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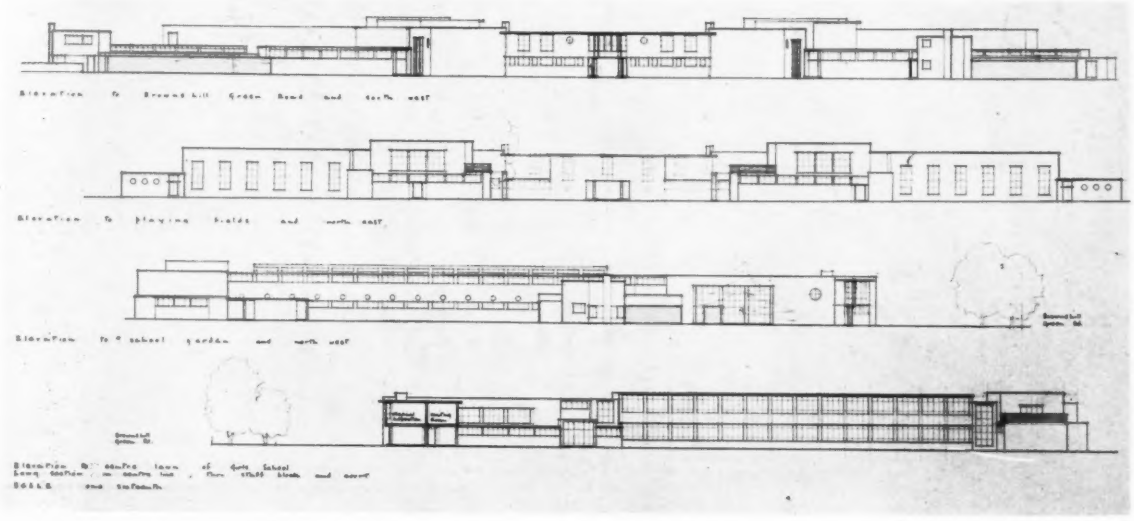
The Editor will be glad to receive MS. articles and also illustrations of current architecture in this country and abroad with a view to publication. Though every care will be taken, the Editor cannot hold himself responsible for material sent him.

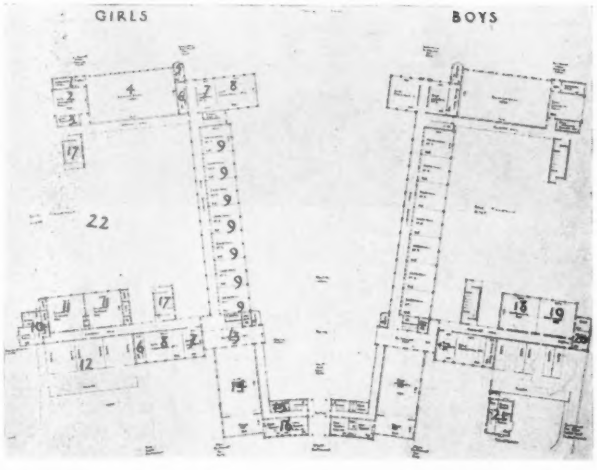
THURSDAY, OCTOBER 28, 1937. NUMBER 2232 : VOLUME 86

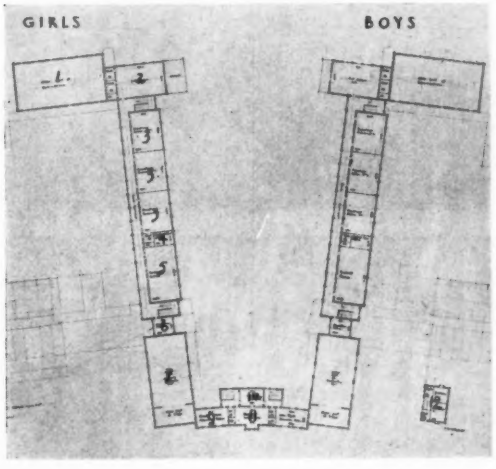
PRINCIPAL CONTENTS

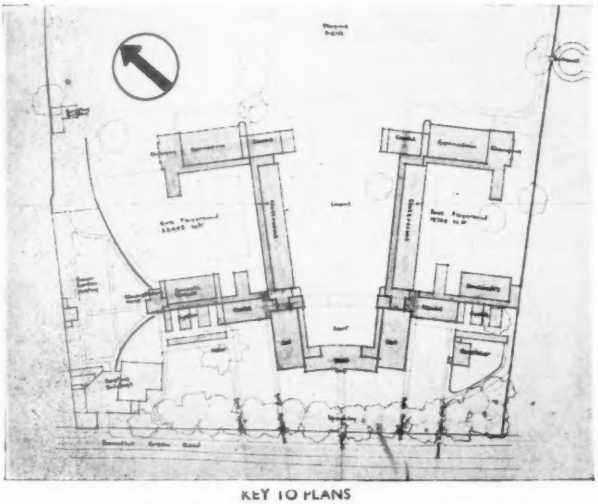
COMPETITION FOR TWO SCHOOLS, COVENTRY

WINNING DESIGN, SECTION A: BY R. HELLBERG









KEY TO PLANS

GROUND FLOOR PLAN

1 : Apparatus store
2 : Changing room
3 : Showers
4 : Gymnasium
5 : Instructor
6 : Drying room
7 : Lavatory
8 : Cloakroom
9 : Classroom
10 : Demonstration house
11 : Domestic science
12 : Cycles
13 : Entrance hall
14 : Assembly hall
15 : Staff cloaks
16 : Head teacher
17 : W.C.s
18 : Metalwork
19 : Woodwork
20 : Timber store
21 : Caretaker's house
22 : Playground

FIRST FLOOR PLAN

1 : Upper part of gymnasium
2 : Art room
3 : Practical rooms
4 : Preparation room
5 : Science room
6 : Projection room
7 : Upper part of assembly hall
8 : Demonstration house
9 : Staff common room
10 : Waiting room
11 : Medical 12 : Caretaker

Mr. W. T. Benslyn, F.R.I.B.A., the assessor of the competition (limited to architects practising in Coventry) for two schools for the City of Coventry Local Education Committee, has made his award as follows :—

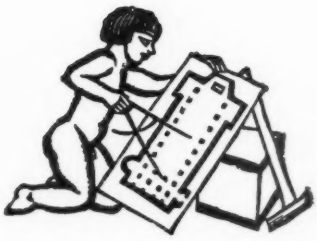
Section A : New public elementary school for senior boys and senior girls on the "Oakhurst" site : Design placed first (£100) : Mr. R. Hellberg, A.R.I.B.A. Design placed second (£75) : Messrs. T. R. Meakin and Sons, A. & L.R.I.B.A. Design placed third (£50) : Messrs. C. Redgrave and Son, A. & L.R.I.B.A.

Section B : New public elementary school for juniors and infants on the "Hill Farm" Estate : Design placed first (£100) : Messrs. C. Redgrave and Son. Design placed second (£50) : Mr. R. Hellberg. Design placed third (£30) : Messrs. Hattrell and Wortley, LL.R.I.B.A.

On this page we reproduce the winning design in Section A. The key to the plans applies to both wings, with the exception of rooms 18, 19 and 20. The design placed first in Section B is given on page 645.

TOMBSTONE

A tombstone in Walberswick Churchyard. It stands five feet high, is of Hopton Wood, and was executed by Mr. Eric Kennington. The symbols represent the following attributes of the person to whose memory the memorial was erected: fearless (sword); just (scales); a great friend (hand-clasp); a painter (palette); a gardener (spade and flower); a nature lover (birds).



THE NEW SCHOOL

IT is now a year and a-half since the JOURNAL published a Special Issue on Schools. The issue was wholly concerned with the schools of the local educational system; and by being so it caused some surprise among architects.

That it should have done so showed the extent to which public opinion needed changing concerning education. Architects, from self-interest, if nothing else, are not likely to become apathetic over the architectural possibilities of a huge section of building activity if it does not seem hopeless to expect any general public support. And that was what had happened in the case of elementary schools.

In May, 1936, the mass of architects were aware that educationalists, and even the Government, were disturbed about the standard of State education and the buildings in which it was carried on. But there was nothing fresh about that. And those architects whose practices did not include work for an education committee had become so accustomed to the dreariness of elementary schools that they had almost stopped thinking of them as architectural problems at all. Despite a Gold Medal to Dudok and admiration felt for foreign schools, an apathy which began with compulsory education had left elementary schools only works of architecture by virtue of a few competitions and the efforts of a dozen struggling pioneers.

The change of mind towards schools which has taken place in the last 18 months is a standing example of what architects, once convinced themselves, can do towards social progress with the help of experts and the more responsible section of the Press.

The schools of local education authorities have now become, in theory, architectural problems of the greatest significance. In them far more than 19 out of every 20 children spend their most impressionable years; and by their surroundings there, if the school is what it should be, the children's taste, outlook and physique will chiefly be formed.

The progressive policy of the Board of Education, the "Ten-Year Plan for Schools," the *News-Chronicle* Competition, the National Health Campaign, the R.I.B.A. Exhibition—and possibly the efforts of this JOURNAL—have brought a large section of the public to realize that general intelligence and good health cannot be expected in children without changes in education and school buildings designed for the changes.

The largest obstacle to better schools is therefore being successfully ended and the new educational policy is ready—has been ready for ten years. Only two difficulties now remain. It is necessary to persuade individual local education authorities to adopt the new policy, together with its higher standards for schools. And it is necessary to provide for the much greater number of architects now concerned with schools a work of reference to what the new educational policy needs in its surroundings and to the methods of planning and design which have been found, so far, most nearly to supply those needs.

Persuading local committees must be left to public opinion and the Board of Education. It will probably be a long business. In England and Wales alone there are over 300 education authorities, some controlling the full range of education and more (many of them with 10,000 inhabitants and little bigger than villages) controlling elementary education only. Local interests and rights, local jealousies, small-minded committee-men and small finances must inevitably obstruct better schools in some districts for many years, and may eventually compel the concentration of educational administration in the hands of County Councils or similar large units.

For the next few years the interest of the architect, however, will be in the progressive authorities. The list of pioneers like Cambridgeshire, Derbyshire and Middlesex has now been greatly extended. Education architects are designing for higher standards of accommodation and equipment, and a number of authorities have awarded commissions to outside architects.

This measure of competition and the possibility of comparison has given a tremendous stimulus to the building of better schools. But the architects, whether salaried or private, who are designing the new buildings are working under considerable handicaps.

Educational policy has changed very greatly in the last ten years, and architects must understand that policy in some detail before they can design satisfactory surroundings for it. They should also examine in reproduction the schools which have already been built in this country and elsewhere in accordance with changed educational ideas. At present no book exists which will enable them to do this.

The JOURNAL intends, therefore, to try to make good this gap in architectural works of reference. Next week it will begin the third of its series entitled "The Planning of Modern Buildings" by publishing the first section of "Schools." This series will summarize the new educational policy and its demands upon accommodation and equipment as it affects the elementary school child from the child welfare clinic to the age of fifteen.

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NOTES & TOPICS

BLOOMSBURY AGAIN

EVERY six months or so there is another outcry over the disappearance of another Bloomsbury Square. The British Museum and the Bedford Estate seem bent on ruining Bedford Square, Russell, of course, went years ago, when the agent thought a few terracotta slabs would push rents up a bit, Tavistock is in little better state, and now Brunswick.

*

Symmetrically planned about the top of the Foundling Site, Brunswick and Mecklenburgh form a really coherent piece of planning—and now the Pharmaceutical Society proposes a £200,000 headquarters which will take nearly the whole of the North side of Brunswick, the best residential side incidentally, for it is a dead end, the square not being a square but a U.

*

To the south west, the vista will shortly be closed by a new medium-rent flat block described by the owners (the Foundling Estate, incidentally, who might have had other ideas as "dignified being in Tudor, Georgian style."

*

How soon will Mecklenburgh go the same way? Mr. Yerbury and one or two other distinguished people have already retreated across the Gray's Inn Road to one of Cubitt's still unspoilt Islington squares, but be very sure the advancing hordes will follow them even there—rushing up the full ten floors in the name of fourteen per cent. where fourteen per cent. is still rare.

WEMBLEY . . .

I have been sent a rather naïve little paragraph in a circular issued by the opposition party in the forthcoming Borough Elections at Wembley; either naïve or cynical, I am not sure which.

By placing-out the plans for the new Town Hall to open competition, the Council has been involved in a *needless expenditure* of many thousands of pounds. Moreover, this procedure has caused many months of delay during which building costs have risen considerably. Labour opposed this method and advocated as an alternative the direct employment of an architectural staff *which would have saved all this money and avoided delay.* (Italics in the original.)

*

The author of this appeal to the electorate ought to be asked a question, I think. Either the profession (that portion of it which derives its income from the payment of normal fees for services rendered) is grossly overpaid—a state of affairs which is refuted by any enquiry into their standard of living—or, alternatively, an architectural staff in a municipal office is a species of sweated labour; which?

*

You can't have it both ways, and the fact that this attitude is fairly widespread merely intensifies the scandal. It is not as though the author of the paragraph had any prejudice against brain as opposed to brawn, for he goes on in the next sentence to commend the inclusion of an up-to-date library service in the new building.

. . . AND OTHER MUNICIPALITIES

The section of the profession which we call "official" architects are a long-suffering lot. Anyone who imagines them as glibly battening on the ratepayer in the cause of suave and gracious modern school designs—or at worst preparing attractive schemes for other public buildings—knows little of municipal life. In times of slump and depression the municipal staffs are likely to be reduced and the trained assistant is faced with unemployment; in times of boom and prosperity he naturally hopes to better his position, but here he is meeting with a new and insidious form of obstruction.

*

From a letter in the JOURNAL last week it seems that when an able assistant, having served his borough or city faithfully, decides to apply for a better job he goes in the usual way, complete with testimonials, to his interview with the departmental committee of another and probably larger town. This second town then rings up the first and says: "Jones is here, do you want to lose him?" If the answer is "No," then there is honour among cities and Jones creeps back to the old job. I am not sufficiently expert to question the legality of this proceeding, but it sounds dangerously like interference with the liberty of the subject, and morally, of course, it is pure feudalism.

*

I remember once helping to organize a little exhibition of local work in a provincial town. A number of photographs of quite admirable fire stations, schools, etc., were sent in from the city surveyor's department. We hinted that we would like the names of the designers that we might enter them in the catalogue. The photographs were instantly withdrawn. It was the city fathers of Florence, was it not, who organized a procession through the streets in honour of Raphael's latest work?

WHERE IS DR. CRONIN?

I wrote just now that an enquiry into the standard of living of architects would not suggest an excess of prosperity; this hardly applies, of course, to the upper five hundred—one of whose claims to our gratitude is that they provide employment for an army of assistants, wraithes too often condemned to walk the earth for ever nameless. For these an architectural Dr. Cronin has yet to appear.

*

Those who have read the latest work by the author of *Hatter's Castle* will know what I mean. I happen to know

The "British Railways" ticket office, Queen's Road, W., designed by Mr. H. T. Cadbury Brown, which was opened last week.

that there is truth in the appalling exposures of *The Citadel*. A parallel book about our own profession would make juicy reading and be great fun. Thinking of a title might make a subject for an amusing competition—my own suggestion is "Lilies of the Field." One could improve on this, but the Camrose case has made me cautious.

R.I.B.A. ELECTIONS

I have just received the list of the elections made at the R.I.B.A. Council Meeting last week. The R.I.B.A.'s association with the Royal Family is long and honourable. Four out of the five immediate past monarchs appear on its note-paper heading, and it is gratifying to find the new presidency ushered in by the addition of two royal names to the list of Hon. Fellows. H.R.H. the Duke of Gloucester is one, and the other is described in real R.I.B.A. fashion as Harewood: the Rt. Hon. the Earl of, K.G., G.C.V.O., D.S.O., T.D. (Leeds).

*

Royal patronage is a curious thing, and it would be silly in these democratic days to expect more than a polite interest in architecture to emanate from personages so august. However, the Earl of Harewood is, at any rate, the feudal lord of Carr, Yorks' most charming village.

*

The list of Hon. Corresponding Members is a long one. (Is it true that a recent inquiry discovered many to be dead?) Professor Gropius is a good addition to the American list, though whether Herr Heinrich Tessenow will care to have his name printed in the same Calendar is a nice point. The inclusion of Auguste Perret is a highly deserved but rather belated compliment.

MORE ABOUT A TOWN HALL

I have become a marked man since last week. It seemed then that to praise Newcastle-upon-Tyne for deciding upon an open competition to end forty years of hard fighting about a new Town Hall was legitimate enough. I have now been told that Newcastle's big-mindedness has more than one façade.

Many news cuttings tell the story in several ways. A Northumbrian architect underlines a sinister statement by a Councillor that, whilst an assessor will be employed, it is absurd to suppose that the final choice will not lie with the Council.

*

That Councillor is not alone in his determination not to allow so important a decision to rest in the hands of a mere technician. Some snippets from a report of a Council meeting in the *North Mail*:

*

Councillor McKeag said the civic rooms in one Town Hall of which he knew were like "the private apartments of some Eastern potentate."

Criticising the terms of the proposed competition, he added, "I have no objection to the principle of a national competition, but I am not prepared to vote for something which means complete abrogation of our rights and privileges as elected representatives. Out of all the designs which are put forward in this competition the assessor will choose one and that one we must accept willy-nilly."

Cries of "No, no," were heard in the chorus of disapproval which greeted this last remark . . . .

Councillor Hampton Vick, vice-chairman of the special committee, said: "We have benefited enormously by going from town hall to town hall and seeing what has been done in other places. I do not think we have wasted time. . . ."

Replying to Councillor McKeag, Councillor Angus Watson said that the council, while bound to pay for the design selected, were not bound to put up the building. In other words, the council had the power of veto.

*

With a £467,500 building in question, with premiums of £1,750 and an expenditure on the competition estimated at £2,625, the situation on Tyneside is worth watching. I do hope it is decided who *is* going to judge the competition before sending-in day. It makes such a difference.

AMENITIES AGAIN

But not, lest you should be already reaching for your cheque books, another Darwall appeal. The Lancashire branch of the C.P.R.E. has published a really admirable work on what should and should not be done. Not in the "everything's horrible anyway" manner of the D.I.A. cautionary guides, but in a reasonable and logical way, so that even the grumpiest builder ought not to feel that he is being dictated to by superior people who despise him.

*

Particularly sensible is the list of suitable materials, annotated for use in different districts. No vague generalizations, but full makers' descriptions, prices and addresses. Buy a copy—one shilling from the County Offices, Preston—or even buy several copies for the persuasion of possible Lancashire clients.

*

But there is an obverse to this admirable piece of work, for last week's *Times* correspondence had a bitter protest from Hartley Wintney, complaining that the C.P.R.E. had purchased and reconditioned a block of cottages in the name of amenity and then dispossessed the agricultural tenants.

*

Sir Guy Dawber and Mr. Griffin replied that the C.P.R.E., so far as they knew, had had nothing to do with it, but that "investigations were proceeding."

ASTRAGAL

NEWS

POINTS FROM THIS ISSUE

WATERLOO BRIDGE

The London County Council announces that work on the construction of the new Waterloo Bridge is about to begin.

The contractors for the new bridge have already placed orders for a large amount of material, including Empire timber in considerable quantity and steelwork for the temporary stagings in the river and several hundred tons of steel sheet piling for the cofferdams within which the river piers will be built. Work is to begin immediately in erecting a crane gantry across the river.

The contract time for the completion of the new bridge is two-and-a-half years. After the bridge is completed the existing temporary bridge will be demolished—the contract time for demolition being nine months.

ANTI-RAID SHELTERS FOR LEEDS

A panel of Leeds architects is to advise the Corporation air raids precautions committee on the building of bomb shelters and other buildings.

"SAVE THE COUNTRYSIDE" EXHIBITION

On Saturday, November 6, in the Graves Art Gallery, Sheffield, Sir William Rothenstein will open the second "Save the Countryside" Exhibition organized by the Sheffield and Peak District Branch of the C.P.R.E. The first exhibition was held in 1929.

MUNICIPAL BUILDINGS, KIRKCALDY

Mr. Thomas S. Tait, F.R.I.B.A., the assessor of the competition (open to architects practising in Scotland) for municipal buildings for the Royal Burgh of Kirkcaldy, has made his award as follows :

Design placed first (£200) : Mr. David Carr, of 3 Rutland Square, Edinburgh.

Design placed second (£150) : Mr. Stuart R. Mathew, of 43 Minto Street, Edinburgh.

THE ARCHITECTS' DIARY

Thursday, October 28

R.I.B.A., 66 *Portland Place, W.1. Exhibition of the designs of students of schools of architecture recognized for the exemption from the R.I.B.A. Intermediate Examination. Until October 29. 10 a.m. to 8 p.m.*

ARCHITECTURAL ASSOCIATION, 36 *Bedford Square, W.C.1. Annual exhibition of water-colours, drawings and other etchings by members. Until November 16.*

INSTITUTION OF STRUCTURAL ENGINEERS. *At the Institution of Civil Engineers, Gt. George Street, S.W. Presidential address by Professor J. Husband. 6.30 p.m.*

WELSH SCHOOL OF ARCHITECTURE. *Technical College, Cardiff. "Plastic Relief and Broken Colour Effects." By William Cook. 7 p.m.*

Friday, October 29

JOINT COMMITTEE ON MATERIALS AND THEIR TESTING OF TECHNICAL INSTITUTIONS AND SOCIETIES IN GREAT BRITAIN. *At the College of Technology, Sackville Street, Manchester. "The Physical Meaning of Impact Tests." By Professor R. V. Southwell. "Some Aspects of the Notched Bar Test." By L. W. Schuster. "The Development and Present Position of Continental Research on the Notched Bar Impact Test." By Dr. Ing. Max Moser. 2.30 p.m.*

Monday, November 1

R.I.B.A., 66, *Portland Place, W.1. Inaugural address by H. S. Goodhart-Rendel. Also, presentation of the London Architecture Bronze Medal for 1936 to Stanley Hall, J. M. Easton and H. Robertson. 8 p.m.*

Tuesday, November 2

UNIVERSITY EXTENSION LECTURES. *At 66 Portland Place, W.1. Fifth of the series of lectures: "Architecture: Its Place in Human Society—The Part Religion has Played." By Basil Ward. 6.30 p.m. (Admission 1s. 6d.).*

INSTITUTION OF CIVIL ENGINEERS, *Gt. George Street, S.W. Presidential address by S. B. Donkin. 6 p.m.*

Wednesday, November 3

ECCLESIOLOGICAL SOCIETY. *At 6 Queen Square, W.C. "Moorish Architecture in Spain." By D. Chisholm Simpson. 8 p.m.*

INSTITUTION OF HEATING AND VENTILATING ENGINEERS. *At the Institution of Mechanical Engineers, Storey's Gate, S.W. "Electric Heating." By W. Gilchrist and S. A. Williams. 7 p.m.*

ROYAL SOCIETY OF ARTS, *John Street, Adelphi, W.C. "The State and the Worker." By Lord Amulree. 8.30 p.m.*

WORSHIPFUL COMPANY OF CARPENTERS, Carpenters' Hall, E.C. "*Sanitation of Domestic Buildings: Urban and Rural.*" *By H. H. Clay. 7.30 p.m.*

Design placed third (£100) : Mr. Alister G. Macdonald, of 123 George Street, Edinburgh, in collaboration with Mr. John Patterson.

Highly Commended : Messrs. J. and J. A. Carrick, of 7 Alloway Place, Ayr ; and Mr. W. H. Kinnmouth, of Messrs. Rowand, Anderson and Paul, of 16 Rutland Square, Edinburgh.

The scheme is estimated to cost £90,000, including £8,000 for the gardens.

ARCHITECTURAL ASSOCIATION

"Industrial Architecture" was the subject of a paper by Mr. L. H. Bucknell, F.R.I.B.A., President, at the annual general meeting of the Architectural Association on Tuesday last. Extracts from the paper are given below :—

Industrial architecture must be approached with an open mind. The architect must have no preconceived ideas of form and style. The factory is not a building in which machinery is installed, but a building which grows from the necessity and form of the machinery. The building is the skin to protect the machine and the worker. Regarded in this way, there is every chance for the skilled designer to produce an architecture having a form and quality of its own.

Although industrial building covers a very wide field, the principal unit is the factory. The requirements vary considerably, and can be met only by close co-operation between the architect, the employer, and his various departmental representatives. But generally in any system of production the flow must be continuous from the reception of the raw materials to the place of dispatch.

Many factories will contain the following units :—

1 : Administrative offices.

2 : The factory proper, including reception and storage of raw materials, preparation processes, finishing processes and by-product processes. Laboratory, storage and dispatch of the finished product.

3 : Power plant.

4 : Welfare centre, first aid and ambulance.

5 : Means of recreation for the staff. Mess rooms and canteens.

The choice of site may occasionally be the concern of the architect, and is influenced by the ease of transport of possibly all kinds, and the accessibility of workers.

The bearing strength of the soil may considerably affect the building cost, but the condition of very weak soil may easily be outweighed by the convenience of transport.

The type of structure and the materials used will depend upon the position of the factory and effect of byelaws. In some places a steel skeleton covered with thin sheeting may be possible ; in others the rather solid construction of the L.C.C. code of practice may be required.

To what extent really thin walls are economic is, I think, not yet proved. Whether the wall of sufficient thickness to exclude wet and cold is a better capital outlay than the thin wall with the consequent higher heating cost is a matter for research, but I think it needs more than a theoretical research and should include numerous buildings of various conditions. The minimum of wall thickness where a warm working temperature is required is a doubtful economy until that is done.

I think it is desirable to use such materials as will minimize the cost of upkeep. The minimum capital outlay may mean the maximum cost of upkeep ; but, of course, it depends upon the purpose required. Generally, finishings should be smooth and simple, and such things as ledges should be avoided to prevent the collection of dust.

Materials must be studied in relation to the process both for wear and sometimes for chemical action, such as in breweries and processes involving the use of sugar. I have found sugar a most tiresome material for which to provide the ideal floor to resist boiling liquid and chemical action.

Many of the new materials need serious examination in relation to the claims made for them. A long period guarantee is not a test. You need to be sure also that the firm will last as long as the guarantee. Laboratory tests do not always tell the whole story; although they may be true tests of the material they are not always tests of the material as applied to building.

R. I. B. A.

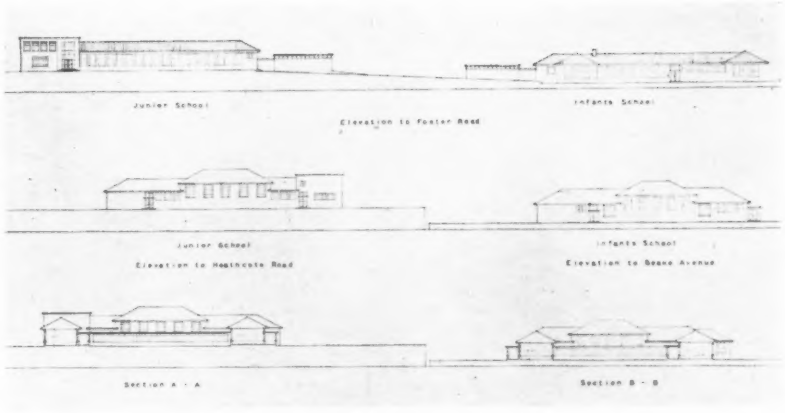
NEWS BULLETIN

Presidential Address : Mr. H. S. Goodhart-Rendel's presidential address on Monday next, November 1, is the first important event of the new session. It is understood that his main topic will be the organization and national status of the profession. At the same meeting the London Architecture Bronze Medal, 1936, will be presented to Messrs. Stanley Hall and Easton and Robertson. Also Mr. Harold Knight's

COMPETITION FOR TWO SCHOOLS, COVENTRY

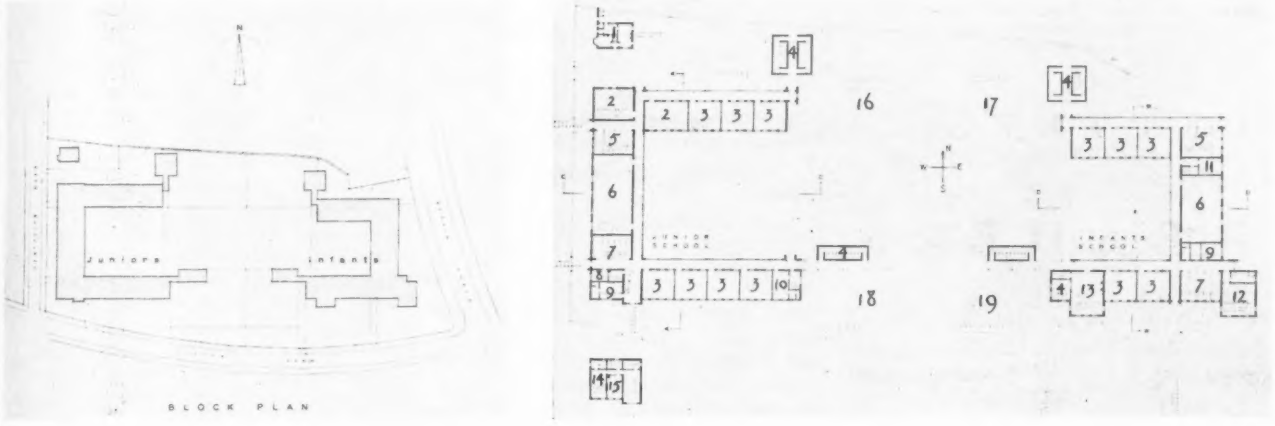
WINNING DESIGN

SECTION B: BY C. REDGRAVE AND SON



The assessor's full award is given on page 639.

