 gauge and provided that protection against corrosion is assured there are economies in the use of material.

Fabrication, which is usually by means of spot welding or riveting, can be carried out by the light engineering industry, but, nevertheless, the supply position is poor at the moment owing to the great demand for this type of steel in industry. The shape of the structure can easily be fabricated into a structural panel.

The structure which fulfils all the requirements of ease of fabrication, economy in the use of steel, speedy erection, functional shapes, and clean cut appearance is the welded structure. It is not, unfortunately, likely to cost less than the riveted structure even though less steel is used, but it is to be hoped that with the greater demand of welded work to save steel the price will eventually be reduced.

Another method of achieving economy is to increase the depth of the members by building up sections as opposed to using a standard joist section. This method is carried out by building up by welding, angle or tee sections to provide flanges with some form of lattice web. Fabrication is more expensive unless mass production methods are used and whilst considerable saving in metal is achieved as compared with a riveted steel structure, there is not very much saving in steel when compared with a rigid welded frame.

Concrete.—The principle of the economy of the rigid frame also applies with the use of reinforced concrete, although when the units are pre-cast at a factory, transport and handling cause stresses which have to be accounted for by increased reinforcement. Furthermore, the erection is more difficult because the weight of the units is much heavier than steel, necessitating the use of lifting tackle. On a fairly large school it might be economical to employ cranes with special spreaders to lift complete frames which have been pre-cast horizontally on the surface of the slab.

The most economical types of concrete frame in the use of steel is the cast *in situ* one in which no handling stresses are created, but the question of formwork has to be considered carefully. Some firms may be able to justify the use of standardized formwork if sufficient repetitive work can be assured, as forms suitable for this would have to be of steel for robustness, and the initial cost would be high. The steel forms should also be able to support the roof members to enable this work to be carried on whilst the concrete is setting.

Unless pre-stressing is resorted to it is uneconomical to employ the beam and post system except for very small spans. Higher tensile strength steels are desirable for economy. This also applies to the foundation work as well as the framing.

Comparative Weights.—As a rough comparative guide to the weight of steel used and the total weight of frame for various framing systems, the worst case of a riveted beam and stanchion frame is taken as 100 per cent. The systems are then as shown in the table below.

TRANSPORT, STORAGE AND ERECTION

Questions of transport and handling must be considered when deciding on the type of structure. Points to note are: (*a*) The maximum sizes of units; (*b*) the suitability of certain shapes to be packed efficiently; (*c*) breakage risks; (*d*) the storage at the site; and (*e*) the possible necessity of erecting, say, the shell of the assembly hall to provide storage.

In considering the erection, it will be necessary to decide on the maximum weight of units employed. The need for plant may not always be justified and this would mean limiting the weight of elements to be man-handled. On a larger job it may be cheaper to design heavier units demanding the use of plant.

NEW FORMS OF STRUCTURE

In view of the steel situation, it is important that a more enterprising approach be made towards unorthodox types of structure, and the following are notes on possible future development.

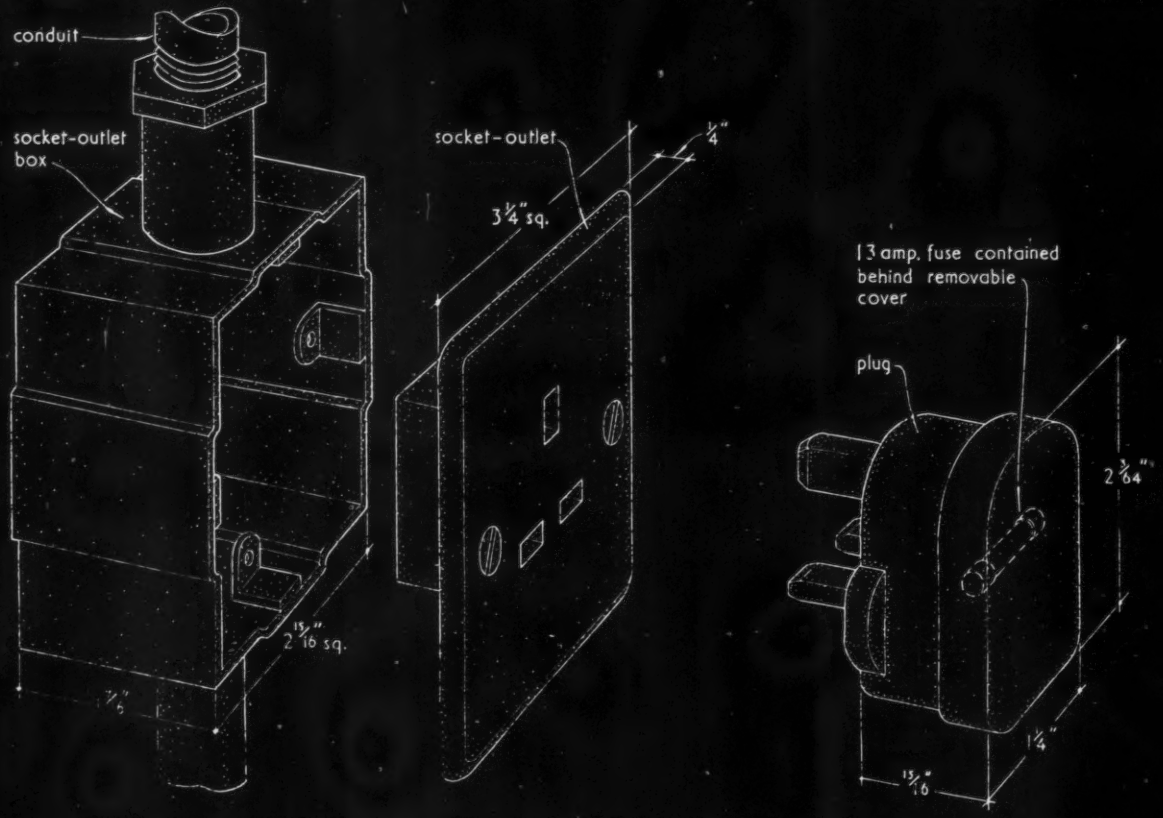
Pre-stressed concrete.—There is evidence that the increasing use of pre-stressed reinforced concrete using special high tensile steel wire, is to be expected in the near future. This material has progressed beyond the experimental stage and is being used on the Continent for a wide range of building types, and in a number of cases in competition with traditional methods.

It is essentially a method calling for factory production on a large scale

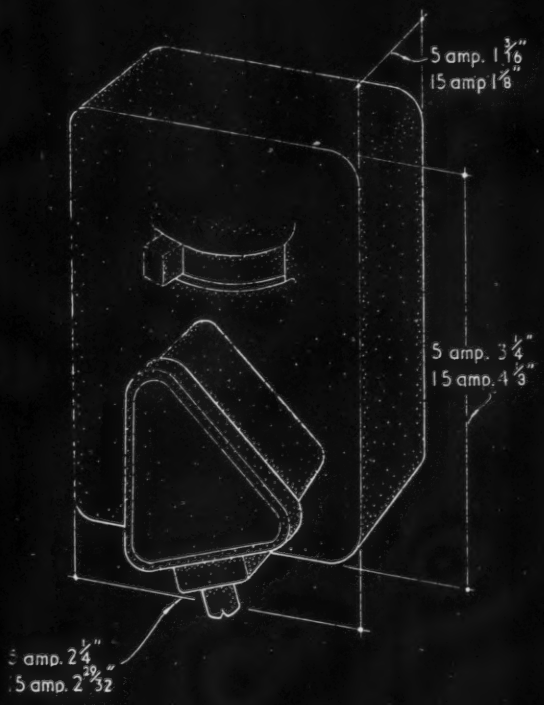
Type of Frame	Comparative Steel Content	Comparative Total Wts.
	Per cent.	Per cent.
A. Steel		
1. Riveted post and beam	100	100
2. Welded rigid frame	60	60
3. Built-up angle trusses on R.S.J. stanchions	65	65
4. Cold rolled or pressed light gauge sections	50	50
5. Hot rolled built-up frames with lattice webs	55	55
B. Concrete		
6. Post and beam pre-cast mild steel	50	300
7. Rigid frame pre-cast mild steel	45	270
8. Rigid frame cast *in situ* mild steel	35	260
9. Rigid frame pre-cast normal high tensile steel	30	260
10. Rigid frame pre-stressed special high tensile steel	10	180

Comparative frame analysis.

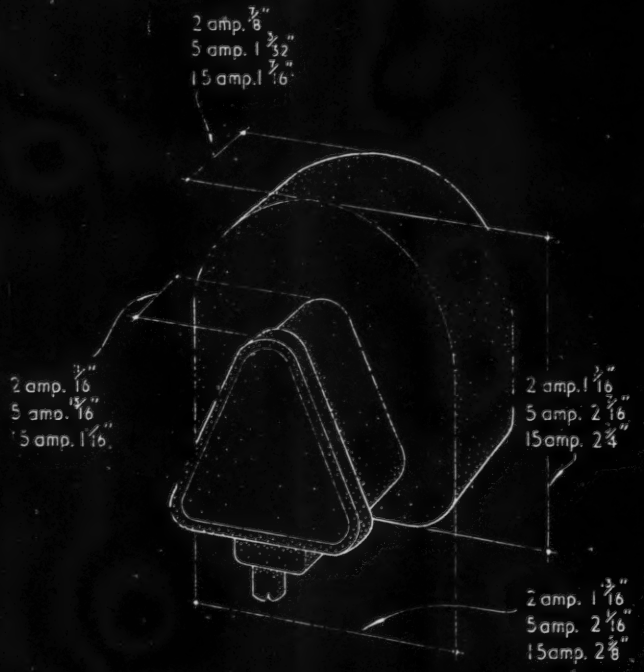
The Architects' Journal Library of Information Sheets 73. Editor: Cotterell Butler, A.R.I.B.A.



13 AMP. FUSED-PLUG AND SOCKET OUTLET SUITABLE FOR RING MAIN CIRCUITS (TO B.S. 1363).



5 AND 15 AMP. SHUTTERLOCKED SAFETY SWITCH SOCKETS.



2, 5 AND 15 AMP. SAFETY SOCKETS. (TO B.S. 546).

ELECTRIC PLUGS AND SOCKETS. Manufacturer: Wm. Sanders and Co. (Wednesbury) Ltd.

37.C10 ELECTRIC PLUGS AND SOCKETS

This Sheet describes the 13 amp. fused-plug and shuttered socket-outlet to B.S. 1363 suitable for ring main circuits and also gives details of the 5 and 15 amp. shutter-locked safety switch socket and the 2, 5 and 15 amp. safety socket.

13 Amp. Fused-plug and Shuttered Socket-outlet to B.S. 1363 : 1947

This is a standard three-pin domestic socket-outlet and plug, the form, pitch and dimensions of plug pins being standardised to provide complete interchangeability. As the plugs are individually fused, any number of socket-outlets may be looped into a ring main circuit installed in domestic premises not exceeding 1,000 sq. ft. superficial area. In larger premises the number is limited to ten.

Socket-outlet box : Sockets have been designed to fit into a standard switch box listed by all manufacturers of conduit fittings. The fact that no special box is needed is an advantage.

Socket-outlet : This consists of a plate covering a flush mounted shuttered socket-outlet base.

Plug : This accommodates cartridge fuse links to B.S. 1362 in standard ratings of 3, 7 or 13 amps.

Shutterlocked Safety Switch Socket

This is obtainable in either 5 or 15 amp. size according to loading and to the dimensions shown. An alternative sunk type socket is also available. It has been designed to provide a degree of safety (from accidental shock) which cannot be obtained from the ordinary switch socket.

The design is such that the switch dolly can be operated whether the plug is in position or not, but no live contacts are ever exposed. The plug cannot be inserted when the switch is in the " on " position as the live contacts are automatically covered.

Shuttered Safety Socket to B.S. 546

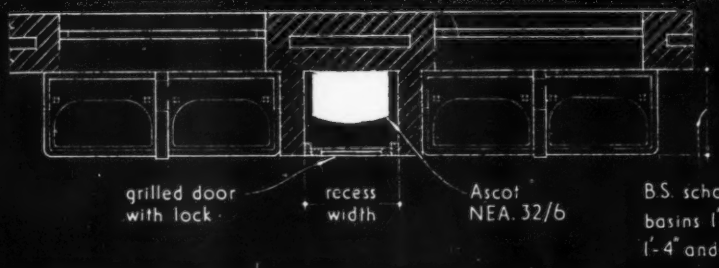
This is obtainable in either 2, 5 or 15 amp. size and to the dimensions shown. An alternative sunk type socket is also available. The design is such that live contacts are completely shielded and remain so until the plug pins have entered the holes in the cover. In the 5 and 15 amp. sizes the pins are partly insulated. All types are wired from the front and sunk types are self adjusting to plaster level so that adjustable grid boxes are not required.

Compiled from information supplied by :

Wm. Sanders & Co. (Wednesbury) Ltd.
Head Office : Falcon Electrical Works, Wednesbury, Staffs.
Telephone : Wednesbury 0595-7.
Telegrams : Sanders Wednesbury.
London Office : 78, Neal Street, W.C.2.
Telephone : Temple Bar 8984.
Telegrams : Sandecco, Westcent, London.

WATER HEATING | UNITS | GAS

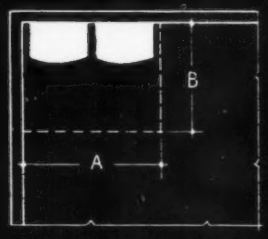
The Architects' Journal Library of Information Sheets 74. Editor: Cotterell Butler, A.R.I.B.A.



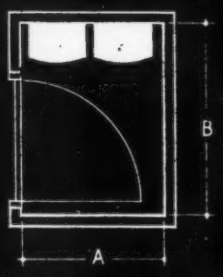
no. of Ascots	no. of basins	recess width
1	4	1'-6"
2	8	3'-0"

H. W. SUPPLY TO BASINS BY ASCOT NEA. 32/6 MULTI-POINT HEATER IN RECESS WITH PROTECTIVE GRILLE.

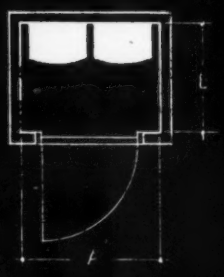
basins	heaters NEA 32/6	showers	heaters NEA 32/6	minimum space allowance — existing store		minimum dimensions — cubicle type 1		minimum dimensions — cubicle type 2	
				A	B	A	B	A	B
4	1	2	1	1'-6"	2'-3"	3'-0"	4'-0"	3'-0"	2'-3"
8	2	4	2	3'-0"	2'-3"	3'-0"	4'-0"	3'-0"	2'-3"
12	3	6	3	4'-3"	2'-3"	4'-3"	4'-0"	4'-3"	2'-3"
16	4	8	4	5'-9"	2'-3"	5'-9"	4'-0"	5'-9"	2'-3"



existing store



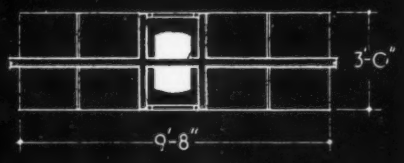
cubicle type 1



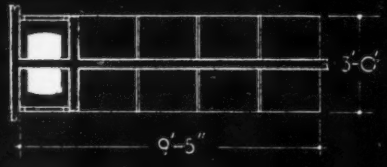
cubicle type 2

note: a minimum of 15 sq. in. effective ventilation for each water heater must be provided in store or cubicle

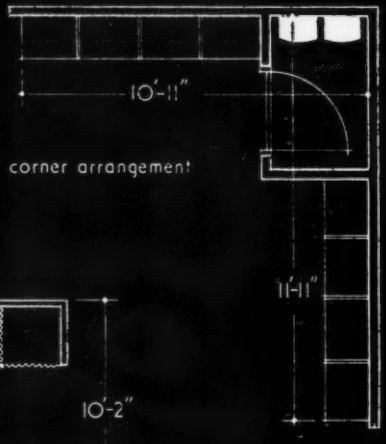
TABLE AND DIAGRAMS GIVING MINIMUM SPACE REQUIREMENTS: BASINS OR SHOWERS.



symmetrical arrangement

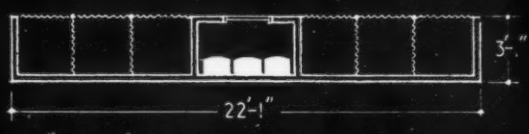


asymmetrical arrangement

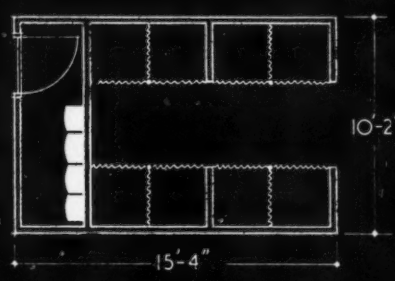


corner arrangement

TYPICAL BASIN FEEDING ARRANGEMENTS.



TYPICAL SHOWER FEEDING ARRANGEMENTS.



dimensions are based on:
4" partition walls
1'-10" x 1'-4" basins
2'-9" sq. showers

·ASCOT· INSTANTANEOUS GAS WATER HEATERS: APPLICATIONS: SCHOOLS. Manufacturer: Ascot Gas Water Heaters Ltd.

32.C26 ASCOT INSTANTANEOUS GAS WATER HEATERS: APPLICATIONS: SCHOOLS

This Sheet describes water-heating installations in schools using Ascot instantaneous gas water heaters.

School plans often consist of single-storey buildings widely dispersed on the site. For this reason or because intermittent supplies are required, it is frequently more practical and economical to provide a hot water supply to sports' pavilions, caretaker's quarters, special subject rooms, administration blocks, and points for the use of cleaners by means of local heating equipment, rather than to employ long pipe runs from the central water heating installation. Ascot instantaneous gas water heaters efficiently supply basins and showers, either singly or in groups, remote from the boiler house, the installation of the heaters being a simple proposition. The supply of hot water from the heaters is immediate, continuous and economical, as there are no storage losses and gas is only consumed when hot water is being used.

For general particulars of Ascot heaters, see Sheets 32.C20, 32.C21 and 32.C22.

These water heaters do not require full-time attention and with normal use maintenance is only necessary twice annually. During school shut-down periods the heater installations may be easily drained, thus guarding against frozen and burst pipes.

Installation

The following factors should be taken into consideration when planning multi-point instantaneous gas water heating installations supplying school showers and basins.

1. The lengths of draw-off piping should be as short as possible (see Sheet 32.C22).

2. Provision must be made for an efficient flue, which should be built in as recommended by British Standard Codes of Practice C.P.331.104:1947—Flues for Gas Appliances—paragraph 301, which states: *In new buildings it is desirable that flues should be integral with the structure, but where this is not possible and additional flues are required they should be carried up inside the building.*

3. The installation should be planned so that the heaters are inaccessible to children, as recommended in paragraph 14L of the memorandum on the Building Regulations of the Education Act (1944), 24th March, 1945, which states: *Where localised systems for providing hot water are fixed in lavatory compartments they should be so placed or protected as to eliminate danger to the children.*

4. Any cubicle or storeroom in which heaters are installed must have adequate ventilation to ensure satisfactory combustion. This may be ensured by building cubicles of open mesh material; by providing a grille instead of solid doors, or by a minimum of 15 sq. in. effective ventilation area for each water heater by means of air bricks or a section cut from the top or bottom of the door. Where an open mesh grille is specified a pilot-guard—available from the manufacturers—should be fitted to the heaters, particularly in the case of a cloakroom with cross ventilation, in order to ensure that the pilot flame does not become extinguished.

Existing Schools—Conversions

Where an additional hot water supply is required in existing school buildings, instantaneous water heating by gas may be adopted to form a simple installation without recourse to the structural alterations which would otherwise be necessary in the event of the original large boiler plant being used.

Water Supply to Heaters

The diagrams show the number of heaters type NEA.32/6, and the installation space required to supply various numbers of basins and showers.

Basins: Head of water required: 10-12 ft. measured vertically from the level of water in the tank to the basin taps, plus allowance for controlled mixing facilities. Paragraph 14K of the memorandum on the Building Regulation of the Education Act (1944), states: *To prevent scalding, particularly in the case of younger children, controlled mixing facilities should be provided for basins and for showers.* For further information the manufacturers should be consulted.

Piping: ¾ in. i.d. with short ½ in. branches to the basins.

Rate of flow from heater: Approximately 2½ gal./minute at hand washing temperature of 105-110° F.

Showers: Head of water required: 14 ft. measured vertically from the level of the water in the tank to the shower roses, using ¾ in. inlet, 6 in. roses capable of passing 2 gal./minute at 6 ft. head, plus allowance for controlled mixing facilities. For further information the manufacturers should be consulted.

Piping: ¾ in. i.d. throughout.

Rate of flow from heater: Approximately 2½ gal./minute at shower temperature of 100-105° F.

Compiled from information supplied by:

Ascot Gas Water Heaters, Ltd.

Head Office: 43, Park Street, London, W.1.
Telephone: Grosvenor 4491.
Works: Ascot Works, Neasden, London, N.W.10.
Telephone: Willesden 5121.
Telegrams: Gascot, Phone, London.
Branch Offices: Belfast, Birmingham, Bournemouth, Bristol, Cambridge, Glasgow and Manchester.

and the elements easily produced are simple beams, slabs and columns, using less than one-third of the amount of steel normally employed in reinforced concrete work. This steel has an ultimate stress of 120-150 tons per sq. in. and is usually pre-stressed to about two-thirds of this figure, and the stress transferred to the concrete when cast. Not until this concrete stress is taken up is there any tension zone in the concrete and therefore considerable deflection in handling can take place before failure occurs.

Steel Sheet Box Forms Filled with Concrete.—The frame consists of box sections of light gauge steel sheet formed into a frame by welding and capable of supporting on its own the subsidiary framing of the building. This box forms part of the permanent reinforcement. When in position the frame is filled with concrete with the addition of supplementary high tensile reinforcement. This method has the advantage of lightness, and ease of erection, and will obviate shuttering. Fabrication is possible by the light engineering industry.

Lightweight concrete.—In view of the weight and poor thermal insulation of concrete, there is a need to develop the use of lightweight concrete which overcomes these disadvantages. The uses it could be put to are wall panels, partition blocks, and roofing slabs. As an example, a form of lightweight concrete used in Sweden is manufactured on a full mass production scale. One of the products is roofing and floor slabs and for a 10 ft. span a slab of 4 in. thickness, weighing 14 lb. per sq. ft. and giving a "U" factor of 0·2 is produced.

