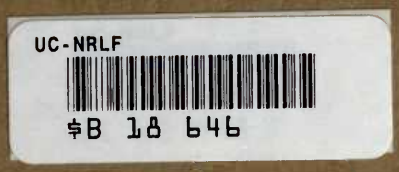

SECOND EDITION

LABOUR SAVING IN SMALL HOUSES

Being the Report of an inquiry made by a Sub-Committee of the Women's Section of the Garden Cities and Town-Planning Association

Contents

THE GARDEN CITIES AND TOWN-PLANNING ASSOCIATION
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Labour Saving in Small Houses

Being an inquiry into the attempts to save labour in small houses built since the war, made by a Sub-Committee of the Women's Section of the Garden Cities and Town-Planning Association.

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ACKNOWLEDGMENTS

The following is a list of those to whom the Sub-Committee desires to express its gratitude for much help and information which it has received:

The Association of Teachers of Domestic Subjects. The Manchester Women's Citizen Association. The National Gas Council. The Staff of the Gas Light and Coke Company. The Staff of the South Metropolitan Gas Company. The Staff of the National Training College of Domestic Subjects. Mr. A. H. Barker, B.A., B.Sc., Lecturer in Heating and Lighting Engineering, University College. Miss Buck, Secretary, Association of Teachers of Domestic Subjects. Miss Helen Edden, Women's Advisory Staff, Gas Light and Coke Company. Dr. Margaret White Fishenden. Miss Marion Fitzgerald, Associate R.S.I. Mr. A. Stokes, South Metropolitan Gas Company. Mr. W. A. Young, Member of the staff of the *Ironmonger*. And many others who have kindly placed their expert knowledge and experience at the service of the Sub-Committee.

Much of the information obtained, though useful, is too detailed to be suitable for insertion in this Report; but the Hon. Secretary will be glad to answer any inquiries addressed to her at the office of the Association, 3, Gray's Inn Place, Gray's Inn, W.C.1.

PURPOSE

The purpose of the Sub-Committee has been—

(*a*) To make inquiries concerning the usefulness and practical value of labour-saving devices and arrangements, such as are now supplied to small houses of the kind built for Housing Authorities and Public Utility Societies; and in addition to examine the relative value of such fittings as gas cookers, which may be supplied by the tenant, either bought by him or, as is more frequently the case, provided by the Gas Supply Company.

(*b*) To consider the best means of putting buyers in touch with firms supplying types of fittings deemed desirable from a labour-saving point of view.

I. General Inquiry

Method of Procedure.—This has included consultations with experts, both personally and by letter, and help has been obtained from other Associations able to give expert assistance and in possession of special information.

An illustrated folio or classified collection of advertisements has been compiled containing particulars of all the labour-saving devices and arrangements which could be discovered, suitable for small servantless houses, to serve as a book of reference and source of information to the Sub-Committee when discussing the relative merits of different types of apparatus (see p. 2).

Cooking, Heating, and Hot Water Supply.—This, as the most pressing and difficult problem, received first attention. Electricity for heating, cooking, and hot-water supply is so expensive at present, except in one or two districts, that it is not possible to instal it in small houses. The Sub-Committee decided to defer the consideration of these appliances until a later date, depending upon information being received as to the possibility of electricity becoming cheap enough in the near future to be used by people with small incomes.

Efficiency Tests.—The question of cost is a most important factor, as the very people who are most in need of labour-saving appliances are least able to pay for them. Efficiency in labour saving, therefore, cannot be considered apart from expense. The landlord's point of view is also important; therefore durability and cost of installation must

* Resigned, March 9th, 1922, owing to ill-health.

be remembered. With this idea in mind the question of fuel-costing tests was considered. It was found to be an exceedingly difficult matter to test the relative cost of cooking with different patterns of stoves, and the advice of experts was sought.

Mr. A. H. Barker kindly attended a meeting at which the subject was discussed. He expressed the view that only laboratory tests could be relied upon. The Sub-Committee agreed, and decided that it would not be possible to organize such tests. Laboratory tests are now being made by the Fuel Research Board, but the results as regards individual patterns of stoves are not published.