Key: 1, Caretaker's house; 2, practical room; 3, classrooms; 4, lavatories; 5, boys' cloaks; 6, halls; 7, girls' cloaks; 8, kitchen; 9, head teachers; 10, medical officer; 11, staff room; 12, reception room; 13, nursery class; 14, female staff; 15, male staff; 16, junior boys' playground; 17, infant boys' playground; 18, junior girls' playground; 19, infant girls' playground.



portrait of Mr. Percy Thomas, past-president, will be unveiled. The meeting will start at 8.30 p.m.

Sir Banister Fletcher.—A specially bound copy of the R.I.B.A. Library Catalogue is to be presented to Sir Banister Fletcher by the President and Council. The ceremony will take place at the Council's dinner on November 22, before the general meeting, at which Mr. C. J. Morreau, M.A., A.R.I.B.A., is to read his paper on "The Prevention of Noise in Buildings." The production of the catalogue was made possible by a generous donation by Sir Banister.

R.I.B.A. Exhibitions.—The total attendance at the "Modern Schools" Exhibition for the seven days that it was open in London was 2,166. The visitors, in addition to architects, were mostly laymen having a definite technical interest in school planning, such as members of education committees, headmasters and teachers. The exhibition will reopen at the Mortimer Gallery, Carr Lane, Hull, on November 1. The "Airports and Airways" Exhibition, after a very successful showing at Portsmouth, is to open at Coventry on November 8. The "Civic Centres" Exhibition has left Lincoln and opens at Kidderminster Museum and Art Gallery on November 1.

Exhibition sent to America.—A photographic exhibition entitled "British Architecture of Today," has been lent by the R.I.B.A. for a tour of universities in the United States. The nucleus of it was the original "British Architecture of Today" exhibit that was arranged for the Brussels Exhibition and afterwards sent on a tour of English provincial centres. This exhibit has been brought up to date by the addition of some fifty photographs of newer buildings and the omission of several older examples. Professor Shirley W. Morgan, president of the Association of Collegiate Schools of Architecture, arranged the tour, which has now begun at Princeton, his own university. The exhibition will visit the 25 leading universities of the United States, including Columbia, New York, Yale and Harvard.

R.I.B.A. Social Activities.—The first dance of the session will take place on Friday, November 5. Members and students of the R.I.B.A., their wives and families are eligible for membership of the club. A double ticket for the series of four dances costs £1 15s., and single tickets are 6s. for each dance. The clerk to the Dance Club is Mr. R. W. H. Robertson, at the R.I.B.A.

Dr. Malcolm Sargent is to take the chair at a meeting of the Opera Circle, which will take place at the R.I.B.A. on Sunday, November 7, at 8.30 p.m., under the auspices of the R.I.B.A. Music Group. A talk and concert will be given on "Comic Opera in Beethoven's Time." Guest's tickets, price 5s., can be obtained from Mrs. Lanchester, 19 Bedford Square, W.C.1. (Museum 3369.) They must be purchased beforehand and cannot be sold at the door. Full particulars of the social activities for the new session were published in the *R.I.B.A. Journal* of October 16, page 1075.

ELECTION OF MEMBERS

At a recent council meeting of the R.I.B.A., the following members were elected:—

As Hon. Fellows (2): H.R.H. the Duke of Gloucester, K.G., etc. (London), and The Rt. Hon. the Earl of Harewood, K.G., G.C.V.O., D.S.O., T.D. (Leeds).

As Hon. Corresponding Members (9): Messrs. S. H. Eldem (Istanbul, Turkey); G. Guevrekian (Teheran, Iran); P. Karantinos (Athens, Greece); N. B. Paulsson (Upsala, Sweden); A. Perret (Paris); J. L. Sert Lopez (Barcelona); H. Tessenow (Berlin-Charlottenburg, Germany); Professor Walter Gropius (Cambridge, Mass., U.S.A.); and Professor J. S. Siren (Helsingfors).

As Fellows (6): Messrs. H. B. Elkington (London); J. A. Meikle (London); F. W. Tempest (Mansfield, Notts.); K. M. Winch (London); and O. G. Speight (Preston). *Overseas:* Mr. A. J. Thompson (Calcutta).

As Associates (25): Messrs. R. H. Bell (Lurgan, co. Armagh); M. H. Bristow (London); E. V. Collins (London); Ian Hamilton (Newcastle-on-Tyne); (Miss) B. Henty (London); W. P. Hunt (Sheffield); W. J. Irvine (Aberdeen); G. F. Kendrew (London); I. J. Lewis (Cardiff); (Miss) M. E. Lloyd (London); T. M. Porter (Guildford); K. R. Rowe (London); W. S. Scott (Kelso, Roxburghshire); F. Senior (Richmond); S. Smith (Cardiff); E. V. Tibbits (Chichester, Sussex); and (Miss) A. M. Wride (Cardiff). *Overseas:* Messrs. E. W. Andrew (Sydney, New South Wales); E. G. Bench (Pretoria, South Africa); (Mrs.) E. Cowin (Johannesburg,

South Africa) ; J. C. De Mol (Campsie, New South Wales) ; R. L. Little (Enfield, New South Wales) ; N. F. Perkins (Nedlands, Perth, Western Australia) : R. L. Spooner (Ashfield, New South Wales) ; and J. L. Vaz (Bombay).

As Licentiates (6) : Messrs. J. Carter (Windermere) ; C. W. Geddes (Swansea) ; A. J. Hale (London) ; W. L. Jones (London) ; R. Lutyens (London) ; and F. H. Walker (Windermere).

IN PARLIAMENT

Old Buildings

Mr. Bossom asked the Chancellor of the Exchequer if, when he was compiling his next budget, he would consider providing a reasonable sum of money which should be at the disposal of a small independent group, similar to the Import Duties Advisory Committee, to be granted in cases of smaller old buildings of character, which after approved examination were found capable of reconditioning but could not be so treated and now were destroyed, due to the money needed for reconditioning being more than that available from all sources on the strictly economic basis.

Sir J. Simon said he assumed that his hon. friend had mainly in mind country cottages. He would draw his attention to the fact that Exchequer grants for reconditioning were already available under the Housing of Rural Workers Acts.

Mr. Bossom asked if the rt. hon. gentleman was aware that in many cases it was not sufficient and that a very small addition to the amount now allowed would preserve a tremendous number of buildings of architectural importance.

Sir J. Simon said he could understand the importance of the matter, but he thought his reply covered the point.

Rent Restrictions Acts

Mr. Ellis Smith asked the Minister of Health when he expected to receive the departmental committee's Report on the Rent Restriction Acts ; would he consider the large reductions in wages which took place between 1920 and 1930 while rents remained fixed ; and would he bear in mind the need for a substantial reduction in rents.

Sir Kingsley Wood said he understood from the chairman of this Committee that he might expect to receive this report within the next few weeks. The whole position regarding rent control would be carefully considered in the light of the report.

LETTERS FROM READERS

A. W. BARR (Secretary, Association of Architects, Surveyors and Technical Assistants)

E. MATTHEWS, Secretary, Institute of Registered Architects)

G. C. RUSSELL-ROBERTS, F.I.A.A.

H. W. J. STONE

Applications for Appointments

SIR,—Your correspondent, Mr. R. D. Manning, is right in characterizing as a "conspiracy" the practice of certain official bodies in preventing their assistants from leaving them for better posts by agreeing *sub rosa* between themselves not to accept applicants from each others' staffs. The A.A.S.T.A. is actively engaged in opposing this practice and would welcome in confidence from any of your readers particulars of individual experiences.

The offices most concerned are four very large official departments employing altogether well over 1,000 assistants. The practice has gone on for some time, and in effect constitutes a temporary union of employers to keep down salaries. A man may have been in an office, say, for 18 months or two years as a "temporary" and have probably received no increase during that time. He finds that other men are being taken on owing to comparative scarcity, at much higher salaries, and he himself makes attempts to obtain a job as a "temporary" in another large office at a higher salary, and the procedure which Mr. Manning aptly describes comes into operation to prevent his securing it.

The A.A.S.T.A. knows of cases where on a first application a man has been informed of a vacancy at £7 a week, subsequently to be told, however, presumably after communications have passed between the offices concerned regarding his previous salary, that the post is available but only at £6 6s. Details of a particular case upon which we cannot comment further at the moment but which seems to us to be a flagrant example of the general principle, are now being placed by Mr. George Lathan, M.P., on behalf of the A.A.S.T.A., before the official department concerned.

In times of economic depression it becomes a "national duty" for assistants to accept cuts, but in times of comparative boom they are prevented (by Government offices !) from taking advantage of the relatively favourable conditions.

Individual action can do little, and may result in victimization. We appeal to any of your readers who may have had actual experience of this "conspiracy," to get in touch with the A.A.S.T.A., 113 High Holborn, W.C.1, if not for their own particular advantage then, at least, to strengthen further with concrete illustrations our case for abolishing this scandalous interference with individual liberty.

A. W. BARR

SIR,—The letter published by you under the name of R. D. Manning, in the JOURNAL for Oct. 21, certainly calls attention to the curb on architects' freedom of action in obtaining appointments, and we deal with any case of this nature as, and when, it arises.

I can assure you that this Council, in general agreement with other Institutes, are doing their best to standardize agreements of this nature.

E. MATTHEWS (Major)

Housing

SIR,—In reply to the letter by Mr. Philip R. Rathbone in your issue for October 21 in regard to the Housing Estate at Frinton.

The income stated for each tenant, i.e. £2 15s. per week, was purposely kept at that low figure in order to prevent the properties being occupied by persons who could well afford a better house. The 15s. per week is one which includes rent and rates and there is no further liability so far as the tenant is concerned.

Mention is made of the road being used as a playground for children, which is considered a flaw in the scheme. In practice this is not so. The main road from which the cul de sac leads is one which takes a comparatively large amount of swiftly moving traffic between Walton-on-Naze and Thorpe on the main Colchester Road. It has been proved that very few traders' cycles or vans use the estate road for two reasons, one, that the majority of the tenants transport their own small amount of goods and, second, that it is more convenient to leave vans on the main road for a short time or just turn them in at the junction of the new road and the main road which, at this point, is wide enough to allow them to turn. The estate road is a private one and could, if necessary, be closed to traffic at any time.

Although the country round about is quite open the fields are farmed and fenced and cannot be used by children. Neither can the main road, and this is the whole reason for the very large turning circle and plantation which will give an opportunity for small children to play in perfect safety and under observation from the houses.

G. C. RUSSELL-ROBERTS, F.I.A.A.

History of Coal

SIR,—I am engaged in writing a book on the history and evolution of the coal fireplace and its importance in British family life from the days of the crude hole in the middle of the floor to the modern labour-saving grate. May I claim the hospitality of your columns for information or references from your readers on the following points :—

(1) What is the earliest reference in praise of coal in English literature or poetry ?

(2) What is the oldest known coal fireplace still in use in the British Isles ?

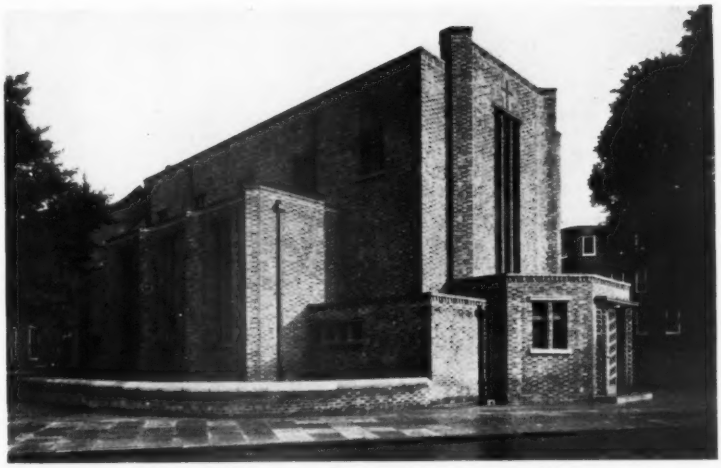
(3) Is there any published work dealing with coal fireplaces in famous houses or which have any association with historical figures ?

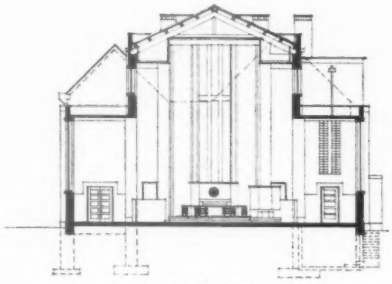
H. W. J. STONE

The Authors' Club,
2 Whitehall Court, S.W.1

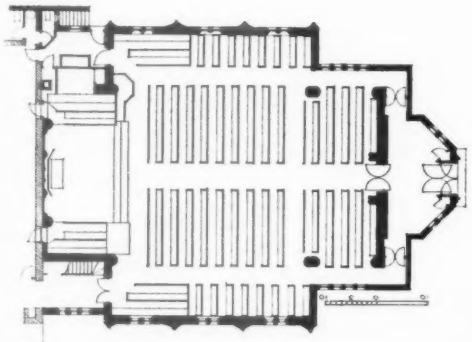
METHODIST CHURCH AT HENDON

DESIGNED BY WELCH AND LANDER

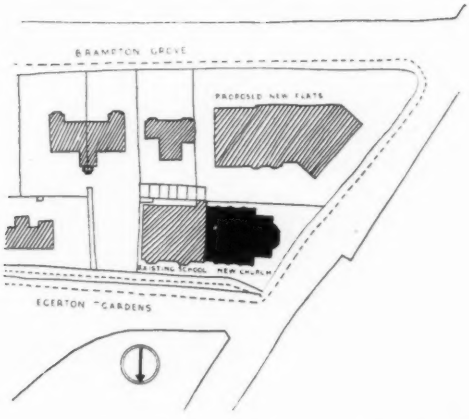




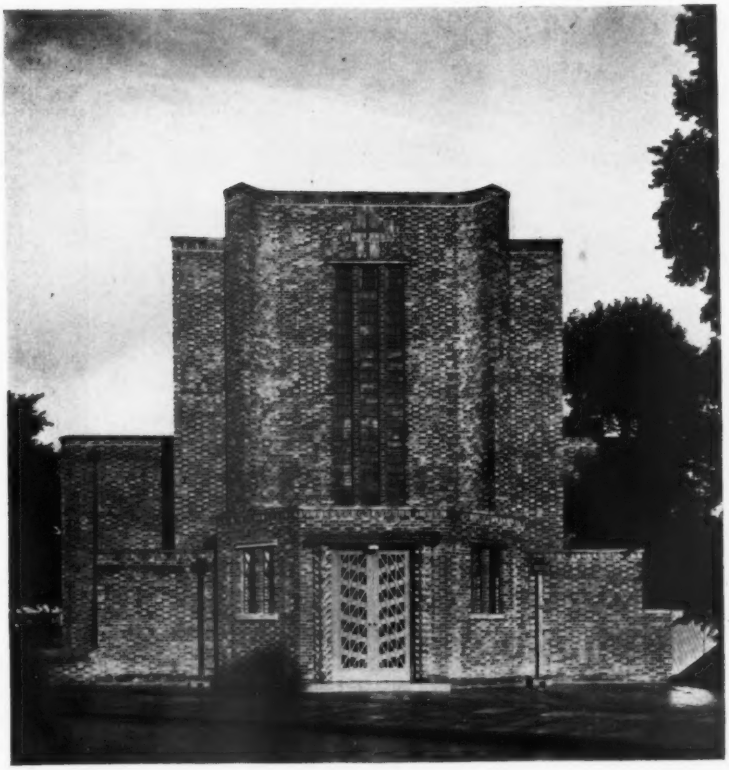
SECTION



PLAN



SITE PLAN



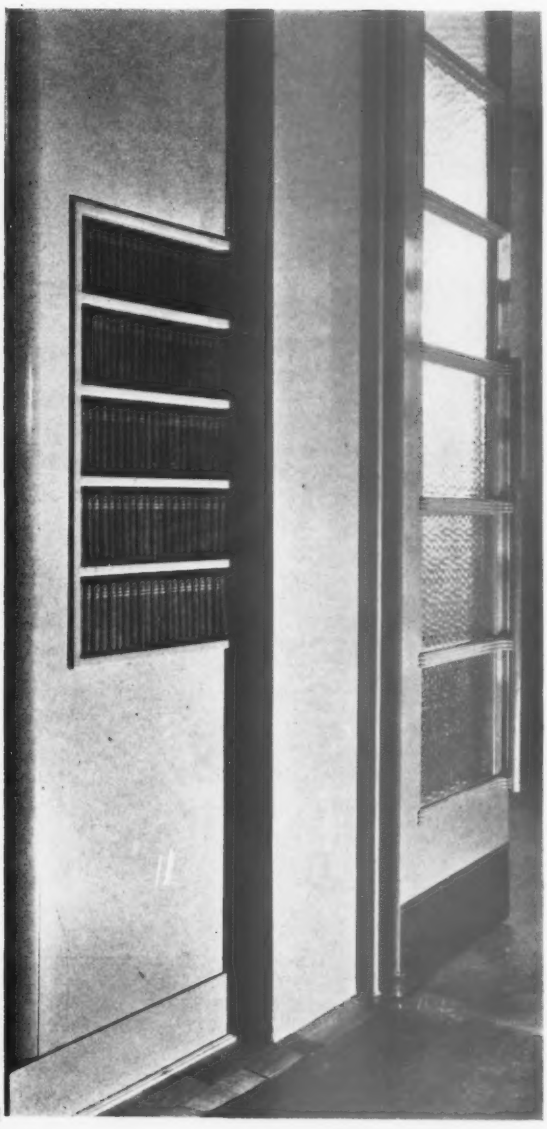
GENERAL PROBLEM—*Methodist church with seating accommodation for 400 persons.*

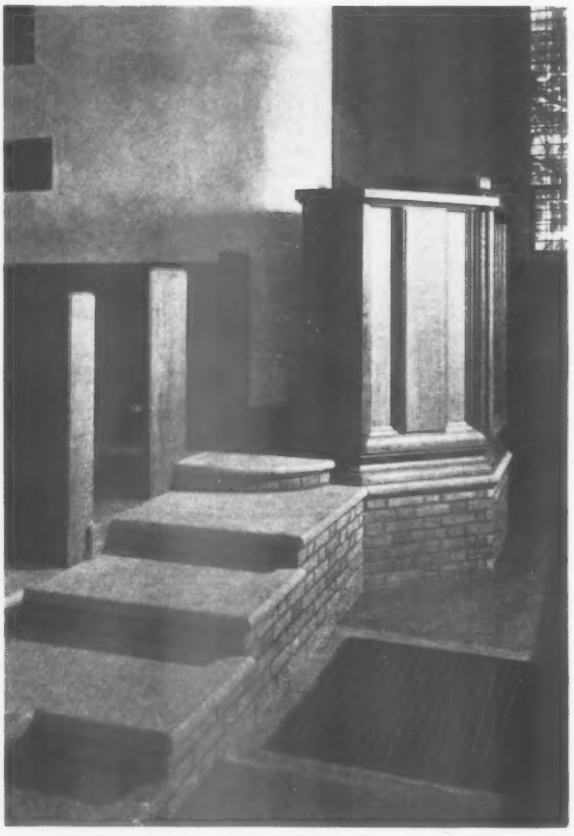
SITE AND PLAN—*The site was restricted and partly occupied by the existing school building. The plan is almost square, and was dictated to a great extent by the site. It is a convenient shape for a church as it enables all the congregation to be reasonably near the pulpit. The effect of squareness is disguised by the longitudinal stepping of the ceiling which gives apparent length to the building.*

The photographs show : above, the exterior from the north-west ; right, the west front.

D

METHODIST CHURCH AT HENDON: DESIGNED

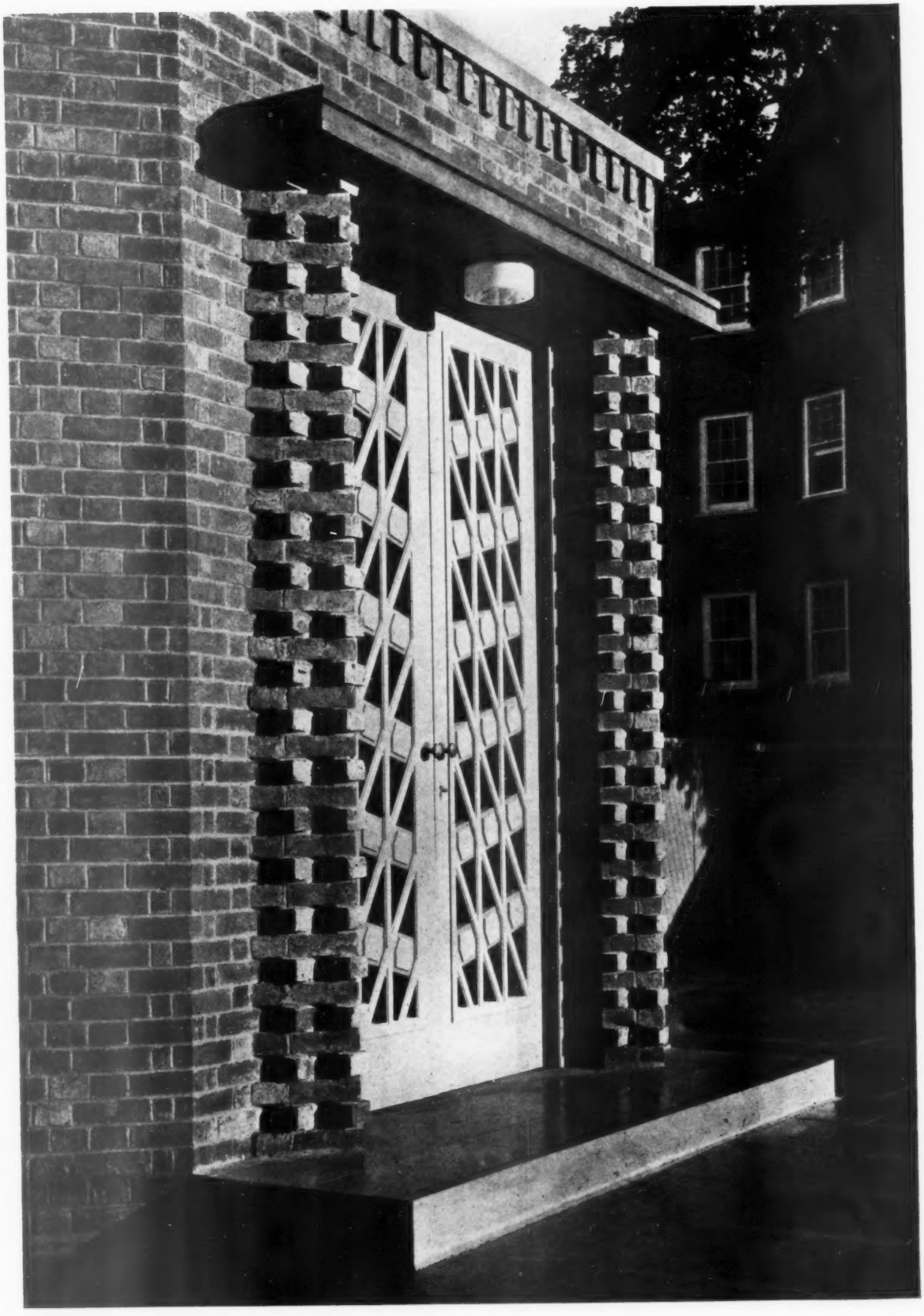




CONSTRUCTION—*Reinforced concrete and brick, with slate roof on steel trusses. Floors are birch block under pews; aisles, linoleum on cement screeding; and walls are finished with plaster internally left natural colour. The ceiling is of wall board divided into panels with gilded battens. Panels are blue with natural colour border; interstices between battens of vermilion. Back walls are treated with asbestos spray to absorb reverberation. Windows are leaded lights. The stained-glass east window representing the work of women in the church was executed by Christopher Webb.*

The photographs show: Above, one of the two recessed book cases in the reveals of the west doors leading to the porch; right, the pulpit; and a view looking from the church, through the porch, towards the west doors. On the facing page is a detail of the west doorway.

BY WELCH AND LANDER



METHODIST CHURCH AT HENDON

DESIGNED BY WELCH AND LANDER

INTERNAL FINISHES—*The chancel furniture is in Austrian oak and other joinery generally is deal painted grey, relieved with red and gold. The organ grille is finished red and gold.*

SERVICES—*Lighting is by flood-lighting units in ceiling and indirect lighting from reflectors on window cills in aisles; heating is by warmed air by the pipeless system.*

PRICE—*Including furniture and ground work, but excluding organ, £8,800 approximately.*

The photographs show: left, the west window; below, the north aisle; and a view looking towards the chancel.

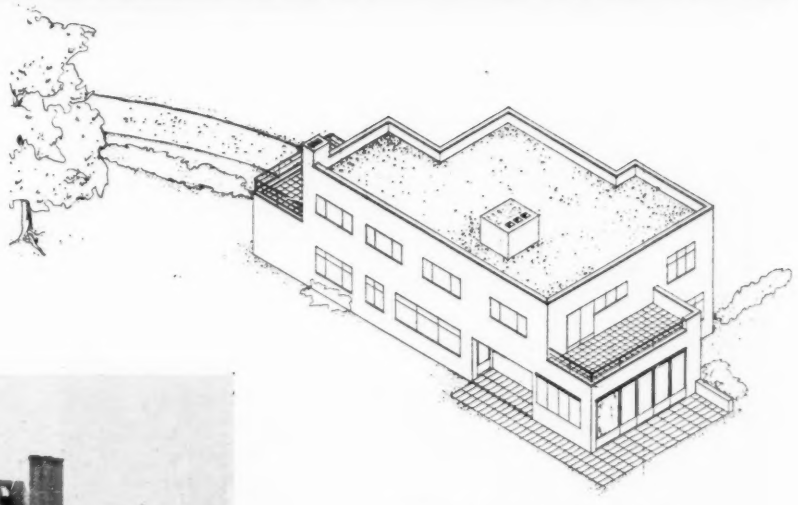
For list of general and sub-contractors see page 687.

HOUSE AT BREDON, WORCESTERSHIRE

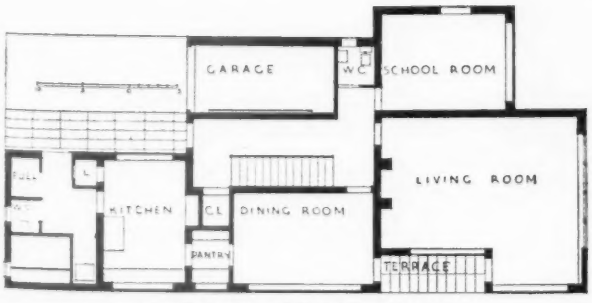
SITE—*The house is built on a small isolated hill rising sharply from the banks of the River Avon. It is so orientated that the view from the living room includes the village of Bredon, a a long stretch of river, and, on the distant bank, a flat ground of several hundred acres.*

CONSTRUCTION—*Local bricks, hollow walls. Internal brickwork over openings to wide windows carried by R.S.J.'s. with facing bricks supported by steel angles secured to the steel joists. Exterior painted two coats flat paint, cream colour. Windows : steel, standard opening parts. Purpose-made fixed lights. Sliding-folding window to living room, in wood. Blinds : Brownish-red sail-cloth, on extending arms. Staircase : reinforced concrete with jointless composition finish. Canopy to garage ; formed from roof-glazing bars and Georgian wired glass, carried on cantilevered steel angles.*

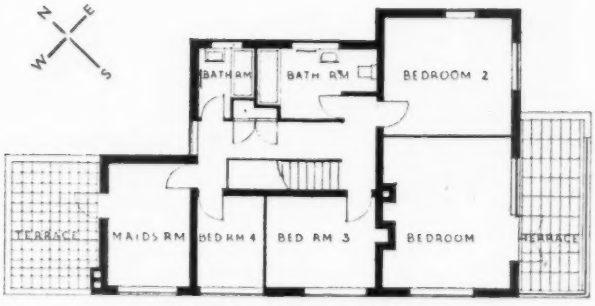
Right, a view from the east ; below, a view from the north.