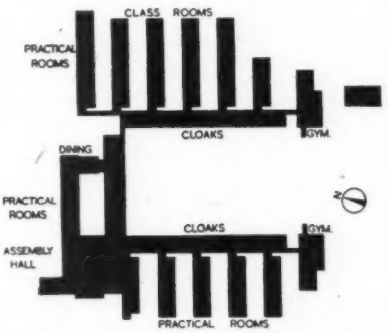
Types of lightweight concrete wall and floor panels have been experimented with in this country. They employ a sandwich form of construction with thin dense concrete or plaster as "skins" and an inner core of lightweight concrete. This type of development should be encouraged on a wide scale. One of the main difficulties of reinforcing lightweight concrete for structural use is the question of bond between the concrete and the reinforcement, and corrosion. But both of these problems are capable of solution.

Suspended structures.—All permanent structures have in the past been designed on a basis of restricted movement, mainly because of the risk of cracking plaster finishes, whereas many structures in exhibitions of a temporary nature, and in permanent engineering projects, have been built using a minimum of material and rely structurally on suspended catenaries of wire. It would seem, therefore, that these systems could be adopted providing that a certain amount of movement is allowed for. The saving in steel would be phenomenal and this factor alone should facilitate further experiments.

NOISE AND ACOUSTICS

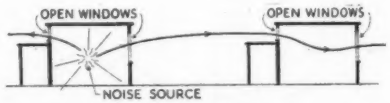
By D. Dex Harrison

MOST contemporary trends in school design militate against good conditions of quiet, except the tendency to choose a large site and to spread the buildings, in blocks of one storey, all over a couple of sizeable fields. Most of our post-war school building has been of this nature and when distance is no object and ground limitless, no trouble from noise need arise. But we must soon face the urgent problem, of rehabilitating the more urban type of school. It is already evident that the single storey school cannot be made to serve the needs of those very large all-purpose units called, I believe, Comprehensive Schools.



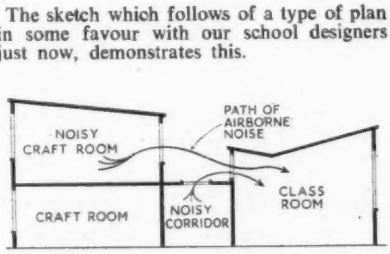
Block plan of a comprehensive school in Middlesex of the type referred to in the article.

The block plan, reminiscent of a wartime hostel, indicates a horizontal congestion which spells disaster from the noise point of view, with over 1,000 lusty children learning to write, sing, recite, listen to the wireless lesson and play basket ball within these narrow confines. Classrooms placed in such close ranks are all very well so long as the windows are kept closed, but the modern classroom, which has windows back and front to let in the daylight, as well as a through draught of air, is quite the wrong sort of vehicle to be sited in this manner. Noise will pass down the line through each unit in turn.



Noise transmission.

The sketch which follows of a type of plan in some favour with our school designers just now, demonstrates this.

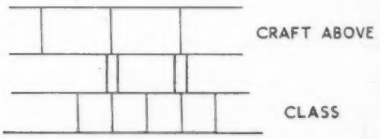


Bad acoustic planning.

On plan such a scheme looks good enough, and segregation excellent, but in section,

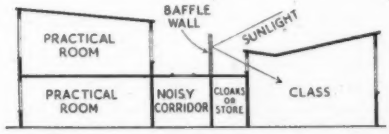
Schools are apt to be among the noisiest of buildings. The photograph gives an indication of the kind of problem that the architect is likely to encounter.

when the windows are open for ventilation the insulation against noise transmission is nil, and very little is gained by setting the classrooms forward at the end of stalks, since dissipation of sound in air is relatively slow.



Very little is gained by setting the classrooms at the end of stalks.

The ear is an instrument adapted especially to pick up sounds passing through air, and better protection is always given if we can interpose some solid obstacle between the source of sound and the recipient. Herein lies the value of the baffle, of which all too little use is made. In the above section, for instance, a baffle wall, as indicated, would give better protection and would not cut out any light. In fact, if colour-washed white, it would allow reflected sunlight to enter the rear of the room.



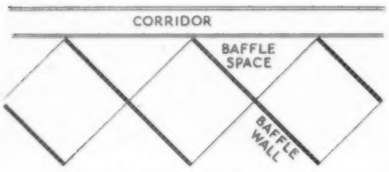
Use of the baffle wall.

Even the normal classroom, when converted into an open-air classroom, has no real barriers against sound. The one class could not hold a noisy session without disturbing the other. The dividing walls are not the weakest link in classroom design. All the noise that is significant will pass *via* the open windows and round the very short baffle walls. In point of fact the standard set as a minimum in P.W.B.S.* No. 14 for sound transmission through a partition wall between classrooms can be achieved by the use of a 4½-in. brick partition plastered on both sides, giving the recommended minimum reduction of 45 decibels.

A wicker screen between classrooms, or high close planting extending some ten to twenty feet from the wall and of rather greater height than the top of the opening lights, would give the required degree of insulation, the aim always being to get a roughly equal degree of insulation by all possible routes of transmission. It would be no good extending the walls more than twenty feet out unless they were made considerably higher, and this would be uneconomic; nor is there any point in making

*Post War Building Studies No. 14. HMSO.

the baffle more efficient than the dividing partition itself. Some interesting versions of baffled classrooms have been and are currently being produced and we may soon be in a position to investigate this part of the teaching problem very thoroughly from practical examples.



Baffle plan for sound insulation.

This is essentially an architect's problem, for teachers and children will not complain if given a type of plan which they accept as normal. Thus it is not sufficient to argue that because no complaints are made, no improvement is necessary.

SITING OF UNITS

In towns, the siting of the units of the school becomes a matter of compromise, and in these circumstances the location of the site itself is all important. The problem can be reduced to a quite simple calculation once the level of noise source is known. P.W.B.S. No. 14 suggests that a suitable threshold noise to allow for in classrooms is from 25 to 30 phons. The threshold noise is the level of noise below which sounds from outside are not noticed. This threshold of 25-30 phons is considerably higher than the accepted standards for study rooms and has been set at this level to allow for the inevitable small movements and noises from a class of children—shuffling, scratching of pens, sucking of lips and sterterous breathing—even when they are being quiet. Clearly, in dealing with secondary schools, when a higher personal discipline may be expected to prevail, it would be wise to allow a reduction of 5 phons in these figures.

KERB LOUDNESS

The following table from P.W.B.S. No. 14 gives kerb loudness of a selection of urban road types:

Arterial road (main city road) ...	100	phons.
Sub arterial road	90	,,
Local (shopping) road	70	,,
Local (residential) road	40	,,

Thus, the required noise reduction in the classrooms of a senior school on a sub-arterial road would be 90 — 25 = 65 phons or on a noisy local road 70 — 25 = 45 phons. If the school were built 100 ft. from the road, 5 phons would be gained and a good screen of trees and shrubs might gain a further 5 to 10 phons. Thus we should have a residue of 50 and 30 phons respectively to be taken care of by the structure itself. In practice, this means by the windows, and the two examples we are considering could be given the required protection by the use, in the case of the higher of the two figures, of double glazed windows of 21 oz. sheet glass spaced 6 in. apart, and, in the lower, of ¼-in. plate.

This protection is destroyed as soon as the windows are opened, when the protection afforded by the structure is nil. It is also clear that the building itself is the best form of baffle, if the quiet rooms are kept on the side remote from the street with a solid piece of building between; and again the danger of allowing noise to pass into classrooms through clerestory windows on the rear wall facing a street, should not be overlooked. It is also evident that if a site must be on a main road it should be on the south side of it. There are other sources of noise such as industry and railways which must be taken on their merits, but a school should not in any case be planned less than ¼ mile from a shunting yard.

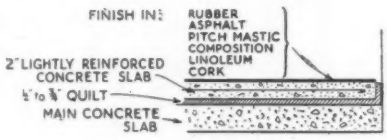
PLAYGROUNDS

Within the school, the playground is the greatest source of noise. It is now usual to place it behind and away from the classrooms, which are made to face on to a sward of green. The neighbours should be considered in siting the playground—I have seen architects make a very careful study of noise on their school site *as it affects their own building*, completely ignoring the effects their school might have upon its neighbours. An architect should take the broader view as guardian of the community interest.

CORRIDORS

In detail, it is not usually difficult to segregate the noisy and quiet rooms and we need not point the obvious. The corridor is most often the weak link. Corridors are noisy and transmit sounds over long distances; it pays to take care with the floors and walls. Acoustic absorbents should be used for the upper part of walls and ceiling and the floors, more particularly if upper floors, should be properly floated to reduce drumming.

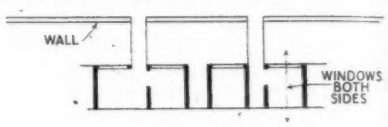
The architect may have to fight to get rid of the hard wearing plaster, glazed brick and cement surfaces beloved of the educationalist, for efficient sound insulation implies some sacrifices in longevity and hard wear. Wood boards on battens and cement finishes must not be used for floors unless they are on an adequately floated sub-floor or the drumming will be intolerable particularly in the case of upper floors.



Acoustic floor construction.

ACOUSTICS

When I was at school, we were compelled to wear gym shoes as the floors of the school were of polished maple throughout. There were no noise troubles in that school. We liked our gym shoes and we liked the polished wood floors, which were always clean and dry. As a system it required



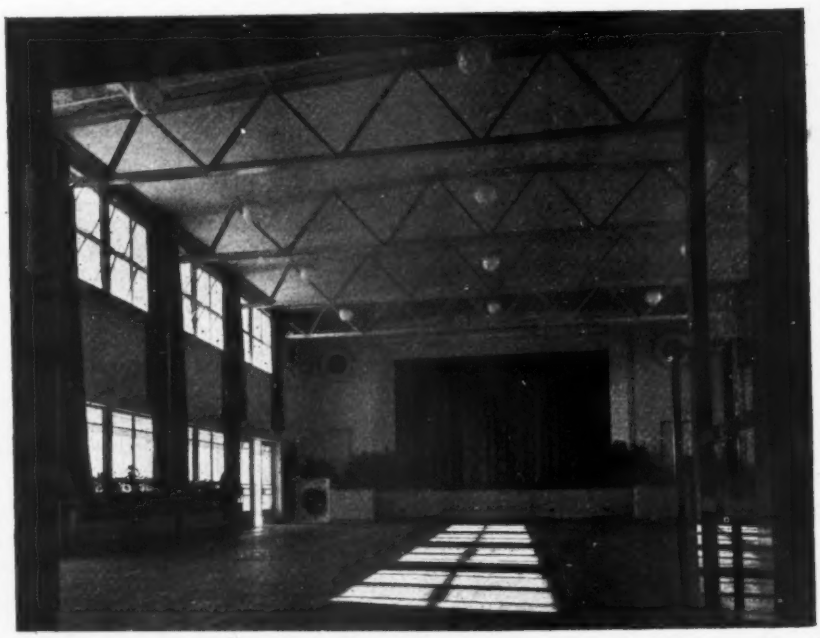
Planning measure to neutralize corridor noises.

rather special planning, but I commend it to educationalists as the method par excellence of reducing air-borne noise and at the same time of preserving delicate floor surfaces. It is possible to achieve much with planning measures to neutralize corridors, as Clarke Hall demonstrated at Richmond.

Classrooms, too, should have their ceilings treated with an acoustic absorbent; so treated they are very much more sympathetic for teaching as external sounds are less obtrusive owing to the damping effect of the room.

The one acoustic problem that is particular to school halls is the need for an adjustment of size to the physical capacity of the child. Part of the terror which children feel in performing on the stage is due to their having to try to throw their puny voices around a hall meant for adults. Let us have more bijou performances, perhaps, until money permits, in modified classrooms equipped with a stage annexe, later in proper children's theatres quite distinct from the main assembly hall

Until our present school policy changes, however, architects will still have to contend with the all-purpose school hall. There is really no need for a fixed proscenium arch in such a hall, it can all be done with curtaining, which may be removed when music is to be performed, but a cyclorama is essential and should be shaped so as to take in as much of the ceiling of the stage as possible.



The assembly hall at Bourne School, Middlesex, by Howard Lobb. The ceiling is of wood wool with the bays nearest the stage plastered to produce an acoustic reflection. At the entrance end the wood wool is distempered only, in order to leave its sound absorbent qualities unimpaired. The curtains on the windows are also sound absorbent, and the welded roof trusses serve to break up sound waves.

The following article, by a member of the Building Research Station, is published by permission of the Director of Building Research.

LIGHTING

by J. A. Godfrey

THE value of the decorations for contributing to the effectiveness of the artificial illumination of rooms is well understood. What is perhaps not quite so evident is the importance of the brightness, contrast and colour characteristics of all the main internal surfaces as an aid towards satisfactory visual conditions and to assist formal teaching under both daylight and artificial lighting. This means that the selection and treatment of all major internal surfaces assumes even more significance in illumination design.

BRIGHTNESS

Brightness is governed by the light reaching the eye by reflection from an object and, essentially, the technique of brightness engineering can in one sense consist of balancing or adjusting the brightness differences of all the main surfaces within the limits of the visual field, by controlling the initial illumination and by the choice of surfaces with closely related light reflection characteristics, the whole to form a visual environment with a brightness pattern which is tolerable to the eye. If universally applied it not only means restraint about the choice of decorations, but control of high brightness sources such as windows by shades and louvres and the shading or reduction of the surface brightness of artificial light sources where they come within the field of view.

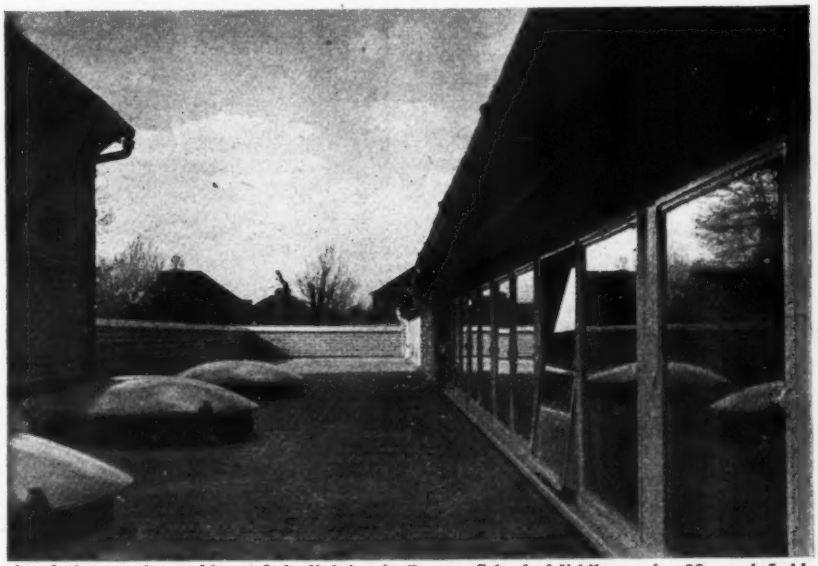
The principles of brightness control are based on the idea that for optimum seeing conditions the brightness of all main areas within the field of view must be uniform, a hypothesis which arose from the work of Lythgoe in England. For school classrooms, however, where attention as well as comfort and maximum acuity is desirable, absolute uniformity of brightness throughout the whole visual field is neither practicable nor desirable and a range of brightness differences has to be accepted.

The inter-relationships of brightness differences in the visual field are known as brightness ratios, and in order to understand the term it is necessary briefly to consider the geometry of the visual field. The approximate field of view of the eye is shown in the diagram overleaf. It consists of the central or foveal field and the surround and peripheral fields. The fovea is the central part of the eye that allows accurate vision. In other words, critical seeing is done within the narrow cone of the foveal or central field. Thus, if the visual task is reading a book or writing, the brightness of the page is the brightness of the central field.

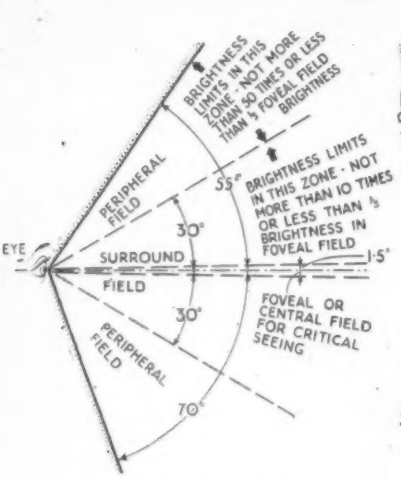
The surround field is arbitrarily limited to a cone of 60 degrees for design purposes, although in fact there is no sharp differentiation between it and the peripheral field. The diagram on page 531 shows that the 60 degree cone of the surround field takes in a major portion of the classroom interior when the pupil is looking towards the chalkboard. The periphery of the entire visual field subtends an angle of approximately 120 degrees vertically and about 160 degrees horizontally.

Brightness is expressed in units called foot-lamberts. For opaque surfaces the brightness derives from the illumination reflected from the surface of the object, modified by the reflection factor of the material. Thus a chalkboard with a reflection factor of 11 per cent. and illuminated with 20 ft.-candles on the vertical plane would have a brightness of

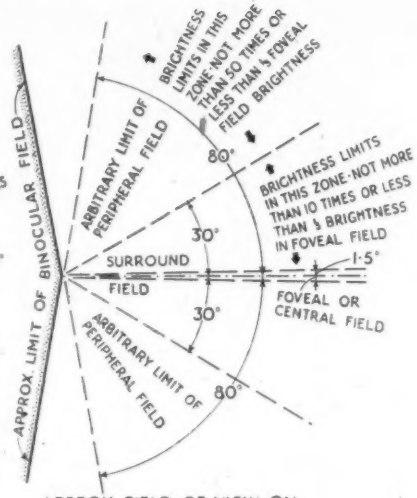
This classroom at Cheshunt School, Herts., by C. H. Aslin, illustrates one simple but effective way of ensuring brightness control. Venetian blinds are cheap, pleasant in appearance, and easily adjustable with considerable accuracy.



A solution to the problem of daylighting in Bourne School, Middlesex, by Howard Lobb. The watchglass lanterns give roof lighting to the corridor below and allow clerestory lighting for the classroom on the right.



APPROX. FIELD OF VIEW ON THE VERTICAL AXIS



APPROX. FIELD OF VIEW ON THE HORIZONTAL AXIS

2.2 ft.-lamberts (*i.e.*, reflection factor × illumination incident over the surface in ft.-candles = brightness in ft.-lamberts). The brightness of surfaces which emit light, *e.g.*, lamps and fittings, is usually expressed in candles per square inch, but for comparison can be easily transposed into ft.-lamberts by multiplying by 452.

TYPICAL EXAMPLES OF BRIGHTNESS

	Foot-Lamberts (approx)
Sunlight on white building	8,000
White clouds	3–5,000
Clear sky	1,000
Hazy or overcast sky	1,500–2,000
Bare 200-watt tungsten filament lamp	65,000
Enclosing globe	12,000
Bare fluorescent lamp (48 in.) at 90° to main axis	1,900
Chalkboard with reflection factor of 11 per cent. illuminated at 20 foot candles	2·2
Desk top with reflection factor of 35 per cent. illuminated at 12 foot candles	4·2
White paper with reflection factor of 84 per cent. on ditto	10·0

REFLECTION FACTORS OF TYPICAL SURFACES

Material.	*Reflection Factor.* Per cent.
White tiles (glossy)	80
White plaster	90
Red brick	25
Yellow brick	35
Matt painted surfaces—	
Pale cream	75
Light stone	60
Eau-de-nil	47
Salmon pink	44
Sky blue	30
Matt perspex, dove grey	24·8
Matt perspex, crimson	6·3
Black board (grey in use)	10–11
Brown linoleum	10
Light buff linoleum	50

Note.—These are approximate values only for clean surfaces viewed under tungsten lighting, the proportion of light reflected depending somewhat upon the colour of the incident light.

From the foregoing it will be appreciated that if brightness ratios for the three visual zones can be established, we can apply a useful check to the effectiveness of the illumination and decoration of classroom interiors. Attempts have already been made by various research workers (*e.g.*, Moon and Spencer in the USA) to formulate precise recommendations for acceptable brightness ratios, but unfortunately many of the suggestions put forward to date are difficult to obtain in practice and tend to be unduly restrictive in design. However, the following table from figures suggested by C. Gibson, USA, represents working recommendations for brightness differences which are obtainable in classrooms at reasonable cost and will serve as a useful guide.

MAXIMUM BRIGHTNESS RATIOS

Surrounding Field.		*Ratio.*
(*a*) The brightness of any surface should not be more than 10 times that of the task	*i.e.*,	Task to brightest surface = 1 : 10
(*b*) The brightness of any surface should not be less than 1/5th that of the task	*i.e.*,	Task to darkest surface = 5 : 1

Peripheral Field.

(*a*) The brightness of any surface should not be more than 50 times that of the task	*i.e.*,	Task to brightest surface = 1 : 50
(*b*) The brightness of any surface should not be less than 1/5th that of the task	*i.e.*,	Task to darkest surface = 5 : 1

It will be seen that extreme brightness ratios throughout the entire visual field should not exceed 250 : 1. In many schools where the general level of illumination is low and the interior surfaces are finished in drab colours with windows and artificial light fittings not adequately shielded, extreme brightness ratios of 5,000 : 1 are common.

To attain a balance of brightness differences within the limits suggested, this will mean as a general rule reflection factors of 85 per cent. for ceilings, 40-60 per cent. for walls, 35 per cent. for desk tops and 30 per cent. for floors with adequate control of the admission of direct sunlight, the screening of views of bright sky and the brightness of artificial light sources kept within tolerable limits or shielded from view.