Selection Points.—Having abandoned the idea of fuel-costing tests, some other means of securing the same object was sought, and it was decided to set a standard of efficiency for each type of appliance, taking into account (*a*) labour-saving qualities, (*b*) durability, (*c*) fuel economy, and to express this standard in a series of selection points for the guidance of manufacturers and buyers.

Illustrated Folio.—The problems involved in carrying out the second part of the terms of reference have been very carefully considered by the Sub-Committee. Although it is very desirable to bring buyers and sellers of labour-saving arrangements into touch with one another by some more satisfactory means than that of advertisement, it considers that it is inadvisable from every point of view for it to undertake the responsibility of recommendation. The Sub-Committee, therefore, suggests that the illustrated folio, compiled for its own use, be added to the library of the Association, where it will be available for any interested person who may wish to see it. The intention is that it should always be kept up to date, and thus offer a collection in handy form of advertisements of the fittings on the market, classified according to type, with the names and addresses of the vendors or makers; it includes also particulars of some Continental appliances. *This folio would be in no sense a recommended list*, but merely a directory, the completeness of which could not be guaranteed, though every effort has been and should be made to make it as comprehensive and helpful as possible. Those who consulted it would be advised to write to the vendors for illustrated catalogues.

Visits of Inquiry.—It was considered advisable to collect information concerning labour-saving experiments already made, and a list of Housing Schemes was compiled for this purpose. It was decided that, where possible, visits would be much better than letters of inquiry. The Association of Teachers of Domestic Subjects kindly helped the Honorary Secretary in this project, and members living near experimental schemes in various parts of the country have visited them and sent reports. In some cases where visits were not possible, the secretaries of schemes have written in reply to a circular letter. In all, twenty schemes have been visited, and reports have been received from the secretaries of five others.

Although primarily intended to discover the satisfactoriness or otherwise of labour-saving fittings, particularly cooking stoves and their fuel consumption, *the most interesting result of the inquiry has been the information gained as to the use which is made of the different rooms, and the significance of house design as a factor in saving labour.*

Generally speaking, the greater number of new houses, though well planned and a great improvement in many ways on the old, still leave much to be desired in their labour-saving arrangements. The most important piece of labour-saving apparatus is the house itself, and if this is wrongly planned mistakes cannot afterwards be rectified by the introduction of labour-saving fittings. *The secret of labour saving is to be found in the elimination of the need for work* rather than in the provision of so-called labour-saving devices, for indeed many of these appliances create more work than they save. A proper equipment of shelves and cupboards *in their right places* may save considerably more work than an expensive fitting, and the same applies to the position of sink, drainer, and cooking stove.

A thorough training in housewifery is necessary to enable the home organizer to do her work to the best advantage and with the least trouble, but no training, however excellent, will enable her to conquer the structural difficulties of a house which is wrongly planned. No houses have been visited which did not admit of improvement in this respect. This is partly due to the need for economy, yet a labour-saving house is not necessarily an expensive one to build, especially if the labour-saving point of view

is adopted in the early stages of the design. Expenditure, no matter of what amount, is always limited ; the question of cost, therefore, cannot be neglected under any circumstances. True economy lies not only in spending little, but in laying out the available funds to the best advantage. In all the houses visited, much more comfort and convenience might have been secured for the same amount of money, had there been a more intimate knowledge on the part of the architects, builders, and housing committees of the manner of life of the prospective tenants, and the duties of the home-organizer. The combination grate is a case in point : generally it is used merely as a sitting-room grate, but costs about three times as much as the ordinary type to buy and fix. Shelves are another example; there are never enough, yet as many as could possibly be needed would cost less than the unwanted dresser in the living-room. Modern systems of motion study and costing have shown the immense importance of placing centres of activity, such as the sink or cooking stove in their right relation to one another. It need cost no more in money to place doors, shelves, sink, etc., aright—all that is needed is knowledge and forethought.

There is a marked tendency to use the kitchen living-room solely as a sitting-room, and to do all the work possible in the scullery. There are exceptions to this ; but they are few, and likely to be less, as the change indicates a rise in the standard of living. Houses are not built for the needs of the present moment only, but will be in use for sixty years and more, therefore this tendency should be taken into consideration and houses built and fitted in accordance with it.