DESIGNED BY
GEOFFREY BOUMPHREY
CONSULTANT ARCHITECT,
F. R. S. YORKE



GROUND FLOOR PLAN



FIRST FLOOR PLAN

HOUSE AT BREDON

Above : Two views in the living room. Below : The principal bedroom. The furniture was designed by Geoffrey Boumphrey.

DESIGNED BY GEOFFREY BOUMPHREY
CONSULTANT ARCHITECT: F. R. S. YORKE

LAW REPORT

QUESTION OF RESTRICTIONS

Wright v. *Childwickbury Stud, Ltd.—Chancery Division.—Before Mr. Justice Clauson.*

THIS summons raised a point of law in regard to restrictions. The applicant, Mr. H. C. Wright, of Bamville Farm, Wheathampstead, sought a declaration that no part of the property contained in certain conveyances was any longer affected by restrictions in a conveyance of June, 1906. The property consisted of about 18 acres of land, and was put up for auction in 1906. It was then part of the estate of the late Sir John Blundell Maple. The conditions of sale imposed a condition binding the purchaser to perform and observe certain conditions and stipulations. The point at issue in the case was whether in case of a breach or threatened breach by the applicant of the covenant, relief either at law or in equity could be obtained by anyone against him.

The conditions scheduled prohibited the erection of buildings other than private dwelling houses or buildings, except garden or farm buildings, otherwise than of red brick in accordance with plans approved by the vendor. There were also provisions as to the minimum value of the houses to be built by the user of the same.

Later, Mr. Joel became the owner of parts of the estate, and there was no reference to stipulations in his conveyance. He later conveyed to the respondents the property, which consisted of some 1,700 acres.

His lordship, after long legal argument, said the drafting of the conveyance was certainly very confused, but he did not feel justified in thus cutting down the ambit of the covenant. He held that the land for the benefit of which the covenant was taken was Mr. Joel's land, and the fact that they claimed by virtue of a purchase from Sir John Blundell Maple's widow would not affect their title to use.

The next question was whether the covenant was capable of running with the land for the benefit of which it was taken. It was obvious to his lordship that while a breach of the stipulations might possibly affect a portion of the land on Mr. Wright's area, the largest part of the respondents' area would not be affected at all. He therefore held that the respondents could not sue Mr. Wright on the covenant. Under these circumstances he declared that Mr. Wright's property was no longer affected by the restrictions.

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SIR JOHN SOANE'S MUSEUM

Sir John Soane's Museum in Lincoln's Inn, W.C., will be open free of charge during the Thursdays and Fridays of next month between the hours of 10 a.m. and 4 p.m.

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CHANGES OF ADDRESS

Mr. A. F. Russell, A.R.I.B.A., has moved to No. 12 Peterborough Villas, Fulham, S.W.6. Telephone No. : Fulham 7523.

Messrs. Banks and Gray, Registered Architects, have moved their office to No. 4 Haymarket. Telephone No. : Whitehall 4608.

The Architects' Journal Library of Planned Information

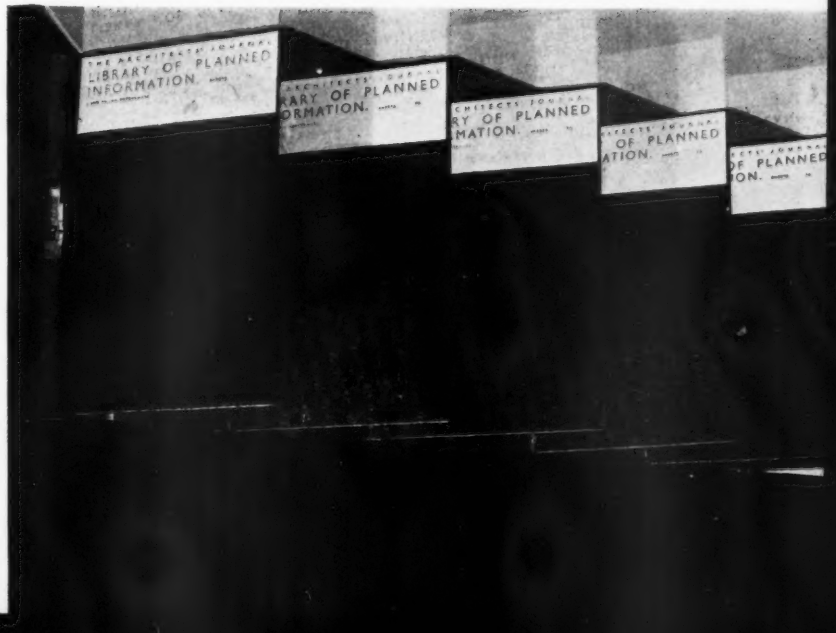
INFORMATION SHEET

SUPPLEMENT

SHEETS IN THIS ISSUE

568 Leadwork

569 Gas Cookers



Sheets Issued since Index :

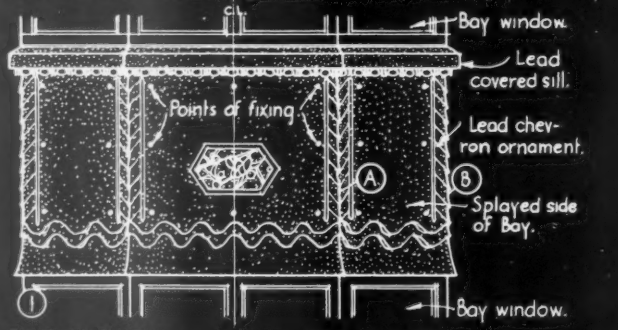
501 : Aluminium
502 : Fixing Blocks
503 : Approximate Estimating—XII
504 : Aluminium
505 : Aluminium
506 : Approximate Estimating—XIII
507 : Plumbing : Jointing of Copper Pipe
508 : Roofing—Valley Flashings
509 : The Equipment of Buildings
510 : Aluminium
511 : Elementary Schools—II
512 : School Lighting
513 : Approximate Estimating—XIV
514 : Air Conditioning
515 : Insulation of Buildings
516 : Cycle Parks
517 : Cycle Parks
518 : Plumbing Systems—II
519 : Kitchen Equipment
520 : Roofing—Flashings
521 : Motor Cycle Parks
522 : Reinforced Asbestos-Cement Roofing Tiles
523 : Poison Gas Precautions
524 : Kitchen Equipment
525 : Metal Reinforced Asbestos Cement
526 : Leadwork to Photographic Developing Tanks
527 : Asbestos-Cement Corrugated Sheets
528 : Cycle Parks
529 : Kitchen Equipment
530 : Asbestos-Cement Corrugated Sheets
531 : Plumbing
532 : Roofing—Flashings
533 : Asbestos-Cement Corrugated Sheets
534 : Insulation of Buildings
535 : The Equipment of Buildings
536 : Asbestos-Cement Ventilators
537 : Slate Window Cills, etc.
538 : Petroleum Storage
539 : Linoleum
540 : Plumbing
541 : Linoleum
542 : Garage Equipment
543 : The Equipment of Buildings
544 : Sheet Leadwork
545 : Elementary Schools—III
546 : Elementary Schools—IV
547 : U.S.A. Plumbing—III
548 : Wallboards
549 : Elementary Schools—V
550 : Elementary Schools—VI
551 : U.S.A. Plumbing—IV
552 : Sheet Leadwork
553 : Kitchen Equipment
554 : Burnt Clay Roofing Tiles
555 : A.B.M. Draining Boards
556 : Kitchen Equipment
557 : Asbestos-Cement Roofing
558 : A.B.M. Rainwater Pipes
559 : Flashing
560 : Kitchen Equipment
561 : Asbestos-Cement Roofing
562 : A.B.M. Rainwater Gutters and Fittings
563 : Asbestos-Cement Roofing
564 : The Equipment of Buildings
565 : Air Conditioning
566 : A.B.M. Rainwater Gutters and Fittings
567 : Plywood—I

743.

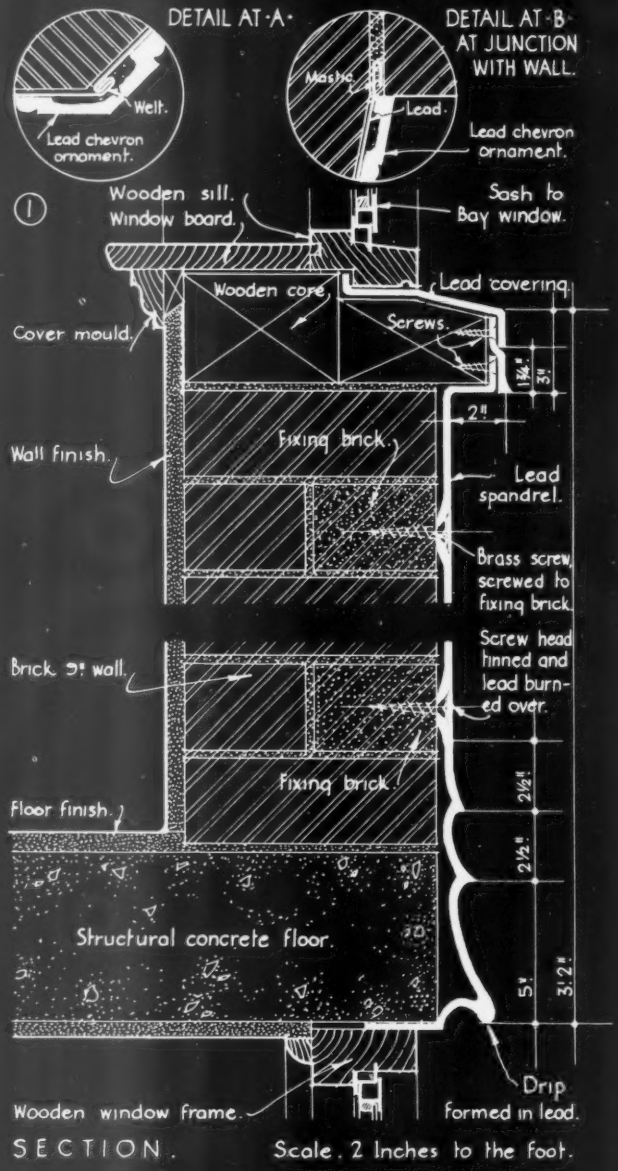
THE ARCHITECTS' JOURNAL LIBRARY OF PLANNED INFORMATION

METHODS OF FIXING ORNAMENTAL LEAD WINDOW SPANDRELS :

DETAILS OF LEADWORK IN A SPANDREL TO A BAY WINDOW : (SPLAYED ON PLAN.)

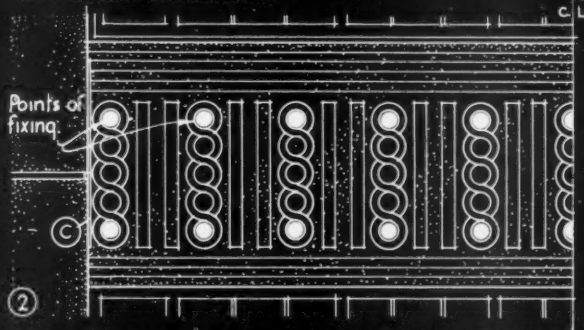


ELEVATION. Scale. 3/8" to 1'0"

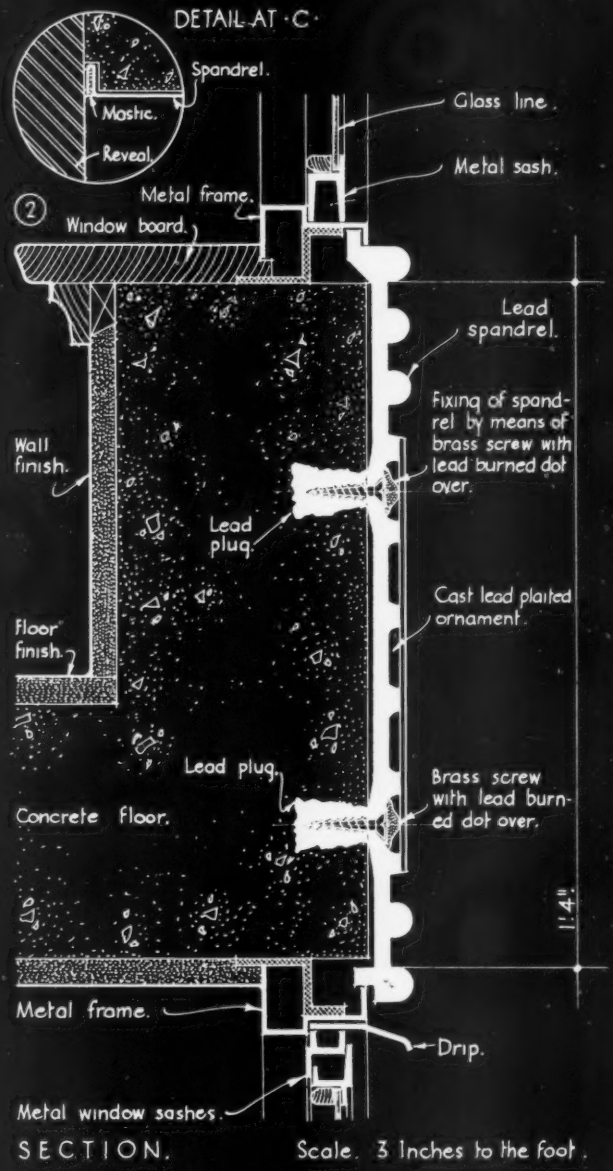


SECTION. Scale. 2 Inches to the foot.

DETAILS OF LEADWORK IN A FLAT SPANDREL BETWEEN WINDOWS.



HALF ELEVATION. Scale. 1" to 1'0"



SECTION. Scale. 3 Inches to the foot.

Information from The Lead Industries Development Council.

INFORMATION SHEET : LEAD WINDOW SPANDRELS : No. 41

SIR JOHN BURNET TAIT AND LORNE ARCHITECTS ONE MONTAGUE PLACE BEDFORD SQUARE LONDON WC1. B&A.A. Bayne.

THE ARCHITECTS' JOURNAL
LIBRARY OF PLANNED INFORMATION

INFORMATION SHEET

• 568 •

LEADWORK

Subject : Lead Window Spandrels

General :

This Sheet deals with ornamental cast lead spandrel panels between windows.

Two types of lead spandrel panel are shown, Detail No. 1 being the construction of the bay windows at Dorchester Court, Sloane Street, London, designed by Messrs. H. F. Murrell and R. M. Pigott, FF.R.I.B.A., and Detail No. 2 being one of the various lead spandrels at the new London University, designed by Charles Holden, F.R.I.B.A.

Detail No. 1 (Dorchester Court) :

In this case the spandrel panel is fixed on a brick panel wall between two wood framed windows. The lead work has been designed in three units ; the main panel, a lead covering to the sub-sill, and a strip which forms a link between the two and provides a drip to throw off water from the sill. The weight of the lead to the main panel, excluding surface decoration, is equal to 8 lbs. per square foot, and the covering to the sill is in 6 lbs. milled sheet lead.

The bottom edge of the main panel is formed with a drip to throw off water, and is then turned in between the wood window frame and the concrete to form a waterproof joint.

Fixing :

Each face of the main panel is fixed in six places, and the centre member has additional fixings in the middle under and over the decorative motif. In all cases brass screws have been used, and are screwed into fixing bricks or lead plugs, or directly into the woodwork. The heads of all screws were tinned and lead-burned over.

The vertical chevron ornament is applied separately over the two flat faces as shown at A.

Detail No. 2 (London University) :

The weight of this panel excluding all decorative work is equal to 10 lbs. per square foot.

In this case the spandrel is cast in one piece and shaped to fit under the metal sill of the upper window and over the head of the lower window. The panel is fixed with brass screws driven into lead plugs in the concrete, the heads of the screws being tinned and lead-burned over afterwards.

Information from : The Lead Industries Development Council

Address : Rex House, 38 King William Street, London, E.C.4

Telephone : Mansion House 2855 (3 lines)

LEADWORK

This photograph illustrates a series of spandrels between bay windows at Dorchester Court. Architects : H. F. Murrell and R. M. Pigott, FF.R.I.B.A.
These spandrels are of the built-up type and have the angular chevron ornament applied after the main spandrel has been fixed. The spandrel is detailed in Fig. 1 on the Information Sheet.

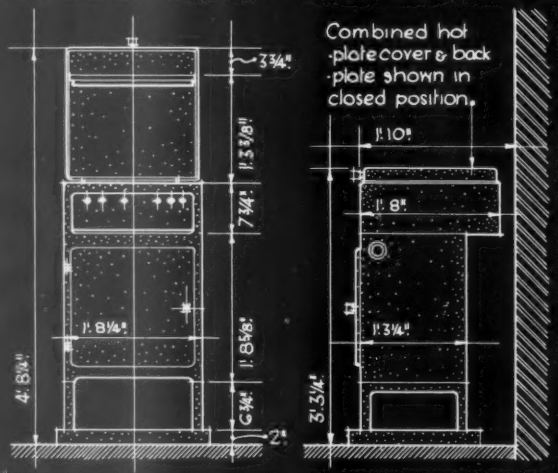
LEADWORK

The upper photograph illustrates the spandrel as detailed in Fig. 2 on the Information Sheet. The spandrel is approximately 18 ins. deep extending the full width between the masonry piers and is fixed in position by lead dots at the points shown, on the extreme loops of the plaited ornament. Architect : Charles Holden, F.R.I.B.A.

The lower photograph illustrates another type of lead spandrel also designed by Charles Holden, F.R.I.B.A., for the London University. The fixing points can be seen as circular buttons projecting above the flat surface of the spandrel.

07.

ARRANGEMENT AND DETAILS OF FLAVEL GAS COOKER MODEL No 37.



FRONT AND SIDE ELEVATIONS. ½" SCALE.

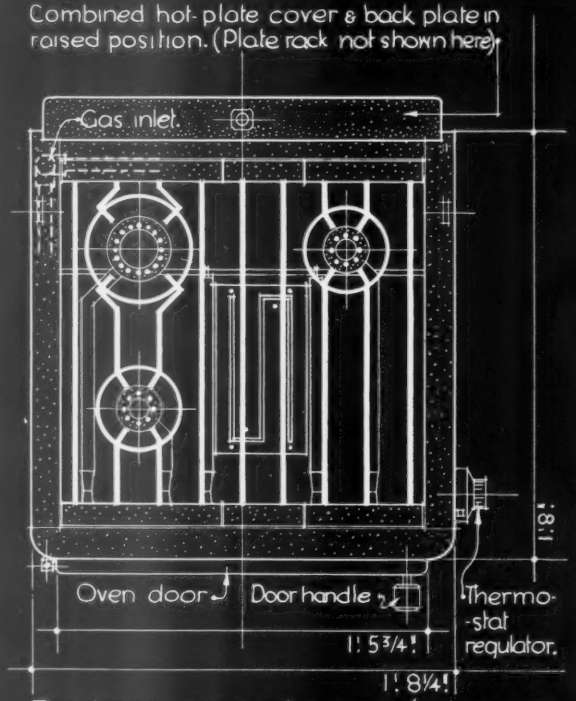
OVEN CAPACITY, ETC.

The internal dimensions of the oven are as follows, Height 1' 4½". Width 1' 4½". Depth 1' 2¾".

The heat is regulated by thermostat, and is supplied by two burners set along the sides of the oven, just below floor level.

The oven rack supports are of an easily cleaned type, having no inaccessible corners.

PLAN OF HOT-PLATE : SCALE 1½" = 1'0"

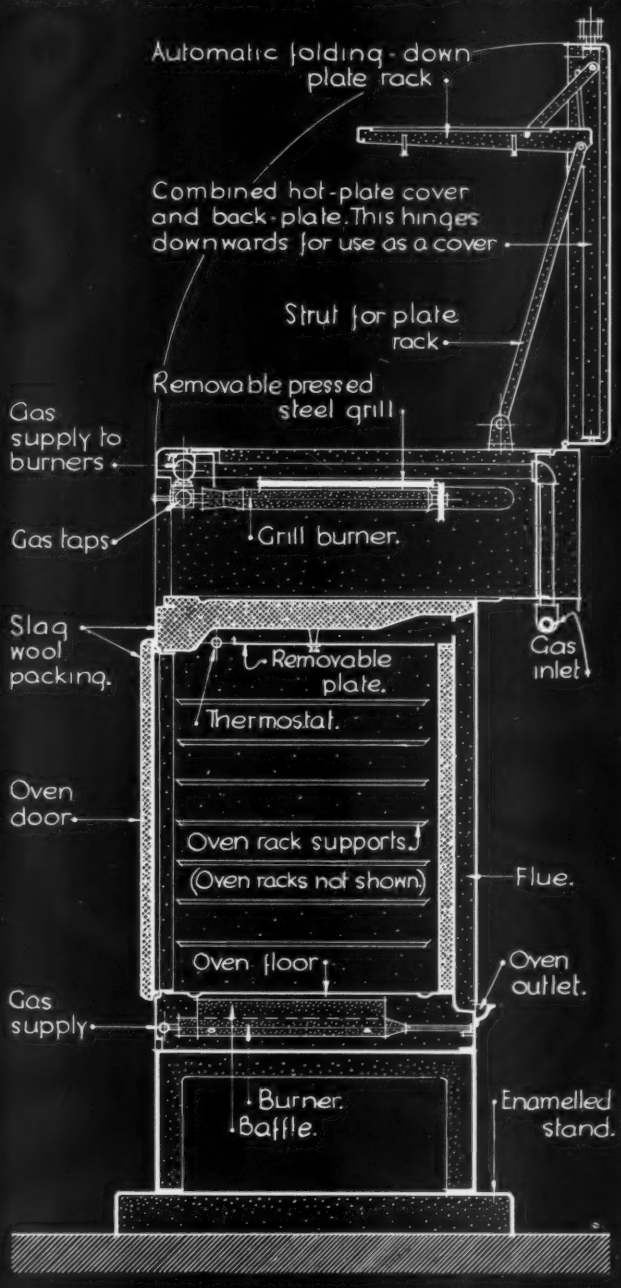


The clearance behind the oven (see the side elevation & section) reduces wall discolouration & makes cleaning easier, the gas connection is also simplified.

HINGED TOP & SELF-FOLDING PLATE RACK

The hot-plate of the cooker is fitted with a flat lid which forms a splash-back in the open position. It is fitted with a special automatic folding-down plate rack which swings into position when the lid is opened, and closes automatically when the lid is lowered. The plate-rack is shown in the cross section below.

CROSS SECTION OF COOKER : 1½" = 1'0"



Information from Sidney Flavel and Co Ltd.

THE ARCHITECT'S JOURNAL
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INFORMATION SHEET

• 569 •

GAS COOKERS

Product : The Flavel Model 37 Gas Cooker

This model has been designed to provide a gas cooking unit of maximum neatness and compactness which will provide the greatest cooking power for the amount of gas consumed, and harmonise with modern tendencies in the layout and equipment of kitchens. Its special feature is a combined lid and hot-plate cover, with an automatic self-folding plate-rack.

Models :

The cooker is made in one size and type of finish only, as described here.

Construction :

Largely of pressed steel, the burners and hot-plate bars being of cast iron. The oven is very heavily lagged with slag wool on all sides, in the door, and in the top.

Finish :

The exterior is finished in white porcelain enamel with black edges. The crown-plate, plate-rack and splash-back are in black porcelain enamel, with hot-plate bars, burners, and carriers in black japan. The oven is finished in mottled porcelain enamel.

Cooking Capacity :

This model has a normal cooking capacity for 6-9 persons.

Hot-plate and Grill :

The hot-plate is fitted with one large and two small boiling burners. The grill is the Flavel High Speed Grill fitted with heat-resisting steel fret deflectors, which are indestructible, and 50 per cent. faster and more efficient than cast-iron deflectors.

Oven :

The oven linings are of embossed pressed steel, with a removable inner crown-plate and back-plate. The base-plate is solid, and level with the bottom of the door opening. Two grid shelves and a cake-tray are provided in a grease-resisting black finish. The grid shelf supports are formed by curved swellings in the side linings, formed to avoid lodging-space for grease.

There are two oven burners, set along the sides and protected from grease, etc., by being below base-plate level. They are fitted with baffles as draught shields. The base-plate is pierced above each burner to allow the heat to pass into the oven.

The flue outlet is towards the front of the crown-plate, as shown in the cross section, and the flue passes across the roof of the oven and down the back, with an outlet, provided with a small condense trap, at base-plate level. This long, indirect path of travel prevents undue loss of heat by way of the flue.

Connection of the flue outlet to a flue pipe is optional, and in no way necessary if it should be inconvenient. The flue is recessed into the body of the cooker.

Automatic Oven Heat Control :

The temperature of the oven is regulated by an automatic thermostatic control, which can be set to provide any desired temperature.

Plate-Rack and Splash-Back :

This folds down in one movement to form a smooth flat table-top lid to the hot-plate. The plate-rack automatically swings downwards and folds flat against the splash-back as the lid is lowered.

Price :

£11 15s. listed in the makers' price list.

Manufacturer :	Sidney Flavel & Co. Ltd.
Address :	Eagle Foundry, Leamington
Telephone :	Leamington 100
London Showrooms :	38 Welbeck Street, W.1
Telephone :	Welbeck 2838

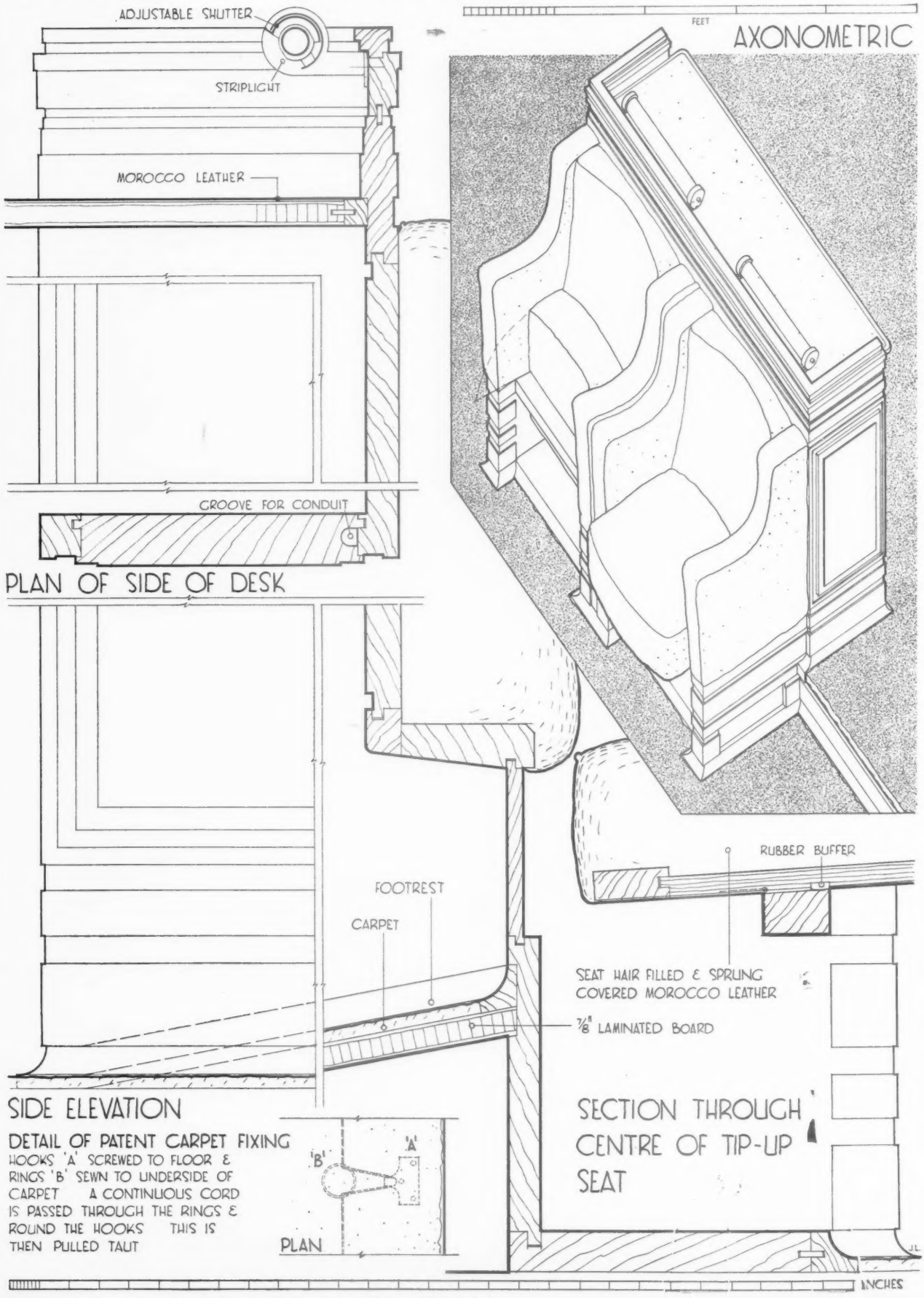
WORKING DETAILS : 603

SENATORS' DESKS • SENATE HOUSE, LONDON UNIVERSITY • CHARLES HOLDEN

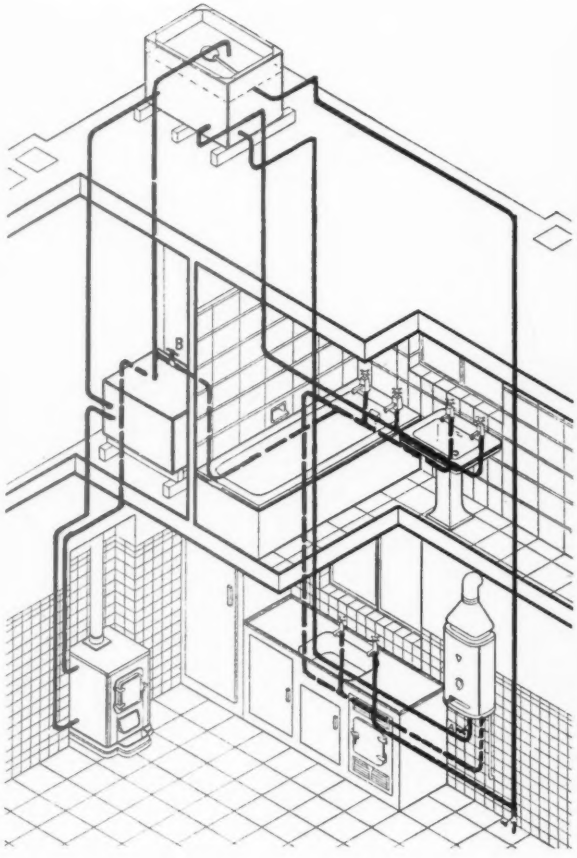
The desks are arranged mostly in pairs, with separate tip-up seats. They are constructed in walnut, with Morocco leather covered desk tops and seats upholstered in Morocco leather. There is a striplight with adjustable shutter to each desk.
Axonometric and details are shown overleaf.