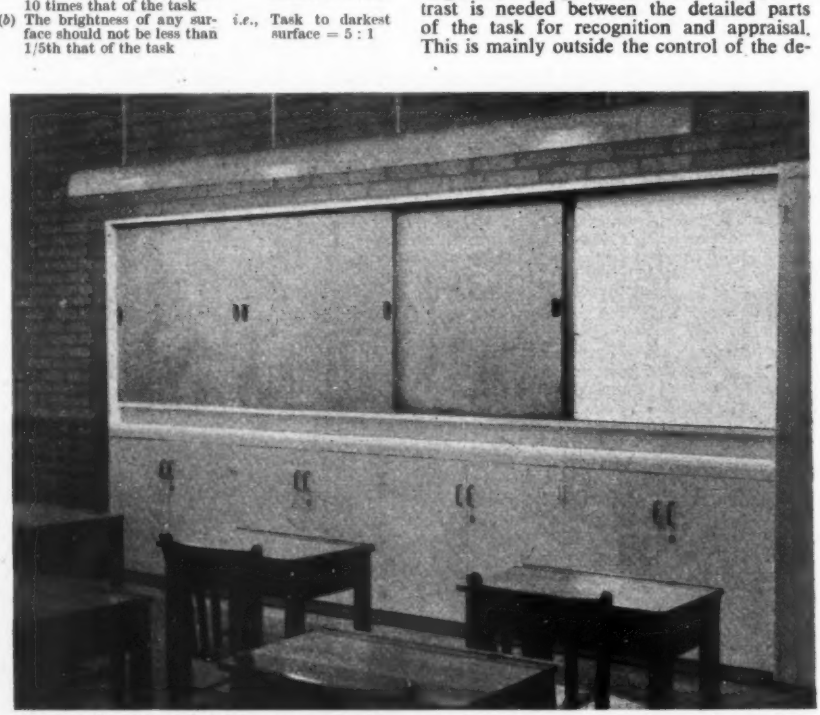
In applying the technique of brightness balance it will be immediately apparent that the central field is not a fixed point, but depends upon the task and is constantly changing with the movement of the eye. For normal classrooms, however, it is only necessary to take into account two main focal areas, the desk top and the chalkboard, for looking at the chalkboard and writing on desks are the two main tasks of any duration

With rooms of convential shape (*e.g.*, almost square) the surround field of the children at the back of the classroom, when they are looking forward towards the chalkboard, will include the whole of the wall behind the teacher. Therefore, in general the whole demonstration area will need to conform to surround field ratios and side windows, side walls and those parts of light fittings almost directly overhead, to ratios of the peripheral field.

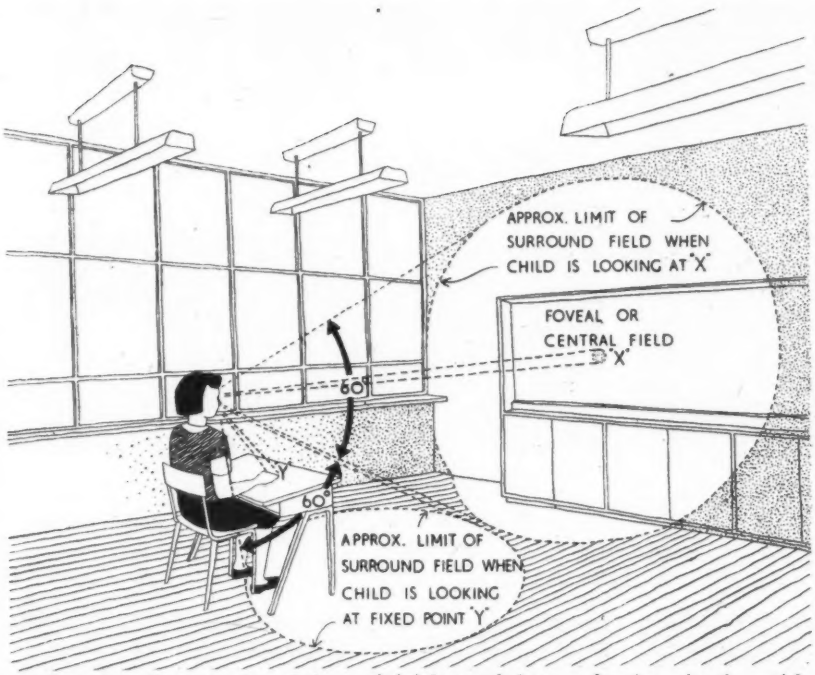
CONTRAST

Brightness control is primarily directed towards the attainment of maximum visual efficiency and comfort, but there is another aspect of the problem and that is contrast. In addition to a general uniformity of brightness throughout the field of view, contrast is needed between the detailed parts of the task for recognition and appraisal. This is mainly outside the control of the de-

Glass brick partitions can give a pleasing effect of brightness and can solve many lighting problems. This example is from Tidworth Down School by T. Walker.



An example of how brightness concentration, of the kind referred to in the article, can focus attention on important points in the room. Here, fluorescent lighting over the blackboard gives a comparatively great light intensity in comparison with the rest of the room. The classroom is one in a school at Ruislip by Howard Lobb.



This diagram illustrates the technique of brightness balance referred to in the article. The desk top and the blackboard are the two main focal areas since it is on them alone that visual attention is likely to be fixed for any considerable time.

signer, as the tasks may range from reading black print on white paper to sewing with black thread on dark cloth, but with critical tasks such as the latter the lack of contrast can be improved by increasing the amount of light.

Another matter related to contrast which is more the concern of the designer, is the question of attention. The opinion is growing that in formal teaching it is a very useful thing if attention can be focused on the teacher and chalkboard by means of the illumination and decoration. This can be achieved by introducing moderate contrasts in brightness between the chalkboard and immediate surround through the choice of surfaces with known reflection characteristics; by introducing mildly contrasting shades of colour; or by increasing the brightness of the chalkboard and demonstration area by increased illumination in those parts, a method already adopted in several of the new schools. Thus, within the range of brightness values accepted as tolerable for good seeing, we can deliberately introduce moderate contrasts and increased brightness in those areas where we want to focus and maintain attention

COLOUR

The essential factors in colour selection are brightness, hue and the strength of colour or the degree of colour saturation. The brightness range of the main coloured surfaces is already determined by illumination requirements and in general large areas of light colours are desirable. When we come to choice of hue and the degree of colour saturation, we need moderation just as we do with brightness ratios. In other words, it is necessary to avoid large areas of strong contrasting colours, as these produce visual discomfort which is analogous to glare in the strictly lighting sense.

Choice of hue depends upon personal preference and within the range of brightness and colour saturation considered tolerable, selection is almost unlimited. For the general decoration of wall surfaces there is much to be said for choosing the so-called warm colours such as pinks and yellows for rooms facing north and the cooler range of blues and greys for rooms with a south aspect. When it is desirable to focus attention on the demonstration area, this could be attained by contrasting colours between the chalkboard and the surrounding wall surface whilst still maintaining a general uniform brightness level. In fact, it is probably a good thing to place colours which are complementary to the colour of the task (*e.g.*, chalkboard) adjacent, to prevent visual tiredness, and there seems scope for experiment in this direction.

Finally, the often expressed need for gaiety and liveliness in the school environment can be achieved by discriminating use of small areas of stimulating contrasts between highly saturated colours, a technique which is often employed in the nursery school by the use of brightly coloured furniture. The effect so produced is similar to the mild glare sensation arising from small areas of specular reflection, such as sunlight on water and the glitter from silver.

INTERNAL FINISHES

By John Eastwick-Field and John Stillman

THE impression a school gives depends very much on the colour and texture and general quality of the finishes. Quite apart from the obvious limitations on the choice of materials imposed by the special conditions existing in schools, the present lack of supplies and the need for rigorous economy further reduces the choice. Unfortunately, the synthetic materials which have been developed and which at first sight appear promising are mostly too expensive. Also, while they are intended mainly to replace traditional materials, they appear on the basis of our present knowledge to be less satisfactory. If one considers floor finishes, for instance, a review of a number of pre-war schools shows that wood, in block or strip form, was used almost to the exclusion of any other type of flooring for certain rooms, and at least one school building authority has suggested that if wood were at present more easily obtained there would be little question of searching for alternatives.

This argument is not necessarily applicable to wall finishes, where the choice of material and its application may be influenced by non-traditional methods of construction, and where some of the more newly developed materials may be more suitable: for instance, the use of self-finished panels in systems devised for factory production and dry construction.

ENTRANCE HALL

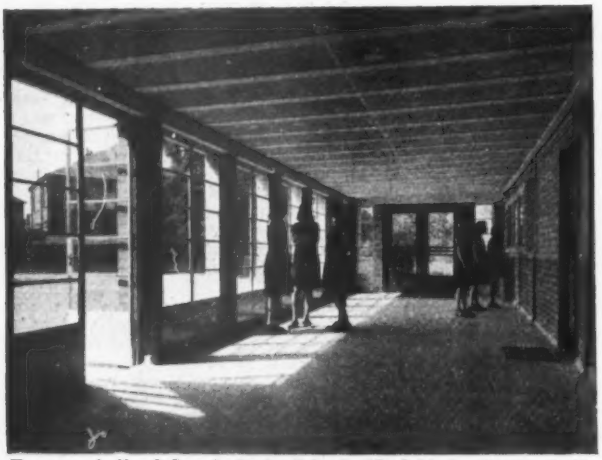
More often than not, the entrance hall is nothing more than an enlargement of one of the corridors in the school, so that the conditions will clearly be similar. On the other hand, some designers feel that this part of the school deserves greater emphasis—implying of course extra cost—and the choice of finish is then governed to a greater extent by the visual effect which it is desired to create. Also, whereas it is necessary to adhere to materials which are readily cleaned, which wear well, and which will withstand impact, it is not necessarily so important to provide for sound absorption in floors and ceiling; indeed the brightness of colour and pattern which is designed to contrast with the somewhat monotonous repetition of corridor and classroom, is notably enhanced by a corresponding brightness in acoustic effect. The principle, therefore, is that hard-wearing materials, such as terrazzo, semi-vitreous tiles, and concrete tiles are not ruled out for floors in entrance halls where decorative effect is considered worth while, providing the cost is not prohibitive, and the problem of slipperiness is guarded against by avoiding too high a polish.

CLASSROOM

Floors should be warm, quiet, hard-wearing, easy to clean, and reasonably non-slip, and of good appearance; also, they should not be of a kind (such as boarded floors which are merely butt jointed) which collect dust. If a jointless floor is used it should be hard enough to withstand the weight of desks and chair legs. In one school recently completed pitch mastic was used, and failed on this score. It might, however, be wiser to design school furniture to meet this defect, rather than reject this type of floor.

Jointless floors have the advantage that coved skirtings at the junction of floor with walls and with built-in furniture can readily be formed, and there is, of course, comparatively little opportunity for dust to collect; on the other hand, cracks do undoubtedly form all too easily, and it is particularly important that the floor be laid in the first instance by skilled operatives and on a suitable base. Pitch and asphalte mastic, which are amongst the more satisfactory jointless floors, are available only in dark colours, which may not always be desirable, but this does not apply to the same extent to the cement rubber latex finishes, which also do not suffer so much from the patina of scratches which are very apparent on the asphalte and pitch mastic finishes. None of these floors can be considered particularly warm or quiet.

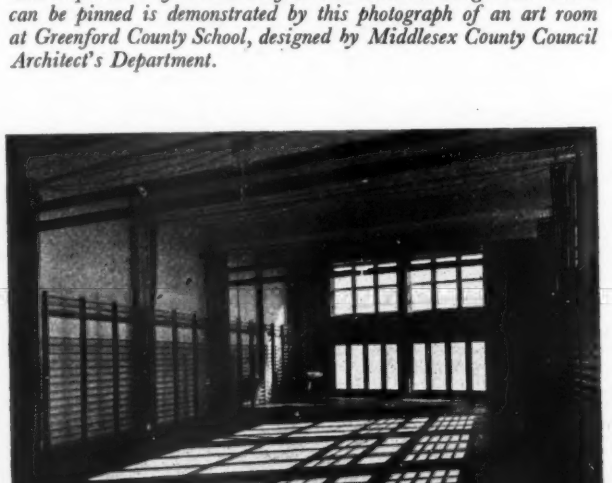
Lino, cork carpet, and rubber are all good: In nursery schools, cork carpet, being warm and resilient, is particularly suitable, and therefore perhaps worth the extra cost.



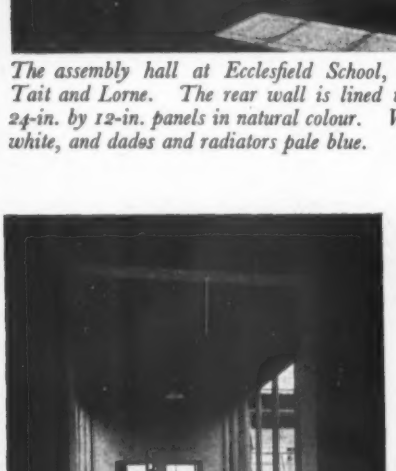
Entrance hall of St. Audrey's School, Hatfield, by H. V. Lobb. Fair-faced brickwork is used, and a solid floor with a wood-wool ceiling to minimise acoustic resonance. The entrance is treated as the enlargement of a corridor.

The importance of a wall surface on which drawings and notices can be pinned is demonstrated by this photograph of an art room at Greenford County School, designed by Middlesex County Council Architect's Department.

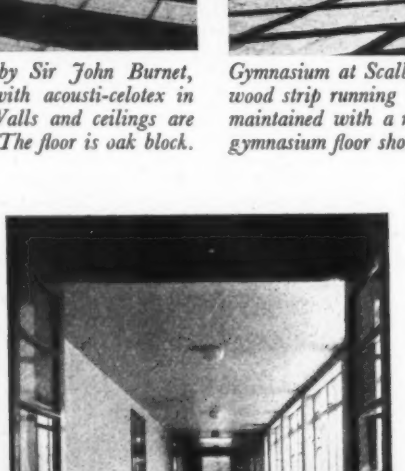
The assembly hall at Ecclesfield School, by Sir John Burnet, Tait and Lorne. The rear wall is lined with acousti-celotex in 24-in. by 12-in. panels in natural colour. Walls and ceilings are white, and dados and radiators pale blue. The floor is oak block.



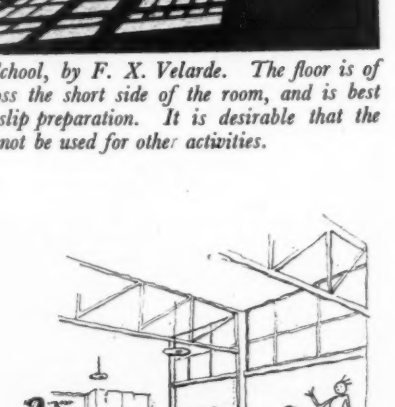
Gymnasium at Scalby School, by F. X. Velarde. The floor is of wood strip running across the short side of the room, and is best maintained with a non-slip preparation. It is desirable that the gymnasium floor should not be used for other activities.



Entrance to classrooms off the main corridor at Scalby Senior School, by F. X. Velarde. The floor is tiled. Windows on both sides give an impression of lightness and space.



Corridor of a school at Guildford by Scott and Duncan. Monotony is relieved by the doors at intervals and the use of a dado. The floor is wood block.



Walls should be washable.

SCHOOL FLOOR AND WALL FINISHES.

Tiles of cork and rubber are similar in characteristics to the same materials in their other forms. Composition blocks, if properly maintained, have much the same characteristics as wood blocks, and, of course, they do not splinter. They are made in fairly bright colours, and the pattern which they make, in common with other tiled floors, may be useful in design.

WALL FINISHES

Wall finishes may vary according to their position in the classroom. The bottom of the wall, where there is no furniture, usually gets kicked, the lower third is dirtied by finger marks, and notices may be pinned indiscriminately; for the rest, appearance, upkeep, and where necessary acoustic qualities will normally govern the choice. On external walls the need for heat insulation may be a deciding factor, and special methods of construction and the development of manufacturing processes along particular lines may also affect the choice. Already, the factory production of large self-finished panels for a prefabricated system has suggested the use of fibrous plaster in combination with wood wool.

As to the decorative finish, there is a choice of flat or gloss paint. If the dado alone is treated with gloss paint of a different colour from the remainder of the room, a strong horizontal division is created which is æsthetically objectionable. On the other hand, if the whole wall surface is glossy, specular reflections may become extremely annoying in view of the high overall intensity of light advocated for classrooms. Flat paint is the alternative, which, though less durable, does not have this objection, and is quite sufficiently washable even for dados. A gloss paint of the same colour as the rest of the wall would be less noticeable, but naturally rather less efficient in hiding dirt. A lightly bound oil paint which can be scrubbed and which is very much cheaper than normal oil paint has been developed for use in similar positions in factories, and there is every reason to suppose that it would also be valuable for schools.

Every effort has been made in the past to eliminate the general dirtying of walls by using glazed bricks and tiles, lino, and other materials as dados. These have been abandoned partly because of expense and partly because they are mostly rather unsightly. Part of the answer to the problem of dirty walls is to have classrooms which are large enough to avoid crowding.

For economic reasons, fairfaced brickwork is now often left unpainted. This means that a suitably even brick should be specified, for example sandlime or good concrete bricks, which have the additional merit of being produced in a number of light colours. Dislike of unplastered brickwork has often been expressed by teachers, but this may be only a prejudice which will disappear in the course of time. From an architectural point of view there seems no objection to this finish, and like tiled floors, it gives an interest by its texture and pattern. If an even colour is required for some reason, it is more suitable technically to use a cement paint than an oil paint direct on brickwork.

CORRIDORS

Corridors demand two particular qualities. They must have floors which are hard-wearing and not slippery, and since this usually implies a hard floor—granolithic or composition block or cement rubber latex—which is relatively noisy, they must have a ceiling which absorbs the maximum of sound Wood wool slabs are useful for this purpose, since they are an effective absorbent, and may also be distempered without impairing this property. Since corridors are necessarily long, it may be desirable to break up the floor area to give some relief. This should not be done by a change in material, which would be dangerous, but by a change in colour, or if a jointless floor is used, by including ebonite or similar strips at intervals. These may in fact be necessary to prevent cracking if the floor be laid in long lengths.

CLOAK ROOMS AND CHANGING ROOMS

Clay tiles, concrete tiles and granolithic are fairly satisfactory for the wet areas, but are unyielding, and tend to be slippery. Incidentally, wood slats or duckboards in showers are to be avoided since they are said to cause foot rot. In the changing room proper a warmer floor which will nevertheless withstand a certain amount of water should be provided. Asphalte, mastic or composition block or cement rubber latex may be used, but if cost permits, lino, rubber, or cork are pleasanter. Asphalte tiles would be suitable and if one dared to consider the use of timber, oiled teak blocks would be ideal.

For walls in cloakrooms where dampness and condensation may be serious, glazed tiles are excellent, but glazed cement renderings have been used satisfactorily. The real answer to the question of condensation and dampness in these rooms is to minimize them by proper ventilation and extraction.

ASSEMBLY HALLS AND GYMNASIA

These two rooms are purposely grouped together, since the functions of each are often required in only one room; yet, if one considers the floor, which is perhaps the most critical finish in each, it is obviously impossible to provide adequately for this contingency. In an assembly hall, which may be used for social events, concerts, plays, and above all dancing, the floor must almost certainly be of wood as in the gymnasium, but whereas a wood block or strip floor well polished and treated with french chalk is admirable for dancing, it is entirely unsuitable for physical training. The gymnasium floor should be of a wood strip such as maple, with the strips running across the short side of the room, and it should be maintained with one of the special non-slip preparations made for the purpose.

If the assembly hall is not used for dancing, other finishes such as composition block, "asphalte" tile, or some of the jointless floors may be considered.

The other major requirement in an assembly hall is that the acoustic conditions shall be satisfactory, but this factor is not peculiar to schools. In passing, it should not be forgotten how valuable are gaily designed curtains for their decorative and acoustic qualities.

HEATING

By J. R. Kell

INSULATION

IN a recent example the proportions of heat losses from a typical classroom are as follows:—

	B.T.U. per hour for 30° diff.		
Heat for air-change ..	10,000 (39%)		
Heat loss through windows	8,300 (32%)		
Heat loss through wall (insulated)	3,600 (14%)	(uninsulated)	5,400
Heat loss through roof (insulated)	4,000 (15%)	(uninsulated)	8,700
(Floor heated—loss excluded)			
	25,900		32,400

The effect of insulation of walls and roof will be noted. The overall saving by insulation is in this case 20 per cent. of the total uninsulated heat loss.

AIR CHANGE

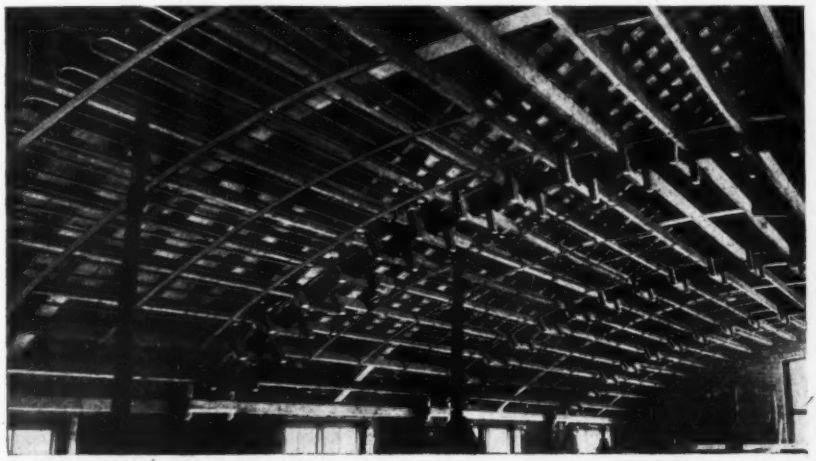
But it will be seen that the two chief losses are due to air change and windows. The air change rate is laid down in the Ministry of Education Order, 1945, No. 345, at *six* per hour for teaching rooms. It has nevertheless been agreed that as a basis for designing the heating system *three* changes per hour be allowed. This latter rate is reasonable, and it would not be wise to reduce on it. Incidentally it can be shown that the heat from the occupants is nearly sufficient to warm the other three changes from 32° to 62°, so that, when in use, between 5 and 6 air changes per hour are possible, and when not in use the windows should be closed to conserve heat.

WINDOWS

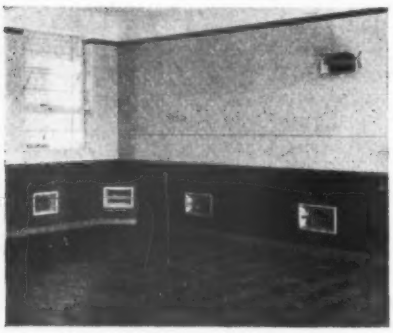
The area of windows in modern schools is so great compared with older practice, that in the interests of heat economy the question may well be asked, "Are such vast expanses of glass really necessary?" If the area could be reduced by one-third, 10 per cent. of the fuel would be saved.

NIGHT LOSSES

The occupation period of a school may be about 40 hours per week, equivalent to 40/168 = 24 per cent. Thus for roughly three-quarters of the time the building is not in use, but some warming has to be maintained if the unpleasant conditions of cold walls and furniture, etc., are to be avoided. A mild heat to keep the rooms at 50° or so during unoccupied periods has much to recommend it, leaving the final few degrees to be put in just before school starts. Bearing in mind that the average external temperature in this country in



A heating layout for a school assembly hall. The photograph shows a panel heating assembly in a suspended ceiling and the methods of fixing the coils.