The popularity of the combination grate is largely due to this tendency. In spite of the fact that there are flues which must be cleaned if it is used, housewives like it, not because it is more efficient than the kitchener, but because it makes the room look more like a sitting-room, and because the only alternative offered is the ugly range. In any case, they seldom use either for cooking, not because they are unsatisfactory, but because they are placed in the living-room. The gas cooker may owe some of its popularity to this tendency, as it is always fitted in the scullery. There are tenants who prefer to cook by a coal fire, yet use a gas cooker simply because it is not in the living-room.

The old-fashioned built-in kitchen range is universally unpopular, and the idea that it is economical for small households has been exploded by the Report of the Building Materials Research Committee (see *Tests on Ranges and Cooking Apparatus,* by A. H. Barker, B.A., B.Sc., H.M. Stationery Office). On the whole there are good grounds for asserting that to separate the functions of heating, cooking, and hot-water supply, particularly in small households, need cost no more in fuel, while as regards the resulting increased comfort, convenience, and efficiency there is no doubt whatever (see p. 7).

As the sensible housewife now invariably makes the scullery her workshop, more attention should be paid to its arrangements for health, convenience, and comfort.

As regards health, draughts cannot be prevented, but they should not cut across centres of activity, such as the sink or cooker. None of the houses visited had any special means of removing the products of combustion from the gas cooker, which is used constantly, although all gas wash-boilers, which are only used once a week, were provided with a flue as a matter of course. There are special regulations regarding gas stoves in factories and workshops, and the products of combustion must not detrimentally affect the air of the workroom. The organization of the home is our largest industry, and the health of the family depends upon the health of the housewife. Good working conditions in the scullery, or "home workshop," are, therefore, as least as important as in any factory, and some special means of ventilation other than the window should therefore be provided where the cooking is done in the scullery (see p. 8).

With regard to convenience, attention to detail is sadly lacking in the new houses. Doors, for instance, are often in awkward positions ; the place where the gas supply pipe enters the house frequently settles the position of the gas cooker, regardless of comfort or convenience ; shelves in the scullery are almost invariably too high, and are seldom near enough to the sink to be convenient for putting pans and crockery away, while the slot meter is usually placed upon the highest.

Regarding comfort, some means of warming the scullery other than the gas cooker would be a great advantage, and would also be useful for airing and drying clothes.

Storage accommodation is deficient in the new houses. A good storeroom is badly needed, but a large larder with no separate storage place for perishable food is a mistake. Butter, milk, and other perishable articles of diet are not improved by being kept in the same place with a miscellaneous collection of spare crockery, empty bottles and jam pots, grocery stores, and anything else for which no other place can be found.

Washing Machines.—Laundry work is the heaviest work of the house, and to it and to the arrangements desirable in connection with it the Sub-Committee has given a good deal of thought. Wash-tubs with hot and cold water supply and connections with the drain, and a copper similarly equipped, will do a great deal to lighten the work. Inquiry showed that although the usual makes of washing machines are so expensive as to be quite impossible for the household of small means, there are on the market a few less expensive machines made on the percolator principle, and it was arranged for one to be tested at a well-known training college of domestic science, which reports as follows :

We find the . . . very satisfactory, if the following points are observed :

1. *Tepid* water should be put in and the water gradually brought to boiling point.
2. The dirty parts of the clothes should be *rubbed* a little before putting them in.
3. The clothes should be much more thoroughly *rinsed* than when boiled in a copper.

The . . . is specially useful for shirts, collars and cuffs, as it removes the cold water starch.

The apparatus costs about the same as an ordinary gas copper, and can be used for the same purpose, as well as acting as a washing machine. The internal percolator fitting might be adapted by the makers for use in existing coppers, which would have the added advantage of a steam escape and flue pipe.