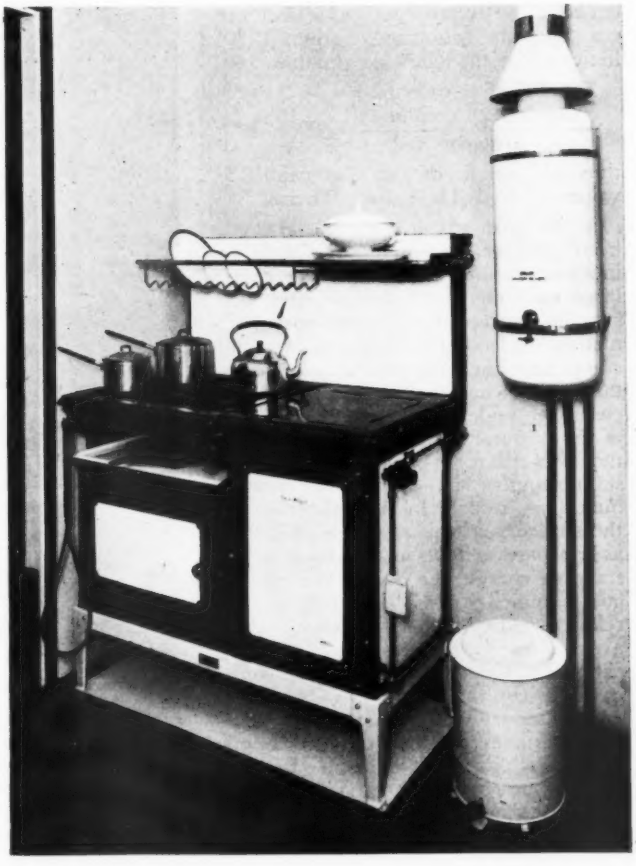
WORKING DETAILS : 604

SENATORS' DESKS • SENATE HOUSE, LONDON UNIVERSITY • CHARLES HOLDEN



Axonometric and details of the Senators' Desks illustrated overleaf.





INFORMATION SUPPLEMENT

GAS EQUIPMENT

[BY GEORGE FAIRWEATHER, A.R.I.B.A.]

IT is the object of this special issue of THE ARCHITECTS' JOURNAL to provide information on the subject of gas mainly as applied to the problem of domestic heating and cooking. Information on the subject is at the moment scattered in a wide variety of publications, trade and otherwise, and much is only contained in catalogues which have yet to be codified and collated for the architect. As far as possible the actual technical data have been presented in the form of tables which give in an averaged or generalized form the main facts with regard to the principal types of equipment, since within the space available it is impossible to deal with every aspect of the subject.

Above: left, diagram of piping layout of a multi-point non-storage heater when used as alternative to a solid fuel boiler. Right, non-storage multi-point direct-feed heater installed alongside a recent cooker model.

In spite of an increasing attention to domestic heating and cooking problems, the importance of equipment carefully adjusted to the needs of individual households is not yet fully realized. The problem is an involved one, which never has and never will be finally solved by a single scheme applicable universally, but there is no doubt that careful consideration of the details at an early stage in the planning of the building will enable a far better service to be provided.

It is not possible to say that one fuel or type of equipment is the best, unless the statement refers only to one clearly defined set of conditions, since much will depend upon the social and culinary habits of the householder. Not only will the demands made upon the equipment vary from family to family, but also the relative importance which is attached to the question of cost, ease of working, cleanliness and so on.

The principal claims made for gas as a domestic fuel are cleanliness, rapid and easy heat control, and absolute freedom from interruption of the service. It is, in addition, as completely "labour saving" as any possible alternative.

Measurement and Supply

Coal gas, as generally sold by supply undertakings, with certain exceptions, has a calorific value of 500 British Thermal Units per cubic foot of gas. The British Thermal Unit is the amount of heat required to raise one pound of water at 32 degrees Fahrenheit through one degree Fahrenheit. The calorific value together with the degree of purity and pressure is usually prescribed by Act of Parliament, and gas undertakings are under an obligation to adhere to these requirements.

Gas is measured in cubic feet by officially stamped meters, but is generally charged for in therms, the therm being a unit of heat equal to 100,000 B.Th.U.s. The relation

between the number of cubic feet of gas and the number of therms is indicated by the following equation :—

$$\frac{\text{Number of cubic feet} \times \text{calorific value}}{100{,}000} = \text{Therms}$$

thus 200 cu. ft. of gas of a calorific value of 500 B.Th.U.s = 1 Therm.

In the past gas has almost always been sold on a simple tariff, with, in some cases, a sliding scale benefiting large consumers and special rates for supplies obtained through coin-operated meters. Recently, however, some companies have introduced two part tariffs following the practice of most electricity undertakings. A great part of the value of the gas supplied lies in the fact that it is available instantaneously in large or small quantities, in fact in the existence of the service, and this service is paid for as a separate item in the form of a standing charge, the cost of the actual gas supplied being charged at a relatively low rate, so benefiting the average or larger consumer at the expense of the uneconomic, casual and irregular consumer.

A gas service can be installed in any building either during the course of erection or later, but it cannot be too strongly stressed that it is not only cheaper to instal when the building is being erected, but the work is bound to be neater, and it is possible to give very much more convenient connections. In the majority of cases gas undertakings have a service engineer who can be consulted, and who in many cases will later control the actual installation of the pipes. It is therefore obvious that the sooner the matter is discussed with him the better, so that pipes may be buried and services laid and outlets provided not only for the immediate needs, but with a view to possible future alterations and extensions.

The pipe between the main and the meter is normally the property of the gas company, and the size and method of laying will be controlled by it. In some cases, however, it may be necessary for the building owner to lay comparatively long runs of pipe underground on his own property. In such cases not less than steam-weight tubing should be used, and the pipes should not be laid near, and never in the same trench as an electric cable owing to the risk of possible corrosion by stray currents. Such pipes should be laid with a fall towards the main and should be provided, particularly where they are over 2 ins., with control valves outside the building, and where the soil conditions are known to be corrosive should be wrapped or laid in bitumen, or other means taken to protect the steel.

The Meter

The meter is supplied and fixed by the gas company in normal installations, which requires that it should be placed as near to the main as possible, and in a dry position having the minimum possible temperature change. In the case of large installations the meter is of considerable size, and since like all mechanical fittings it may have to be replaced either by reason of wear or by reason of an increase in the amount of gas to be consumed, adequate space and access must be allowed to provide for its removal and replacement.

Since the meter must be read by the inspectors at regular intervals, and since it is usually advised that it should be read by or on behalf of the owner to prevent any extravagant use of gas by the employees, it is essential that it should be placed in a position reasonably lighted and of easy access. Particularly in the case of coin-operated meters they should not be placed at a greater height than, say, 6 ft. overall, or over any gas fire or gas stove. In many cases meters are placed beneath stairs, but owing to difficulty of access this should be avoided, and as far as possible the meter should be kept away from any electrical services.

Single point broken-feed water heater, bath model.

Carcassing

It is obviously desirable to determine the position of gas appliances at the earliest possible moment in new buildings. The following are perhaps the more obvious cases :—

Gas Fires. Connection at the back of the hearth with a concealed control cock at the side of the fireplace or at hand level is preferable to the old side connection with visible brass or plated tube.

Cookers and Refrigerators. These are preferably connected above the floor and clear of the skirtings or tiles. Built-in types, of course, require special consideration.

Airing cupboard heaters are preferably connected at the back of the cupboard, either at the back of the tank, or if there is no tank, at floor level. In this case it should be remembered that provision must be made for the admission of fresh air to the cupboard.

Plug-in Gas Points should be arranged in a position as near as possible to the level at which the appliance is to be most used. For example, plug-in connections likely to be used for gas irons should always be at dado height and not on the skirting.

Pipes should be chased into the wall, and it should be remembered that the size of the chase must be adequate to allow space not only for the pipes, but also for the fitter's tools required to screw the pipes together.

In the case of large flat blocks and office blocks it frequently happens that the final sub-division of the floor areas is not determined until after the building is partially or fully completed. In such cases ring mains on each floor may save much subsequent cutting away and waste. In most cases it is safe to leave a plugged-off tee at about skirting level and placed centrally in the brickwork between each two windows, since it is reasonable to suppose that this is the position which will be ultimately occupied by a partition should it be built. The cost of such ring mains is generally less than the cost of making the connections later, and their convenience is obvious.

In other cases it may be equally convenient and still cheaper to run one or two extra rising mains and to arrange the subsequent distribution on a vertical grid instead of a horizontal grid, but decision on such points can

only be taken when the general plan form is known.

Gas Governors

From time to time special governors to regulate gas pressures and special safety devices are offered on the market. Generally speaking such devices are unnecessary. One of the features of gas supply is the ease with which the flow may be controlled by means of a simple tap. Some variation in mains pressure is inevitable, as is the case with the voltage on electric mains, but the variation is small and of no particular importance for normal apparatus. Should for any reason the variation be excessive it is in the case of gas exceedingly easy to fit a governor, but the need for this and its position, size and type must be determined by a gas engineer.

With regard to special safety devices, these are not necessary, except in the case of prepayment meters, or slot meters as they are sometimes called, which are fixed in lodging houses or tenements where coins may be inserted by individuals who otherwise do not form part of the same family. Under these circumstances, it is just possible for the gas to be extinguished and the tap left on in one room when a fresh coin is inserted by a stranger, with the result that the flow of gas would recommence and dangerous conditions might arise. To overcome this difficulty it is possible either to fit a safety device on the individual apparatus, or special devices on the meter are occasionally used. In the case of the ordinary water heater or similar apparatus controlled by a pilot flame, these safety devices are always incorporated in the fitting itself, and no further precaution is necessary.

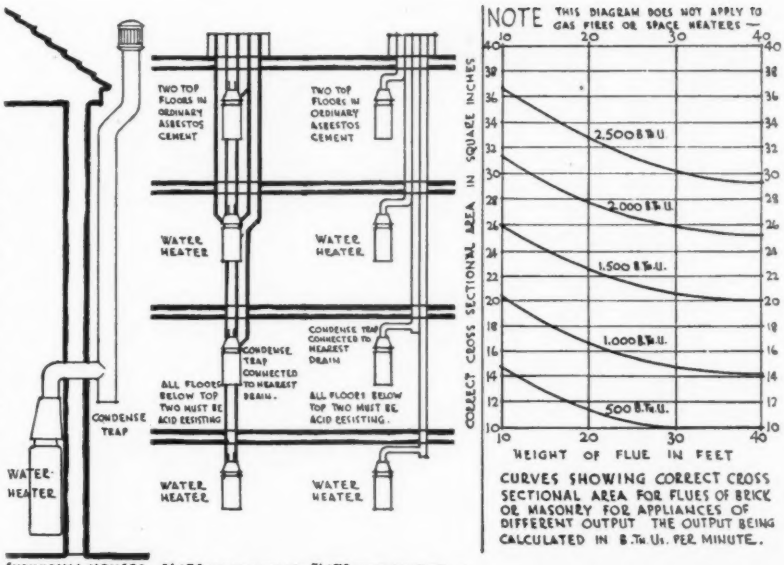
Flues

Flues connected to gas consuming apparatus serve two distinct purposes :

(1) The provision of general ventilation for the room and the removal of the products of respiration—ideal comfort conditions cannot be obtained by heating alone. Adequate ventilation is essential.

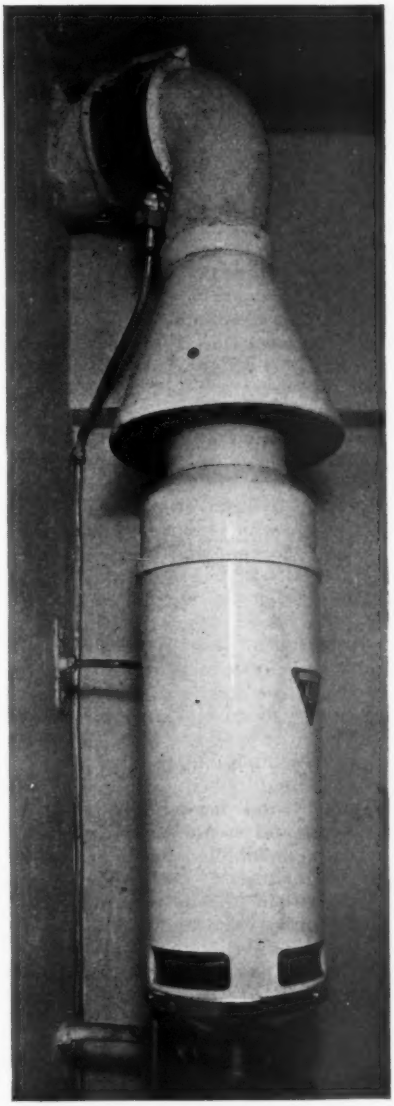
(2) The removal of the products of combustion.

In the case of gas fires, which act not only as room heaters but also as automatic ventilators, allowance must also be made in designing the flue for carrying off not only the products of combustion but also for the provision of adequate ventilation, and in many cases the greater part of the flue area is required for ventilation purposes. In the case of other gas-fired appliances (particularly water heaters) as opposed to solid-fuelled appliances, sufficient air for complete combustion is generally provided by the apparatus itself, and it is not necessary to provide a long flue, the suction or draught in which will be needed in order to draw air into the combustion chamber to provide for complete combustion. In the case of gas, therefore, it is only necessary to provide sufficient flue area and sufficient height to evacuate the products of



Gas water-heaters—flue installations.

Flue connections to water heaters:—
Internal flue-pipes should always be fitted with the sockets upwards.
Outside flue equipment—bends, pipes and terminals—should preferably be of incorrodible material, and as a general rule, should be fitted with the sockets downwards.
Where the flue-pipe inside the apartment enters the wall or ceiling, it must not be directly cemented in, but connected by means of a sleeve or in some other suitable manner which will facilitate the removal of the flue-pipe for cleaning without damage to the flue, wall or appliance.
Particular care must be taken to insulate the flue from any combustible material through which it may pass, and then to make a sound watertight joint at the roof. Where the pipe passes through laths, roof boards and the like, it may be insulated from them by an outer sleeve of asbestos-cement pipe with an air space between them.



Flue connection to gas water-heater showing pipe connection to drain for removal of condensation water.

1 2 3

1: Multi-point non-storage gas water heater with capacity of 3½ gallons a minute raised 40° F. 2: Single-point heater, 7 pints a minute raised 40° F. 3: Calorifier storage heater, suitable for hard water.

combustion to the outside air. In normal cases the height of any flue in feet need not be more than four times the mean breadth of the flue measured in inches, unless, of course, additional height is necessary to reach a suitable position for the outlet. It will be seen, therefore, that the actual vertical height required for the evacuation of flue gases is in most cases a matter of only a few feet, and the determining factor is the position of the flue terminal or outlet, which must be located so that back draught and static conditions or poor draught caused by wind blowing into or across the flue outlet are impossible.

The ideal position for a flue outlet is at or above the ridge. Where this cannot be arranged, satisfactory outlets can be made by carrying a short stack up for, say, two or three feet above the eaves. Flue outlets should never be permitted immediately below the eaves, since wind may be trapped in this angle and create a high pressure area with inevitable down draught. For similar reasons outlets should not be placed in the re-entrant angle of a building, close against stack pipes or small projections, or anywhere where the free passage of the wind is likely to be impeded. Particular care should be taken in the case of flat roofs where the outlet must be placed at or above the level of any parapet wall.

In most districts it is permitted to allow the flue to discharge in the roof space. This is satisfactory provided the roof is not close boarded or felted, and provided the outlet is not placed close to a cold water tank, on the outside of which the warm moist flue gases might condense and so give trouble.

The ideal shape of flue is undoubtedly circular, as this gives the least friction or resistance to the ascending gases. Square section flues are satisfactory, but where rectangular flues are used the breadth should never be less than 2 ins., and even then it should be remembered that a very small projection of mortar or exceptional roughness of the inside of the flue wall will materially reduce the effective area of the flue. For the same reasons square bends in flues are undesirable and even connections between the outlet of the appliance and the main flue should be made as far as possible with obtuse bends, which offer far less resistance to the passage of flue gases. Similarly long horizontal runs should be avoided.

The use of built-in flue blocks is now commonly understood, and need not be dealt with here, except perhaps to note that connecting pieces for use where the section of the flue changes from rectangular to circular are now available, as are also a rather greater variety of special blocks for use where the flue changes direction. Where a change of direction is exceptional and a standard block is not available, great care should be taken to see that the cross-sectional area of the flue is not reduced at the point of change of direction.

In the case of steel-framed and reinforced concrete buildings the ordinary type of built-in flue block is sometimes difficult to use, owing to the fact that the steel or concrete frame generally is of about the same width as the wall which it supports. In these cases flue blocks can either be placed inside the wall, so forming a small chimney breast of 4½ ins. projection or alternatively the flue may be built up from circular or rectangular section asbestos-cement pipes, encased for the sake of appearance in expanded metal and plaster, or, in the case of reinforced concrete buildings, concreted in to form a fair face as the work proceeds. Sheet metal, whether galvanized or not, should not be used for built-in flues of this type, owing to the risk of corrosion. Even when concreted in, these would be dangerous owing to the risk of the scale and rust falling and blocking the flue.

Condensation

In the case of gas fires for space heating there is little or no risk of condensation owing to the large volume of air which passes up the flue, but in the case of water heaters there is a possibility of a good deal of moisture being deposited in the form of condensation, at any rate where the flue is more than 6 ft. or 8 ft. in length, or is placed on the outside or in a cold position. It must be realized that when 1 cub. ft. of gas is burned under normal conditions approximately 1 cub. ft. of water vapour is produced. Put in another way, an instantaneous heater burning 180 cub. ft. of gas per hour produces about 7 pints of water per hour in the form of water vapour. Even in the worst cases only a small proportion condenses, but it is necessary to provide for this. In the case of asbestos-cement flues placed outside the building, it is often sufficient to leave a tee where the appliance is connected through the wall, the lower end of which has a hole in it, through which the condensed water may drip. In the case of exceptionally long internal flues where condensation is feared, some arrangement should be made for the removal of this condensation water and connection to a drain is essential.

Long masonry flues, which are to be used in connection with the larger gas water heaters and boilers, must therefore, always be made waterproof. In America this is sometimes done by bitumen lining, but in this country it is usual to use either glazed stoneware pipes or asbestos-cement pipes, which in such cases must always be fixed socket upwards. The lower end of such flues is often left open as this is found not to interfere with the draught, while at the same time it allows a large volume of dry air to be drawn in, so diluting the products of combustion and reducing the risk of condensation.

The design of such large flues, however, should always be discussed with the gas engineer in the early stages of the work. In every case an entirely separate flue must be provided for each gas appliance. A combined flue almost always leads to trouble in one form or another.

Ventilation

The term " ventilation " is used when referring to a widely different set of conditions of air change in a building. Conditions which may vary between the casual leakage of fresh air through the walls and chinks, to a complete air-conditioning installation. It is, however, to stretch the meaning of the word to apply it to the casual and occasional airing of rooms by the opening of doors or windows which may serve to dilute the vitiated atmosphere, and there can be no truly satisfactory ventilation of a room without some definite method of producing a calculated and more or less controllable passage of air through it, since the mere diffusion of fresh air from the outside to displace the vitiated air inside is at best a slow and partial process.

Leaving aside the more expensive methods of ventilation such as air-conditioning or blowers, the most economical way of providing good " automatic " ventilation is by way of a flue with some form of warm gases from a fire or stove at its base carrying up with them air from the room and regularly changing its air contents several times an hour. And even when the heating element is not in use, the flue assists the ventilation of the room, since the room's atmosphere is nearly always warmer than the outside air.

The use of tight-fitting windows and doors and of much denser materials in building construction has recently made this question of good ventilation specially important. In weather at all cold or windy, when windows are shut, casual ventilation of rooms through chinks and under doors cannot now be relied on for air changes, and a flue in conjunction with a permanent ventilation opening in window or by an air brick seems one of the simplest and most efficient means towards good ventilation.

Although flues of any kind in modern flats and houses carry with them disadvantages of rigidity of planning and extra expenditure, this question of ventilation should not be forgotten in deciding whether or not to provide them. In addition, flues, once provided, allow flexibility in the use of heating media and increase the value of the property ; whilst gas-flues and fireplace openings can easily be completely concealed by a tenant who does not wish to use gas.

Finally, under this heading, it may perhaps be worth considering the controversial question of flueless heaters. So far as gas fired flueless heaters are concerned, there have been several investigations as to their desirability from the point of view of health. Finally, a committee of eminent medical men was appointed by the British Medical Association to investigate the existing information. They found that there was not the slightest risk arising from the products of combustion, since it was in practice impossible for these to reach a dangerous concentration. Even in the smallest rooms discomfort from overheating would be experienced long before there could be any possible danger. Nevertheless, flueless heaters, whether gas, electric or oil, or the still more common hot water radiator, do not, of course, contribute to the ventilation of the room, and this should be borne in mind.

Room Heating

Recent research has shown that comfort conditions involve more than the mere raising of the temperature of the air to a predetermined limit. The body reacts not only to the actual air temperature, but also to the humidity,

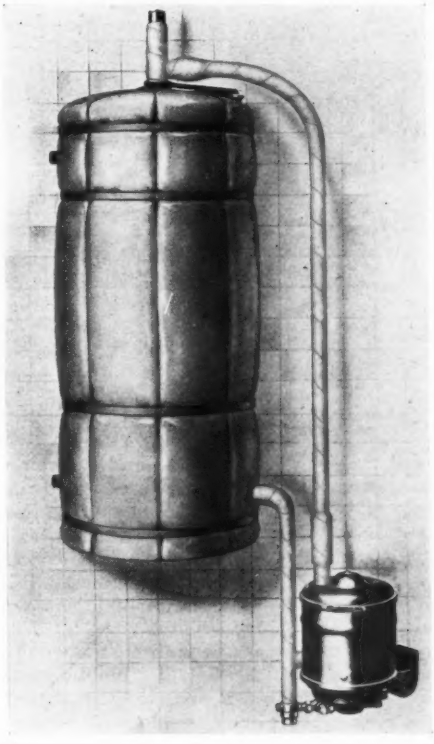
1 : Storage water-heater. Small capacity sink model.

2 : Non-storage water-heater. Sink model.

1

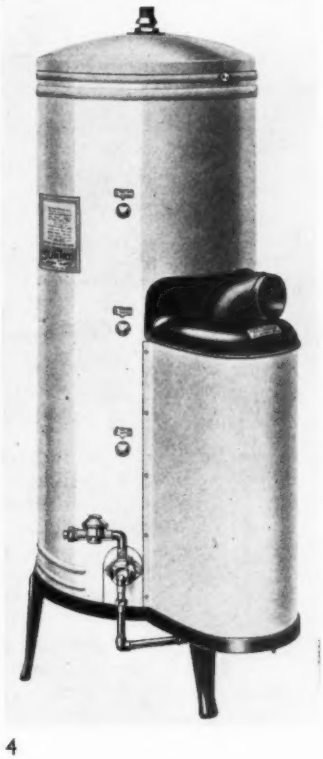
2

3 : A lagged cylinder with gas circulator.



3

4 : Storage water-heater. Calorifier model for hard water.



4

TABLE SHOWING SIZE OF FIRE IN NUMBER OF RADIANTS FOR ROOMS OF DIFFERENT SIZES

Length of Room in feet	Width of Room in feet														Length of Room in feet
	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
7	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7
8	5	5	5	5	6	6	6	6	6	7	7	7	7	9	8
9	5	5	5	6	6	6	6	6	7	7	7	7	9	9	9
10	5	5	6	6	6	6	6	7	7	7	7	9	9	9	10
11	5	6	6	6	6	6	7	7	7	7	9	9	9	10	11
12	6	6	6	6	6	7	7	7	9	9	9	9	10	11	12
13	6	6	6	6	7	7	7	9	9	9	9	10	11	11	13
14	6	6	6	7	7	7	9	9	9	9	10	11	11	12	14
15	6	6	7	7	7	9	9	9	9	10	11	12	12	12	15
16	6	7	7	7	7	9	9	9	10	11	11	12	12	14	16
17	7	7	7	7	9	9	9	10	11	11	12	12	14	14	17
18	7	7	7	9	9	9	10	11	11	12	12	14	14	14	18
19	7	7	7	9	9	9	11	11	12	12	14	14	14	14	19
20	7	7	9	9	9	10	11	11	12	14	14	14	14		20
21	7	9	9	9	9	11	11	12	14	14	14	14			21
22	9	9	9	9	10	11	12	12	14	14	14				22
23	9	9	9	9	11	12	12	14	14	14					23
24	9	9	9	10	11	12	12	14	14						24
25	9	9	10	10	12	14	14	14							25
26	9	9	10	10	12	14	14								26
27	9	10	10	12	14	14									27
	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	Width of Room in feet														

To calculate number of units in portcullis gas fire—divide number of radiants by 2½.

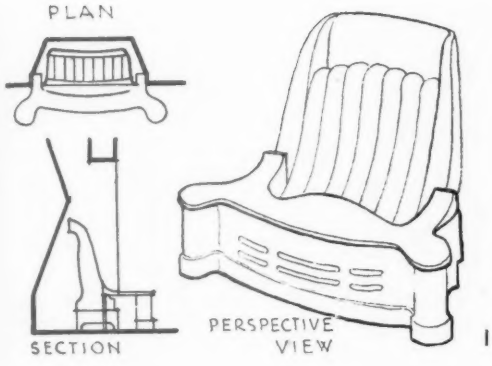
and more particularly to radiant heat. In other words, it is possible to sit in a room where the air is definitely too cold, and yet remain perfectly warm, provided there is a source of radiant heat. Similarly, if the air is warm, but the walls are excessively cold, the body will lose heat to those walls and complaints will be made of lack of warmth, despite the evidence of the thermometer that the room is in the old sense adequately warm.

The ordinary thermometer is not a satisfactory instrument for determining comfort conditions, and several new instruments which take into account not only air temperature but the presence or absence of radiant heat, humidity, draught and other factors, have been developed, and a scale known as the "equivalent temperature scale" has been evolved which combines some of these factors. From the point of view of heating, these recent developments in theory are extremely important, particularly in the case of intermittent heating. In the old days, it was considered necessary to warm up the whole of the air in the room, and before any real comfort could be obtained not only the air but also the walls, floor and ceiling had to be brought to a reasonable temperature. This necessarily took considerable time and in the case of very large buildings was almost an impossibility.