Electric high temperature low level radiators in a classroom.

winter is about 42°, 50° means an 8° rise. As the system is designed for 30° rise, the proportion of full scale heat for maintenance of this steady background heat is on an average thus roughly 25 per cent. By closing windows and reducing unwanted air change this can be reduced to about 20 per cent.

SHUTTERS

If in addition some form of shutters could be provided to the windows, the loss would come down to about 12,000 B.T.U. per hour for the classroom mentioned above, which for an 8° rise equals only 12 per cent. of full scale heat.

OVERALL ECONOMY

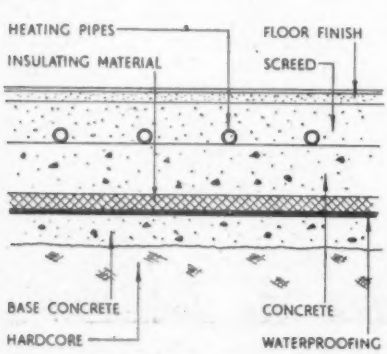
By these measures—insulation of walls and roof, reduction of window area by one-third, closing of windows at night, and provision of shutters to glass surfaces—it can be shown that an overall annual saving of fuel can be effected to the extent of over 50 per cent. It is therefore suggested that the most important aspect of school heating today is to see how small a quantity of heat can be made to suffice to do the job in hand. To achieve this aim fullest collaboration between the architect, heating consultant, and education authority will be necessary.

METHODS

The types of school heating system in use today out of which a choice has to be made may be reduced to these:—

Hot water radiators and pipes.
Panel heating in floor or ceiling.
Electrical heating.
A new form of warm air system.

The hot water radiators and panel systems are central systems with a boiler or boilers, which may be fired by any available or convenient fuel, such as coke, coal, oil, or gas. The electrical system may in many cases be ruled out at the present time owing to the embargo on the acceptance of new loads in most areas. The last named system on the list, known as "Weatherfoil," is also a central system using hot water for heat distribution and warm air for circulation in the room.



Construction for floor heating.

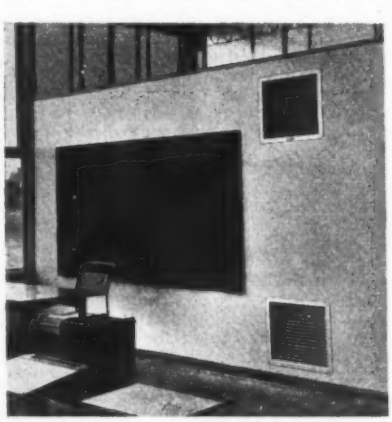
HOT WATER RADIATORS

The radiators are generally placed under the windows to check the down draughts off the cold glass, but owing to the high heat losses of conventional school construction it is frequently necessary to place some on the opposite wall in addition. The radiator and pipe system is generally the cheapest system to install, but against this must be considered:—

(i) The loss of floor space due to the use of radiators;
(ii) The loss of heat due to convection currents from the radiators carrying warm air to the ceiling, where it can frequently escape through open windows.

PANEL HEATING IN FLOOR OR CEILING

There can be little doubt that of all types of building for which panel heating is particularly suitable, schools are near the top of the list. By panel heating is meant the embedded panel system, using pipes of steel or copper through which warm water is circulated at a temperature of about 100° to 110° F. Where the heating is in the floor, the pipes are laid on top of the concrete slab at perhaps 9 in. or 12 in. centres; the cement screed is then laid so as to embed the pipes in the solid, and this is followed by the floor finish in the normal way. In some instances insulation below



The Weatherfoil apparatus referred to in the article. After installation the air intake and discharge grills alone are visible.

the floor has been included where the floor is on ground, as in the figure on this page. A surface temperature of 75° to 80° is usual. There is not space here to discuss the various points of detail which should be watched if the system is to be permanent and satisfactory, but it must suffice to say that there are innumerable instances of completely successful panel heating installation, many of which are in schools.

In a school where children sit with their feet under a desk, the floor seems the best place to put the heat. The ceiling is the alternative, and it frequently is desirable to use floor heating in some rooms such as classrooms, and ceiling heating in others as in an assembly hall. If in the ceiling, the pipes may be buried in the soffit of the slab and plastered over. If the ceiling is suspended, the pipes are then wired to the framing before the expanded metal is fixed, insulation being placed above. The hall shown in the illustration is of this type [p. 533.]

Radiant heating, whether from floor or ceiling, is not dependent on the circulation of warm air as with a convection system such as conventional radiators. In schools where teachers are notoriously open-window-minded, this is of the highest importance, as the radiant heat will warm the occupants, independently of air motion. It is no doubt due to this that the panel system is found to have a lower fuel consumption than convective types.

It should perhaps be mentioned that apart from the embedded system of heating a floor, there is the cavity system in which pipes are run in ducts below a suspended floor, or in channels of some form. The pipes are not in contact with the structure and are run at a higher temperature. The results are the same in the two cases, and the selection of method depends partly on personal preference, but principally on cost and conditions.

ELECTRIC HEATING

For convenience, ease of control, and simplicity of installation electric heating is supreme. It requires no boiler house and no labour to run. It causes no dirt, smoke, or fumes. Before 1939 a good deal of school heating was being carried out electrically where cost of current was low, but the position is now changed, and it may be some years before additional loads of this magnitude can be accepted by the Supply Authority. Electric heating can be easily applied in radiant form, and for the reasons stated earlier, this method is to be preferred for schools. The radiation can be at any temperature. Floor heating will give a surface temperature of 75°-80° F., wall or ceiling panels about 100° F. Small non-luminous flat plate type heaters placed at an angle to the wall run at about 400° F. Finally come luminous heaters similar to the electric fire, with an element running at bright red heat.

ELECTRIC FLOOR HEATING

One interesting application—"Panelec"—has been carried out in several schools in Scotland. It comprises a lead-covered, asbestos-insulated resistance cable, drawn through a conduit laid in the floor screed, controlled thermostatically and by time-switch. The latter cuts off the current at peak-load periods, and the thermal capacity of the floor material carries over the gap. Records show that the drop is only 2° five hours after power is shut off. It is stated that a saving of 25 per cent. in current consumption has been shown compared with other forms of electric heating.

LUMINOUS HEATERS

Another system which has been tried out successfully at Worcester before the last war makes use of electric reflector-type luminous radiators, fixed on the walls either overhead or near floor, one being in each of the four corners, and others on the side walls under windows. These are controlled by hand. They are switched on shortly before occupation, and off when unoccupied. They rely almost entirely on the direct radiation of heat at high temperature, and the results are thus again more or less independent of air movement. Due no doubt to the short period of actual use the running consumption is stated to be in one case only 37½ per cent. of the average figure for tubular heaters.

"WEATHERFOIL"

In this system hot water is circulated from boilers to heater units fixed at high level adjacent to each classroom. These units are in the form of a duct approximately 2 ft. square, provided with openings at high and low level seen in the accompanying illustration. Air is drawn in through a low level opening by means of a fan which passes it through a copper heater, and discharges it at high level into the classrooms. The fan is started and stopped by the operation of a thermostat. Very close control of temperature in each room occurs, thus saving heat and preventing overheating. For small installations, Janitor boilers burning anthracite are preferred, and for larger systems some type of firing which can be automatically controlled, such as automatic coal stokers. It is stated that the installation is extremely simple and economical.

CENTRAL SYSTEM. FUEL AND FIRING

If a central system is adopted the fuel and method of firing needs careful investigation, but is at present most difficult to decide upon. Electric thermal storage has not been found economical for schools, even if the load could be accepted. Gas-fired boilers are labour-free, clean, and require no fuel store. Their use is dependent on cost of gas and whether mains or plant capacity are available to take the load. Oil firing, though most efficient, clean, and labour-saving, is for the moment under a cloud due to restriction of supply. Coal in automatic stokers is dependent on supplies of suitable fuel, which for the time being is not always forthcoming, though some improvement may be looked for in the future. Coke hand-fired in sectional boilers is the most common method and cheapest in capital cost. Results depend on the human element. Magazine boilers burning coke or phurnacite were much in use pre-war, but reasonably intelligent attention is required, apart from which the supply position is at present difficult. Whatever the system of firing, thermostatic controls will make for fuel economy and improved results provided periodical servicing is arranged.

The above touches briefly on some of the chief aspects of school heating. Other subsidiary problems arise in the provision of adequate ducts for the running of main pipes, the provision of hot water supply for cloaks, showers, etc., the heating of the gymnasium, art room, science rooms, etc., and the ventilation of the assembly hall and kitchen.

SANITARY EQUIPMENT

By Henry Goddard

IT has become a definite and important part of children's training that, from an early age, they should learn regular and cleanly habits: and it is in the properly supervised use of the washroom that these habits are learnt. Thus, the washroom has, in its way, as important a function as the classroom. To achieve the results desired, the standard of planning and equipment must be very high, and supervision, maintenance and cleaning made as easy as possible. The latter is of particular importance when staff for cleaning is so difficult to obtain, and any failure in this direction will bring the whole scheme to nought.

Briefly, the requirements of school sanitary fittings are these:—

(1) They must be of good appearance.

(2) They muse be easily cleansed, both inside and out, and have a minimum of corners or angles able to harbour dust.

(3) They must have easy facilities for maintenance: in particular, ready means of clearing traps or wastes must be provided.

(4) They must have sufficient physical strength to stand possible abuse and to ensure hard wear.

(5) They must not only be foolproof, but must also be, as far as possible, proof against the mischievous machinations of the children.

(6) A further requirement, which recently has received considerable publicity in America, and is now the object of attention in this country, is that back siphonage from any fitting into the water supply must be guarded against. Though the standard type of water system used in this country is less susceptible to this fault than that normally used in America nevertheless, the risk of infection due to this cause is probably higher in schools and similar institutions than elsewhere.

Lavatory basins for a nursery school manufactured by Dent and Hellyer, Ltd.

To enable manufacturers to concentrate on a limited number of types of fitting, and thus to be able to supply the large number required by the present school programme with a minimum of duplication and waste of effort, standard specifications have been laid down: the publication BS/MOF/1-7, refers, and should be consulted. The requirements for sanitary accommodation under the Education Act of 1945 are given in S.R. & O. 345, of 1945. A brief summary of its provisions are included; these should be taken as a regular standard.

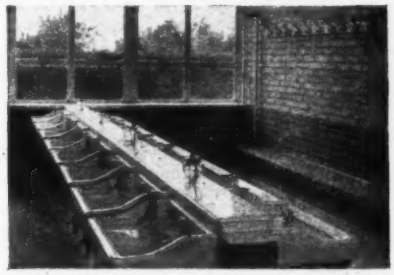
WATER CLOSETS

County and Voluntary Schools :—
- For the first 100 girls : 1 closet to every 10 girls.
- For the next 100 girls : 1 closet to every 15 girls.
- And thereafter, 1 additional closet to every 25 girls.
- For the first 200 boys : 1 closet to every 25 boys.
- And thereafter, 1 additional closet to every 30 boys.
- In addition, where there are children under 8 years, separate closets must be provided for them to the extent of one closet for every eight children.
- No school must have less than two closets.
- Each closet must have its own flushing apparatus.

Nursery Schools :—
- One closet for every six children under five years.
- One closet for every eight children over five years.

Boarding Schools :—
- One closet for every five girls.
- One closet for every ten boys.

They are available in sizes suitable for children from the age of two. For small children the low type is to be favoured. seven inches high with opening seven to nine inches diameter for children from two to five years, and eight inches high with opening ten inches diameter for children from five to seven. Pedestals twelve and fourteen inches high are available for older children. Hardwood or plastic inserts are generally used, rather than tip-up seats, but the latter are favoured by some on account of their training value. Similarly, it is generally considered desirable for each closet, even for the smallest children, to have its own manual flushing device rather than automatic or seat-operated apparatus. The importance is stressed of providing means by which closets can be flushed at frequent intervals, without the usual delay in refilling the cistern. This may be overcome, in the case of a range of closets, by the provision of either a trough type cistern, or by a gravitational system in which the individual cisterns are fed by large diameter pipes from a large cistern at the same level. Flush valves meet this requirement in districts where their use is permitted: they should be fed from a separate cistern to avoid dangers of back-siphonage. Vacuum breaker valves, of the type now being introduced in America, would probably offer too great a chance for interference. Easy access



A range of wash-basins at St. Audrey's School, Hatfield.

A towel and toothbrush trolley for a nursery school manufactured by the Educational Supply Association.

A wash-basin in the Eriksdalsskolorna, Stockholm. The tap is of a type not often seen in this country and the anti-siphonage trap is luxuriously chromium plated.

to traps for cleansing or clearance is essential.

URINALS

County and Voluntary Schools :—
For the first 100 boys : 1 stall to every 10 boys.
And thereafter : 1 additional stall for every 12 boys.
Boarding Schools :—
One stall for every 10 boys.

Urinals should be provided, even for the smallest boys: when they are fixed in mixed Infants' lavatories, they should be placed in a compartment of the same type as that used for the W.c.s. The slab type urinal is generally used on account of cheapness, but the stall type is in every way preferable on hygienic grounds.

ABLUTIONS

County and Voluntary Schools :—
For the first 100 pupils : 1 basin to 8 pupils.
For the next 100 pupils : 1 basin to 10 pupils.
And thereafter : 1 additional basin for every 12 pupils.
Sufficient showers must be provided, where there are gymnasia or playing fields.
Nursery Schools :—
1 basin for every 5 children under five years.
1 basin for every 8 children over five years.
1 bath for every 40 children under five years.
Boarding Schools :—
1 slipper bath for every 5 girls.
1 slipper bath for every 30 boys.
1 shower bath for every 5 boys.
1 basin for every 3 pupils.
Where the boarding school is for crippled children, there should be one slipper bath for every 5 boys, and one shower for every 20 boys.

It is a requirement that where water under pressure is available, running hot and cold water should be supplied to all fittings in each type of school: where it is not available, a sufficient supply of hot and cold water must be provided. A minimum supply of ten gallons of water per diem for each pupil is required.

WASH BASINS

Wash basins are essential for younger children, and greatly preferable to wash fountains for older children, as the latter type of equipment is very wasteful of water. Basins should be fourteen inches high for children of two, and should have a cold tap only or a tap fed from a thermostatically-controlled mixing valve. For children from three to five years, basins should be sixteen inches high, and from five to seven, seventeen inches high, and hot and cold taps provided. The press-down non-concussive type of valve is well suited to basins for older children, and may effect a saving of water by preventing washing under a running tap. They are, however, difficult to operate by small children, and should not be used for them. The limitation of pressure and temperature for the water supply is desirable, to avoid the risk of scalding, and reduce the temptation of playful misuse.

Ranges of basins may be either free standing or wall pattern, ease of cleansing being obviously of the greatest importance. Angular type basins are to be avoided. Wastes which discharge to an open channel leading to a trapped outlet are preferable to individually trapped wastes, as they are less readily blocked. The material for basins is normally glazed fireclay, and though this is excellent from the point of view of hygiene, it is also very easily broken. Vitreous enamelled pressed steel basins are available, and their use should be considered. All taps should have their outlets not less than 1½ in. above the basin rim, to avoid any risk of water from the basin being siphoned back into the water system.

BATHS

Whilst it is necessary to provide fixed baths for children in nursery and primary schools, for older children showers will generally be provided. The modern economic type of shower head uses far less water than the old-fashioned rose, and, in fact, a satisfactory shower can be had with the use of only one to two gallons of water at 105° F. Individual controls for the showers should not be provided: it is preferable to provide a thermostatic control for the whole range under the control of the person in charge.

KITCHENS

By J. C. Morris

THE advent of the Board of Education School Meals Programme whereby some millions of school children, *i.e.*, Council and Secondary, were to be provided with mid-day meals, has brought about probably the biggest experiment in standardized kitchens ever known or thought of in this country. Not only has there been an effort to standardize equipment from the actual cooking utensils to the large heavy duty cooking appliances and preparation units, but the actual design of the building to house the kitchen together with plan or layout has been standardized to a marked degree. This short article is an attempt very briefly to explain the different forms of standardized kitchens that are being employed for the School Meals Scheme.

(A) CENTRAL KITCHENS

These are large cooking centres where food is stored, prepared and cooked, but not consumed, *i.e.*, there is no dining room together with service room as part of the building. The central kitchens are usually arranged at the most suitable districts for despatching cooked foods in specially designed containers and boxes which are insulated so that the food is kept in an appetizing condition and transported to a number of small sites where the meals are plated and served to the children. Their capacities range from 500 to 2,000 or more meals per day.

(B) SATELLITE KITCHENS

These are not really kitchens in the cooking sense at all, but are more aptly described as scullery and dining room, being the small unit to which the cooked food is sent from the central kitchens. The equipment here is obviously only for service and washing up. Sizes vary considerably, small establishments receiving 30 or 40 meals, but quite large numbers can be efficiently catered for in this manner, *i.e.*, up to 300.

(C) CENTRAL KITCHEN AND DINING ROOM COMBINED

This type is very similar to the large central kitchen described in (A), but in addition to the despatch of the bulk of the meals a number are served from the actual kitchen in an adjacent dining room, thereby necessitating a service room and wash-up for crockery in addition to the large kitchen.

(D) CANTEEN DINING ROOM

This type is the most popular and the most usually understood kitchen, where food is stored, prepared, cooked, and served at the same place. For this type it is obvious that a wide range of sizes has had to be employed, varying from a kitchen and dining room catering for as low a number as 40, up to 500 or more.

The kitchen at Bourne School, Middlesex. The equipment consists of gas-fired steaming ovens and boiling pans, centrally grouped to minimise labour. There is a hot cupboard on the kitchen side of the serving hatch.

AREA

(A) CENTRAL KITCHEN

500 meals per day capacity, approximately 3 sq. ft. per meal.
500 to 1,000 meals per day capacity, approximately 2·25 sq. ft. per meal.
1,500 meals per day capacity, approximately 2 sq. ft. per meal.
2,000 meals per day capacity, approximately 1·75 sq. ft. per meal.

These figures would include space for all stores, preparation departments, despatch bay (*i.e.*, area required for the storage and packing of the special containers for transporting food to satellite kitchens), container wash-up and sterilization of utensils, kitchen staff accommodation and the actual kitchen area, but do not make allowance for the area needed for a boiler house if a particular boiler house for steam boiler plant has to be provided.

(B) SATELLITE OR SCULLERY KITCHENS

With 100 seating capacity in the dining room allow 2 sq. ft. per person for a scullery and wash-up area.
With 150 seating capacity allow 1·5 sq. ft. per person.
With 250 seating capacity allow 1·2 sq. ft. per person.
With 300 seating capacity allow 1 sq. ft. per person.

(C) CENTRAL KITCHEN WITH DINING ROOM ATTACHED

The same area would be required for the central kitchen as given under schedule (A) with the addition of the space required for the service room, and this would be according to the size of the dining room, and the addition to cover this would be on the basis given for the satellites in (B).

(D) CANTEEN DINING ROOM

100 meals capacity allow area of kitchen 5/6 sq. ft. per meal.
150 meals capacity allow area of kitchen 5 sq. ft. per meal.
250 meals capacity allow area of kitchen 4½ sq. ft. per meal.

These figures cover store rooms, preparation departments, kitchen area, service room and wash-up. The following calculations show the approximate total overall area occupied when serving the same number of children:—

	Sq. ft.
Example One	
Central kitchen for 2,000 meals at 1·75 sq. ft. per person	3,500
8 satellite or scullery dining rooms, each for 250, at 1·2 sq. ft. per person = 300 sq. ft. per satellite	2,400
Approximate total area occupied	5,900
Example Two	
8 canteen dining rooms complete, serving a total of 2,000 people, *i.e.*, 8 sites each for 250 children, at 4½ sq. ft. per person = 1,125 sq. ft. each kitchen Approximate total area occupied	9,000
Example Three	
Central kitchen for 2,000 meals at 1·75 sq. ft. per person	3,500
Serving 4 satellites, each for 100 persons at 2 sq. ft. per person = 200 sq. ft. per satellite	800
4 satellites, each for 150 persons, at 1·5 sq. ft. per person = 225 sq. ft. per satellite	900
4 satellites, each for 250 persons, at 1·2 sq. ft. per person = 300 sq. ft. per satellite	1,200
Approximate total area occupied	6,400
Example Four	
12 canteen dining rooms complete, serving a total of 2,000 arranged as follows :—	
4 each for 100 persons at 6 sq. ft. per person = 600 sq. ft. per dining room	2,400
4 each for 150 persons at 5 sq. ft. per person = 750 sq. ft. per dining room	3,000
4 each for 250 persons at 4½ sq. ft. per person = 1,125 sq. ft. per dining room	4,500
Approximate total area occupied	9,900

The above examples indicate that by the use of a central kitchen serving a number of satellites a total saving of space occupied is quite 50 per cent. over separate kitchens for each dining room. Another factor is that whereas at some schools it is possible to arrange for a small dining room with a suitable service room and wash-up in the existing building, it is not generally possible to provide a self-contained kitchen without additional construction. There are, of course, many other considerations to be borne in mind as well as space, but the information given is on a subject of general interest.

CHOICE OF EQUIPMENT AND FUEL

With the type of catering necessary for school kitchens, the demand is obviously one of bulk cooking as against that required in a public restaurant where a varied menu has to be provided. The equipment therefore should be of a type to handle a large quantity of food as economically as possible. The chief items of cooking equipment can be classified as follows:—

(*a*) Roasting.
(*b*) Baking.
(*c*) Boiling.
(*d*) Steaming.

The demand for frying is very limited, therefore a large area of boiling table surface, usually provided as a boiling top on a range (whether gas, electric, or solid fuel), although essential to a restaurant, is not required in this type of kitchen. This allows for separate independent ovens and general purpose ovens for roasting and baking mounted on legs, giving easier operation for the cooks and certainly allowing for ease of cleaning. This applies to gas and electrically heated ovens, but if for any particular reason solid fuel has to be used, a range having small ovens with a boiling table top must be provided. It is surprising that whenever a large-scale kitchen is being planned how automatically the first fitting usually considered is the range. The point to stress is that with this type of kitchen where gas or electricity can be employed, one should not think of a range but of independent ovens and a small boiling table. There is a far greater need for more oven capacity and less boiling table surface than can be obtained with a range, apart from the ease of operation and of cleaning. Boiling pans provide the means of cooking green vegetables, soups, stews, etc., while large steaming ovens handle the potatoes, steamed puddings, and steamed fish.

Other subsidiary equipment is needed, particularly in the self-contained canteen kitchen where service apparatus has to be provided, *i.e.*, hot cupboards for plate warming, food storage, also water boilers. The choice of fuel to be used for the equipment briefly mentioned above is governed by:—

(*a*) Availability.
(*b*) Cost.
(*c*) Individual preference.