Average Consumption of Fuel.—A.—Coal. An effort has been made to discover the quantity of coal used weekly in a typical working-class household, the usual quantities in which it is bought, and the amount of storage accommodation needed ; and for this purpose inquiries have been made from the housewives visited (see Appendix, Schemes 12, 15, 16, 17, and 19), and also from coal merchants and representative co-operative societies. From the housewives anything more than an estimate was extremely difficult to obtain, except in the case of those who bought their supplies weekly. The figures arrived at by the Sub-Committee refer to the normal expenditure by a superior artisan family sufficiently well off to afford the rents usually charged for State-aided houses. It would seem that the amount used is 2 cwt. a week for all purposes, with from ½ to 1 cwt. less in hot weather and from ½ to 1 cwt. more when the weather is cold. This amount does not bear any relation to the fuel capacity of the range : it is merely the amount which the housewife can afford to spend on fuel. Being a necessity of life, the demand for coal is not elastic, and its consumption therefore varies only slightly in relation to its price. Any saving in the quantity used is effected at the cost of efficiency and comfort. The *very* poor, who, however, do not live in the new houses, frequently buy in 7, 14, and 28 lb. bags, in which there is a considerable trade ; coke, also, is sold largely in similar quantities. Coal merchants and co-operative societies endorse the evidence of the housewives, and have also remarked that many people have ceased to buy their coal by the load, and that there is a marked increase in the weekly trade of the trolley merchant. From 65 per cent. to 75 per cent. of co-operative customers buy their coal weekly in small amounts ; while in Birmingham 95 per cent. do this, in spite of the fact that practically all co-operators in that part of the country have coal stores of 1½ to 2 tons capacity.

All co-operative societies and other merchants agree that the most usual quantity *sold at a time* is 2 cwt. less in the four summer months, and for this there are various reasons : (*a*) economy, as less is used if there is only a small quantity in hand ; (*b*) lack of ready money ; (*c*) insufficient storage accommodation ; (*d*) cleanliness and convenience of delivery in bags.

Often a few hundred weight are accumulated and kept in reserve if there is storage room. Even among the fairly well-to-do 5 cwt. is a usual order, and the household, even in the suburbs, which takes more than 3 tons a year is the exception. It would seem, therefore, that a large coal store is seldom necessary in urban districts (see p. 10).

B.—Gas. An idea of the importance of the gas cooker in the London area will be gained from the fact that the highest hourly total rate of consumption is on Sunday morning about noon, when the Sunday dinner is being cooked. At this time no gas is being used either for commercial purposes or for

street or house lighting, and, therefore, the gas cooker, and it is safe to say the gas cooker in the working-class household, is responsible for this enormous extra consumption.

The amount of gas used is much more variable than that of coal. While the kitchen range must be kept burning ready for use when required, whether wanted often or seldom, gas is burned only when needed for actual use.

So many circumstances influence the amount of gas consumption that it is exceedingly difficult to arrive at the most *usual amount* used weekly. The most usual amount may also be the average, but it is by no means certain that it is so. Habits of economy or wastefulness will, of course, affect the amount used, but this consideration is not relevant to the inquiry. The standard of life is the main determining factor, but the number, ages, and occupations of the family, their habits and whether their hours of work and meals synchronize, will also have effect. In twelve typical artisan houses of the same size in the same street, the actual consumption as registered by amounts collected from the slot meter, between June 27th, 1921, and June 14th, 1922, inclusive, varied from 22,700 cub. ft. to 38,000 cub. ft. Thus it is impossible to state that a certain amount per week is usually spent on gas. The following data, however, may be useful in forming an estimate of the probable usual consumption for any particular class or district.

Practically all working-class people are supplied on the automatic or prepayment meter system, and no distinction is made between the charges for lighting and other household purposes, but it may be safely assumed that with the automatic consumer who has a gas cooker, gas for lighting is a third of the total.

The statistics given in *Field's Analysis* show that three-quarters of a million householders in London, served by the three metropolitan gas companies, have gas cookers and/or fires on the automatic system; they consume yearly from 19,500 cub. ft. in one company's district to 23,500 cub. ft. in another's, an average of 21,500 cub. ft. The price of gas is practically the same in each company's area, and this, therefore, does not account for the variation of consumption in each district. In the suburbs, where people on the whole are better off, the average yearly automatic consumption is 23,500 cub. ft., although the cost is a little more. The ordinary suburban consumer, who is moderately well-to-do and therefore pays his bills quarterly, uses twice as much gas as the average automatic consumer in the same district.