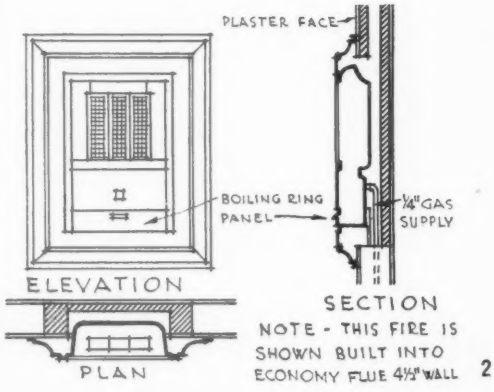
It has, for instance, been shown that the artificial heating of a building such as St. Peter's, Rome, were it needed, would be almost a physical impossibility, since it would take some months to warm up the actual structure, and until this were done, whatever the air temperature, the building would feel cold.

It is now realized, however, that perfectly satisfactory living conditions can be obtained not by raising the air temperature, but by placing a source of radiant heat in a suitable position in relation to the occupants. It, therefore, becomes necessary to consider the true difference between radiant heaters and convection heaters. A pure convection heater is one which serves to warm and circulate the air in the room. When this is once warmed and circulated, it in turn slowly warms the structure and the occupants. The heat rays from a pure radiant heater do not to any great extent warm the air, but do immediately warm any object upon which they impinge. Radiant heat travels in a straight line from the source, it may be reflected or directed by reflectors such as would be used for light, and it may be shaded by placing an object between the source of heat and the individual it is required to warm. The difference is really very simple, but it has been confused by the term "radiator," commonly applied to cast-iron central heating units, which are almost wholly convection heaters.

The gas industry can provide both pure radiant heaters, convection heaters, and heaters which are a combination of both, and when considering any heating problem, particularly an intermittent heating problem, these factors must be borne in mind. A gas-fuelled radiant heater attains its maximum temperature within



1



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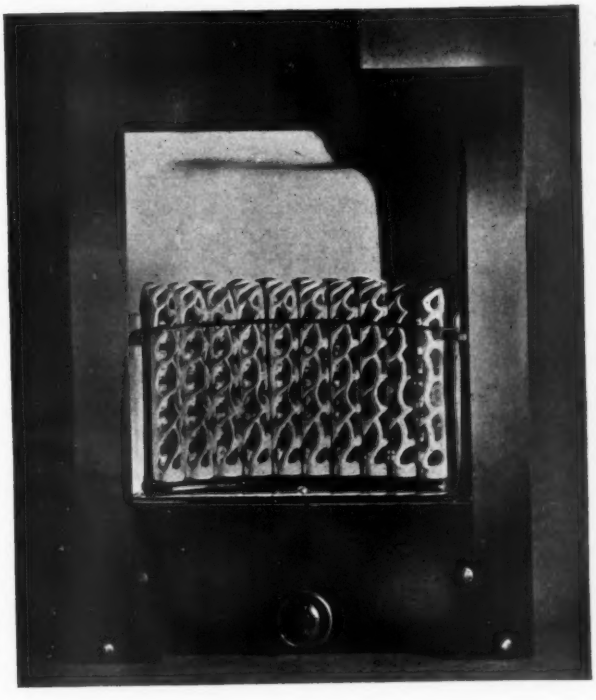


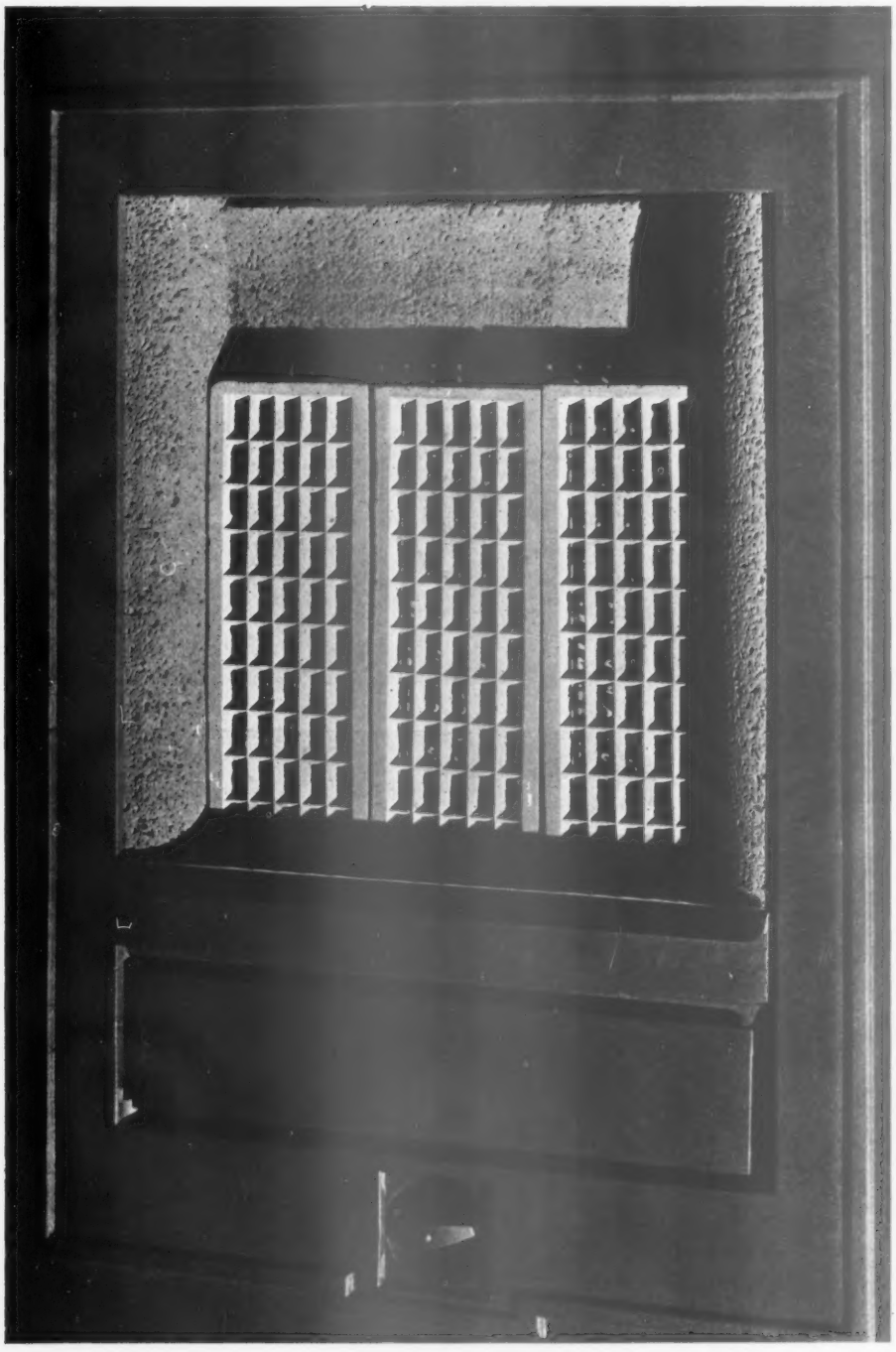
5

1 & 3: Inset fires ensuring wide angle heat dispersion. 2: Panel fire with concealed boiling-ring, built-in type. 4: Built-in candle radiant type. 5: Built-in type with curved radiants.

a minute or two of lighting, and provided there is no obstruction or shadowing the person using the room will be warmed almost immediately and without much regard to the actual air temperature. Of course as the heat strikes objects in the room these will become warm, and will in turn act to some extent as convectors, heating the air, which after a period will also be warmed. Obviously for very large rooms intermittently used, such radiant heating is advantageous, but it must be remembered that radiant heating is directional.

Where, however, a room is to be used regularly or by persons who may occupy various positions or move about, it is probably more convenient to use convection heaters, and to some extent it may be found more economical. In the case of a domestic sitting-room a combination of the two seems required, since the position of the occupants must change and portable heaters are not always convenient. It is also pleasant to feel that the air and walls are reasonably warm. In the case of a bedroom it is almost always desirable to be able to turn the heat on instantaneously, and a pure radiant heater may, therefore, be economical and satisfactory.

An ordinary gas fire may be looked upon as primarily a radiant heater. There is, however, some convection heat, since when it is placed in an ordinary room it very quickly warms up both the floor in front and the



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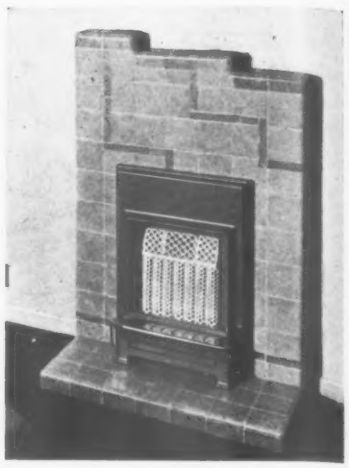


1

1: High-beam fire intended for high efficiency in heat dispersion. 2: Three-unit built-in fire with two fixing units and separate front. 3: A raked fire, another type designed for wide angle heat dispersion.

3

surrounding furniture, which in turn tend to warm the air. The gas fire, however, serves one further purpose.

All gas heaters can, of course, be controlled instantaneously. Most types can also be controlled thermostatically, but at the moment there is no really suitable cheap thermostat on the market which is sensitive to all the factors which together give maximum comfort conditions in a room.

Gas Fires

The usual type of gas fire consists of a burner placed below a suitable flue and backed with some form of fireclay block. In front of this are placed radiants which are usually of two types, the older candle type and the newer brick or lattice type radiant. The usual consumption of gas for each normal short type candle radiant is 4 to 4½ cub. ft. per hour, while the comparable lattice type 3 ins. in width has a gas consumption of about 10 cub. ft. per hour, equivalent approximately to 2½ candle type radiants. These facts are given because it is usual to calculate the size of gas fires on the basis of the number of radiants. The table on page 668 based on this radiant unit may be used as a guide in determining the size of radiant fires to heat various rooms. It should be noticed that the shape of the room is important—naturally a small gas fire placed at one end of a long narrow room will have little effect at the opposite end, although the fire may be adequate in relation to the actual cubical content of the room.

To read the table, find the line corresponding to the length of the room and follow this across the page until it meets the line corresponding to the width of the room. The figure where these two lines meet represents the number of ordinary radiants required.

1

2

1 : Portable heater with stainless steel or copper bowl and stainless steel guard. 2 : Two-radiant portable fire with screens.

If the room is much exposed, has more than two outside walls or is built of lighter materials than ordinary brick and stone, one-tenth should be added to the length of the room. In selecting a fire it is always best to err on the large size, so that the room may be warmed quickly, the fire afterwards being turned down and the heat adjusted to a comfortable degree.

Surface or Convector Heaters

In recent years a great many different types of heater have been evolved, in which the burners are arranged beneath a row of pipes or other units which present a large surface area. Such heaters may be mainly classed as convection heaters, since their chief effect is to warm the air, although in some cases they also act partly as radiant heaters. Such heaters can be used wherever it is desired to heat the whole of the air in the space under consideration. They may be free standing or designed to fix against the wall, or in the nature of a panel inset into the wall. In some cases they may also be arranged to provide directional heating by means of reflectors placed behind the hottest part of the exposed heating surfaces. In each case they are provided with a series of baffles and airways through which the air to be heated circulates in contact with the heating surface.

In most cases these heaters are designed for use without flues, but it should be realised that they have a fairly high rate of gas consumption, and so should only be used in large rooms or in reasonably well ventilated small rooms. Their efficiency is extremely high and they may be fitted with automatic thermostatic control, operating, however, on the air temperature only.

Portable Gas Heaters

A very great variety of portable heaters, which may be called purely radiant heaters, of which the bowl fire is the commonest type, or combined radiant and convection heaters have recently been marketed. They prove extremely useful for occasional use where a concentration of heat is required for short periods or for the heating of small rooms not provided with flues. Normally they are connected by flexible tubes and plug-in cocks to the gas supply.

As in the case of the convection heaters mentioned above the whole o the heat is utilized in warming the room either by radiation or convection, and for this reason they are extremely efficient. Naturally some permanent ventilation is desirable in rooms, particularly small rooms, in which they are used, if reasonable comfort conditions are to be obtained.

It is also possible to combine the various types of heater. For instance in a hall used also as a sitting-room or lounge, it may be desirable to have a convection heater for normal use, and a radiant heater which can be turned on when the room is actually in use as a sitting-room, in order to give directional or localized heat.

Automatic Ignition

There are several types of automatic gas lighter which may be fitted to almost any gas fire, and these are an added convenience. They are based on one of three principles. First the electric type, in which a small torch battery is connected to a filament which glows when the gas tap is first turned on. These generally are used to light a pilot jet which in turn lights the fire. Secondly, a mechanical type dependent on a wheel and flint spark, similar to the ordinary cigarette lighter, operated again when the tap is turned on. Third, the cold catalyst, which relies on the fact that when a stream of gas and air flows over finely divided platinum the platinum will glow sufficiently for the gas to be ignited. Existing types of fire can be fitted with one or other of these automatic lighters in most cases.

Thermostatic Control

Room thermostats for the control of gas heating apparatus are now fairly commonly adopted. The control valve is placed as near as may be to the actual burner unit, while the thermostat, which operates on air temperature rather than on comfort conditions, may be placed at any suitable position in the room where it is likely to be safe from mechanical damage and free from draught. This type of control is, of course, mainly used with central heating plants or convector heaters, since with any type of heater which is mainly radiant, the position of the source of heat in relation to the thermostat would be of vital importance.

In commercial buildings thermostatic control of heating is now considered

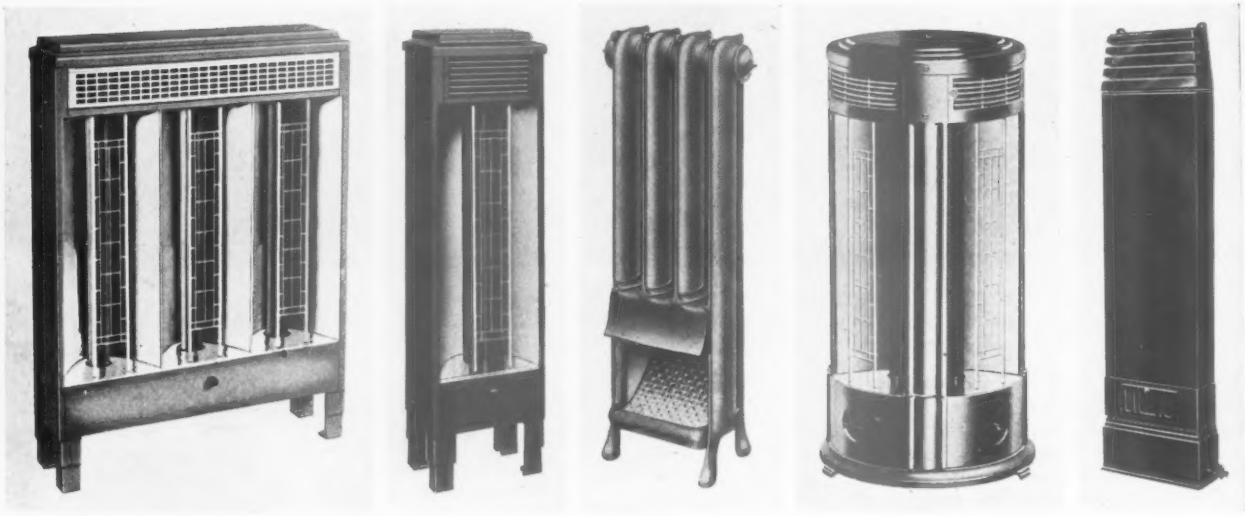
LOW TEMPERATURE SURFACE HEATER OR CONVECTOR

TABLE SHOWING MAXIMUM GAS RATES FOR FLUELESS APPLIANCES—SUGGESTED

Maximum gas rates in flueless rooms calculated on a room of 500 cubic feet capacity and allowing for 1½ changes of air per hour

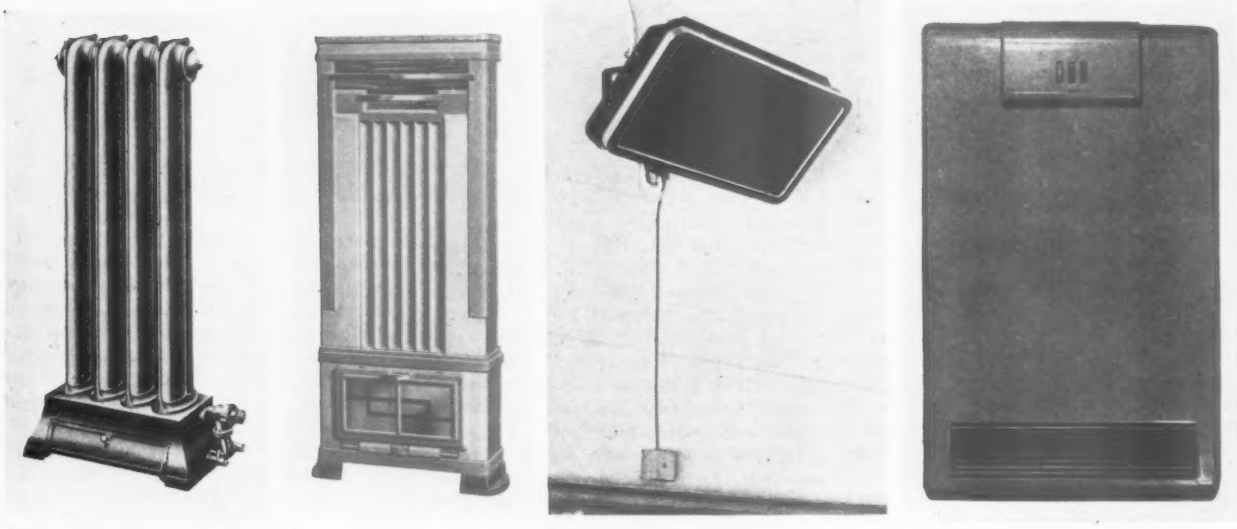
Sulphur Content of Gas per 100 cubic feet	Gas Rates : Continuous use	Gas Rates : Intermittent use
10 grains	9 cubic feet per hour	18 cubic feet per hour
20 grains	4·5 cubic feet per hour	9 cubic feet per hour
30 grains	3 cubic feet per hour	6 cubic feet per hour

Gas rates for rooms of other capacities and varying degrees of air change may readily be calculated from these figures.



1 2 3 4 5

1 & 2 (combined) : Convector heaters with parabolic reflectors providing forward radiation. 3 : Governor-controlled radiator with luminous radiant panel. 4 : Circular convector heater with parabolic reflector providing radiation in all directions. 5 : Single-column convector suitable for remote control.



6 7 8 9

6 : Regulo-controlled radiator, burners enclosed in the base. 7 : Convector cabinet heater. Top and back surfaces are cool. 8 : High temperature radiant panel heater—governor-controlled. 9 : Wall-panel convector, may be fixed in any position.

TABLE SHOWING COMPARISON OF WATER HEATING INSTALLATIONS

Fuel	Coal and Coke	Oil	Electricity	
System	Boiler	Boiler	Single point heater, 1½ galls.	Distributing system.
Labour	Manual feed and kindling	Can be automatic ..	Automatic in operation..	Automatic in operation.
Output and convenience ..	5,000–10,000 B.Th.U. per hour 6–12 gallons of water raised 80° F. per hour. This allows for one bath in 2–4 hours. House heated during summer.	20,000 B.Th.U. per hour or 25 gallons of water raised 80° F. This allows for approximately one bath per hour.	Delivers 1½ gallons raised 80° F. in approximately ½ hour.	Optimum loading 3 kw. or approximately 10,000 B.Th.U. per hour or 25 galls. raised 80° F. per hour. Allows for one bath per hour.
Space required	5 cub. feet of space including boiler. Additional space for fuel storage required.	9 cub. feet. Additional space for fuel required.	½ cub. foot. Storage included in heater.	10 cub. feet.
Efficiency	50 per cent.–60 per cent.	70 per cent.	95 per cent.	95 per cent.
Overall efficiency	30 per cent. assuming boiler is used to full capacity.	50 per cent. assuming boiler is used to full capacity.	90 per cent. on the basis of 15 galls. per day raised 80° F.	85 per cent. on the basis of 25 galls. per day raised 80° F.
Cost of 100 galls. raised 80° F.	6d. coal, 3½d. coke. Coal 48s. and coke 38s. per ton. Coal 13,500 calorific value. Coke 12,500 calorific value.	4¼d. Oil at 80s. per ton. Calorific value 18,500 B.Th.U. per pound.	26d. Electricity at ½d. per unit.	27½d. Electricity at ½d. per unit.
Fuel	Gas	Gas	Gas	Gas
System	Single point storage heater	Distributing system ..	Single point non-storage	Multipoint non-storage.
Labour	Automatic in operation..	Automatic in operation..	Automatic in operation..	Automatic in operation.
Output and convenience ..	Delivers 2½–3½ galls. raised 80° F. in from ½–1 hour.	Raises 15–30 galls. to 80° F. in 1 to 6 hours. High consumption type will give constant supply to small house.	500 B.Th.U. per minute or ⅝ galls. raised 80° F. per minute. Gives constant supply. Pilot loss ½–¾ cub. foot per hour.	1,200 to 1,500 B.Th.U. per minute or 1½ to 2 galls. raised 50° F. per minute. Constant supply. Baths every 10 mins. Pilot loss.
Space required	½ to ¾ cub. foot. Water storage space incorporated in heater.	15 cub. feet. Storage space incorporated in heater.	¼ to ½ cub. feet. No storage required.	3 to 3½ cub. feet. No storage required.
Efficiency	75 per cent. while heating up.	75 per cent. while heating up.	80 per cent.	80 per cent.
Overall efficiency	50 per cent. on the basis of 15 galls. per day raised 80° F.	45 per cent. on the basis of 25 galls. per day raised 80° F.	65 per cent. on the basis of 15 galls. per day raised 80° F.	55 per cent. on the basis of 25 galls. per day raised 80° F.
Cost of 100 galls. raised 80° F.	13¾d. with gas at 8·6d. per therm.	15½d. with gas at 8·6d. per therm.	10½d. with gas at 8·6d. per therm.	12½d. with gas at 8·6d. per therm.

Note.—The efficiencies of use are based on observations and are believed to be as accurate as is possible at the moment.

normal practice, and usually results in very great economy in fuel.

In the case of small unit convector type heaters, it is now becoming increasingly common to fit a thermostat to the heater itself, operated on the air temperature and arranged to cut down the supply of gas so soon as the predetermined temperature is reached. Obviously the thermostat fixed to the heater is a less satisfactory method of controlling the temperature of the whole room than is a suitably placed room thermostat, but it does make it possible to turn the heater on when the room is first in use to the maximum temperature, knowing that so soon as a reasonable room temperature is reached the heater will return automatically to normal and maintain that temperature.

Normally gas fires are not as yet fitted with thermostatic temperature control, which would be difficult to arrange, owing to the fact that they are primarily radiant heaters, but manual operation of the single or dual tap controls is so easy that a thermostat is hardly called for.

Water Heating for Domestic Use

The principal advantages claimed for gas as a medium for water heating may be summarized under the following heads :—

Complete automatic thermostatic control can be simply arranged.

Where desired the heat may be applied directly to the storage cyclinder, so saving the space of a boiler.

With the instantaneous type of heater hot water may be obtained at once and to any volume, though at a slow rate.

In addition, it is clean, dustless, and requires no labour. Where up-to-date apparatus is used and the cylinder and pipe work is lagged and the gas supply controlled by reliable thermostats, overall working efficiencies of about 75 per cent. are common, and with such efficiencies gas is definitely an economical method of heating.

Some further comparisons with other fuels are given in the table above. It is, of course, impossible to give in tabular form all the advantages and disadvantages of any method of heating, since such factors as comfort, convenience, and adaptability to particular requirements or habits of the people using the service cannot be reduced to figures. The table may serve, however, as a useful guide.

TABLE SHOWING ESTIMATED WATER REQUIREMENTS EXCLUDING BATHS (15-HOUR DAY)

Equivalent Number of Persons	Sink Tap only		Sink + 2 Taps		Sink + 3 Taps		Suggested Overall Figures	
	Estimated Water requirements calculated at 140 degrees Fahrenheit							
	Per day	Per hour	Per day	Per hour	Per day	Per hour	Per day	Per hour
1 person	15 gallons	1 gallon	17 gallons	1·1 gallons	19 gallons	1·25 gallons	20 gallons	1·25 gallons
2 persons	30 ,,	2 gallons	33 ,,	2·2 ,,	36 ,,	2·4 ,,	36 ,,	2·5 ,,
3 ,, ...	45 ,,	3 ,,	50 ,,	3·3 ,,	55 ,,	3·6 ,,	55 ,,	3·5 ,,
4 ,, ...	60 ,,	4 ,,	66 ,,	4·4 ,,	72 ,,	4·8 ,,	75 ,,	5·0 ,,
5 ,, ...	75 ,,	5 ,,	83 ,,	5·5 ,,	90 ,,	6·0 ,,	90 ,,	6·0 ,,
6 ,, ...	90 ,,	6 ,,	100 ,,	6·6 ,,	110 ,,	7·5 ,,	110 ,,	7·5 ,,

MAXIMUM DAILY REQUIREMENTS FOR BATHS + DOMESTIC HOT WATER

Equivalent Number of Persons	Number and Amount of Medium Baths required Daily					
	Estimated Water requirements calculated at 140 degrees Fahrenheit					
	1 Bath	2 Baths	3 Baths	4 Baths	5 Baths	6 Baths
1 person	35 gallons					
2 persons	51 ,,	66 gallons				
3 ,, ...	70 ,,	85 ,,	100 gallons			
4 ,, ...	90 ,,	105 ,,	120 ,,	135 gallons		
5 ,, ...	105 ,,	120 ,,	135 ,,	150 ,,	165 gallons	
6 ,, ...	125 ,,	140 ,,	155 ,,	170 ,,	185 ,,	200 gallons

TABLE SHOWING PARTICULAR DEFINITION OF BATHS GENERALLY ADOPTED—BATH 5′ 6″ × 22½″ × 16½″

Small bath	10 gallons at 140° F. or about 20 gallons at 105° F. Water 6″ deep.
Medium bath	15 ,, ,, ,, 30 ,, ,, ,, 8″ ,,
Large bath	20 ,, ,, ,, 40 ,, ,, ,, 10″ ,,

Choice of Type of Heater

There are many types of appliance available, as well as a variety of sizes, and it is important that the selection of the heater for a given service should be correctly made. Fundamentally there are two types. First, the appliance which heats the water only as it is drawn off, involving a relatively high rate of gas consumption. Secondly, the appliance which heats the water continuously at a low rate of gas consumption and stores the hot water in a suitably insulated container. There are also, of course, intermediate types, combining a higher rate of gas consumption and therefore quicker recovery with some storage facilities.

Consideration of this fundamental difference will simplify the choice of heater to be employed when the requirements for particular domestic purposes are analysed.

Baths. A large supply of hot water required at widely spaced intervals of the day or night.

Shaving. A small supply of very hot water for a short period.

Wash hand basins. A small supply of hot water at irregular intervals of the day or night.

Washing up. Somewhat larger supplies of hot water during three or four periods of the day.

Cooking. A small supply of practically boiling water at any period of the day or night.

Laundry. Relatively large supplies of hot water during about half a day on one or two days a week.

Emergencies. Supplies of hot water for use in illness, sundry cleaning, filling hot-water bottles, and so on. Generally speaking these require small quantities of really hot water at any time of the day or night.

It will be seen from consideration of the above that an instantaneous heater is capable of dealing with all the requirements, while most of them can also be dealt with economically by the use of a storage heater. A storage heater, however, suffers from the disability that if it is run completely cold by a succession of baths, it takes a comparatively long period to obtain a further supply of really hot water.

Quantity of Water Required

Unfortunately, in normal domestic establishments the quantity of water required varies considerably at different periods of the day. Baths, for instance, are almost only used between, say, seven and nine in the morning, again between seven and midnight at night. It is not practical to provide accurately for the amount of water required in a given time, but fair estimates can be worked out which serve as a sufficiently accurate guide.

Roughly, it may be said that the daily requirement for a single middle-class person for purposes other than baths may be averaged at 15 gallons of water raised through 80 degrees F., or about one gallon per hour per person throughout the working day. Where two persons are at home only during the morning and evening hours they may be counted as equivalent to one for this purpose. It is found in practice that the amount of water used is to some extent dependent upon the number of taps, and within certain wide limitations one can say the more hot taps, the more water is used. It is, therefore, advisable to increase this rough estimate by about 10 per cent. for each additional hot tap after the first.