It is possible, whatever the size of the kitchen, for the equipment to be arranged for:—

(*a*) All-gas.
(*b*) All-electric.
(*c*) A combination of both.
(*d*) If steam is available it should be used wherever possible for boiling, steaming, and for hot cupboards, leaving gas and/or electricity for roasting and baking.

In some districts solid fuel burning equipment has had to be used because the other services were either not available or were very unreliable.

The main questions that generally have to be answered are, when shall one use gas or electricity, assuming that both are available, and secondly, when is it worth while to install steam-heated equipment?

Modern gas and electrically heated equipment will be found equally efficient for roasting and baking, and both can be used for boiling and steaming—the choice therefore depends largely on cost.

A fair comparison is that for roasting, baking, grilling, etc., electricity should be about 1/20th the cost per unit of gas per therm, *i.e.*, gas at 1s. 3d. per therm would compare with electricity at ¼d. per unit. With boiling and steaming, electricity should not be more than ½d. per unit to compare with cost of gas at 1s. 3d. per therm. These figures are given on the assumption that there will be no fixed or standing charges to be made for one or both. These figures are controversial, but after a study of all types of kitchens using all fuels, the comparisons given can be considered a fair statement.

As to steam equipment, if steam is required and used for any other purpose, such as providing hot water, heating, or in the case of a hospital for sterilizers, it will always pay for the steam boiler to be of a size to deal with the extra load required for the kitchen. Obviously for the Public or Boarding School these other services are more likely to be required than in the day school, where it is very unlikely that a steam boiler installation is provided. For a large central kitchen dealing with 1,000 to 2,000 meals per day, the increased capital expenditure of a steam boiler plant is well worth while, and in some instances it pays to install a steam boiler even for the smaller job where gas and electricity are not available or unreliable. Here a solid fuel range would be used for roasting and baking and a small steam boiler for the boiling pans and steaming ovens. Although solid fuel boiling pans with steaming attachments are available, they create unnecessary heat and dust in the kitchen, whereas the small steam boiler does not only handle the cooking requirement but provides the means for hot water and heating the hot cupboards.

ESTIMATED FUEL CONSUMPTION

These examples are of complete canteen kitchens and dining rooms equipped "All-gas" or "All-electric."

EXAMPLE ONE. KITCHEN PROVIDING 100 MEALS PER DAY

All-Gas.—Approximately 1,350 cu. ft. of gas would be consumed, which would be about 13 cu. ft. of gas per meal.

All-Electric.—Approximately 150 units of electricity would be used, which means about 1.5 units per meal.

EXAMPLE TWO. KITCHEN PROVIDING 400 MEALS PER DAY

With the larger numbers being catered for, the consumption per meal would drop to 8/9 cu. ft. of gas or about one unit of electricity.

EXAMPLE THREE. KITCHEN PROVIDING 1,000 MEALS PER DAY

With such a large number as this, considerable economy can be effected in fuel costs, and the consumption figures should not be more than 6 cu. ft. of gas per meal, or .6 of a unit per meal for the all-electric installation.

To achieve an efficient layout for a school kitchen there are many other details that have to be studied which are not covered in this article, but information usually required by architects in initial planning has been given, *viz.*, area, types of equipment, and fuel costs.

FURNITURE AND EQUIPMENT

By David Medd and Mary Crowley

FOLLOWING the 1944 Education Act, the opportunities and responsibilities of designers and manufacturers of school furniture are now greater than has been generally realized. Hitherto there has been no clear idea of what is wanted due to the lack of central guidance. Good designs have come, consequently, largely by chance. Too many designs on the market now are the result of independent action taken either by the client, the architect or the manufacturer. The purpose of this article is to show that a successful design can only be achieved by the co-operation of all three.

The architect must work with the client, with whom contemporary educational requirements will be defined, and the scientist, who will furnish him with basic data on dimensional and performance standards, presented for designers' not scientists' consumption. The emphasis on the necessity for standards does not mean the standard specifications (which are really standardized designs) as we now know them, but the publication of basic information on standards of function and quality which alone can guide the designer, leaving him free to make his own interpretation. The architect must now relate this information to production conditions and to the methods of the particular manufacturers with whom he is concerned. He will thus find himself in a central position where he will not only design but must also be the purchasing agent. If the purchasing is done by a person not intimately concerned with design developments, the results must inevitably tend towards a mere repetition of previous orders.

In the absence of central scientific research on dimensional data the architect, before he can design furniture, or even buildings, should undertake local dimensional surveys through the educationalists. The accompanying tables show how information can be presented so that it forms an essential day-to-day reference for the designer. The cumulative effect of a series of such surveys will give increasingly reliable conclusions.

TABLE I.—*Boys and Girls Infants (Ages 5 to 6·9 Years).*

		ft. in.	ft. in.	ft. in.
1	Eye level standing	3 5½	3 7½	3 0½
2	Ht. of pegs, etc.	4 1½	4 5½	3 6½
3	Ht. of handles and switches	2 3½	2 6½	2 1
4	Ht. of standing working plane	1 11½	2 3½	1 9½
5	Ht. of tables and flat-topped desks	1 8	1 9½	1 6½
6	Ht. of chairs	11½	12½	10½
7	Eye level sitting	2 7½	2 9	2 5½

TABLE II.—*Boys and Girls Juniors (Ages 8 to 8·9 Years Only).*

		ft. in.	ft. in.	ft. in.
1	Eye level standing	3 9½	4 0	3 7
2	Ht. of pegs, etc.	4 8½	5 0	4 6½
3	Ht. of handles and switches	2 7½	2 10½	2 6
4	Ht. of standing working plane	2 3½	2 6	2 2
5	Ht. of tables and flat-topped desks	1 11	2 4	1 10
6	Ht. of chairs	1 1½	1 2½	1 0½
7	Eye level sitting	3 1	3 4½	3 0

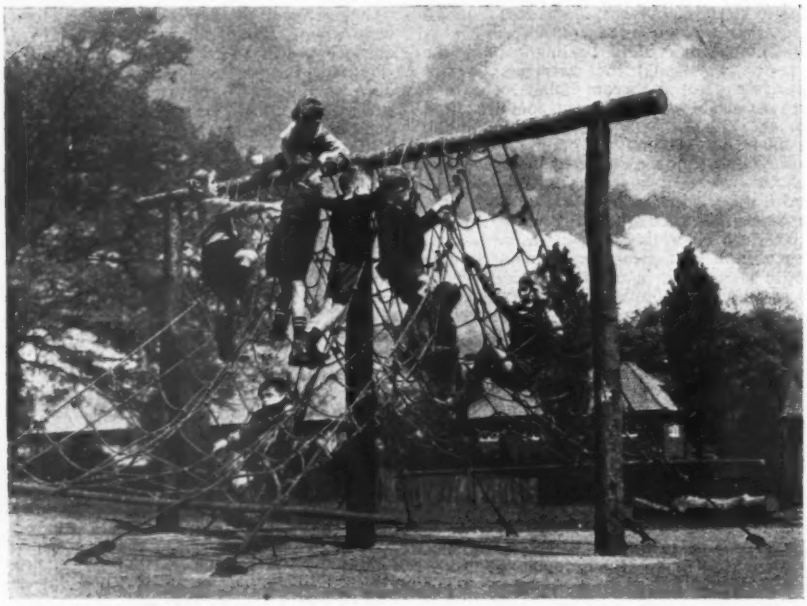
TABLE III.—*Boys and Girls Seniors (Ages 11 to 14·9 Years).*

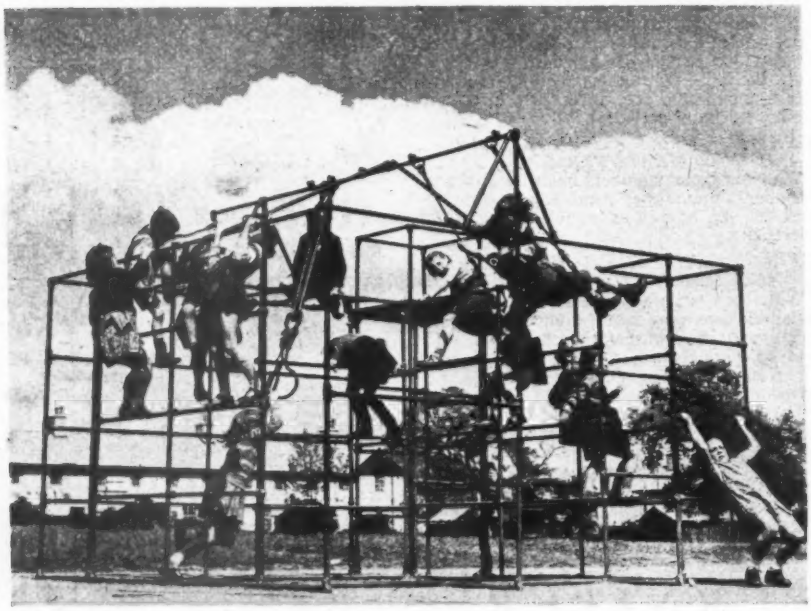
		ft. in.	ft. in.	ft. in.
1	Eye level standing	4 7½	5 0½	4 1½
2	Ht. of pegs, etc.	5 7½	6 2½	5 1½
3	Ht. of light switch, door handles, etc.	3 4½	3 9½	3 0½
4	Ht. of standing working plane	2 10	3 2½	2 6½
5	Ht. of tables and flat-topped desks	2 2½	2 6	1 10½
6	Ht. of chairs	1 5½	1 8½	1 4½
7	Eye level sitting	3 4½	3 8½	2 10½

NOTE.—These tables only show the conclusions from the measurements and not the actual measurements themselves.

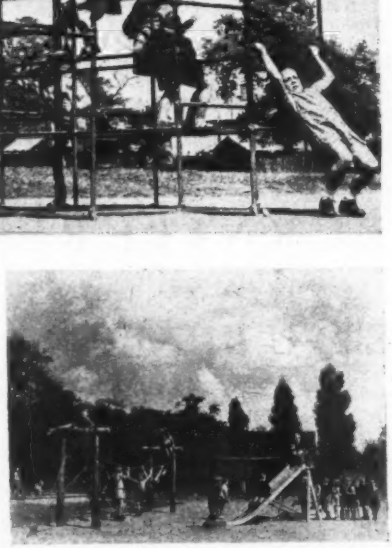
At the risk of stating the obvious, it must be emphasized that it is not enough for the architect only to "consult" with the client, but he really must associate himself with the school life by first-hand observation. It is only this visual experience which can focus the imagination to see things as they are wanted for children.

There has been a temptation to generalize about school furniture with an over-emphasis on such equipment as desks, blackboards and easels. A school does not consist of teaching spaces only; to equip fully even a primary school (comparatively so much simpler than a senior school) a wide range of domestic furniture is involved. This article considers some aspects of the needs of Primary Schools, as the space available does not permit the discussion of the more specialized equipment in Senior Schools. Increasing emphasis is being laid on practical activities of all kinds, carried out in small groups





Playground equipment, especially in junior schools, is now receiving more attention from manufacturers and designers. The photographs show, top, commando nets; centre, a climbing cage; below, parallel ropes; right, a general view of a well-equipped playground with its slides and commando nets.



with the teacher no longer imposing discipline on rows of children, but encouraging their different ways of self-expression, and not only in the teaching spaces, but in the whole of the school. To furnish the administrative rooms (for the head teacher, the secretary, the doctor and the staff) normal domestic furniture will be needed. As utility furniture is unobtainable for this purpose, the designer has some interesting opportunities in these rooms.

A locker unit. Each child has his own locker distinguished by a letter—an arrangement which is coming to be preferred to the locker desk.

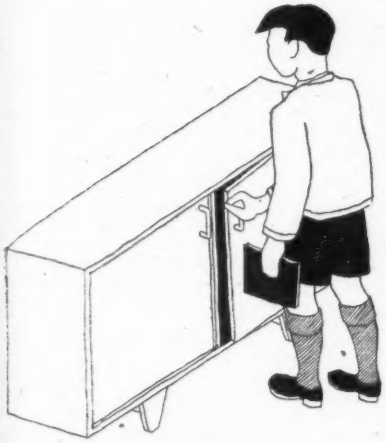
All new schools must, under the Act, provide for the midday meal, and a new category of equipment is called for—that is to say, if the architect can avoid the Ministry of Works forms and tables, relics from the war emergency, which are not only dimensionally outrageous, but dangerous and out of character. Dining rooms in Primary Schools might well have the character of small gay restaurants with tables that can be grouped in a variety of ways. The tables need to be rather heavier in character than the normal infants' teaching tables. They should be stackable, as the dining room is likely to be used for other purposes.

Coming to the teaching spaces, the activities of the youngest children of 5-7 years are so varied that the furniture must be capable of being used for many different purposes, such as drawing and painting, light woodwork, clay modelling, etc. Infants' tables should be of dual size (approximately 3 ft. by 1 ft. 6 in.) in order that 40 children can have table space. The tables should also be stackable and designed in such a way that the tops can butt together in any direction to form larger surfaces for group work. This top surface will be subject to very hard wear indeed. Plywood may prove unsatisfactory in the long run, and linoleum, if obtainable, would be more satisfactory. The tables must combine strength and lightness.

A bin unit used for storing materials such as wool and raffia in juniors' practical rooms. The flat surfaces lend themselves to painting in gay colours.

Lightness and the need for mobility make it essential to provide rubber stops or some other device, especially as hard floors are unfortunately rather common.

In Junior teaching spaces, the dual table gives way to individual locker desks at which more reading and writing is done. Again, these desks must not only be strong, but light and easily moved. Their tops should be sloping for reading and writing, but capable of adjustment to form level surfaces. Desks also need to be placed together to give larger areas for group work. As yet no existing dimensional surveys or standards give any guide to design, although desks are probably the most difficult items of school furniture to design. In the higher age groups the difficulty is aggravated by the need for adequate storage and comfortable knee-room under the desk, and the conclusion may be reached that desks should be designed without lockers, which would become separate items of furniture. The teacher's desk should be light and unassuming, as it is likely to be moved about in accordance with the changing activities.



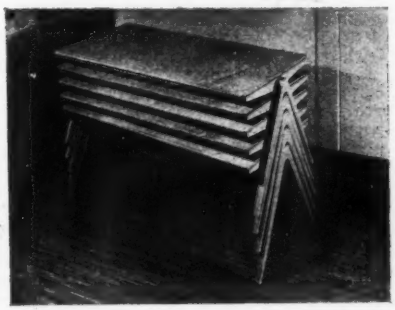
A cupboard unit for papers and books. Once again this design gives an opportunity for using gay contrasting colours to enliven the classroom.

The heavier practical work will be carried out in a separate room with heavier tables, work benches and cupboards for equipment and materials. A sink, bookcase and display case are also needed. Primary School chairs should also be light and nesting. There appear as yet to be no chair which makes use of the latest anthropometrical data. Most substitute materials for seats and backs are less satisfactory than plywood. Canvas is to be avoided for reasons of hygiene and comfort.

It is certain that the scientist's desire for tailor-made table and chair sizes will conflict with the constantly changing activities and re-grouping in the teaching spaces. It would be optimistic to provide more than two sizes per teaching space and these should be differentiated by colour.

No fixed blackboard for the teacher seems necessary in the Infants' rooms; a small mobile blackboard (possibly on wheels) will be more useful. All available wall space should be given over to a combination of pin-up space and children's blackboard surfaces. In addition the architect should be prepared to design such equipment as Wendy Houses, water play troughs, work benches and sand trays, all of which may be wanted. Small sinks at infants' height are also required.

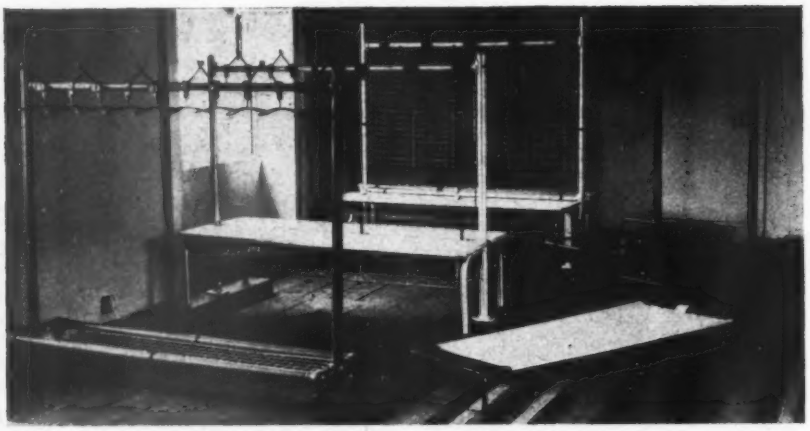
It seems that four different types of storage unit are needed for the wide variety of craft equipment in teaching spaces. These units, as illustrated, are all 4 ft. by 13 in. by 2 ft. 3 in. high.



Top, a teacher's table with separate mobile filing unit designed by R. D. Russell in collaboration with the Harris Lebus studio. Centre, left, infants' light alloy resting chairs made by the Educational Supply Association. Their seats and backs, and the table top are of plywood. Centre, right, infants' tables can be stacked when not in use, and butted end to end when a longer table is needed. Right, a desk by R. D. Russell and the Harris Lebus studio. The top construction is standardised but the leg heights vary. The storage box and top are of plywood and the legs of birch.

Nowadays cloak-room equipment should be considered as a simple domestic arrangement for storing coats and shoes rather than as elaborate zoo-like metal cages, as recommended in the existing standards. Similarly the Ministry recommendations encourage smaller lavatory units. For some reason (probably export) the larger sanitary equipment manufacturers have been slow to realize the great opportunities to raise the standard of design and to lower costs given by the new Act. Existing standards show no advance on pre-war designs and are very inadequate. Special types associated with large lavatories should be discouraged and give way to equipment more in character with that found at home.

In furnishing a new school, the architect should not forget outdoor equipment. Here there is plenty of scope for the imagination, so that the initiative of teachers may be encouraged. Although some good equipment



Three types of school coat rack. The one in the foreground is on castors and mobile. On the right is a nursery school day bed, and in the rear a rocker. All are of steel tubular construction.

is purchasable, it is quite possible to go a long way by means of fairly simple improvization.

In the past those who provided school furture seem to have given almost exclusive priority to durability and maintenance-free designs. As a result we are still embarrassed today by the cast iron and pitch pine furniture of fifty years ago. The difficulty that designers have to face now is to provide furniture which will not outlive the purpose for which it was designed. The problem, therefore, is a technical one: to combine low cost with lightness and strength —lightness is the only new factor. Some of the recent developments in the use of light alloy are very encouraging. It is important, however, not to forget the æsthetic satisfaction of wood for furniture, in schools where this quality is sadly lacking. There is more than light oak or pitch pine to be considered. Not only the improvement of veneering and other techniques, but the unexpected arrival of strange woods (because of controls) can bring a wider vocabulary and richness of quality into the school.

A tray unit for paints, brushes and other craftwork materials.

With modern production methods it seems only reasonable that those standards usually associated with luxury work should become part of the normal environment of every child. Fortunately the school programme is sufficiently large to justify this. There is, however, a danger that the opportunity will be missed unless central guidance is forthcoming on fundamental requirements of quality and performance. With the furniture industry in the unfortunate position of not only being controlled for raw materials, but also for design—witness the now familiar utility types—the opportunities afforded by this large non-utility programme covering most domestic items of furniture, should encourage manufacturers and designers to develop their prototypes for a post-controlled era.

COSTS

By Davis, Belfield and Everest

FEW examples of post-war schools exist, and the designs of the relatively few projects for which tenders have been obtained tend to vary to an unusual degree, as a result of the efforts on the part of the designers concerned to avoid the use of materials in short supply or overcome other difficulties of a like nature. For this reason, whilst it is perfectly possible for an experienced estimator to forecast the cost of a particular school with reasonable accuracy, it is extremely difficult for him to lay down rule-of-thumb methods of estimating for the guidance of others.

When evidence is scanty it is particularly important that all known data should be taken into consideration, and it is to be hoped that some central authority, such as the Ministry of Education, will collate such data and make it available to architects and other interested persons. In the meantime any private individual or firm, with a limited field of observation, must remain painfully aware that generalizations based upon particular examples are suspect and subject to review as fresh evidence comes in.

COST

Whilst it is true to say that tenders for schools, received since the war, have covered a fairly large range, partly as a result of fluctuating prices and partly because of variations in design, it would appear that average prices for schools today should be approximately as follows:—

Cost per ft. cube, 3s. 6d. *Cost per ft. sup.,* £2 9s. *Cost per place,* £150.

These apply equally to Infants, Junior, and Secondary Schools, as the examples upon which they are based show no marked distinction as regards cost; they are not intended to apply to other types of schools, such as Nursery Schools, for which insufficient post-war data exist. If the estimator is not in possession of a substantial amount of detailed information, pricing per ft. cube or per ft. sup. must be considered as more reliable than pricing per place, as, for instance, any increase or decrease in the area of accommodation provided will only be reflected automatically in the price, if the former methods are adopted.

The above prices are intended to be used for estimating the contract sum for all work normally forming part of the building contract, including built-in equipment and external works and playgrounds, but excluding furniture and the formation of playing fields. The extra cost of price increases which may arise after the date of tender is not included.

ANALYSIS OF COST

Because of the limited number of examples of schools of similar character available, no very detailed analysis is possible, but Table I, which follows, gives some indication of how the cost may be allocated.

The cost of the structure remains fairly constant, whatever methods are used, providing they are suitable and economical. The cost of "cladding, finishings and equipment" is more variable, and for this reason additional tables are given later. The rest of Table I refers to services, external works, and drains, and from the information given it is possible to gauge very roughly the probable effect upon a contract as a whole if, for instance, abnormal drainage is required.

Frequently prices are obtained from specialists, but it is difficult to judge whether they are reasonable or likely to increase the target figure for the job as a whole. For this reason Table II has been prepared: it indicates appropriate p.c. sums for services, expressed as a percentage of the contract sum. Each job will vary in detail, but if the aggregate of the quotations received greatly exceeds 18.25 per cent. of the estimated contract sum, it is probable that the target will have to be revised or the standards lowered.