The upper table on this page is calculated on these allowances, and the figures in the last column may be used

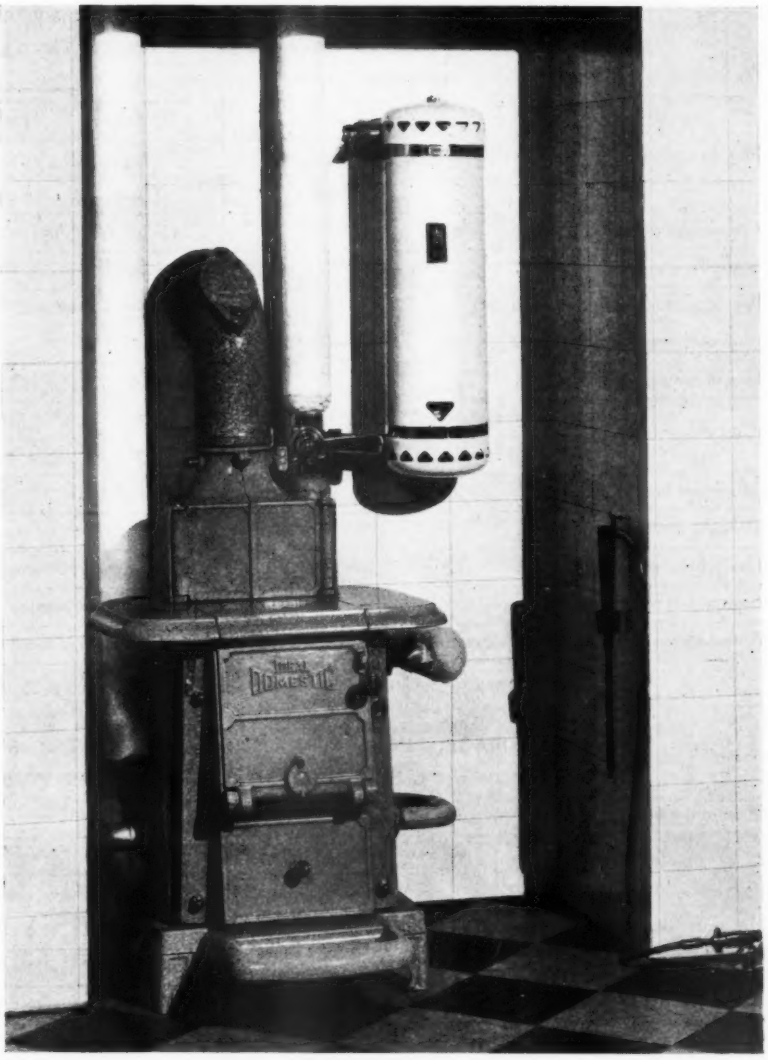
when examining the suitability of a particular appliance for a particular household. To these quantities must be added the hot water required for baths. The second table is calculated to show the maximum daily requirements for families comprising one to six persons for domestic hot water plus bath water. This table should not be used to estimate the *capacity* of storage required, because bath allowances must be examined in conjunction with the other hot water requirements. In the lower income groups rather less hot water is normally used, and allowances of from two to seven gallons per day raised through 80 deg. may be all that is demanded. While in exceptionally luxurious establishments the figure rises to as much as 20 to 35 gallons per day.

While gas water heaters may be classified as storage or instantaneous types, these two categories can be still further sub-divided to simplify the selection of the best type for a particular purpose.

Non-storage Gas Water Heaters

Modern instantaneous or non-storage gas water heaters may be described as being one of two types, the open outlet and the pressure type. The open outlet type was originally designed with a broken feed to satisfy the regulations of certain water supply authorities, who forbade the connection of hot water appliances of any kind directly on to the main, owing to what was then considered to a be a risk of contamination. Such open outlet or broken feed types of heater are only designed to supply one point. They may be connected, however, with a hose or other semi-temporary device to serve, for instance, both a bath and a basin. They may be supplied directly from the main in any district, and obviously also from the cold water cistern.

More recently, following on the improvement in design of gas water heaters, this regulation has been waived by the majority of water boards, and it is now permissible to connect an instantaneous water heater direct to the main in most districts, provided it is of an approved type. Conditions laid down generally may be summarized as follows: The heater must be of a type approved by the Board and the maximum capacity of water contained in the apparatus must not exceed three gallons. A heater of this type may not be fixed without prior notice being given to the Board, stating the address at which it is to be fixed, make, type, and capacity of the heater, and concessions to fix such a heater can only apply to each specific case. The Board will only permit heaters to be fixed where the conditions of supply and the size of the supply pipe to the premises are suitable and adequate, and the Board accepts no liability for any damage or injury which may occur as a result of the supply to the heater being taken direct from the main. This last requirement presumably refers to the possibility of an appliance becoming overheated in the event of a failure of the supply from the company's mains. Since, however, heaters are fitted nowadays with an automatic valve which cuts off the supply of gas in the event of failure of the water supply, the clause is of little real importance.



A gas circulator coupled to solid-fuel hot water system as alternative heating system. Note gas poker for starting up solid fuel boiler.

These instantaneous pressure type heaters can be connected to one or any number of points, either on the same floor or within certain limits on floors above and below. The gas is turned on and the heater brought into operation automatically every time any one of the taps to which it is connected is turned on, always provided, of course, that the pilot light is alight and the water supply to the heater is adequate. Safety devices to prevent the gas being turned on should the pilot light be blown out or the supply of water fail are automatically brought into play.

Modern types of pilot safety devices embody some form of thermostatic control. The bi-metallic spring is probably the device most often used; it is a simple cut-out operated by the movement of a bi-metallic strip heated by the pilot jet or burner flames. So long as the gas is burning, the valve remains open, but in the event of the pilot jet or burner flames being extinguished, the bi-metallic strip cools and closes the gas valve.

While these notes have been based mainly on the larger type of heater suitable for baths or the whole hot water requirements of the normal small family, instantaneous heaters of either type suitable for fixing over a sink or lavatory basin are also available, and tables setting out characteristics of these are given later. The small types do not require to be connected to a flue, since the rate of gas consumption is low, but the larger types must be connected to a proper flue discharging at a suitable point into the outside air.

It should be remembered again that

NON-STORAGE SINGLE-POINT GAS WATER HEATER—BATH MODEL—AVERAGED
TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY THE HEATER

Open outlet heater. No fittings should be added to the outlet. Interlocking gas and water taps or safety valve.

Hot water output (per minute)	Raised 60° F.	1½ galls.	1⅝ galls.	1¾ galls.	1⅞ galls.	2 galls.
	Raised 50° F.	2 galls.	2 galls.	2⅛ galls.	2¼ galls.	2½ galls.
	Raised 40° F.	2¼ galls.	2½ galls.	2¾ galls.	3 galls.	3½ galls.
Gas consumption—cub. feet per hour		135 cub. feet	150 cub. feet	165 cub. feet	180 cub. feet	195 cub. feet
Stand-by gas		Not needed	—	—	—	—
Meter capacity required—cub. feet		In accordance with hourly gas consumption.				
Flue diameter—internal		4″	4″	4½″	4½″	5″
Size of gas supply pipe		½″–¾″	½″–¾″	¾″	¾″–1″	1″
Cold water supply pipe	Mains supply	½″	½″	½″–¾″	½″–¾″	½″–¾″
	Tank supply	¾″	¾″	¾″–1″	¾″–1″	¾″–1″
Minimum head of water		5′ 0″	5′ 0″	8′ 0″	10′ 0″	10′ 0″
Draught diverter or baffle		Generally integral part of heater.				
Gas volume governor		Can be incorporated to ensure constant supply of gas to burners.				
Gas cut-out or pilot safety device		Generally provided to ensure that no gas will pass the burner if extinguished.				
Automatic valve and temperature control		Incorporated in some appliances to ensure constant outflow temperature.				

Note.—These figures are calculated on gas having 500 B.Th.U. cal. value.

NON-STORAGE SINGLE-POINT GAS WATER HEATER—SINK MODEL—AVERAGED
TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY THE HEATER

Open outlet heater. No fittings should be added to the outlet. Hot and cold taps incorporated in the appliance.

Hot water output (per minute)	Raised to boiling	2½ pints			3 pints		3½ pints
	,, 100° F.	⅜ gall.	7/16 gall.	½ gall.	9/16 gall.	⅝ gall.	11/16 gall.
	,, 80° F.	½ gall.	9/16 gall.	⅝ gall.	11/16 gall.	¾ gall.	13/16 gall.
	,, 50° F.	¾ gall.	⅞ gall.	1 gall.	1⅛ galls.	1¼ galls.	1⅜ galls.
	,, 40° F.	1 gall.	1⅛ galls.	1¼ galls.	1⅜ galls.	1½ galls.	1⅝ galls.
Gas consumption—cub. feet per hour		65 cub. ft.	70 cub. feet	75 cub. feet	80 cub. feet	85 cub. feet	90 cub. feet
Stand-by gas—cub. feet per hour		⅓ cub. foot	⅓ cub. foot	⅓–½ cub. foot	½ cub. foot	½ cub. foot	½ cub. foot
Meter capacity required—cub. feet		In accordance with hourly gas consumption.					
Flue diameter—internal		3″	3″	3½″	3½″	4″	4″
Size of gas supply pipe		⅜″–½″	⅜″–½″	½″	½″	½″–¾″	½″–¾″
Cold water supply pipe	Mains supply	½″–¾″	½″–¾″	½″–¾″	½″–¾″	½″–¾″	½″–¾″
	Tank supply	½″–¾″	½″–¾″	½″–¾″	½″–¾″	½″–¾″	½″–¾″
Minimum head of water		8′ 0″	10′ 0″	10′ 0″	15′ 0″	15′ 0″	20′ 0″
Draught diverter or baffle		Generally integral part of heater.					
Gas volume governor		Can be incorporated to ensure constant supply of gas to burners.					
Gas cut-out or pilot safety device		Generally provided to ensure that no gas will pass the burner when extinguished.					
Design of taps		Hot and cold water taps (mixing or independent) incorporated in the appliance.					
Automatic valve and temperature control		Incorporated in some appliances to ensure constant outflow temperature.					

Note.—These figures are calculated on gas having calorific value of 500 B.Th.U.'s.

when coal gas is burnt a very considerable volume of water vapour is produced. Where, as in the case of the gas fire, a large volume of fresh dry air is also drawn into the flue, there is little risk of condensation. In the case of gas water heaters practically no fresh air is drawn into the flue with the products of combustion, and the risk of condensation is therefore greater. In the early types a good deal of heat remained in the products of combustion with the result that the flue walls were warmed up, the flue gases themselves were relatively hot and condensation or deposition point was rarely reached. With improvements in the design of water heaters the amount of heat removed from the products of combustion is greater. Some heat is necessarily left in in order to provide

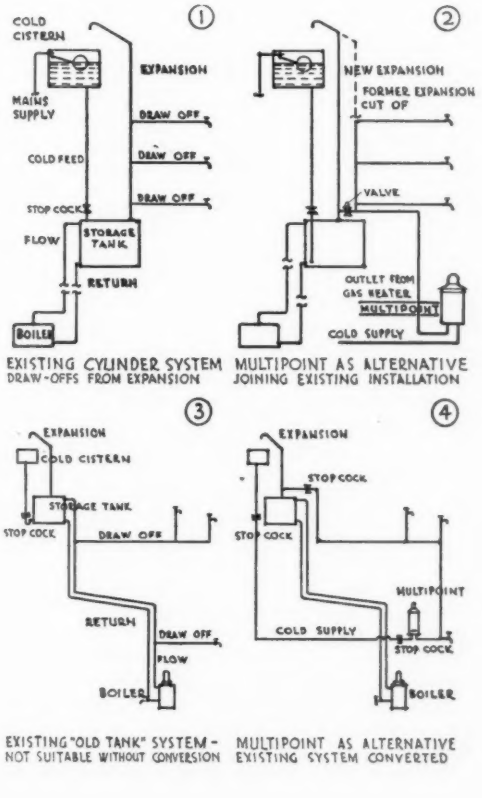
(*continued on page 678*)

NON-STORAGE MULTIPOINT GAS WATER HEATER—AVERAGED CONCLUSIONS

TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY THE HEATER

Number of Taps served		Three		Four		Five
Hot water output (per minute)	Raised 100° F.	⅞ gallons	1 gallon	1¼ gallons	1⅜ gallons	1⅝ gallons
	,, 80° F.	1 ,,	1¼ ,,	1½ ,,	1¾ ,,	2 ,,
	,, 50° F.	1¾ ,,	2 ,,	2½ ,,	2¾ ,,	3¼ ,,
	,, 40° F.	2 ,,	2½ ,,	3 ,,	3½ ,,	4 ,,
Gas consumption—cub. feet per hour		120 cub. feet	150 cub. feet	180 cub. feet	210 cub. feet	240 cub. feet
Stand-by gas—cub. feet per hour		½ cub. foot	½ cub. foot	½ cub. foot	½ cub. foot	½ cub. foot
Meter capacity required—cub. feet		In accordance with hourly gas consumption				
Flue diameter—Internal		4″	4″	5″	5″	5″
Size of gas supply pipe		¾″	¾″	¾″–1″	1″	1″
Cold water supply pipe	Mains supply	½″	½″	½″	½″–¾″	½″–¾″
	Tank supply	¾″	¾″	¾″–1″	¾″–1″	¾″–1″
Hot water supply pipes	Mains supply	½″	½″	½″	½″–¾″	½″–¾″
	Tank supply	¾″	¾″	¾″	¾″–1″	¾″–1″
Minimum head of water—Tank supply		6′ 0″	6′ 0″	6′ 0″ to 9′ 0″	6′ 0″ to 9′ 0″	6′ 0″ to 9′ 0″
Draught diverter or baffle		Generally integral part of heater				
Gas volume governor		Can be incorporated to ensure constant supply of gas to the burners				
Gas cut-out or pilot safety device		Generally provided to ensure that no gas will pass the burner when pilot is extinguished				
Water governor and thermostat		Can sometimes prove useful by ensuring constant outflow temperature				

Note.—These figures are calculated on gas having calorific value of 500 B.Th.U.



Diagrams showing how the non-storage multipoint gas water heater may be used as an auxiliary heater to an existing system.

Diagram 1 shows part of an existing cylinder system having several draw-off pipes taken at separate points from the expansion.

Diagram 2 shows the method of conversion which enables the outlet from the gas heater to join the existing installation and give satisfactory working with least complication. The old expansion pipe is cut at the junction of the highest draw-off branch. It is also disconnected from the storage tank and a new expansion pipe taken from the tank in the usual way. The hot water outlet from the heater is connected to the new expansion pipe and to the lower end of the old expansion pipe, a valve being inserted between the connections. When the gas heater is in use this valve must be closed, and opened only when it is desired to draw off coke-heated water from the storage tank.

Diagram 3 shows part of an existing older "Tank" system.

Diagram 4 shows the installation converted.

STORAGE GAS WATER HEATER—SMALL CAPACITY—AVERAGED.

TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY THE HEATER

Gas rates—cub. feet per hour		10 cub. ft.	10 cub. ft.	10 cub. ft.	10 cub. ft.	10 cub. ft.	12 cub. ft.
Hot water storage capacity in gallons		2 galls.	2¼ galls.	2½ galls.	3 galls.	3½ galls.	5 galls.
Hot water output (per hour)	Raised 100° F.	4 galls.	4 galls.	4 galls.	4 galls.	4 galls.	4¾ galls.
	Raised 80° F.	5¾ galls.	5¾ galls.	5¾ galls.	5¾ galls.	5¾ galls.	6¾ galls.
	Raised 50° F.	8 galls.	8 galls.	8 galls.	8 galls.	8 galls.	9½ galls.
	Raised 40° F.	11½ galls.	11½ galls.	11½ galls.	11½ galls.	11½ galls.	13½ galls.
Stand-by gas—cub. feet per hour		1½ cub. feet	1½ cub. feet	1½ cub. feet.	2 cub. feet	2 cub. feet	2½ cub. feet
Meter capacity required—cub. feet		In accordance with hourly gas consumption.					
Flue diameter—internal		Not needed	—	—	—	—	—
Size of gas supply pipe		¼"–⅜"	¼"–⅜"	¼"–⅜"	¼"–⅜"	¼"–⅜"	¼"–⅜"
Cold water supply pipe		½"	½"	½"	½"	½"	½"
Minimum head of water		1′ 0"	1′ 0"	1′ 0"	1′ 0"	1′ 0"	1′ 0"
Gas cut-out or safety valve.		Thermostat control.			Gas volume governors are or may be incorporated.		

Note.—These figures are calculated on gas having calorific value 500 B.Th.U.

for adequate draught, but where the flue is long or cold, condensation becomes a possibility and it is essential to consider how this may be controlled.

As has been said in the article on flues the trouble may be overcome by a waterproof lining to the flue or by provision of additional fresh air inlets into the flue below the heater, and in special cases other means are available. A large size modern water heater should never be connected to an existing porous brick or even precast concrete flue without consideration of the possible risks of condensation, and in most cases it is desirable to discuss the matter with a gas engineer. Where a large instantaneous heater has to be fitted in a small room it should be remembered that a certain amount of air is still evacuated by the action of the flue, and adequate fresh air inlets to allow for this must be provided.

The position of a multipoint heater can be varied to suit the planning of the individual house or flat, but generally speaking it is best placed in or adjoining the kitchen or scullery, since, as will be seen from previous remarks, it is there that small quantities of the hottest water are required at many and irregular intervals during the day. If these supplies had to be drawn through a considerable length of pipe from a heater placed elsewhere, a certain amount of cold water would have to be drawn off first on each occasion and the cost of heating would be increased. Further, certain water companies limit the length of run of direct hot water service without some flow and return arrangement, and while these regulations seem to be drawn up without regard to the conditions arising with instantaneous gas heaters they may limit excessively long runs.

The advantages of the instantaneous type of heater are obvious. The only normal objection raised to them is that as the actual rate of delivery of hot water is from 1½ to 4 gallons a minute, it takes longer to fill a bath with this type than it does from the storage heater type. A bath with 12-ft. run of pipe between heater and hot tap will take about one minute to run hot and about 4/5 minutes to give 8 ins. of hot water in a normal bath. Longer pipe runs and very cold temperatures in the house or flat increase this time of waiting. Where the client lays unusual stress on the need for quick filling of a bath, it is, therefore, necessary to utilize a storage heater, which can give very rapid delivery of its content of hot water. On the other hand, the storage heater must necessarily have a recovery period, and where the demand for hot water is irregular and likely to be large at any one moment, the instantaneous heater is often more convenient.

Storage Water Heaters

It is not always easy to choose the correct size of storage water heater for any particular installation, since the minimum size will depend not on the total daily consumption of water, which is generally fairly constant, but on the maximum volume required at any one time. Obviously all the casual washing up can be done on a relatively small capacity, but where the

(*Continued on page 681*)

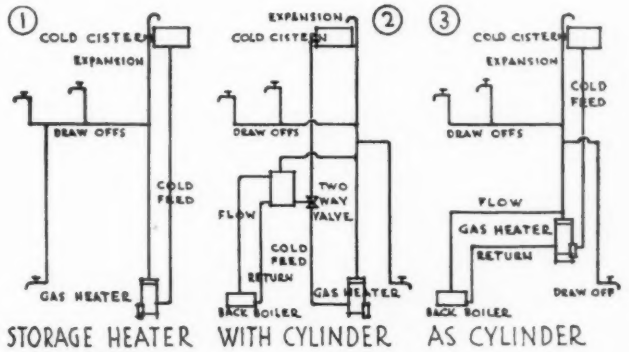
Wash-boiler with 10–12 gallons capacity. The possible danger of over-turning to which earlier circular free-standing boilers were subject has been eliminated in this model.

STORAGE-CYLINDER CIRCULATING GAS WATER HEATER—AVERAGED

TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY HEATERS

Gas rates—cub. feet per hour		10	25	10	25	10	25	30	60	30	60	30	60
Hot water storage capacity in gallons		20	20	30	30	40	40	20	20	30	30	40	40
Hot water output (gallons per hour)	Raised 100° F.	3½	8½	3½	8½	3½	8½	11¼	22½	11¼	22½	11¼	22½
	Raised 80° F.	5	12½	5	12½	5	12½	14	28	14	28	14	28
	Raised 50° F.	7	17	7	17	7	17	22½	45	22½	45	22½	45
	Raised 40° F.	10	25	10	25	10	25	28	56	28	56	28	56
Stand-by gas—cub. feet per hour		3	3	4	4	5	5	3	3	4	4	5	5
Meter capacity required—cub. feet		In accordance with hourly gas consumption											
Flue diameter—internal		—	3″	—	3″	—	3″	3″	3½″	3″	3½″	3″	3½″
Size of gas supply pipe		¼″	¼″	¼″	¼″	¼″	¼″	⅜″	½″	⅜″	½″	⅜″	½″
Cold water supply pipe		¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″
Hot water delivery pipe		¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″	¾″–1″
Minimum head of water		6′ 0″	6′ 0″	6′ 0″	6′ 0″	6′ 0″	6′ 0″	8′ 0″	8′ 0″	8′ 0″	8′ 0″	8′ 0″	8′ 0″
Maximum head of water		50′ 0″	50′ 0″	50′ 0″	50′ 0″	50′ 0″	50′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″
Gas cut-out or safety valve		Thermostat control					Gas volume governors are or may be incorporated						

Note.—These figures are calculated on gas having calorific value 500 B.Th.U.



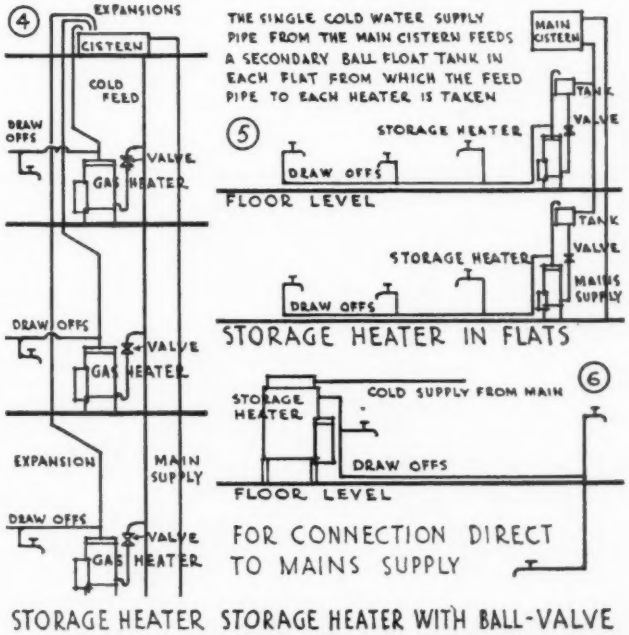


Diagram 1 shows heater fixed in the kitchen; it can, if desired, be placed on the upper floor.

Diagram 2 shows the heater connected to an existing range back boiler system where the storage tank is on the upper floor. By making use of the two-way valve, hot water can be drawn either from the heater or from the range boiler. It is important that the flow pipe from the range back boiler be connected directly to the expansion and not to the top of the existing storage tank.

Diagram 3 shows the heater taking the place of the cylinder originally connected to the back boiler. This installation is a most economical one because of the efficient lagging of the heater cylinder.

Diagram 4 shows the heater installed in flats; a single cold water feed is used to serve all the heaters directly. Each branch pipe connection should be above the level of the heater and a valve and connector should be provided so that any heater may be disconnected without interfering with the rest of the system.

Diagram 5 shows the heater installed in flats where a single cold water feed supplies a secondary ball float tank in each flat. The feed to the heater is taken from the secondary tank.

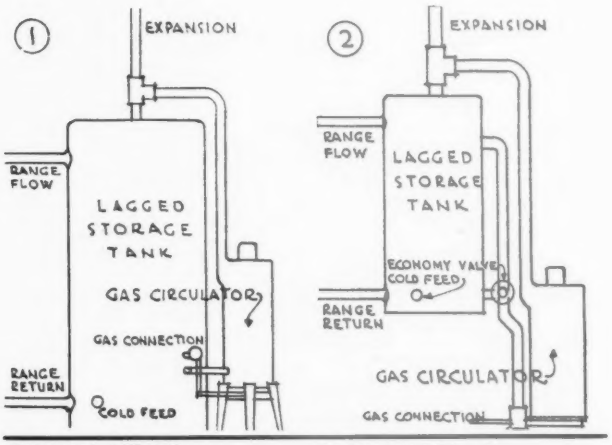
Diagram 6 shows the installation of a ball valve controlled heater where the draw-off pipe must not rise above the level of connection on the heater. This heater is for use where direct connection from the mains supply is essential.

CIRCULATOR GAS WATER-HEATERS FOR STORAGE TANK SYSTEMS

TABLE SHOWING CHIEF CHARACTERISTICS AND SERVICE GIVEN BY HEATER

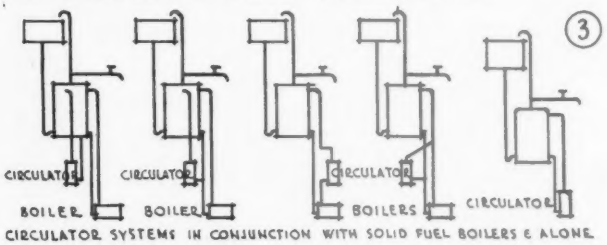
Gas rates—cub. feet per hour		10	25	30	40	60	80	100
Approximate cylinder capacity—gallons		20–30	30–50	30–50	50–75	75–100	100–150	150–200
Hot water output (gallons per hour)	Raised 100° F.	3½	8½	11½	14	22	28	36
	Raised 80° F.	5	12½	14	20	28	40	50
	Raised 50° F.	7	17	23	28	44	56	72
	Raised 40° F.	10	25	28	40	56	80	100
Stand-by gas—cub. feet per hour		2	2½	3	3	3½	4	4–5
Meter capacity required—cub. feet		In accordance with hourly gas consumption						
Flue diameter—internal		— or 2″	3″	3″	3″	4″	5″	5″
Size of gas supply pipe		¼″	¼″	⅜″	½″	½″	¾″	¾″–1″
Size of water pipes	Flow	¾″	¾″	¾″	1″	1″	1¼″	1¼″
	Return	½″	¾″	¾″	¾″	¾″	1″	1″
Minimum head of water		1′ 0″	1′ 0″	1′ 0″	1′ 0″	1′ 0″	1′ 0″	1′ 0″
Maximum head of water		40′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″	40′ 0″
Gas cut-out or safety valve		Thermostat control	Gas and water governors are or may be incorporated					

Note.—These figures are calculated on gas having 500 B.Th.U. cal. value

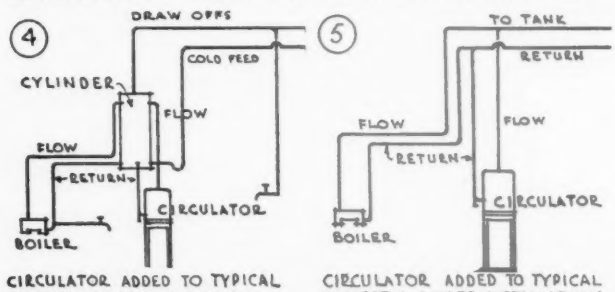


CIRCULATOR CONNECTED TO STORAGE TANK ON SHELF OR FLOOR LEAVING ROOM FOR SWING BURNERS.

CIRCULATOR CONNECTION WHERE IT IS DESIRABLE TO HAVE UNIT BELOW STORAGE TANK



CIRCULATOR SYSTEMS IN CONJUNCTION WITH SOLID FUEL BOILERS & ALONE.



CIRCULATOR ADDED TO TYPICAL DOMESTIC BOILER INSTALLATION.

CIRCULATOR ADDED TO TYPICAL DOMESTIC BOILER INSTALLATION

Where small quantities of hot water are required for ordinary household use and where a large bulk quantity of hot water is not frequently required, it is suggested that an economy valve be introduced in the return pipe. The economy valve may be so fitted that the whole contents of the storage tank, or a part thereof, can be heated.

The heater must not be connected direct to the main.

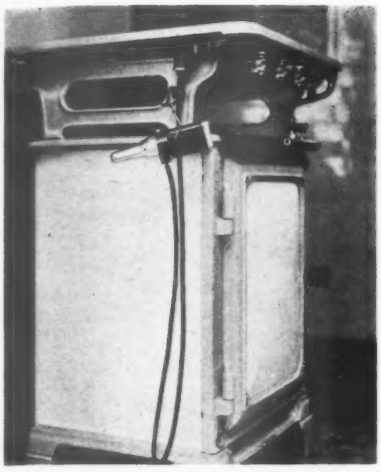
Diagram 1 shows the circulator connected to storage tank.

Diagram 2 shows method of connecting circulator to the storage tank where it is desirable to have the unit below the tank.

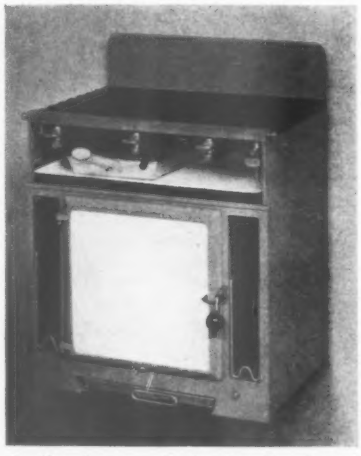
Diagram 3 shows four installations where the heater is to be used in conjunction with a solid fuel boiler. The installation on extreme left side is particularly recommended.

Diagram 4 shows a typical domestic boiler installation to which a gas hot-water circulator has been added. By this arrangement the water is heated by the range boiler or the circulator separately, or by both working together.

Diagram 5 shows another typical domestic boiler installation to which a circulator has been added.



Cooker fitted with automatic lighting gas pistol.



Small cooker; may be fitted on four-legged stand, or can be hung on brackets fixed to wall, or built-in to kitchen fitments on angle runners.

Cooker with high level oven.

number of baths may vary from one a day to an occasional day on which four or five are required, the difficulty is greater. It is, therefore, necessary to consider the total storage in relation to the maximum demand at any period, and to relate the recovery period to the probable intervals between the occurrence of such maximum demands. Where it is necessary to calculate the recovery period, it may be mentioned that generally 10 cub. ft. of gas will raise 4 gallons of water through 8° deg. F. in one hour.

Storage heaters are made in a variety of sizes, small ones having a capacity of from 1 to 2½ gallons being available for fixing over sinks and wash basins. In the case of a sink a minimum capacity of 2 gallons seems indicated, and where considerable washing up is required, slightly larger sizes are desirable. Such heaters, owing to the very low rate of gas consumption, do not require a separate flue. In small households a storage heater of from 10 to 12 gallons is sufficient for bath, sink, and lavatory basin, but naturally this will not give more than one bath at a time.

Such heaters may be fixed in the bathroom itself, either on the wall or the floor, or in any convenient position for connection by service pipes. It is not possible to give general rules for the choice of size of the larger types, but the decision can be based on the considerations given above. Heaters of low rate of gas consumption do not need a flue, but it should be remembered that where they are fixed in comparatively small rooms adequate ventilation is essential. They should not, for instance, be fixed in unventilated cupboards, particularly cupboards beneath stairs.

Wash Boilers

Where it is necessary to cut costs to the minimum, or where premises are only used occasionally, it is possible to provide hot water to sinks and baths by means of a wash boiler, but it should be realized that while there is economy in the initial expenditure, such equipment is less efficient than the instantaneous or storage gas water heaters, and taken over a period it is doubtful if there is any saving. This type of installation has been used to some extent in working-class property, and where it is so used certain precautions should be taken.

The most convenient way is to provide for the delivery of the hot water to the bath, sink, or basin by means of a syphon valve, since dipping from the copper by means of a bucket or baler may be the cause of serious scalding. Alternatively, in some cases the copper can be set on fairly high legs or a small base and allowed to discharge by gravity into the bath. It is not, however, safe to set the copper high enough to discharge by gravity into a sink, because at such a height it is almost impossible to obtain reasonable access when the copper is used for clothes washing.

If a copper is set at some height it should always be anchored by means of a bracket to the wall for fear that anyone holding the edge and slipping should pull it over and be scalded by the contents. Further, the tap should be placed in such a position that it is not likely to be knocked on accidentally by children, and generally speaking safety taps should always be used. In spite of these drawbacks wash boilers can, in certain cases, be a very useful means of hot water supply.

Lagging

In the case of gas, as in the case of all other methods of water heating, it is highly desirable to lag all the exposed parts of the system which contain hot water. Storage heaters are invariably supplied suitably lagged, but where an existing tank is used it is desirable to add the lagging. All flow and return pipes of a circulating system, together with the first 5 ft. of the expansion pipe, should always be lagged. Supply pipes to all taps need not necessarily be lagged, but runs exceeding, say, 25 ft. in length and runs connecting to a tap used more than about once per hour should be lagged. Naturally any exposed pipes in roof spaces or elsewhere should be lagged as a precaution against frost.

Conversions

An existing solid fuel-fired installation may be adapted to gas firing utilizing the whole of the old storage tank and pipe work. Methods of doing this are illustrated in the previous diagrams.

The simplest case is the use of a multipoint instantaneous heater connected to the existing piping, but this type of heater cannot be connected to an installation containing a storage cylinder. Further, it should be remembered that an instantaneous heater does not provide the rapid flow of hot water that may have been available previously where there was a hot storage cylinder. Cold supply to the heater must be taken from the cold water feed tank through a stop cock inserted in the feed at a convenient point.

Where it is essential to utilize the existing storage cylinder, gas-fired immersion heaters can be utilized, but it must be admitted that with most shapes of storage cylinder or tank they are not technically ideal, any more than are the electrical immersion heaters, owing to lack of stratification which arises when the container into which the immersion heater is placed is not specially designed for this purpose. They do, however, save space and initial cost.

Gas-fired Circulators

Where it is not so necessary to cut costs, and where space difficulties are

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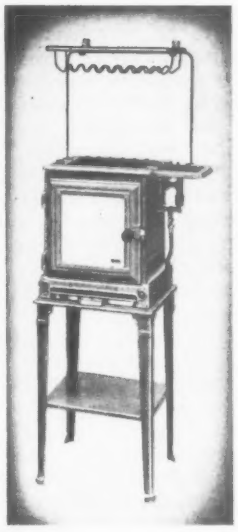

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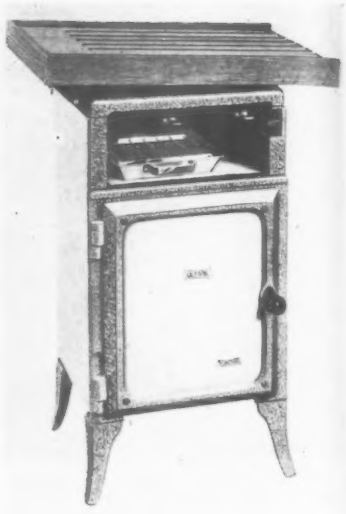

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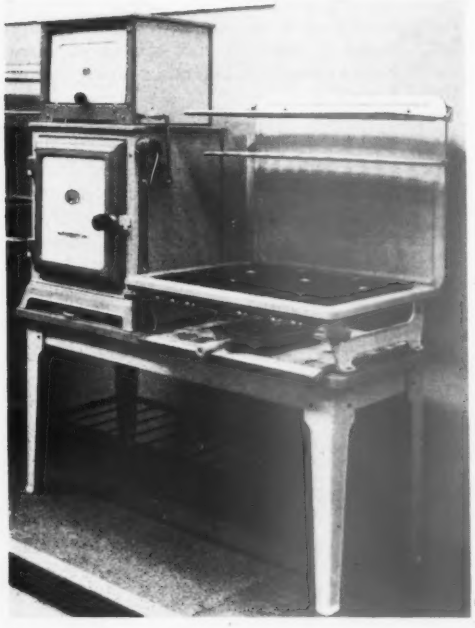
1 : The average cooker which serves the needs of most households of from 4 to 6 persons—oven heat controlled ; with gas boiler alongside. 2 : Compact cooker for two or three persons having double burner oven, covered grill on top and boiling burner at side of grill. 3 : Small cooker having draining board which is hinged to swing back and act as splash plate when the cooker is in use. 4 : A cooking unit with hot closet and shelf below—oven and hot plate at convenient working height.



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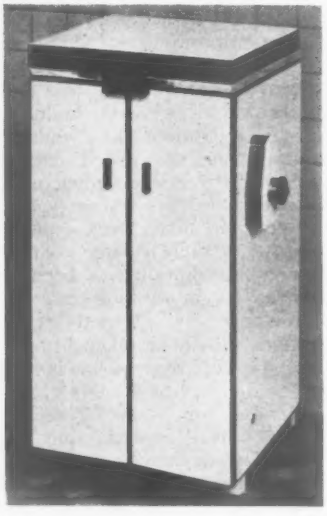

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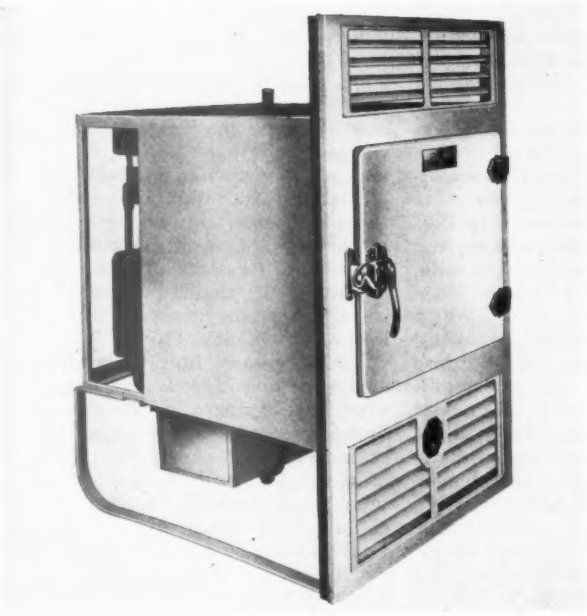
5 : Cooking unit with oven and hot plate at convenient working height. Hot closet over oven. 6 : A cabinet model cooker designed to conceal all working parts. 7 : Regulator for accurate control of oven temperature.

not exceptional, this type of conversion is usually more conveniently done by a gas-fired circulator, connected to the flow and return pipes between the old boiler and the storage cylinder. It is, of course, necessary to choose a suitable point for making the connection, and since in many cases it is not easily found it may be better to run fresh flow and return pipes directly into the cylinder, so as to avoid intercirculation.

Where a circulator installation is connected to existing work, it is always desirable to see that both pipes and storage tank are lagged, but where the



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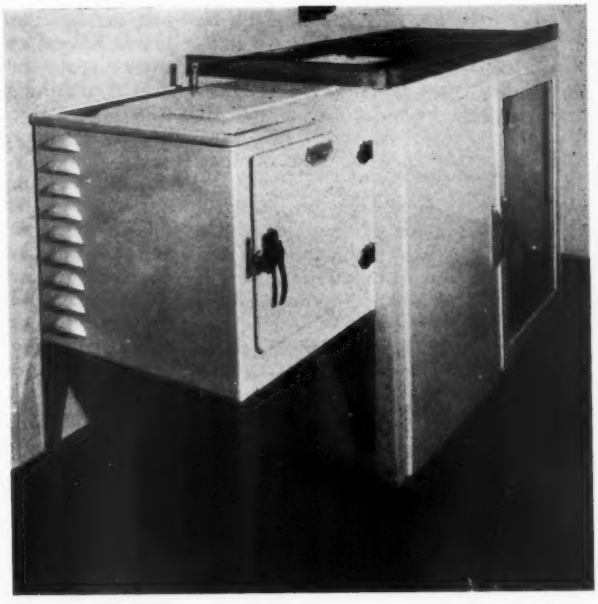

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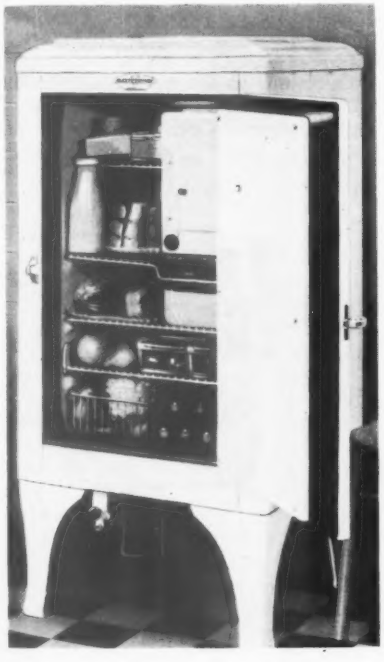

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1 : Small air-cooled refrigerator for building-in to kitchen equipment. 2 : Small air-cooled refrigerator on stand—may be fixed to wall on bracket. 3 : A large air-cooled refrigerator on stand—maximum gas rate $2\frac{3}{4}$ cub. ft. per hour. 4 : Gas washing machine and wringer. Dual model of cabinet type.

tank has been used previously to heat an airing-cupboard it may be necessary to fit a new and properly designed linen-cupboard heating unit, or alternatively to leave some part of the tank unlagged. Such circulators can also be used as boosters in conjunction with the existing coal- or coke-fired boiler, but it should be remembered that where the boiler is not thermostatically controlled the two sources of heat working in conjunction may overheat the water during slack periods, and as a result cause serious scaling. Owing to this difficulty new forms of automatic circulation control are now being developed, and may shortly be marketed. Storage water heaters may also be used as auxiliaries to existing solid fuel systems and are less likely to cause overheating and excessive scale formation.

Supply of Hot Water to Isolated Points

A problem commonly arises of the supply of hot water, usually in small quantities, to isolated spots, for instance, a basin in a doctor's consulting room. Theoretically it is more economical to connect this to the rest of the hot water system, provided always, of course, that the pipe is suitably lagged, but generally speaking far better service can be obtained and hotter water be provided by means of a small single point heater, fitted where the water is required.

Gas Cooking

Controversy over the various fuels and methods of cooking is notoriously bitter. The reason may be because many of the requirements are incapable of definite measurement. From the point of view of the architect who does not go into the finer points of cooking, the principal advantage of gas might be taken as being the ease of temperature control by means of a tap. A large or small flame can be produced instantaneously to suit the needs of the moment, and cooking,

whether it is by the oven, the grill, or the hot plate, is generally quicker than with any other method, not because exceptionally high temperatures are reached, but because the period of heating up the cooking apparatus itself is less than that required by other methods.

Whether gas is always the cheapest method of cooking is a point which may be argued at great length. In the average domestic installation, however, the speed with which maximum heat may be obtained leads to very great economies, and normally speaking these economies do mean that it is the cheapest and certainly the most convenient method of cooking at present available. Clients occasionally start arguments on the subject of the shrinkage of meat when joints are roasted in some particular type of oven, and it is therefore worth bearing in mind the test carried out by the Good Housekeeping Institute, a summary of which is as follows :—

The kind of fuel used makes no difference to the loss of weight by shrinkage, which is greater or less according to whether a high or low temperature is used for cooking. Most people prefer to cook meat at a high temperature, which gives a better browned appearance, but causes greater shrinkage.

Naturally the loss of weight or shrinkage in a joint is due to the loss of water and it does not make any difference to the nourishment value of the meat.

The present cooking belief that most things should be cooked gently and slowly does not diminish the value of gas, as a pan can be raised to the right temperature very rapidly, and the gas thereafter adjusted to maintain that temperature.

In addition to the advantage of rapid heating up, complete thermostatic control of the oven is now available on almost any type of gas cooker, and the accuracy and degree of controlled variation which can be obtained by these fittings is greater than that obtainable with any other method of cooking. So far thermostatically controlled boiling has not been possible with any form of hot plate, but it is, of course, regularly used for tea-urns and similar semi-industrial apparatus. Various automatic gas lighting attachments, operated either by electric battery, by a gas pistol, or flint, are available and should always be specified, since they are a great convenience.

The normal type of gas cooking appliance is an independent unit with the hot plate for boiling and grilling above at a level of about 3 feet above the floor, and the oven beneath. The great advantage of this type of unit is that it saves space. Where space is available it is generally more convenient for the cook to fit the oven unit and the hot plate side by side, either on brackets or legs, so as to avoid bending when basting or filling or drawing the oven. The built-in cooking unit is already known, but has still to be developed before it becomes universal. Obviously, however, sooner or later a combination unit, containing the cooker, the refrigerator and, where needed, the sink and water heater will be developed and become a standard fitting.

The ventilation of kitchens is becoming a more and more serious problem as the kitchen itself becomes smaller. In the old days with fairly large kitchen quarters, generally on a floor below or completely separated by swing doors from the living quarters, the smell and steam inevitably generated in cooking, together, in those days, with the dust and dirt of the fire, did not really matter very much, except from the point of view of the cook. Today, with a kitchen adjoining the living-rooms and little more in some cases than a large cupboard, the concentration of smell and steam is a real problem, and its removal is, in fact, much more important than the removal of the products of combustion in the case of the ordinary size of gas cooker.

There is no need to arrange for separate discharge of the products of combustion from the oven to the outside air. Many ovens are finished with an actual flue nozzle, but they should never be connected directly to a flue, since it might be possible for the gas in the oven to be extinguished. Unburnt gas might then enter the flue and when the oven was again lighted an explosion would be possible. In any event the combustion smell which arises from the oven is generally less than the smell from grilling or frying operations, or even the smell of boiling cabbage or onions. For this reason it is far better to collect the fumes from all sources and to utilize the products of combustion and the inevitable heat from the exposed hot plate to remove the smell by means of a broad canopy fixed at a suitable working height over the whole of the cooking unit and connected to a flue of adequate dimensions. Apart from the question of smell, this will also remove the steam which is otherwise one of the great difficulties in a kitchen, causing condensation and difficulty with the decorative finish of the walls. Where a canopy is connected to a really satisfactory flue, it should be remembered that a relatively large volume of air will be removed, and provision should be made by means of an air brick at low level, or a grating in the bottom panel of the door, for the replacement of the air so removed.

Gas Refrigeration

The installation of a refrigerator has become normal practice in practically all classes of house, and it should be recorded that this summer, arrangements have even been made on some L.C.C. housing estates for tenants to obtain gas refrigerators at extremely low rates of weekly payment. It is unnecessary here to go into the details of the mechanism of a refrigerator, of which there are several types on the market.

The normal type of gas refrigerator is necessarily completely silent, neither can it cause any interference with wireless reception. Since it is not dependent upon moving parts the life is high. Gas consumption varies between $1\frac{1}{2}$ cubic feet and $2\frac{3}{4}$ cubic feet per hour, costing from one penny a day to $1\frac{3}{4}$d. per day, according to the size of the model. Models are made with a storage capacity of from one to $5\frac{1}{2}$ cubic feet, all of which are air-cooled.

The refrigerator may be installed as a separate unit or, as is becoming more common, as part of the complete built-in fitment used instead of the ordinary kitchen cupboards. Standard units can be obtained, or alternatively there is no difficulty in building the equipment into ordinary joiner's work. For efficient and economical operation of the refrigerator, however, it is essential that a free air circulation over the cooling unit at the back of the cabinet is available, in order that the slight amount of heat extracted from the cabinet and dissipated by the apparatus itself may be readily carried away.

Connections to the gas supply are in this case usually made by means of small diameter copper tube, which can be fitted easily behind the joinery work.

Sundry Uses

So far only the well-known and common uses of gas have been touched on in this issue. It seems very desirable to conclude by mentioning some of the rather less common uses which may be of interest to architects. That gas can be used for a great many unusual purposes is generally known. That it can be used for the charging of the low-tension batteries of wireless sets, where it is not possible to have an all-mains set, is perhaps not so well known. Nevertheless, a practical thermopile has been dreamt of by scientists for many years and it appears that at last it has been possible to perfect the design sufficiently to market one as an alternative to the ordinary rather messy battery used for wireless sets. In this case the current is developed by heating with a small gas jet an extremely delicately arranged combination of rare metals.

Gas pokers are, of course, well known, but they are far too rarely fitted. The convenience of being able to light or relight a coal fire at any time, without the necessity of finding paper and wood, can hardly be believed by those who have not tried it. This is also oddly enough one of the very cheapest conveniences which have recently been introduced, since the poker and flex complete cost only a few shillings, and the amount of gas consumed is so little that it is probably the cheapest means known for this particular job.

Gas linen-cupboard heaters have already been mentioned in passing, but there have been developed a great many similar small space heaters, originally designed for use in the industrial field.

They are, however, extremely useful for the heating of such places as exposed w.c.s, and coat cupboards in cloakrooms, which do not justify the use of any of the ordinary gas fires or convection heaters. Similar types of heater may be used in roof spaces and elsewhere to prevent the freezing of water installations, particularly those installations which by reason of their inaccessibility cannot be adequately insulated.

The same type of heaters on perhaps rather a larger scale have also been developed for greenhouses and conservatories, and here again they offer one particular advantage. The small solid fuel stove is probably cheaper to run, but it suffers from the serious disadvantage that it must be stoked at very regular intervals. Should the fire go out in severe weather the entire stock may easily be lost in a matter of a few hours, and for this reason the owner-gardener is as tied to his greenhouse in the winter as a farmer is to his stock. The gas greenhouse heater, which can be thermostatically controlled, once lighted needs no further attention, and there is no risk of a flare-up or smoking, which occurs with the small oil heaters when they are not properly attended to.

Gas-fired incinerators, generally of relatively small capacity, have recently been found extremely useful in hospitals and nursing homes, as well as in the staff rooms of some of the big commercial organizations, where the removal of wet rubbish has otherwise been almost impossible. Such incinerators, of course, require a flue and for this reason the possibility of their installation should be considered when the building is first erected, although the smaller sizes can be connected later by means of asbestos cement flue pipes fixed outside the building.

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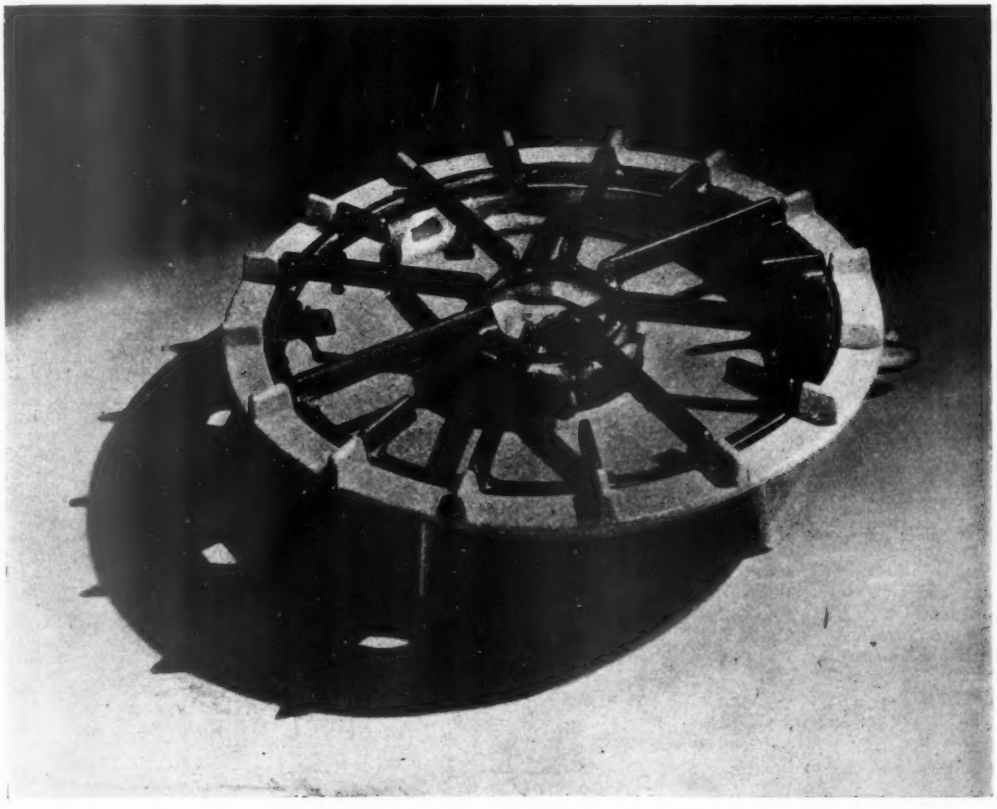
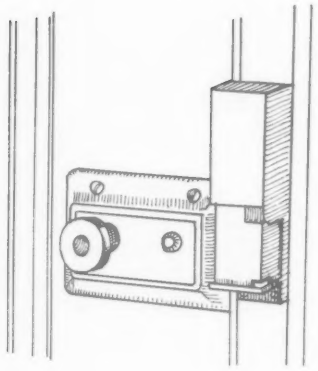


2

1 : Cooker with oven heat automatically controlled and ignition by press-button.

2 : 13½ ins. diameter boiling plate—large enough for kettle and two saucepans; with bowl to catch overflows and grid removable for cleaning.



TRADE NOTES

[EDITED BY PHILIP SCHOLBERG]

Measuring Instruments

EVERY year sees less and less of the good old weight-carrying wall, and architecture becomes more and more a matter of watts, bending moments, foot-candles, phons, decibels, reverberation periods and daylight factors. What can the architect do about it? Not so very many years ago you only needed a board and a set of instruments to lay the foundations of a successful practice—level, ranging poles and tapes could (and still can), be hired from the A.A. for quite a nominal sum. Nowadays it's no good guessing at 60 watts for the living-room fitting; you should, if you really want to get it right, produce a photometer and plot foot-candles at table level all over the room. And the dreadful part of it is that it isn't nonsense either, for the manufacturer can't know what to do until he knows exactly what is happening where.

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I have recently been shown a most excellent noise-meter, of American design and manufacture, which is now being marketed in this country by Messrs. Claude Lyons. So far, most noise meters involve a process of matching up a standard and a variable sound, listening to the noise in one half of a pair of headphones and twiddling taps until the sound in the other half balances. An accurate enough method when it is employed by skilled observers, but one liable to serious errors if the measurements are taken by different people at different times. The virtue of this American meter is that it is entirely visual, and can be used perfectly well by a deaf-mute as long as he is capable of reading a scale; but the snag comes when the catalogue says: "Its cost is very reasonable—only £62 10s. net." Whether or not the cost is reasonable is quite beside the point, which is that £62 10s. is just about £60 too high for the architect, who will probably only need a machine of this kind once or twice a year.

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No blame, of course, can be laid at the door of the manufacturers; I know nothing of their profit and loss accounts except that they are bound to pay an import duty on this particular machine, and this doubtless makes a good deal of difference to its price. But the fact remains that accurate measurement involves accurate manufacture, and costs always go rocketing up when work has to be done to fine limits.

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From the architect's point of view the remedy may lie in some form of hiring system like that already current for such things as levels. The R.I.B.A. has been suggested as the proper organizer for so many things lately that it may perhaps be better to have a different idea. Besides, hire work is very hard on any sort of apparatus, particularly when it has to be accurate, and therefore a certain amount of skilled maintenance work will be necessary, and I can see no reason why this should be the R.I.B.A.'s job. The Building Centre? Quite possibly, for it is already in touch with a whole lot of manufacturers who might easily be convinced that hired apparatus would prove useful enough to lead to sales. There should, I think, also be a clearly understood hire charge to discourage people from keeping apparatus too long.

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And if it's no good to the Building Centre why shouldn't the manufacturers try it themselves? – (*Claude Lyons, Ltd., 76 Oldhall Street, Liverpool, 3.*)

Inexpensive Furniture

At the opening of their new building last week, Heal's had a display of surprisingly cheap furniture. Surprisingly, because, although there has never been any doubt about the standard of Messrs. Heal's workmanship, there has sometimes been a suspicion that their prices imply a succession of pretty wealthy customers. Dr. Pevsner puts the level at which one can avoid the ugliness of things at £1,500 a year, and it is encouraging to see that Heal's can still maintain their standard of workmanship even when they come some way below the price-level of this group. To my mind the best designs are the dining-room tables and chairs and sideboards in beech or birch or both. The two drawings by Mr. Gordon Cullen show a sideboard with a linoleum top which sells at £6 10s. and a table (beech and birch) at £2 19s. 6d., though this price rises to £4 5s. if the top has a special heat- and mark-resisting finish. The chairs in the drawing are 23s. 6d. and 33s. 6d., but there are also some very good ones, again in beech and birch, which are only 13s. 6d.

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In the rest of the exhibition there is a certain amount of waxed mahogany and oak, weathered and otherwise, and I also found a catalogue devoted mainly to designs in laminated wood.—(*Heal and Son, Ltd., 196 Tottenham Court Road, London, W.1.*)

Electric Locks

From time to time I have been duly impressed by the typical thriller villain who pushes buttons on his desk and locks or unlocks doors at will. The electrically-operated bolt, used for locking and unlocking a door from a distance, is not, so far as I know, very much used; but there is much to be said for a device which will enable tenants on a top floor to unlock a door at street level and save themselves the trouble of coming down flights and flights of stairs. (See headpiece above).