TABLE I

	Per cent.
Structure	35·5
Cladding, finishings and equipment, etc.	32
Internal and external plumbing	4
Heating, hot water and ventilation	12
Electrical installation	5
Gas installation	0·5
External works	7
Drains	4
Total	100

TABLE II

	Per cent.
Contract works excluding p.c. sums for services	81·55
P.C. sums for :—	
Internal plumbing and sanitary fittings	3·25
Heating, hot water and ventilation	10
Electrical installation and fittings	4·8
Gas installation and fittings	0·4
Total	100

FINISH AND EQUIPMENT

Having designed an economical form of construction and kept an eye on his principal p.c. sums, the architect is probably most concerned with the type of finish and equipment he can afford. Table III deals with different floor, wall, and ceiling finishes, and although the prices reasonably represent the cost of work executed in the Outer London area at the present time, the table is primarily intended for comparison, as this, within limits, will remain true whether the general price level remains the same or not. Should the prices be used for estimating actual cost as opposed to comparative costs, it must be borne in mind that the prices include nothing for incidental labours, etc.

Table IV shows the comparative costs in typical items of school equipment, delivered to site in the London area. The prices include purchase tax but do not include any allowance for the general contractor's overheads and profit or for the cost of placing and fixing in position.

TABLE III

Pavings and Floorings	s. d.		*Wall and Ceiling Finishes*	s. d.	
1 in. cement and sand screed for pavings ..	2 11	Y.S.	¼ in. plain polished Hopton Wood linings ..	16 10	F.S.
1 in. cement and sand paving ..	3 3	,,	½ in. insulation board to B.S. 1142 ..	4 6	Y.S.
1 in. granolithic paving ..	4 9	,,	½ in. gypsum wall board to B.S. 1230	4 0	,,
¾ in. brown pitchmastic flooring to B.S. 1375 ..	12 9	,,	½ in. asbestos cement flat sheeting ..	4 9	,,
¾ in. red ditto	15 0	,,	Lime and hair plaster on walls ..	3 9	,,
¾ in. brown asphalte paving	17 0	,,	Render and set in Sirapite on walls	3 3	,,
¾ in. red ditto	18 0	,,	Lath, plaster, float and set on walls and ceilings ..	7 6	,,
½ in. red composition flooring to B.S. 776 ..	17 0	,,	½ in. gypsum plaster board and set with hard wall plaster on ditto ..	5 6	,,
¾ in. terrazzo paving ..	22 0	,,	Keene's cement plain face on cement & sand backing	5 0	,,
6 in. by 6 in. by ¾ in. red quarry tile paving ..	18 6	,,	Cement and sand plain face.. ..	4 0	,,
¾ in. Hopton Wood stone paving ..	12 7	F.S.	6 in. by 6 in. by ¾ in. white glazed wall tiles to B.S. 1281 ..	27 6	,,
1 in. straight edge softwood flooring ..	107 4	sq.	6 in. by 6 in. by ¾ in. eggshell matt enamelled ditto ..	39 6	,,
1¼ in. ditto ..	133 3	,,	Prepare and twice whiten walls and soffits ..	0 10½	,,
1 in. tongued and grooved softwood flooring ..	114 0	,,	Prepare and twice distemper ditto ..	1 1½	,,
1¼ in. ditto ..	152 3	,,			
1 in. Columbian pine double grooved and tongued and grooved wood block flooring ..	26 3	Y.S.			
1 in. Canadian Maple ditto	40 5	,,			

Table III—*continued*

Pavings and Floorings	s. d.		*Wall and Ceiling Finishes*	s. d.	
1 in. English beech ditto	31 6	Y.S.	Prepare and paint two oils on plastered walls ..	2 7	Y.S.
1 in. nominal birch strip flooring ..	472 6	sq.	Knot, prime, stop & paint two oils on woodwork ..	4 1	,,
1 in. nominal maple ditto	498 9	,,	Stain and wax polish on hardwood ..	0 9½	F.S.
1 in. nominal Australian jarrah ..	446 3	,,			

TABLE IV

	Each £	s.	d.
Single locker desks (light alloy)	2	5	0
Single locker desks (wood) .	2	7	3
Single locker desks (wood on steel standards)	2	15	6
Stepped locker desks (light alloy)	2	15	0
Chairs (light alloy)	2	9	6
Chairs (wood) ..	1	15	0
Teachers' cupboards, 3 ft. 6 in. by 14 in. by 6 ft. 0 in. high	18	0	4
Teachers' tables (light alloy), 4 ft. 0 in. by 2 ft. 3 in. by 2 ft. 6 in. high	6	19	1
Teachers' armchairs (light alloy)	4	13	2
Teachers' tables (wood), 4 ft. 6in. by 2 ft. 6 in. by 2 ft. 6 in. high, with 2 drawers	12	5	8
Teachers' armchairs (wood) ..	5	11	0
Wall blackboards, panel, 8 ft. 0 in. by 3 ft. 6 in. ..	9	2	9
Science benches, 14 ft. 0 in. by 2 ft. 0 in. by 2 ft. 9 in. high, with hardwood top and 3 pedestals with cupboards and drawers ..	37	14	6
Metalwork benches, 12 ft. 0 in. long, with 8 vices ..	40	9	6
Woodwork benches, 5 ft. 0 in. by 2 ft. 4in. by 2 ft. 6 in. high, with 2 vices	11	0	9
Woodwork benches, as last but with cupboards under ..	15	3	0
Domestic science tables, with 2 drawers	16	7	3
Needlework tables, 4 ft. 0 in. by 2 ft. 6 in. by 2 ft. 6 in. high with 2 drawers and 12 in. flap each end	9	17	0
Plan chests, 3 ft. 2 in. by 2 ft. 4in. by 3 ft. 0 in. high with 6 drawers ..	34	17	10

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SOCIETIES & INSTITUTIONS

ECHSA

New Officials

May 19. At the RIBA. Annual general meeting of the Essex, Cambridgeshire and Hertfordshire Society of Architects, attended by some eighty members.

The following officers were elected for the coming year:—President, R. C. Foster, M.B.E., M.C. (F); Honorary Secretary, F. Evan-Jones (A); Honorary Treasurer, G. W. Dixon; Honorary Registrar, C. S. Jaques (A); Honorary Auditor, D. A. Wilkie (F). Representative on Allied Societies' Conference, the President, Vice-Presidents. The Chairman of the Six Chapters: R. J. Sparrow (A) (Colchester); G. G. O'Neill (F) (Chelmsford); P. Bicknell (A) (Cambridge); D. F. Lumley (A) (Southend); D. A. Wilkie (F) (Hertfordshire); R. O. Foster (A) (West Essex).

In his presidential address, Mr. Foster discussed the difficulties facing architects in private practice at the present time and suggested that Chapters could help by collecting information about the work which their members were doing, or were capable of doing, so that it might be possible to steer work in the direction of those who most needed it. He also made a plea that members should cease to argue about the respective merits of private or official practice, and should all get together for the common

good of the Society and of the RIBA. He spoke of the great opportunities which the new social developments now in hand must bring to architects, and of his conviction that if they would stand together to help each other through the present difficult times, there need be no reason for any gloom about the future of the profession.

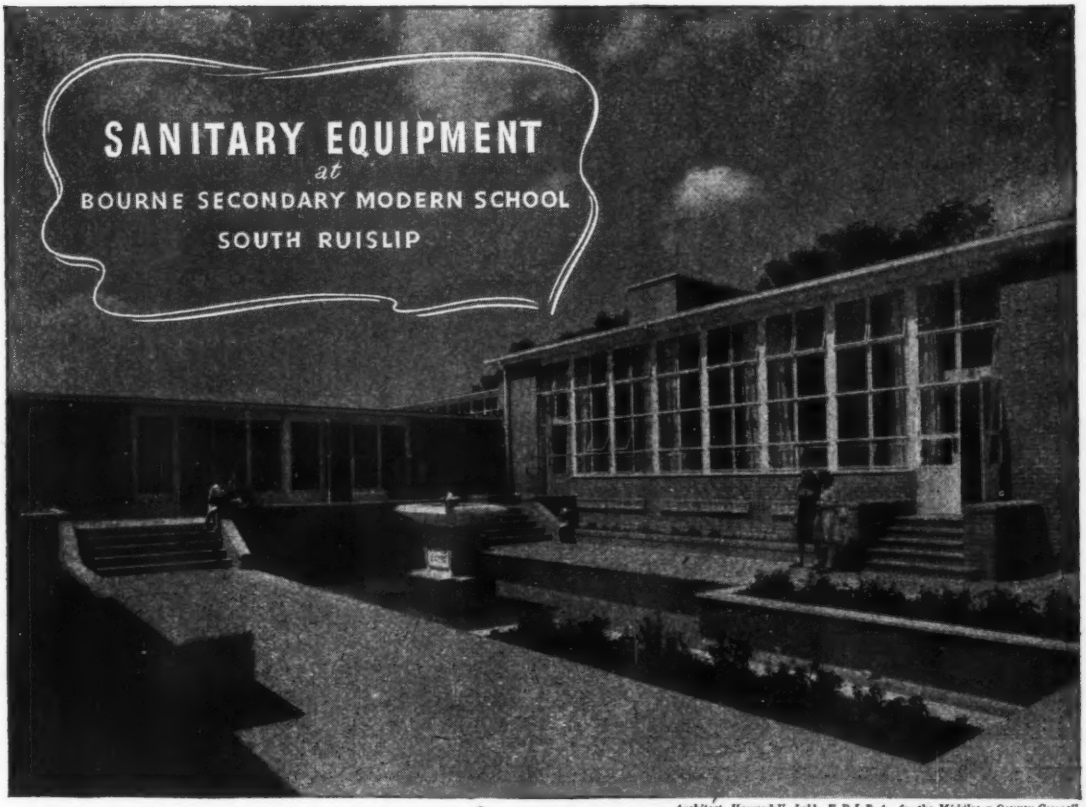
It was resolved that a donation of £40 should be made to the Architects' Benevolent Society. The annual report and accounts were received and approved, all Chapters reporting a considerable increase both in membership and activities during the last year. At the conclusion of the meeting a talk on the development of the English House from 900-1900 A.D. was given by Mr. L. M. Gotch (F).

B & FCAA

May 20. Annual general meeting of the Coventry Chapter of the Birmingham and Five Counties Architectural Association at the Chamber of Commerce Rooms, Coventry.

The Chairman, Mr. A. H. Gardner, F.R.I.B.A., in presenting his annual report, said: The need for building is so transparently urgent that neither financial nor political reasons can continue indefinitely to delay it. It behoves us to prepare both our offices and our organization to deal with this work efficiently, and, above all to ensure that our standards of design and amenity shall be worthy of the responsibility which will ultimately be placed on our shoulders. In the view of your Chapter Council, it is already high time that more attention was given to permanent building, and representations have been made to this effect to the Ministries of Works & Health, the local Members of Parliament, the RIBA and B & FCAA. It has been pointed out that a long term policy of temporary building would necessitate a large increase in the strength of the building trade, which is manifestly impossible, and that the effect of continued temporary building is disheartening to all concerned. I welcome the proposed investigation of restrictive practices in the building trade, but hope that it will extend to cover the subject of bureaucratic control, which at present is unquestionably the most restrictive of all such practices. I see no reason why there should not be an early limitation of building controls to the use of timber and steel only. The Chapter Council has already prepared and submitted to the Chamber of Commerce a report on the state of the profession, in which the stultifying effects of cumbersome and bureaucratic controls have been emphasized, and a plea entered for more decentralization and reality.

In the Election of Officers for the ensuing Session, 1948-49, Mr. A. H. Gardner was re-elected Chairman, Mr. C. F. Redgrave, A.R.I.B.A., Vice-Chairman, A. W. Staniland, A.R.I.B.A., Hon. Sec., Mr. J. Robinson, A.R.I.C.S., Hon. Treasurer, and Mr. C. H. Osborne, F.R.I.C.S., Hon Auditor. The following members were elected to the Council of the Society: D. E. E. Gibson, M.A., A.R.I.B.A., J. Arnold Parker, A.I.A.A., A.I.A.S., S. J. Oldham, L.R.I.B.A., F. B. Reyner, A.R.I.B.A., H. W. Wilson-Wood, F.R.I.B.A., E. T. Baldwin, A.R.I.B.A., L. A. Clarke," A.R.I.B.A., M. H. Harris, A.R.I.B.A. The allied Societies' conference representatives elected were C. F. Redgrave and F. B. Reyner.



Architect, Howard V. Lobb, F.R.I.B.A., for the Middlesex County Council

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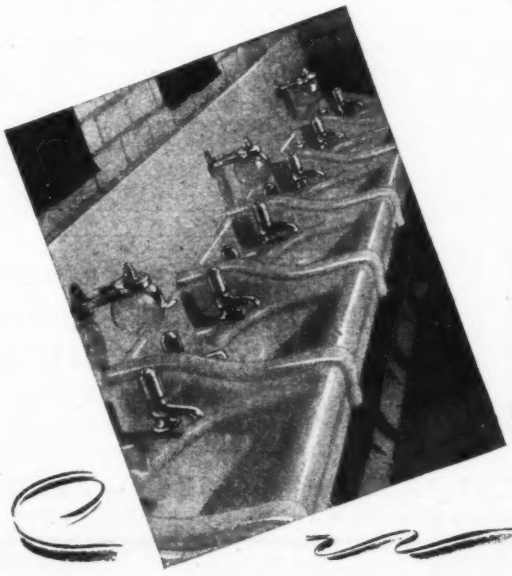

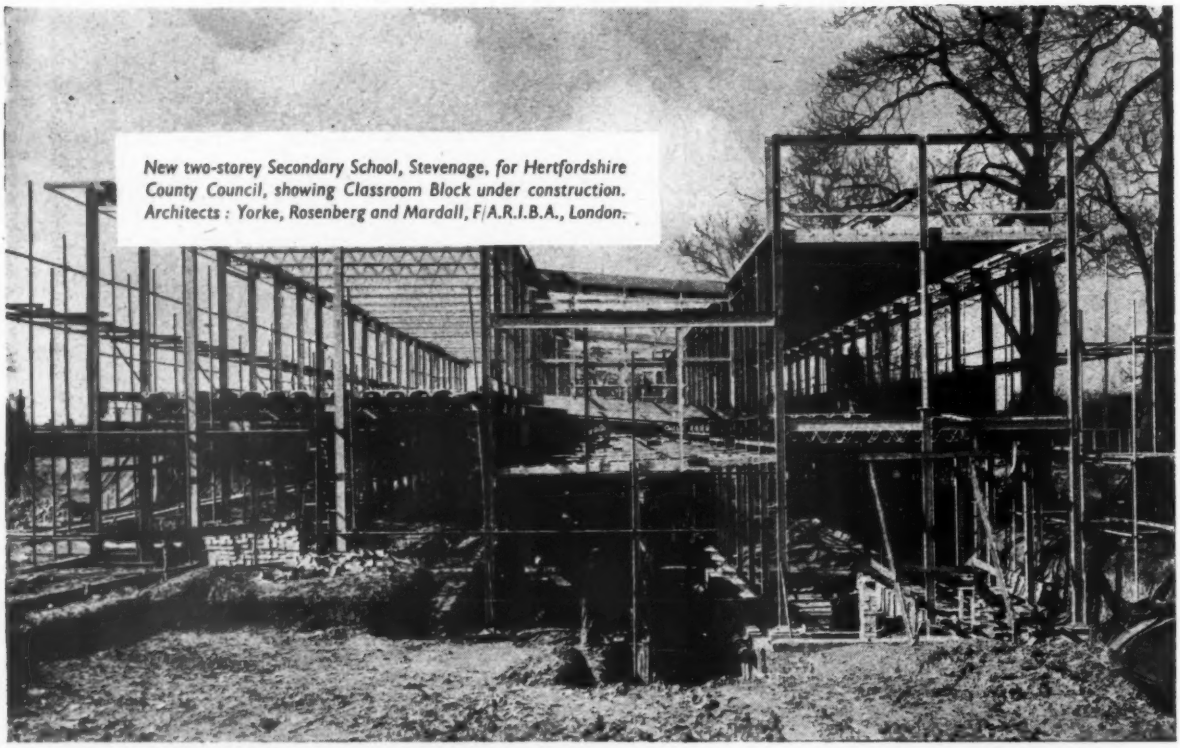

New two-storey Secondary School, Stevenage, for Hertfordshire County Council, showing Classroom Block under construction. Architects: Yorke, Rosenberg and Mardall, F/A.R.I.B.A., London.

New Primary School, Cheshunt, Hertfordshire, for Hertfordshire County Council, showing internal construction of Stage and Assembly Hall. County Architect: C. H. Aslin, F.R.I.B.A., M.I.Struct.E.

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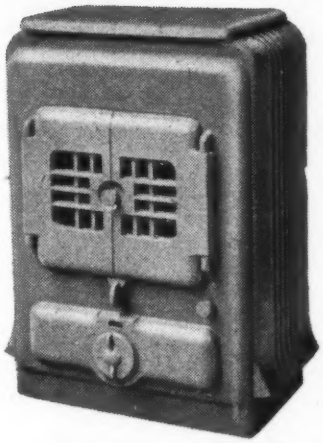

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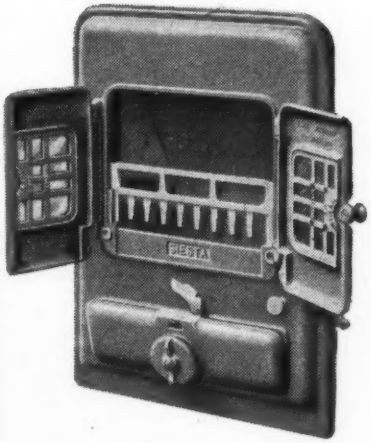

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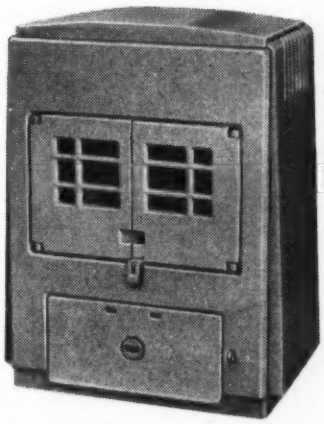

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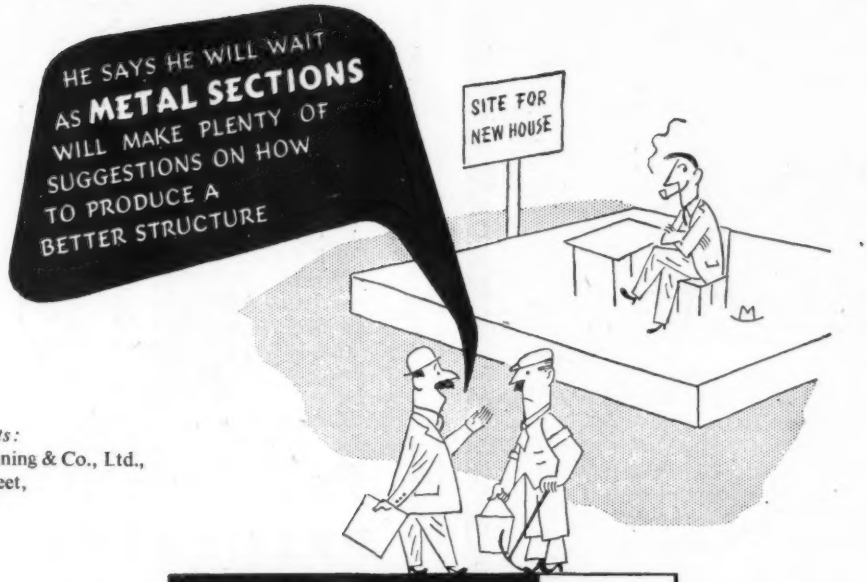

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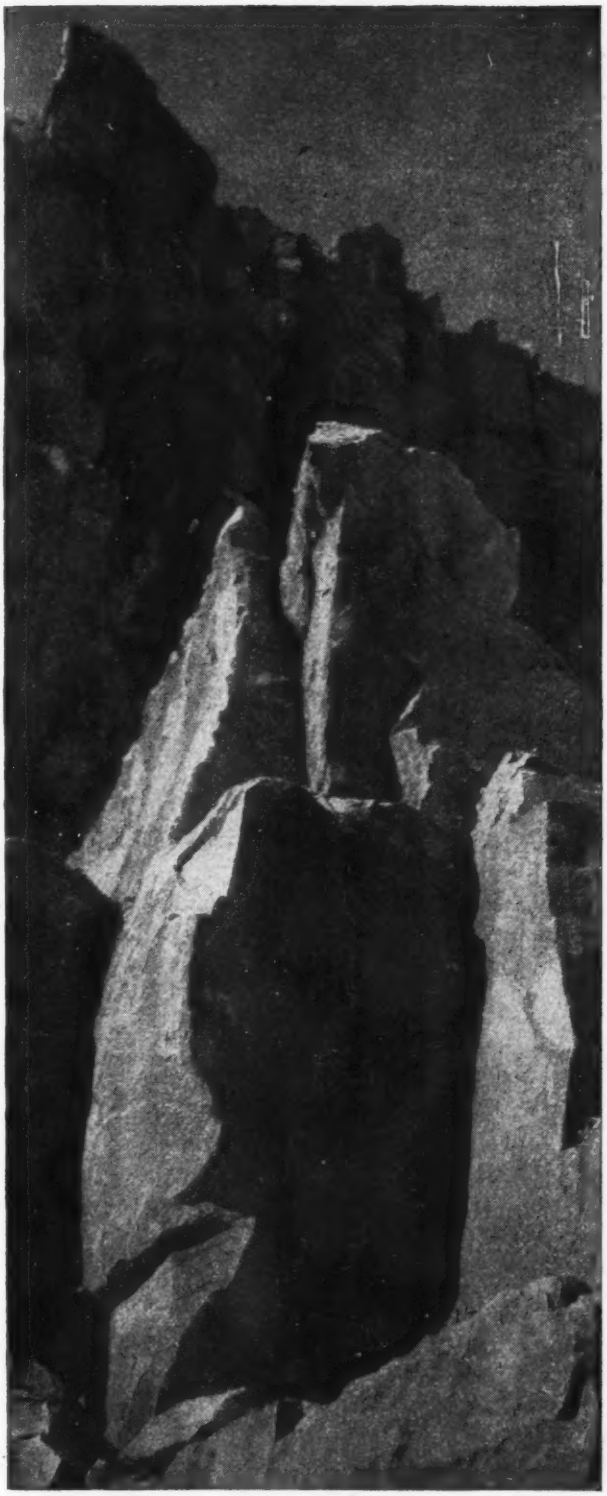

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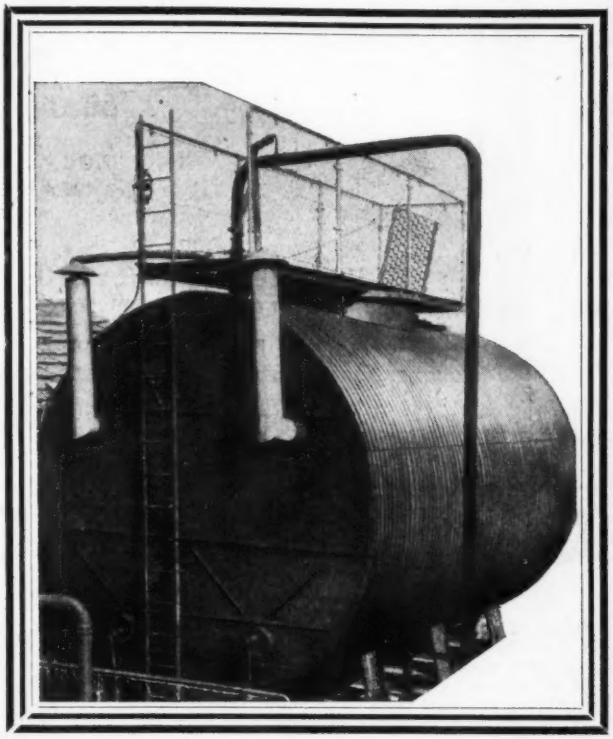

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CFW

CLASSIFIED ADVERTISEMENTS

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

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

None of the vacancies in these columns relates to a man between the age of 18 and 50, inclusive or a woman between the age of 18 and 40, inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1947, or the vacancy is for employment excepted from the provisions of that Order.

Public and Official Announcements

6 lines or under, 10s.; each additonal line, 1s. 6d.

THE INCORPORATED ASSOCIATION OF ARCHITECTS AND SURVEYORS maintains a register of qualified architects and surveyors (including assistants) requiring posts, and invites applications from public authorities and private practitioners having staff vacancies. ADDRESS: EMPLOYMENT REGISTER, WREN PARK, WHITELEAFE. Tel.: Uplands 0935. 991

LONDON COUNTY COUNCIL.
HOUSING AND VALUATION DEPARTMENT.

ARCHITECTURAL ASSISTANTS. Applications are invited for positions of Architectural Assistant, at salaries of up to £580 a year. Commencing salaries will be determined according to qualifications and experience, and qualified candidates will be eligible for appointment to the permanent staff of the Department on the occurrence of vacancies. Engagement will involve Superannuation contributions at the rate of 6 per cent. of salary.

Successful candidates will be required to undertake the design, layout, and preparation of working drawings for housing schemes (cottages and multi-storey flats), and will be employed in the Housing Architect's division.

Forms of application may be obtained from the Director of Housing, The County Hall, Westminster Bridge, S.E.1 (stamped addressed foolscap envelope required). Canvassing disqualifies. (870) 1032

LONDON COUNTY COUNCIL.
VACANCIES FOR PLANNING STAFF IN THE ARCHITECT'S DEPARTMENT.

Applications are invited for a number of temporary positions in the following grades:—

PLANNING OFFICER. Grade II, £700 to £840 a year.

PLANNING OFFICER. Grade III, £550 to £700 a year.

TECHNICAL ASSISTANT. 55s. per week to £580 a year.

Commencing rate of pay, except for Grade II, according to qualifications and experience. Opportunities for competing, on merit, for permanent appointment and higher grades on the occurrence of vacancies. Successful candidates will be superannuable.

The planning work involved includes research assistance in preparation of the Development Plan and Reconstruction Areas, and work on interim development applications.

Knowledge of current town planning legislation is desirable, and candidates for Grade II and Grade III positions should possess Architectural, Surveying or Town Planning qualifications.

Application forms from Architect to the Council (P), County Hall, Westminster, S.E.1 (enclosing stamped addressed foolscap envelope). Canvassing disqualifies. (1222) 887

CITY OF CANTERBURY.
SECOND ASSISTANT ARCHITECT.

Applications are invited for the appointment of Second Assistant Architect, in the City Architect's Department, at a salary in accordance with Grade A.P.T., IV, £480×£15 to £525.

Applicants must be A.R.I.B.A., and should have had experience of housing work. Town Planning experience is also desirable, but not essential.

The successful candidate will be required to pass a medical examination.

Applications, giving age, full particulars of experience and qualifications, and the names of not more than three persons to whom reference may be made, should be received by Mr. L. Hugh Wilson, A.R.I.B.A., A.M.T.P.I., City Architect, not later than 18th June, 1948.

J. BOYLE.
Town Clerk.

Municipal Buildings, Canterbury.
25th May, 1948. 986

CITY OF BIRMINGHAM EDUCATION COMMITTEE.
BIRMINGHAM SCHOOL OF ARCHITECTURE.

A Part-time ASSISTANT TEACHER OF ARCHITECTURE is required to commence duty on 13th September, 1948, for 15 hours' duty weekly throughout a School year of about 40 weeks. Commencing salary will be 5/8th of the Burnham Technical Scale for Assistants (men £300—£15—£555; women £270—£12—£444), with additions for appropriate Graduate and professional qualifications, teaching service and war service. Forms of application may be obtained from the College of Arts and Crafts, Margaret Street, Birmingham, 3, on receipt of a stamped addressed envelope, and must be returned not later than 14 days after the date of this advertisement.

E. L. RUSSELL,
Chief Education Officer.
1018

CITY AND COUNTY OF NEWCASTLE-UPON-TYNE.
CITY ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointments:—

Architects in the General, Housing and Education Sections:

(*a*) FOUR SENIOR ASSISTANT ARCHITECTS.
Salary £595 per annum, rising to £660 per annum (A.P.T., Grade VI).

(*b*) SIX SENIOR ASSISTANT ARCHITECTS.
Salary £520 per annum, rising to £570 per annum (A.P.T., Grade V).

(*c*) ONE ASSISTANT ARCHITECT.
Salary £450 per annum, rising to £495 per annum (A.P.T., Grade III).

(*d*) ONE ARCHITECTURAL ASSISTANT.
Salary £420 per annum, rising to £465 per annum (A.P.T., Grade II).

Applicants for appointments (*a*) and (*b*) should be Associates of the Royal Institute of British Architects, and have had a thorough training in design and construction, preferably that of a School of Architecture, and must have had wide experience in the preparation of sketch plans, working drawings and details.

Applicants for appointments (*c*) and (*d*) should have passed the Intermediate Examination of the Royal Institute of British Architects.

Quantity Surveyors Section:

(*e*) CONTRACTS OFFICER AND CHIEF QUANTITY SURVEYOR.
Salary £750 per annum, rising by annual increments of £50 to £850 per annum, plus cost-of-living bonus, £59 16s. The Officer appointed to this post will control the whole of the Quantity Surveying staff, and must have had extensive experience in the administration of Contracts. The appointment will be subject to 3 months' notice on either side.

(*f*) PRINCIPAL QUANTITY SURVEYOR.
Salary £685 per annum, rising to £760 per annum (A.P.T., Grade VIII).

(*g*) TWO SENIOR ASSISTANT QUANTITY SURVEYORS.
Salary £595 per annum, rising to £660 per annum (A.P.T., Grade VI).

(*h*) THREE ASSISTANT QUANTITY SURVEYORS.
Salary £520 per annum, rising to £570 per annum (A.P.T., Grade V).

Applicants for appointments (*e*) and (*f*) must be Fellows or Professional Associates (Quantities Sub-division) of the Royal Institute of Chartered Surveyors, and must be thoroughly experienced in the preparation of Bills of Quantities, Specifications, and Schedules of Work carried out by Local Authorities, including the measurement, adjustment, and preparation of Interim and Final Accounts. Applicants should be competent estimators and possess a thorough knowledge of constructional detail and methods. Previous experience in the conduct of Direct Labour schemes is desirable.

Applicants for appointments (*g*) and (*h*) must have had experience in the preparation of Bills of Quantities, Specifications, Estimates, and the settlement of Final Accounts on all kinds of Building contracts. Preference will be given to Professional Associates of the Royal Institute of Chartered Surveyors.

The appointments will be subject to the National Conditions of Service as adopted by the City Council; to the provisions of the Local Government Superannuation Act, 1937, and with the exception of (*e*) above will be subject to one month's notice on either side. The successful candidates will be required to pass a medical examination.

Applications, stating age, particulars of education and training, qualifications, experience, present and previous appointments, together with copies of two recent testimonials, and names and addresses of two persons to whom reference may be made, should be addressed to George Kenyon, City Architect, 18, Cloth Market, Newcastle-upon-Tyne, 1, to reach him not later than the 19th June, 1948.

JOHN ATKINSON.
Town Clerk.

Town Hall, Newcastle-upon-Tyne, 1.
25th May, 1948. 979

URBAN DISTRICT OF EAST BARNET.
APPOINTMENT OF CHIEF ARCHITECTURAL AND TOWN PLANNING ASSISTANT.

Applications are invited for the above permanent appointment, at a salary in accordance with Grade VI of the A.P.T. Division of the National Joint Council's scale (£595-£660, consolidated), plus the appropriate London weighting and car allowance for a 10 h.p. Car or under, also in accordance with the National Scale.

Applicants should hold Architectural and/or Town Planning qualification by examination, and preference will be given to those having previous experience in similar work with a Local Authority.

The appointment, terminable by one month's notice on either side, will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications must be made on forms to be obtained from the undersigned and returned to him by not later than 18th June, 1948.

C. M. BARNES, O.B.E., M.I.Mun.E.,
Engineer and Surveyor.

Town Hall, Station Road, New Barnet, Hertfordshire. 964

BUCKS COUNTY COUNCIL.

Applications are invited for the appointment of DEPUTY COUNTY ARCHITECT, at a salary on the scale £910×£25—£1,060 p.a., the commencing salary being fixed according to qualifications and experience.

Candidates must have had professional and administrative experience in the local or central government service. They must be Members of the R.I.B.A., and preferably hold a University Degree, or equivalent, in Architecture.

Travelling and subsistence allowances will be paid on the County Council's scale for the time being in force.

The appointment is superannuable and subject to medical examination.

Further particulars and form of application may be obtained from the County Architect, County Offices, Aylesbury, to whom applications must be delivered by 14th June, 1948.

GUY R. CROUCH,
Clerk of the County Council.

County Hall, Aylesbury.
May, 1948. 960

THE UNIVERSITY OF SHEFFIELD.

Applications are invited for the posts of (i) SENIOR LECTURER IN ARCHITECTURE, at a salary scale of £750, rising by £50 every two years to £1,000, and (ii) ASSISTANT LECTURER IN ARCHITECTURE, at a commencing salary between £450 and £500. The commencing salary will in each case be according to qualifications and experience, with superannuation provision under the Federated Superannuation Scheme for Universities, and family allowance.

Applications (four copies) should reach the undersigned (from whom further particulars may be obtained) not later than 10th July, 1948.

A. W. CHAPMAN,
Registrar.
997

CUMBERLAND COUNTY COUNCIL.
APPOINTMENT OF DEPUTY COUNTY ARCHITECT.

Applications are invited for the above appointment, at a salary of £960×£50 to £1,110 per annum. The salary is inclusive of war bonus, and the commencing salary will be fixed in accordance with the qualifications and experience of the successful applicant. Applicants should state age; qualifications (one of which must be membership of the R.I.B.A.); and details of previous experience.

The successful candidate must provide and maintain a motor car. The standard travelling allowance in accordance with the County Council's scale for the time being in force will be paid, and he must be prepared to reside within a reasonable distance of Carlisle.

The appointment will be subject to the Local Government Officers' Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

The appointment will be determinable by three months' notice on either side.

Forms of application may be obtained from, and are to be returned to John H. Haughan, F.R.I.B.A., County Architect, 4, Alfred Street North, Carlisle, not later than the first post on the 28th June, 1948.

Canvassing, either directly or indirectly, will be a disqualification.

G. N. C. SWIFT,
Clerk of the County Council.
962

CITY OF COVENTRY.

Applications are invited for the following whole-time appointments on the permanent staff of the City Architectural Department:—

(*a*) ONE ASSISTANT ARCHITECT.
Salary grade A.P.T., V, commencing at £520 per annum, and rising by two annual increments of £15 and one of £20 to £570 per annum.

Candidates should be Associate Members of the Royal Institute of British Architects, or hold equivalent qualifications.

(*b*) ONE ASSISTANT ARCHITECT.
Salary grade A.P.T., III, commencing at £450 per annum, and rising by three annual increments of £15 to £495 per annum.

(*c*) ONE SENIOR ASSISTANT QUANTITY SURVEYOR.
Salary grade A.P.T., Va, commencing at £550 per annum, and rising by three annual increments of £20 to £610 per annum.

Candidates should be Professional Associates of the Royal Institution of Chartered Surveyors (Quantities Division).

Salary increments are subject to satisfactory service. The posts are subject to one month's notice on either side, and to the provisions of the Local Government Superannuation Act as amended in regard to annuities to widows by the Coventry Corporation Act, 1936, and a satisfactory medical certificate will be requisite from the Council's medical referee. The successful male applicants will be required to contribute to the Coventry Municipal Officers', Widows' and Orphans' Pension Fund.

Applications must be made on the forms obtainable from the undersigned, and should be returned completed, together with copies of not more than two recent testimonials, or names of two persons to whom reference may be made, not later than Monday, 21st June, 1948.

Canvassing, directly or indirectly, will be a disqualification.

D. E. E. GIBSON,
City Architect.

1A, Warwick Row, Coventry.
3rd June, 1948. 1000

SURREY COUNTY COUNCIL.
COUNTY ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointments :—

ASSISTANT QUANTITY SURVEYOR, Grade VI. Commencing salary £595, rising by annual increments of £20/£25 to a maximum of £660 per annum, together with London allowance of £30.

Applicants should be members of the Royal Institution of Chartered Surveyors (Quantities Sub-Division), and have had adequate experience in the preparation of Bills of Quantities, and in measuring up and in settlement of final accounts.

ARCHITECTURAL ASSISTANT, Grade I. Commencing salary £390, rising by annual increments of £15 to £435 per annum, together with London allowance of £20 or £30, according to age.

Applicants should be of good general training and experience.

STRUCTURAL ENGINEERING ASSISTANT, Grade I. Commencing salary £390, rising by annual increments of £15 to £435 per annum, together with London allowance of £20 or £30, according to age.

Applicants must have had a good training in Structural Engineering, and experience in the preparation of plans, details and simple design of :—(*a*) Steel-framed buildings, and/or (*b*) reinforced concrete structures.

The appointments will be subject to the provisions of the Local Government Act, 1937, and the successful applicants will be required to pass a medical examination.

Applications, stating age, qualifications and experience, and accompanied by copies of three recent testimonials, should be sent to the County Architect, Surrey County Council, County Hall, Kingston-upon-Thames, not later than the 26th June, 1948.

Canvassing, either directly or indirectly, will disqualify a candidate from consideration.

The Council will be unable to provide any housing accommodation, and the successful applicants will be expected to make their own arrangements in this direction.

DUDLEY AUKLAND,
Clerk of the Council.

County Hall, Kingston-upon-Thames. 1028

DORKING URBAN DISTRICT COUNCIL.

Applications are invited for the following appointments :—

(*a*) ARCHITECTURAL ASSISTANT. Grade IV, A.P.T. Division.

(*b*) PLANNING ASSISTANT. Grade IV, A.P.T. Division.

(*c*) DRAUGHTSMAN AND GENERAL ASSISTANT. Grade I, A.P.T. Division.

Applicants for appointment (*a*) must have had good general experience in architectural design, including housing, and possess an appropriate qualification.

Applicants for appointment (*b*) must have had appropriate training and experience in a Municipal Surveyor's or Planning Office, and should preferably have passed the Intermediate examination of the Town Planning Institute.

and expeditious draughtsmen. Preference will be given to applicants with experience in a Municipal Surveyor's Office.

Applicants for appointment (*c*) must be neat

The National Conditions of Service will apply to the appointments. They will be subject to the provisions of the Local Government Superannuation Act, 1937, and the selected applicants will be required to pass a medical examination. They will be terminable by one month's notice in writing on either side.

Application forms may be obtained from the undersigned, and are to be returned, with the names of three referees, not later than 19th June, 1948, in envelopes appropriately endorsed.

Canvassing in any form will be a disqualification, and candidates must disclose in writing whether to their knowledge they are related to any member or to any senior officer of the Council.

H. D. JEFFRIES,
Clerk of the Council.

Pippbrook, Dorking. 1029

METROPOLITAN BOROUGH OF WOOLWICH.
APPOINTMENT OF ARCHITECTURAL ASSISTANT, GRADE VI.

Applications are invited for the appointment of Architectural Assistant, in the Borough Engineer and Surveyor's Department. The post will be in Grade VI of the A.P. and T. Division of the National Scales of Salaries, *viz.*, £595 per annum, rising to £660 per annum, with London weighting in addition. The appointment will be subject to the Council's Conditions of Service in force from time to time; to the provisions of the Local Government Superannuation Act, 1937, and will be terminable by one month's notice on either side. The selected candidate will be required to pass a medical examination. Candidates must have passed the final examination of the R.I.B.A. or have an equivalent qualification, and preferably have had experience in Architectural work, especially housing, undertaken by a local authority. Applications, giving full details of age, qualifications and experience, should be forwarded, together with copies of not more than three testimonials, to reach the undersigned by the 26th June, 1948. Candidates must disclose in writing if they are related to any member or senior officer of the Council. Canvassing members of the Council, either directly or indirectly, will disqualify.

DAVID JENKINS,
Town Clerk.

Town Hall, Woolwich, S.E.18.
June, 1948. 1038

BOROUGH OF WIDNES.
APPOINTMENT OF ARCHITECTURAL ASSISTANT.

Applications are invited for the appointment of Architectural Assistant, in the Borough Architect's Department, at a salary on A.P.T., Grade III, IV, or V of the National Scales of Salaries.

The salary grade will be determined by the qualifications of the candidate, viz., Associate R.I.B.A. on Grade V (£520-£570), Student R.I.B.A. or Registered Architect on Grade IV (£480-£525), otherwise on Grade III (£450-£496), all salaries consolidated.

The successful candidate will be engaged on the layout, design and supervision of housing schemes on modern lines, including a Neighbourhood Unit Project, schools, or other interesting general municipal works. Previous experience in this type of work is essential.

The appointment will be subject to the provisions of the Local Government Officers' Superannuation Act, 1937, and to the candidate passing a medical examination.

Housing accommodation will be made available if required.

Applications, stating age, education, technical training, qualifications, present and previous posts (with dates), and details of experience, together with one recent testimonial and the names of two referees, should be sent to F. Mellor, F.R.I.B.A., Borough Architect, Brendan House, Widnes Road, Widnes, not later than Saturday, 19th June, 1948.

Canvassing, directly or indirectly, will disqualify.

JAMES WALLACE,
Town Clerk.

Town Hall, Widnes. 981

STAFFORDSHIRE COUNTY COUNCIL
EDUCATION COMMITTEE.

Applications are invited for the following appointments on the Staff of the County Education Architect :—

ASSISTANT ARCHITECTS. Salary, Grades IV (£480 to £525 per annum); V (£520 to £570 per annum), and VI (£595 to £660 per annum).

Preference will be given to candidates with experience in school building. Applicants for Grades V and VI must be members of the R.I.B.A. or equivalent. Applicants for Grades IV should have passed the Intermediate R.I.B.A.

All appointments will be subject to the scheme and conditions of service of the National Joint Council and also subject to the provisions of the Local Government and Other Officers' Superannuation Act, 1937, and successful candidates will be required to pass a medical examination.

Applications, stating age, qualifications and experience, accompanied by copies of recent testimonials, should be submitted to the Architect, County Education Offices, Earl Street, Stafford, within fourteen days of the publication of this advertisement.

T. H. EVANS.
Clerk of the County Council.

1031

COUNTY BOROUGH OF OLDHAM.
APPOINTMENT OF SENIOR ARCHITECTURAL ASSISTANTS.

Applications are invited for the following appointments in my Department :—

(*a*) A SENIOR ARCHITECTURAL ASSISTANT, at a salary of £520 to £570 per annum, being Grade V of the National Scale of Salaries.

(*b*) A SENIOR ARCHITECTURAL ASSISTANT, at a salary of £480 to £525 per annum, being Grade IV of the National Scale of Salaries.

Housing accommodation will be provided if necessary.

Candidates for (*a*) should hold a recognized architectural qualification, and a Town Planning qualification would be an advantage. They should also have had comprehensive experience in design and construction.

Candidates for (*b*) must be neat and capable draughtsmen, competent to prepare working drawings, take out quantities, and prepare estimates. They should possess a recognized architectural qualification.

The appointments will be subject to the Local Government Superannuation Act, 1937, and the successful candidates will be required to pass medical examinations. Conditions relating to the appointments can be obtained from the undersigned.

Applications, stating age and previous appointments, in addition to qualifications and experience, and copies of three recent testimonials, must reach the undersigned not later than Saturday, the 26th June, 1948, in envelopes endorsed in accordance with (*a*) or (*b*) as the case may be.

A. L. HOBSON
Borough Engineer and Surveyor.

Municipal Buildings, 75, Union Street,
Oldham.
29th May, 1948. 1019

RICKMANSWORTH URBAN DISTRICT COUNCIL.

ARCHITECTURAL ASSISTANT in Surveyor's Department required. Salary £595, rising to £660. Car allowance per N.J.C. Scale. Applicants must have designed housing schemes, prepared specifications, bills and estimates, and must be A.R.I.B.A. or have reached similar standard.

Applications, giving full details of age, qualifications and previous experience, together with names of two referees, should reach the undersigned by 16th June, 1948.

C. G. RANSOME WILLIAMS,
Clerk of the Council.

Council Offices, Rickmansworth. 1024

COUNTY BOROUGH OF DERBY.
BOROUGH ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointment on the permanent staff in accordance with the National Scale of Salaries :—

ONE CHIEF ASSISTANT ARCHITECT (Town Planning and Architectural work), Grade VIII, A.P. & T. Division. Salary £685-£760 (Consolidated).

Applicants should be A.R.I.B.A., and preferably A.M.T.P.I., with experience in Town Planning.

The appointment will be subject to one month's notice in writing on either side, and to the terms of the National Joint Council's Scheme of Conditions of Service, and the provisions of the Local Government Superannuation Act, 1937, and the successful applicant will be required to pass a medical examination.

Form of application may be obtained from Thos. W. East, F.R.I.B.A., Borough Architect, The Council House, Corporation Street, Derby, and should be returned when completed, together with copies of three testimonials, to arrive not later than Tuesday, 22nd June, 1948.

Canvassing, directly or indirectly, will be a disqualification.

C. ASHTON,
Town Clerk.

Market Place, Derby. 969

ARCHITECTURAL ASSISTANTS wanted by Ministry of Works.