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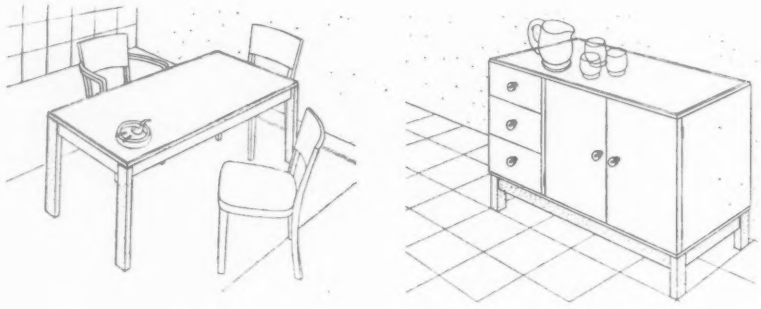
Both types of lock are made by W. C. Davey & Co., but we are concerned here only with the second, or release type, which can be fitted to mortice or Yale-type locks without interfering at all with their normal use. The release is worked from one or a series of ordinary bell pushes, and will operate irrespective of the amount of pressure on the door. The shutting of the door automatically re-locks the release, and there is generally also a small spring which



Table, chairs and sideboard, in beech and birch, from Heal's exhibition of inexpensive furniture.

opens the door an inch or two so as to show strangers that they can get in. The current required is not less than 2 amperes at 8 to 12 volts, but this could well be supplied from the bell transformer, and the cost of operation would be infinitesimal. If anybody doubts the reliability of bell circuits I can only quote some acquaintances of mine who have lived in a flat with one of these locks for nearly three years and it still does all that it should.

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Price is £2 2s. for use with Yale types, £2 16s. with mortice locks. The other type of locking and unlocking bolt is £3.—(*W. C. Davey & Co., 176 Tottenham Court Road, London, W.1.*)

THE WEEK'S BUILDING NEWS

LONDON & DISTRICT (15 MILES RADIUS)

CAMBERWELL. *Welfare Centre.* The Camberwell B.C. is to erect a welfare centre in Herring Street.

CAMBERWELL. *Cinema, etc.* Plans passed by the Camberwell B.C. : Houses, Jasper Road and the Avenue, for Mr. H. Macintosh ; factory, Southampton Way, for Messrs. Fuller, Hall and Foulsham ; Odeon Theatre and car park, Peckham High Street, for Mr. A. Mather.

CHELSEA. *Flats, etc.* Plans passed by the Chelsea B.C. : Block of shops and flats, with basement garage, Manor Court site, King's Road, Marshall and Tweedy ; block of flats, 22 Chesham Place, Mr. G. R. Miles ; four shops and 24 flats, Cale Street, Mr. Austin Blomfield ; block of flats, Sloane Avenue, Mr. J. Newton Smith.

EAST HAM. *Hospital Ward.* The East Ham Corporation has made a grant of £15,000 to the Memorial Hospital Committee in respect of the cost of the provision, equipment and furnishing of a maternity ward at the hospital.

MARYLEBONE. *Electricity Showrooms.* The Marylebone B.C. is to proceed with a scheme for the erection of premises for the electricity distribution department in Aybrook Street, the cost of the buildings being estimated at £30,000.

MARYLEBONE. *Flats, etc.* Plans passed by the Marylebone B.C. : Hostel for girls, Bendall Street, for Messrs. Hastie, Winch and Kelly ; post office, shops and flats, Marylebone High Street and Weymouth Street, for Mr. H. C. Wilkerson ; flats, Grove End Road, for Mr. J. E. Yerbury ; six houses, Springfield Road, for Messrs. Riches and Blythin ; shops and flats, 102-6 Frampton Street, for Messrs. Snell & Co. ; shops and flats, Marylebone Road, for Mr. M. de Metz ; shops, flats and block of houses, Weymouth Street, for Messrs. Guy, Morgan and Partners ; flats, Cochrane Street, for Messrs. A. Savill and Sons ; flats, Cochrane Street, for Mr. A. F. Benjamin ; shops and offices, Baker Street, Paddington Street and Chiltern Street, for Messrs. J. Stanley Beard and Bennett.

WANSTEAD. *Houses, etc.* Plans passed by the Wanstead U.D.C. : Eight houses, 87-101 Worcester Crescent : 15 houses, Ellesmere Close ; 24 flats, Hermon Hill, corner of Cranbourne Avenue ; 110 houses, Roding Farm Estate.

WEMBLEY. *Factory.* Celotex, Ltd., are to erect a factory at Wembley.

SOUTHERN COUNTIES

BOURNEMOUTH. *Houses, etc.* Plans passed by the Bournemouth Corporation : Six houses, The Avenue, Mr. B. B. Burt ; 28 flats and house, "Steyne," Manor Road, Mrs. L. Rowley ; six shops and six flats, Wimborne Road, Winton Broadway, Ltd.; 22 bungalows, Dowland Road, Mr. W. Reakes.

BOURNEMOUTH. *Hospital.* The Bournemouth Corporation is considering plans by the borough engineer for the erection of isolation hospital buildings on the West Howe site, containing 124 beds, with provision for an extension to accommodate 122 additional beds.

BRADMORE GREEN. *School.* The Surrey Education Committee is to proceed with the erection of a secondary school for girls at Bradmore Green.

DARTFORD. *Houses, etc.* Plans passed by the Dartford Corporation : Six houses, Ashen Drive, Cooper Estates, Ltd. ; eight houses, Chastilian Road, Mr. W. Heale ; 16 houses, Seaton Road, Ashleigh Estates, Ltd.; 20 houses, Marcus Road, Lennox Estates, Ltd. ; eight houses, Chastilian Road, J. H. Brewster, Ltd. ; 24 bungalows, James Road, Mr. J. B. Heale ; six houses, Heather Drive, Mr. C. H. Mundy.

DARTFORD. *Housing.* The Dartford Corporation is purchasing 12 acres in Princes Road for housing purposes.

SANDERSTEAD. *Houses.* Plans passed at Sanderstead : 14 houses, Ingham Close, Selsdon, H. Ryan, Ltd.

SWANSCOMBE. *Houses.* The Swanscombe B.C. is considering schemes for the erection of 36 houses on the clearance area, 26 in Knockhall Road, and 20 in Mounts Road.

SOUTH-WESTERN COUNTIES

PAIGNTON. *Bathing Pool.* The Paignton U.D.C. is to acquire property on the foreshore for the construction of a bathing pool.

EASTERN COUNTIES

LOWESTOFT. *Telephone Exchange.* H.M. Office of Works is to erect a telephone exchange in Surrey Street, Lowestoft.

NORWICH. *School.* The Norwich Education Committee is to erect a senior boys' school at Catton, at a cost of £27,136, by direct labour.

YARMOUTH. *Pavilion.* The Yarmouth Corporation is to erect a pavilion at Wellesley recreation ground, at a cost of £3,000.

YARMOUTH. *Library.* The Yarmouth Corporation is to erect a branch library at Newtown, at a cost of £4,000.

YARMOUTH. *Houses.* Plans passed by the Yarmouth Corporation : 52 houses, Lowestoft Road, Gorleston, The Stradbroke Estate, Ltd.

MIDLAND COUNTIES

HANLEY. *Houses.* Plans passed at Hanley : 12 houses, Fenton Road, for Mr. J. Berresford ; six houses off North Street, for Northmere Building Co.

SEDGLEY. *Houses, etc.* Plans passed by the Sedgley U.D.C. : Six houses, Ward Road, Mr. S. F. Pope ; nine houses, Jeremy Road and Rosemary Crescent, Messrs. Brookes and Son; 10 houses, Dudding Road, Washbourne Bros.

SEDGLEY. *Swimming baths, etc.* The Sedgley U.D.C. is to prepare a scheme for the provision of swimming baths, gymnasium and other appurtenances.

SPALDING. *Market Extension.* The Spalding U.D.C. is to enlarge the market, at a cost of £22,234.

STAFFORDSHIRE. *School.* The Staffordshire Education Committee is to provide a new public elementary school in the parish of Barlaston.

STOKE-ON-TRENT. *Market Hall, etc.* The Stoke-on-Trent Corporation has approved plans by the chief architect for the conversion of the Hanley General Market into an up-to-date market and for the extension of the Market Hall, at a cost of £16,500.

NORTHERN COUNTIES

BOLTON. *Houses.* The Bolton Corporation is to erect 34 additional houses at Willows Lane Estate, by direct labour, at a cost of £15,208.

BRADFORD. *Extension to Baths, etc.* The Bradford Corporation has obtained sanction to borrow £20,338 for the extension and modernization of the Lister Park open-air baths.

CARLISLE. *Houses.* The Carlisle Corporation is to erect 76 houses at Montreal Street and 148 houses at Currock Park.

CARLISLE. *Hospital Block.* The Carlisle Corporation has approved plans of the new twelve-bed cubicle block and operating theatre to be erected at the infectious diseases hospital.

CARLISLE. *School.* The Carlisle Education Committee has appointed the borough engineer as architect for the Catholic school to be erected at Currock.

CONGLETON. *School Extension.* The Congleton Education Committee is to extend the council school at a cost of £12,950.

GANTON. *Wireless Station.* The Air Ministry is to erect a wireless station at Ganton, Yorkshire.

WALES

SWANSEA. *Cinema.* The Swansea Watch Committee has agreed to grant a licence to the Manor Cinema (Swansea), Ltd., for a cinema to be erected at Bohun Street, Manselton.

SWANSEA. *Dwellings.* The Swansea Corporation is to erect, by direct labour, 143 dwellings at Townhill, at £48,510 8s., 142 dwellings at Townhill at £50,250 10s., and 214 dwellings at Hanover Square, at £75,933 3s.

THE BUILDINGS ILLUSTRATED

HENDON METHODIST CHURCH (pages 647–650). Architects : Welch and Lander. The general contractors were Pitchers, Ltd., and the sub-contractors and suppliers included : Brick Makers and Factors, bricks ; Trussed Concrete Steel Co., Ltd., reinforced concrete ; Haywards, steelwork ; Mellowes & Co., windows ; Jos. F. Ebner, floors (wood block) ; Stuart's Granolithic Co., grano and precast paving ; Alpha Electrical Co., electrical work ; Holophane, Ltd., and Best and Lloyd, Ltd., electrical fittings ; London Pipeless Heating Co., and T. S. Knight, heating ; Spiers & Co., ironmongers ; Patent Impermeable Millboard, wallboard ; Newalls Insulation Co., acoustic plaster ; J. Wippell & Co., pews ; Allen (Oxford), chancel furnishing ; Roberts Adlard & Co., slate ; Wm. Hill & Son & Norman and Beard, Ltd., organ; Ewart and Son, Ltd., ventilators ; Pinchin Johnson & Co., paint ; Eric Munday and Wm. Pickford, bronze plates ; Christopher Webb, stained glass windows.

HOUSE AT BREDON, WORCS. (pages 651–652). Architect : Geoffrey Boumphrey. Consulting Architect : F. R. S. Yorke. The general contractors were Espley & Co., and the sub-contractors and suppliers included : Ruberoid Co., Ltd., roofing and terraces ; Chance Bros. & Co., Ltd., cross-reeded Georgian wired glass ; Haywood, Ltd., patent glazing "Reform" ; Venetian Flooring Co., patent flooring and stairtreads ; Ideal Boilers and Radiators, Ltd., "Cookanheat" stoves ; Troughton and Young, electric light fixtures ; Walpamur & Co., Ltd., Walpamur on external brickwork ; Dryad Metal Works, door furniture ; Williams and Williams, Ltd., casements ; Farmington Stone Quarries, mantels.

Current Prices for Measured Work are held over from this week's issue; they will be resumed next week.

RATES OF WAGES

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

			I. s.	I. d.	II. s.	II. d.
A	ABERDARE ...	S. Wales & M.	1	7	1	2½
A	Aberdeen ...	Scotland	1	7	1	2½
A_1	Abergavenny ...	S. Wales & M.	1	6½	1	2
A_2	Abingdon ...	S. Counties	1	5½	1	1½
A	Accrington ...	N.W. Counties	1	7	1	2½
A_2	Addlestone ...	S. Counties	1	6	1	1½
A	Adlington ...	N.W. Counties	1	7	1	2½
A	Airdrie ...	Scotland	*1	7	1	2½
C	Aldeburgh ...	E. Counties	1	3	0	11½
A	Altrincham ...	N.W. Counties	1	7	1	2½
B_2	Appleby ...	N.W. Counties	1	3½	0	11½
A	Ashton-under-Lyne	N.W. Counties	1	7	1	2½
B	Aylesbury ...	S. Counties	1	5	1	0½
B	BANBURY ...	S. Counties	1	5	1	0½
B_1	Bangor ...	N.W. Counties	1	4½	1	0½
A_2	Barnard Castle	N.E. Coast	1	5½	1	1½
A	Barnsley ...	Yorkshire	1	7	1	2½
B	Barnstaple ...	S.W. Counties	1	5	1	0½
A	Barrow ...	N.W. Counties	1	7	1	2½
A	Barry ...	S. Wales & M.	1	7	1	2½
B	Basingstoke ...	S.W. Counties	1	5	1	0½
A_2	Bath	S.W. Counties	1	6	1	1½
A	Batley ...	Yorkshire	1	7	1	2½
A_2	Bedford ...	E. Counties	1	6	1	1½
A_2	Berwick-on-Tweed	N.E. Coast	1	6	1	1½
A_2	Bewdley ...	Mid. Counties	1	6	1	1½
B	Bicester ...	S. Counties	1	5	1	0½
	Birkenhead ...	N.W. Counties	*1	8	1	3
A	Birmingham ...	Mid. Counties	1	7	1	2½
A_1	Bishop Auckland	N.E. Coast	1	6½	1	2
A	Blackburn ...	N.W. Counties	1	7	1	2½
A	Blackpool ...	N.W. Counties	1	7	1	2½
A	Blyth	N.E. Coast	1	7	1	2½
B	Bognor ...	S. Counties	1	5	1	0½
A	Bolton ...	N.W. Counties	1	7	1	2½
A_2	Boston ...	Mid. Counties	1	5½	1	1½
A_2	Bournemouth...	S. Counties	1	6	1	1½
B_2	Bovey Tracey	S.W. Counties	1	4	1	0
A	Bradford ...	Yorkshire	1	7	1	2½
A_1	Brentwood ...	E. Counties	1	6½	1	2
A	Bridgend ...	S. Wales & M.	1	7	1	2½
B	Bridgwater ...	S.W. Counties	1	5	1	0½
A_1	Bridlington ...	Yorkshire	1	6½	1	2
A	Brighouse ...	Yorkshire	1	7	1	2½
A	Brighton ...	S. Counties	1	6	1	1½
A	Bristol ...	S.W. Counties	1	7	1	2½
B	Brixham ...	S.W. Counties	1	5	1	0½
A	Bromsgrove ...	Mid. Counties	1	7	1	2½
B	Bromyard ...	Mid. Counties	1	5	1	0½
A	Burnley ...	N.W. Counties	1	7	1	2½
A	Burslem ...	Mid. Counties	1	7	1	2½
A	Burton-on-Trent	Mid. Counties	1	7	1	2½
A	Bury	N.W. Counties	1	7	1	2½
A_1	Buxton ...	N.W. Counties	1	6½	1	2
A_2	CAMBRIDGE	E. Counties	1	6½	1	2
B_1	Canterbury ...	S. Counties	1	4½	1	0½
A	Cardiff ...	S. Wales & M.	1	7	1	2½
A	Carlisle ...	N.W. Counties	1	7	1	2½
B	Carmarthen ...	S. Wales & M.	1	5	1	0½
B	Carnarvon ...	N.W. Counties	1	5	1	0½
A_1	Carnforth ...	N.W. Counties	1	7	1	2½
A	Castleford ...	Yorkshire	1	7	1	2½
A_2	Chatham ...	S. Counties	1	5½	1	1½
A_2	Chelmsford ...	E. Counties	1	5½	1	1½
A_2	Cheltenham ...	S.W. Counties	1	5½	1	1½
A	Chester ...	N.W. Counties	1	7	1	2½
A	Chesterfield ...	Mid. Counties	1	7	1	2½
B	Chichester ...	S. Counties	1	5	1	0½
A	Chorley ...	N.W. Counties	1	7	1	2½
B_1	Cirencester ...	S. Counties	1	4½	1	0½
A	Clitheroe ...	N.W. Counties	1	7	1	2½
A	Clydebank ...	Scotland	1	7	1	2½
A	Coalville ...	Mid. Counties	1	7	1	2½
A_2	Colchester ...	E. Counties	1	6	1	1½
A_1	Colne	N.W. Counties	1	6½	1	2
A_2	Colwyn Bay ...	N.W. Counties	1	6	1	1½
A_1	Consett ...	N.E. Coast	1	6½	1	2
A_2	Conway ...	N.W. Counties	1	6	1	1½
A	Coventry ...	Mid. Counties	1	7	1	2½
A_2	Crewe	N.W. Counties	1	6	1	1½
A_2	Cumberland ...	N.W. Counties	1	5½	1	1½
A	DARLINGTON	N.E. Coast	1	7	1	2½
A	Darwen ...	N.W. Counties	1	7	1	2½
B_1	Deal	S. Counties	1	4½	1	0½
A_2	Denbigh ...	N.W. Counties	1	5½	1	1½
A	Derby	Mid. Counties	1	7	1	2½
A	Dewsbury ...	Yorkshire	1	7	1	2½
B	Didcot ...	S. Counties	1	5	1	0½
A	Doncaster ...	Yorkshire	1	7	1	2½
B_1	Dorchester ...	S.W. Counties	1	4½	1	0½
A_2	Driffield ...	Yorkshire	1	5½	1	1½
A_2	Droitwich ...	Mid. Counties	1	6	1	1½
A	Dudley ...	Mid. Counties	1	7	1	2½
A_2	Dumfries ...	Scotland	1	6	1	1½
A	Dundee ...	Scotland	1	7	1	2½
A	Durham ...	N.E. Coast	1	7	1	2½
A_2	EASTBOURNE	S. Counties	1	6	1	1½
A_1	Ebbw Vale ...	S. Wales & M.	1	6½	1	2
A	Edinburgh ...	Scotland	1	7	1	2½
A	Exeter ...	S.W. Counties	*1	6	1	1½
B	Exmouth ...	S.W. Counties	1	5	1	0½
A_2	FELIXSTOWE	E. Counties	1	5½	1	1½
A_2	Filey	Yorkshire	1	5½	1	1½
A	Fleetwood ...	N.W. Counties	1	7	1	2½
B_1	Folkestone ...	S. Counties	1	4½	1	0½
A	Frodsham ...	N.W. Counties	1	7	1	2
B_2	Frome ...	S.W. Counties	1	4	1	0
A	GATESHEAD	N.E. Coast	1	7	1	2½
B	Gillingham ...	S. Counties	1	5	1	0½
A_1	Glamorgan-shire, Rhondda Valley District	S. Wales & M.	1	6½	1	2
A	Glasgow ...	Scotland	1	7	1	2½
A_2	Gloucester ...	S.W. Counties	1	6	1	1½
A_2	Goole	Yorkshire	1	6	1	1½
A_2	Gosport ...	S. Counties	1	6	1	1½
A_2	Grantham ..	Mid. Counties	1	5½	1	1
A_1	Gravesend ...	S. Counties	1	6½	1	2
A	Greenock ...	Scotland	*1	7	1	2
A	Grimsby ...	Mid. Counties	1	7	1	2
B	Guildford ...	S. Counties	1	5	1	0
A	HALIFAX ...	Yorkshire	1	7	1	2½
A	Hanley ...	Mid. Counties	1	7	1	2½
A	Harrogate ...	Yorkshire	1	7	1	2½
A	Hartlepools ...	N.E. Coast	1	7	1	2½
B	Harwich ...	E. Counties	1	5	1	0½
B	Hastings ...	S. Counties	1	5	1	0½
A_2	Hatfield ...	S. Counties	1	6	1	1½
B	Hereford ...	S.W. Counties	1	5	1	0½
A_2	Hertford ...	E. Counties	1	6	1	1½
A	Heysham ...	N.W. Counties	1	7	1	2½
A	Howden ...	N.E. Coast	1	7	1	2½
A	Huddersfield ...	Yorkshire	1	7	1	2½
A	Hull	Yorkshire	1	7	1	2½
A	ILKLEY ...	Yorkshire	1	7	1	2½
A	Immingham ...	Mid. Counties	1	7	1	2½
A_2	Ipswich ...	E. Counties	1	6	1	1½
B_2	Isle of Wight ...	S. Counties	1	4	1	0
A	JARROW ...	N.E. Coast	1	7	1	2½
A	KEIGHLEY ...	Yorkshire	1	7	1	2½
A_2	Kendal ...	N.W. Counties	1	5½	1	1½
A_2	Keswick ...	N.W. Counties	1	5½	1	1½
A_1	Kettering ...	Mid. Counties	1	6½	1	2
A_2	Kidderminster	Mid. Counties	1	6	1	1½
B_1	King's Lynn ...	E. Counties	1	4½	1	0½
A	LANCASTER ...	N.W. Counties	1	7	1	2½
A_1	Leamington ...	Mid. Counties	1	6½	1	2
A	Leeds	Yorkshire	1	7	1	2½
A	Leek	Mid. Counties	1	7	1	2½
A	Leicester ...	Mid. Counties	1	7	1	2½
A	Leigh	N.W. Counties	1	7	1	2½
B	Lewes	S. Counties	1	5	1	0½
A_2	Lichfield ...	Mid. Counties	1	6	1	1½
A	Lincoln ...	Mid. Counties	1	7	1	2½
	Liverpool ...	N.W. Counties	*1	8½	1	3½
A_2	Llandudno ...	N.W. Counties	1	6	1	1½
A	Llanelly ...	S. Wales & M.	1	7	1	2½
	London (12-miles radius)		1	8½	1	3½
	Do. (12-15 miles radius)		1	8	1	3
A	Long Eaton ...	Mid. Counties	1	7	1	2½
A	Loughborough	Mid. Counties	1	7	1	2½
A_1	Luton	E. Counties	1	6½	1	2
A	Lytham ...	N.W. Counties	1	7	1	2½
A_1	MACCLESFIELD	N.W. Counties	1	6½	1	2
A_2	Maidstone ...	S. Counties	1	5½	1	1½
A_2	Malvern ...	Mid. Counties	1	5½	1	1½
A	Manchester ...	N.W. Counties	1	7	1	2½
A	Mansfield ...	Mid. Counties	1	7	1	2½
B_1	Margate ...	S. Counties	1	4½	1	0½
A_2	Matlock ...	Mid. Counties	1	5½	1	1½
A_1	Merthyr ...	S. Wales & M.	1	6½	1	2
A	Middlesbrough	N.E. Coast	1	7	1	2½
A_2	Middlewich ...	N.W. Counties	1	6	1	1½
B_2	Minehead ...	S.W. Counties	1	4	1	0
B_2	Monmouth & S. and E. Glamorganshire	S. Wales & M.	1	4	1	0
A	Morecambe ...	N.W. Counties	1	7	1	2½
A_2	NANTWICH ...	N.W. Counties	1	6	1	1½
A	Neath	S. Wales & M.	1	7	1	2½
A	Nelson ...	N.W. Counties	1	7	1	2½
A	Newcastle ...	N.E. Coast	1	7	1	2½
A	Newport ...	S. Wales & M.	1	7	1	2½
A	Normanton ...	Yorkshire	1	7	1	2½
A	Northampton	Mid. Counties	1	7	1	2½
A	North Shields...	N.E. Coast	1	7	1	2½
A	North Staffs ...	Mid. Counties	1	7	1	2½
A_1	Norwich ...	E. Counties	1	6½	1	2
A	Nottingham ...	Mid. Counties	1	7	1	2½
A	Nuneaton ...	Mid. Counties	1	7	1	2½
A_2	OAKHAM ...	Mid. Counties	1	5½	1	1½
A	Oldham ...	N.W. Counties	1	7	1	2½
A_2	Oswestry ...	N.W. Counties	1	5½	1	1½
A_1	Oxford ...	S. Counties	1	6½	1	2
A	PAISLEY ...	Scotland	*1	7	1	2
B_2	Pembroke ...	S. Wales & M.	1	3½	0	11½
A	Perth	Scotland	*1	7	1	2½
A_1	Peterborough ...	E. Counties	1	6½	1	2
A	Plymouth ...	S.W. Counties	*1	7	1	2½
A	Pontefract ...	Yorkshire	1	7	1	2½
A_1	Pontypridd ...	S. Wales & M.	1	6½	1	2
A_2	Portsmouth ...	S. Counties	1	6	1	1½
A	Preston ...	N.W. Counties	1	7	1	2½
A	QUEENSFERRY	N.W. Counties	1	7	1	2½
A_2	READING ...	S. Counties	1	6½	1	2
B	Reigate ...	S. Counties	1	5½	1	1½
A_2	Retford ...	Mid. Counties	1	5½	1	1½
A_1	Rhondda Valley	S. Wales & M.	1	6½	1	2
A_2	Ripon	Yorkshire	1	5½	1	1½
A	Rochdale ...	N.W. Counties	1	7	1	2½
B	Rochester ...	S. Counties	1	5	1	0½
A_1	Ruabon ...	N.W. Counties	1	6½	1	2
A	Rugby ...	Mid. Counties	1	7	1	2½
A_2	Rugeley ...	Mid. Counties	1	6	1	1½
A	Runcorn ...	N.W. Counties	1	7	1	2½
A_1	ST. ALBANS ...	E. Counties	1	6½	1	2
A	St. Helens ...	N.W. Counties	1	7	1	2½
B_2	Salisbury ...	S.W. Counties	1	3½	0	11½
A_1	Scarborough ...	Yorkshire	1	6½	1	2
A	Scunthorpe ...	Mid. Counties	1	7	1	2½
A	Sheffield ...	Yorkshire	1	7	1	2½
A	Shipley ...	Yorkshire	1	7	1	2½
A_2	Shrewsbury ...	Mid. Counties	1	6	1	1½
A_2	Skipton ...	Yorkshire	1	6	1	1½
A_2	Slough ...	S. Counties	1	6	1	1½
A_1	Solihull ...	Mid. Counties	1	6½	1	2
A_2	Southampton...	S. Counties	1	6	1	1½
A_1	Southend-on-Sea	E. Counties	1	6½	1	2
A	Southport ...	N.W. Counties	1	7	1	2½
A	S. Shields ...	N.E. Coast	1	7	1	2½
A_1	Stafford ...	Mid. Counties	1	6½	1	2
A	Stirling ...	Scotland	1	7½	1	2½
A	Stockport ...	N.W. Counties	1	7	1	2½
A	Stockton-on-Tees	N.E. Coast	1	7	1	2½
A	Stoke-on-Trent	Mid. Counties	1	7	1	2½
B	Stroud ...	S.W. Counties	1	5	1	0½
A	Sunderland ...	N.E. Coast	1	7	1	2½
A	Swansea ...	S. Wales & M.	1	7	1	2½
A_2	Swindon ...	S.W. Counties	1	5½	1	1½
A_1	TAMWORTH ...	N.W. Counties	1	6½	1	2
B	Taunton ...	S.W. Counties	1	5	1	0½
A	Teesside Dist....	N.E. Counties	1	7	1	2½
A_2	Teignmouth ...	S.W. Coast	1	6	1	1½
A	Todmorden ...	Yorkshire	1	7	1	2½
A_1	Torquay ...	S.W. Counties	1	6½	1	2
B_2	Truro	S.W. Counties	1	4	1	0
A_2	Tunbridge Wells	S. Counties	1	5½	1	1½
A	Tunstall ...	Mid. Counties	1	7	1	2½
A	Tyne District....	N.E. Coast	1	7	1	2½
A	WAKEFIELD	Yorkshire	1	7	1	2½
A	Walsall ...	Mid. Counties	1	7	1	2½
A	Warrington ...	N.W. Counties	1	7	1	2½
A_1	Warwick ...	Mid. Counties	1	6½	1	2
A_1	Wellingborough	Mid. Counties	1	6½	1	2
A	West Bromwich	Mid. Counties	1	7	1	2½
A_2	Weston-s.-Mare	S.W. Counties	1	6	1	1½
A_2	Whitby ...	Yorkshire	1	6	1	1½
A	Widnes ...	N.W. Counties	1	7	1	2½
A	Wigan ...	N.W. Counties	1	7	1	2½
B	Winchester ...	S. Counties	1	5	1	0½
A_2	Windsor ...	S. Counties	1	6	1	1½
A	Wolverhampton	Mid. Counties	1	7	1	2½
A_2	Worcester ...	Mid. Counties	1	6	1	1½
A_2	Worksop ...	Yorkshire	1	5½	1	1½
A_1	Wrexham ...	N.W. Counties	1	6½	1	2
A_2	Wycombe ...	S. Counties	1	5½	1	1½
B	YARMOUTH ...	E. Counties	1	5	1	0½
B	Yeovil ...	S.W. Counties	1	5	1	0½
A	York	Yorkshire	1	7	1	2½

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

The rates for every trade in any given area will be sent on request. The rates of wages have been revised consequent upon the increase in wages which came into operation on February 1, together with all revisions following authorized annual regradings.