Applications are invited to fill vacancies for Architectural Assistants (Male or Female), in an unestablished capacity, for drawing office duties in Edinburgh and Aberdeen; salary up to £510 per annum, consolidated; applicants should have had an approved period of recognized training and experience (not less than 3 years) with a practising architect. Apply in writing, giving full details of age, experience, training, stating town in which employment is desired, to Ministry of Works, 122, George Street, Edinburgh. 1046

CARDIGANSHIRE COUNTY COUNCIL.
COUNTY ARCHITECT'S DEPARTMENT.

Applications are invited for the appointment of ARCHITECTURAL ASSISTANT, in the County Architect's Department, at a salary in accordance with Grade I, A.P.T., *i.e.*, a consolidated salary of £390, rising by annual increments to £435.

The appointment will be subject to the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, endorsed "Architectural Assistant," stating age, qualifications, experience, present appointment and salary, and accompanied by copies of two recent testimonials, should reach the undersigned not later than 26th June, 1948.

IVOR EVANS,
Clerk of the Council.

County Offices, Aberystwyth.
29th May, 1948. 1023

COUNTY BOROUGH OF SMETHWICK.
BOROUGH ENGINEER AND SURVEYOR'S DEPARTMENT.
APPOINTMENT OF SENIOR ARCHITECTURAL ASSISTANT.

Applications are invited for the above appointment, at a salary in accordance with A.P.T., Grades Va and VI, £550-£660 per annum.

The post is subject to the provisions of the Local Government Superannuation Act, 1937, to the successful candidate passing a medical examination, and to termination by one month's notice on either side.

Applicants must be registered Architects, and preference will be given to Associate Members of the Royal Institute of British Architects.

Applications, on form to be obtained from the Borough Engineer and Surveyor, Council House, Smethwick, accompanied by copies of two recent testimonials, should reach the undersigned not later than the 22nd June, 1948.

E. L. TWYCROSS,
Town Clerk.

Council House, Smethwick.
1st June, 1948. 1030

COUNTY BOROUGH OF WOLVERHAMPTON.
APPOINTMENT OF JUNIOR PLANNING ASSISTANT.

Applications are invited for the appointment of Junior Planning Assistant, on the permanent staff of the Borough Engineer, at a salary in accordance with Grade A.P.T., I, of the National Scale (£390-£435, consolidated).

Applicants should have had previous experience in the office of a Municipal Engineer, preferably in Town Planning.

The appointment will be terminable by one month's notice on either side, and will be subject to the provisions of the Local Government Officers Superannuation Act, 1937, for which the successful candidate will be required to pass a medical examination.

The Conditions of Service will be those of the National Joint Council for Local Authorities' Administrative, Professional, Technical and Clerical Services.

Applications, together with copies of two recent testimonials, should be addressed to the undersigned not later than Friday, the 25th June, 1948, in a plain sealed envelope suitably endorsed.

Canvassing, directly or indirectly, will be a disqualification.

J. BROCK ALLON,
Town Clerk.

Town Hall, Wolverhampton.
June, 1948. 1049

COUNTY COUNCIL OF THE WEST RIDING OR YORKSHIRE.
COUNTY PLANNING DEPARTMENT.

Applications are invited for the following permanent appointments to the staff of the County Planning Department :—

(*a*) SENIOR PLANNING ASSISTANTS. Salary scale, £595 × £25—£710 per annum.

Applicants should be Corporate Members of the Town Planning Institute or possess a recognized qualification in Civil Engineering, Surveying or Architecture, and have had considerable experience in a Planning Office.

(*b*) PLANNING ASSISTANTS. Salary scale, £450 × £20—£570.

Applicants should have received training in Town Planning, Civil Engineering, Surveying or Architecture, should have had previous planning experience, and should preferably be Corporate Members of one of the appropriate Institutions for the professions named. Consideration will, however, be given to applicants who possess a University Degree in Economics, Geography, or allied subjects.

The above appointments will be subject to the provisions of the Local Government Superannuation Act, 1937, and successful applicants will be required to pass a medical examination.

Successful applicants will be assigned for duties at one of the County Area Planning Offices to be set up in the towns of Harrogate, Huddersfield and Doncaster in the case of appointments (*a*), and Harrogate, Huddersfield, Doncaster and Barnsley in the case of appointments (*b*), and applicants may indicate a preference for any of these places.

Applications, stating age, qualifications and experience, and accompanied by copies of two recent testimonials, should be received by the undersigned not later than the 26th day of June, 1948.

ARTHUR BATES,
County Planning Officer.

County Planning Office, 19, King Street, Wakefield. 1052

COUNTY BOROUGH OF WALSALL.
PUBLIC WORKS DEPARTMENT.
ASSISTANT ARCHITECT.

Applications are invited for the appointment of an Assistant Architect, in Grade VII of the Administrative, Professional and Technical Division of the National Joint Council's scale of salaries (£635—£25—£710).

Applicants must have had general architectural experience, especially in connection with Housing and Schools, and preference will be given to Associates of the Royal Institute of British Architects.

The appointment is subject to the provisions of the Local Government Act, 1937, and the selected candidate will be required to pass a medical examination.

Applications, giving age, details of qualifications and experience, together with copies of three recent testimonials, should be received by the Undersigned not later than Monday, 28th June, 1948.

M. E. HABERSHON,
Borough Engineer and Surveyor.

Council House, Walsall.
20th May, 1948. 1056

EAST RIDING COUNTY COUNCIL.
COUNTY ARCHITECT'S DEPARTMENT.

Applications are invited for the following appointment, on the permanent staff of the above Department :—

PRINCIPAL ASSISTANT ARCHITECT. Grade VIII, £685-£760 per annum.

Applicants must be fully qualified and have had extensive experience in the supervision of Drawing Office Staff and a contemporary outlook on Architectural Design and Construction, particularly in relation to modern educational buildings. This appointment offers considerable scope to a suitable applicant.

The appointment, which is terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, in connection with which the successful candidate will be required to pass a medical examination.

Applications, stating age, training, qualifications, experience, and details of past and present appointments, with salary, accompanied by copies of three recent testimonials, are to reach the County Architect, County Hall, Beverley, not later than Saturday, the 26th June, 1948.

T. STEPHENSON,
Clerk of the Council.

County Hall, Beverley.
June, 1948. 1055

ROYAL TECHNICAL COLLEGE, SALFORD.
APPOINTMENT OF FULL-TIME LECTURER IN STRUCTURAL ENGINEERING.

Applications are invited for the full-time post of Lecturer in Structural Engineering. Applicants should be Associate Members of the Institution of Structural Engineers, and have good industrial experience. Teaching experience, full-time or part-time, up to the standard of the A.M.I.Struct.E. examinations, is desirable. Ability to teach Building Construction to the advanced stage will be an additional qualification.

Salary for the above post will be in accordance with the Burnham Technical Scale.

Forms of application, together with further particulars of the appointment, may be obtained from the Principal, Royal Technical College, Salford, 5, to whom they should be returned as soon as possible.

H. H. TOMSON, *Clerk to the Governors.* 1039

CITY OF PORT ELIZABETH.
VACANCY—CITY ENGINEER'S DEPARTMENT.
SENIOR ARCHITECTURAL ASSISTANT.

The Council is prepared to receive applications for the above position. Grade IV. Salary scale £700 × £45—£925 per annum, plus cost-of-living allowance—married man £88, single man £46 16s. per annum (which is no longer paid upon the Architectural Assistant attaining the salary status of £780 per annum). Applicants should have passed the Associate Membership Examination of the Royal Institute of British Architects or an equivalent examination, and should have had experience in the design of housing schemes, public abattoirs, health centres, public halls, recreational centres and Municipal buildings generally, and should also be capable of estimating, writing specifications, compiling reports on schemes and supervising and organising departmental work, and the Architectural Assistant will be directly responsible to the City Engineer for the work of the architectural section of the department. The Architectural Assistant appointed will be required to produce a satisfactory certificate of health. Passage out paid. Three years' agreement. The appointment will be subject to the Council's conditions of service and leave regulations, which provide for a probationary period and membership of the Municipal Pension Scheme. Applications, stating age and incorporating full details of education, training and experience, and accompanied by not more than three recent testimonials, must be in the hands of the undersigned not later than 2nd July, 1948.

There is no special form of application.—DAVIS & SOPER, LTD., Agents of the City Council of Port Elizabeth, 52 and 54, St. Mary Axe, London, E.C.3. 2nd June, 1948. 1051

CAERNARVONSHIRE COUNTY COUNCIL.
PLANNING DEPARTMENT.

Applications are invited for the following appointments :—

(*a*) DEPUTY COUNTY PLANNING OFFICER. A.P.T., Grade VI, £595-£660 per annum.

(*b*) SENIOR PLANNING ASSISTANTS. A.P.T., Grade V, £520-£570.

(*c*) RESEARCH ASSISTANT. A.P.T., Grade V, £520-£570.

All the above appointments will be subject to the provisions of the Local Government (Superannuation) Act, 1937, and the National Joint Council's Scheme of Conditions of Service. The successful candidates will be required to pass a medical examination. Appointment (*a*) will be terminable by three months' notice on either side, and appointments (*b*) and (*c*) by one month's notice on either side. Knowledge of Welsh is desirable.

Applications should be delivered to the undersigned (from whom particulars and forms of application may be obtained), not later than 2nd July, 1948.

Canvassing, either directly or indirectly, will disqualify.

GWILYM T. JONES.
Clerk of the County Council.

County Offices, Caernarvon.
4th June, 1948. 1050

METROPOLITAN BOROUGH OF POPLAR.
APPOINTMENT OF TOWN PLANNING ASSISTANT (A.P.T., V).

Applications are invited from suitably qualified persons for the above-mentioned appointment, on the permanent establishment of the Works Department.

Full details of the appointment and forms of application may be obtained from the Borough Engineer and Surveyor, Poplar Town Hall, Bow Road, E.3, to whom completed applications must be delivered not later than first post on Monday, 21st June, 1948. 1022

Partnerships and Financial

6 lines or under, 10s.; each additional line, 1s. 6d.

CONSCIENTIOUS and hardworking Assistant, with financial and business assets, seeks JUNIOR PARTNERSHIP with small firm of Architects, preferably in the London area, with a view to working up a large practice. Reply, in confidence, to Box 978.

ASSOCIATE R.I.B.A., (42), school trained, fully experienced, keen and energetic, seeks Partnership or position leading to partnership; Hampshire-Devon area preferred; capital available, £4,000-£5,000. Box 1043.

Architectural Appointments Vacant

4 lines or under, 5s.; each additional line, 1s. 6d.

ASSISTANT required; capable draughtsman, working drawings, details, specifications, schedules and surveys. Apply Clark, 44, Great Russell Street, W.C.1. 'Phone : MUS. 4400 & 0500. 787

ARCHITECTURAL ASSISTANT required to firm of Building Contractors in Sutton (Surrey) area, for preparation of Joinery details and general work. Write Box 245, c/o George Murray (Advertising), Ltd., 184, Strand, London, W.C.2. 867

SENIOR ASSISTANT required in Architect's City office; interesting varied practice, primarily housing, licensed premises and laboratories; applicants to be A.R.I.B.A. by examination, with several years' good pre-war general office and practical experience, preferably in London; able to take responsibility; preference given to ex-Serviceman if otherwise suitable; 5-day working week; salary offered £500-£600, with profit-sharing bonus scheme. Stewart & Hendry, F./AA.R.I.B.A., A.M.T.P.I., 90, Fenchurch Street, London, E.C.3. 917

ARCHITECTURAL ASSISTANT required; salary, approximately £6 per week. Apply Frederick Gibberd, 35, Gordon Square, W.C.1. 951

ARCHITECTURAL ASSISTANT required; North London office; ability. Box 945.

ARCHITECT to London Brewery requires ASSISTANT for building and land surveys; must be a neat and accurate draughtsman; experience in preparing schedule of dilapidations and knowledge of ordnance maps an advantage. Reply, stating age, training, experience, and salary required, to Box 980.

ARCHITECTURAL ASSISTANTS required up to Intermediate standard for busy West End Architects' office. Box 972.

JUNIOR ASSISTANT required for general practice. Write, giving age, experience, and salary required, to H. W. Sharp, L.R.I.B.A., A.I.A.A., 3, Market Square, Dover, Kent. 1003

ARCHITECTURAL ASSISTANT required, with at least 5 years' experience; capable of making surveys, preparing working drawings from sketches, and supervising work in progress; salary according to ability and experience. Welch & Lander, 38, Gloucester Place, Portman Square, W.1. 1005

ASSISTANT ARCHITECTS required for varied Industrial and Local Authority Housing work; school training preferred, but not essential; salaries according to qualifications and experience. Apply, with full details, to Anthony Steel & Owen, A./A.R.I.B.A., Astragal House, 199, Anlaby Road, Kingston-upon-Hull. 1016

APPLICATIONS invited for the position of STAFF ARCHITECT at large modern Departmental Store in the North of England; site area, 75,000 sq. ft.; floor area, 135,000 sq. ft., with complementary trading activities; duties comprise the further development of the existing premises, general alterations, improved departmental layouts, designs for internal fixtures and fittings; also supervision and control of staff joiners, electricians, painters and plumbers; permanent position; salary according to experience and qualifications; state age, qualifications, previous experience and salary required. Box 1034.

ARCHITECTURAL ASSISTANT required for private practice in S.E. London area; competent draughtsman, working drawings, surveys; knowledge of specification and quantities an advantage; salary £250-£350, according to ability. Apply Box 1041.

ARCHITECT to large Company in London requires ASSISTANT; quick draughtsman, details, specifications, surveys; industrial experience preferred; salary £500. Box 1033.

ARCHITECTURAL ASSISTANT; permanent and progressive position; good salary to capable man. Particulars of experience to Watkin & Willis, Chartered Architects, Burslem, Stoke-on-Trent. 1026

ARCHITECTURAL ASSISTANTS required by Midland company; Inter. R.I.B.A. minimum standard; must be quick and accurate draughtsmen, with experience on industrial buildings. Full particulars, salary required, etc., to Box 1025.

FIBROUS Plasterwork, Decorations, etc.—ARCHITECTURAL DRAUGHTSMAN AND DESIGNER for Midlands; used to interviews, sizes, working details, sketches, etc.; salary and commission. State age and experience fully to Box 1020.

ARCHITECTURAL ASSISTANT required immediately in Architect's Department of the London Co-operative Society, Ltd.; applicants should preferably have had extensive experience in the design of Commercial and Industrial buildings; the successful candidate will be required to pass a medical examination, and after a short probationary period will be eligible for membership of the Superannuation Fund; salary £450, inclusive of war bonus. Reply, stating age, technical qualification, and full details of past experience and positions held, to the Staff Manager, London Co-operative Society, Ltd., 54, Maryland Street, Stratford, E.15. 1017

JUNIOR ASSISTANT ARCHITECT required in West End Architect and Surveyor's office; age 22-25; salary £275/£325, according to experience; scope for advancement. Applications should state age, experience, training and position held, to Box 1021.

ARCHITECTURAL ASSISTANT required immediately for Dublin office; practical knowledge and experience in industrial and hospital work an advantage. Replies by letters, with full particulars of qualifications and experiences, stating age and salary required, to Donald A. Tyndall, Chartered Architect, 121, St. Stephens Green, Dublin. 1047

LOTUS, LTD.—Applications are invited for the appointment of a Qualified Architect, age 30/35, to train as ASSISTANT to the Manager of the Building and Shopfitting Dept.; the position will be permanent and progressive, and will immediately involve the management of the present Drawing Office staff. Applicants should apply in writing, stating training, experience, qualifications and salary required, to Personnel and Welfare Manager, Lotus, Ltd., Stafford. 1048

B.B.C. invites applications for a post of JUNIOR ARCHITECTURAL DRAUGHTSMAN in the Building Department in London; the wage will rise to a maximum of £7 5s. 6d. per week. Applications, stating age, qualifications and experience, should reach the Engineering Establishment Officer, Broadcasting House, London, W.1, within 7 days. 1053

SENIOR ARCHITECTURAL ASSISTANTS required, London; fully experienced in Housing or School work. Full details and salary required, Box 1054.

Architectural Appointments Wanted

JUNIOR ASSISTANT requires situation London; preferably W.1 area; Intermediate standard; 2 years' office experience. Box 111.

JUNIOR ARCHITECTURAL ASSISTANT, 6 years' experience general housing, surveys, etc., would like position for further experience and good prospects ahead; South-West Coast or country. Box 114.

ARCHITECTURAL ASSISTANT (27), R.I.B.A., Intermediate standard, with 6 years' office experience, including administrative responsibility, desires similar position in Kent or London area; present salary £460; car driver. Box 122.

ARCHITECTURAL STUDENT, age 23, requires position in Architect's office; South London district; neat draughtsman and model maker. Box 123.

CHARTERED ARCHITECT, specialising in Industrial work for past eight years, and having good general experience in addition, requires responsible post; could take complete charge and organise branch or department; good designer and draughtsman; school diploma; salary about £1,000; private or commercial firm. Box 124.

FACTORY ARCHITECT, qualified, seeks change; works maintenance and new design; present job completing £50,000 R.C. factory in Midlands; flats conversion, surveying; home or abroad. Box 125.

TEMPORARY position, London area (until end of August) required by JUNIOR DRAUGHTSMAN; two years' office experience. Palmer, 15, Cranbourne Drive, Pinner, Middx. 116

ARCHITECTURAL ASSISTANT (27), married, student R.I.B.A., with over 3 years' office experience, requires position in or near London. Reply Box 117.

ARCHITECT'S ASSISTANT (24), single, wishing to specialize in interior fitting, and decoration, desires progressive post offering further experience; good experience of housing and hospital work; 2 years' R.E. surveyor; willing to travel. Box 119.

A. R.I.B.A. (37), several years' experience in brewery and licensed premises work, desires change to Midlands or South. Box 118.

ASSISTANT (30) desires change; experience conversions, council, school, church and agricultural work; good testimonials. Salary offered and details to Box 120.

ALDERSHOT OR DISTRICT.—Young Man (21), with 5½ years' drawing office experience, requires progressive and responsible position in Architect's office; detail drawings, designs, surveys, etc. Box 121.

FOREIGN Architect, age 40, with experience abroad and in this country, now sitting for final exam. (P.U.C.) in London, desires position as ARCHITECTURAL ASSISTANT in progressive office. Box 126.

Other Appointments Vacant

4 lines or under, 5s.; each additional line, 1s. 6d.

ESTIMATOR required, with experience of large Building and Public Works Contracts, to assist chief estimator to firm of Contractors in Sutton (Surrey) area. Write Box 244, c/o George Murray (Advertising), Ltd., 184, Strand, London, W.C.2. 865

ASSISTANT required to firm of Building Contractors in Sutton (Surrey) area, to deal with enquiries in connection with tendering; must be a capable typist and have a knowledge of the trade. Write Box 245, c/o George Murray (Advertising), Ltd., 184, Strand, London, W.C.2. 866

Services Offered

4 lines or under, 2s. 6d.; each additional line, 1s.

GENTLEMAN, with extensive experience in the Building Industry, and very large personal connection with Architects, Surveyors and Local Authorities, seeks appointment with progressive company desiring experienced representation. Box 54.

LETTERING ARTIST has further capacity for Architectural and Monumental work. Enquiries to R. Riminton, 36, Selan Gardens, Hayes, Middx. 1036

ARCHITECT and SURVEYOR, L.R.I.B.A. (39) desires position in Lancashire, fully experienced and capable, view to partnership and combining own practice; west side of county preferred. Box 1035.

ARCHITECTURAL ASSISTANT requires work for spare time; tracing, drawing and model making undertaken. 113, Clapton Common, London, E.5. 1027

ARCHITECTURAL ASSISTANT offers part-time service, London area; tracings, working drawings, perspectives, etc.; domestic and industrial; quick and neat work. 56, Barn Rise, Wembley Park. ARNold 4715. 1045

HIGHLY qualified ARCHITECT (43), very wide experience in this country and abroad; holder of various academic degrees; Rome scholar; used to negotiations with authorities; at present in charge of the office of well-known London firm of architects; desires responsible position with Architects or Industry. Write Box 1042.

POSITION sought where intuition would be appreciated in Town Planning by Cambridge Graduate in Architecture, with town planning and architectural experience; anywhere considered, but West Midlands to North-West or Cambridge and South-East preferred. Box 1044.

ASSOCIATE offers spare-time services, London area; schemes, working drawings, perspective; specialist conversions and new housing. Box 1057.

For Sale

4 lines or under, 5s.; each additional line, 1s. 6d.

FOR SALE.—Photostat Copying Machine; model 2, type P, No. B.166; complete with camera-back projector, rear illumination cabinet, one 40 in. by 30 in. easel and set of rails, 10 ft. 6 in.—S. P. HAMILL, LTD., 7/8, Lansdown Place, Cheltenham ('Phone 4040). 955

FOR SALE.—Zeiss Level and Tripod; perfect condition; £55, or nearest offer. Box 988.

RED Sable Water Colour Brushes, Nos. 0-6; sample set (7 brushes), 22s. 6d., post free; c.o.d. extra. Spur Artists Brush Co., 12, Duke Street, St. James's, London, S.W.1. Whitehall 6640/6988. 726

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4 lines or under, 5s.; each additional line, 1s. 6d.

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NEWER HEAT DISPLAY, Building Centre, Conduit Street, W.1. New solid-fuel appliances. New heating methods. New standard of home comfort. Open 10-5. Organised by the Coal Utilisation Joint Council. 730

TO LET.—West End firm of Chartered Quantity Surveyors have available an Upper Floor, comprising two rooms; £200 per annum, inclusive of heat, light, rates, cleaning, etc.; only a professional firm considered. Box 1004.

FLOORS OF DISTINCTION Laid: in wood, rubber, composition, cork, mosaic; existing floors repaired, resurfaced and polished; also panelling restored. Davis Floorings, Grove Hall Court, Hall Road, N.W.8. CUN. 3205/6 and 5616. 600

CENTRAL HEATING OIL BURNERS.—Insist on the British-made Parwinac—no stoking, clean, trouble free; no waiting for coal or coke deliveries; no embargo now. Write at once to Parker, Winder & Achurch, Ltd., Makers, 80, Broad Street, Birmingham, 1.

SOUTH AFRICA.—The Builder's paradise, liner and rail, £100; no waiting. Write O.P.S.A. Club, Veryan, Cornwall, stating desired date. 1037

WANTED.—Up to 30 sq. yds. of Linen Prints or Negatives in any condition; no quantity too small; 2s. per yd. Write J. Basing, 255a, Neasden Lane, N.W.10. 1058

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4 lines or under, 5s.; each additional line, 1s. 6d.

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