Individual consumption varies also according to the time of year, lighting in summer is, of course, less, and so is cooking where all cooking is done by gas throughout the year (see Appendix, Scheme 20); but in the gas companies' total average returns, cooking may appear to be more in summer because many people cease to use the kitchen range during that period. The following is the average quarterly gas consumption per automatic consumer in South London:

Lady Day	...	...	6,624 cubic feet.
Midsummer	...	...	5,023 ,, ,,
Michaelmas	...	...	5,449 ,, ,,
Christmas	...	...	6,561 ,, ,,

These houses are fitted with kitchen ranges, etc., so that an unknown quantity of coal is burnt in addition. In a number of houses built by local authorities since the war, many gas appliances have been installed and the following figures give the approximate yearly gas consumption and the kind of fuel used in each apparatus is stated. The price is charged on the automatic system which includes the hire of all apparatus, and is practically the same in each case. The thermal value of the gas is about 500 B.Th.U. per cub. ft., and the price, roughly, 5s. per 1,000 cub. ft.

Scheme.	Heating.	Copper.	Water Heating.	Lighting.	Cooking.	Approx. Gas Consumption.
A.	Coal	Coal	Coal	Electricity	Gas	13,297
B.	Coal	Coal	Gas	Electricity	Gas	14,265
C.	Coal	Gas	Coal	Electricity	Gas	16,620
D.	Gas and Coal	Gas	Gas	Gas	Gas	21,500
E.	Coal	Coal	Coal	Gas	Gas	21,480
F.	Gas and Coal	Gas	Gas	Electricity	Gas	24,287
G.	Coal	Gas	Gas	Gas	Gas	27,180
H.	Coal	Gas	Gas	Gas	Gas	27,236
I.	Coal	Coal	Gas	Gas	Gas	31,060
J.	Coal	Coal	Gas	Gas	Gas	32,500
K.	Coal	Gas	Gas	Gas	Gas	36,837

There are variations in the amounts of gas used which may depend to some extent upon the weekly wage and consequent standard of life of the class of consumer living in each district. Caution, therefore, is necessary in drawing deductions from these figures, but it would seem that it is possible for the summer and supplementary winter cooking alone to be done with 13,300 cub. ft. yearly, while one might reasonably expect to do everything by gas except warm the house with from 35,000 to 40,000 cub. ft. ; about 1s. 6d. and 4s. per week respectively, with gas at 5s. per 1,000 cub. ft. In this relation the account of Scheme 20 is particularly instructive, though it should be remembered that anyone so methodical as Mrs. X is not likely to be wasteful. (See also Appendix, Schemes 7, 8, and 12.)

All gas consumption for heating and cooking would doubtless be reduced if more efficient fittings and proper insulation were insisted upon.

Insulation.—By the kindness of the Principal of a well-known gas testing laboratory, a test was made which established the importance of a non-conducting interlining for gas ovens. In two otherwise identical gas cookers of the type usually hired on the slot-meter system, one insulated, the other merely lined with enamel sheeting in the ordinary way, two exactly similar dinners were cooked in exactly the same way, at the same time, by the same person, consisting of—

3 lb. topside of beef.
3 lb. potatoes, baked in their jackets.
2 lb. greens, boiled.
1 pint Yorkshire pudding.
3 pints bread-and-butter pudding.

Both dinners turned out equally well, and the time required was the same for each. The amount of gas used was registered by a couple of test meters, and there was a saving of 21 per cent. of gas in the insulated oven, which also was more efficient, as it was not affected to the same extent by variations in heat due to opening the door for observation purposes. The actual amount of gas used was 36.25 cub. ft. in the insulated cooker and 46.2 cub. ft. in the non-insulated.

This experiment is confirmed by the experience of Mrs. X (see Appendix A, Scheme 20). With an insulated cooker her consumption was from 82 to 153 cub. ft. per week, while with an ordinary slot cooker, which was neither lined nor insulated, she used an average of 80 cub. ft. *more than that* per week.

Insulation for hot water cylinders is of the greatest importance. The question of hot water supply is still far from being solved for the household of small means. In the Government Report already mentioned, it is pointed out that the real waste is to be found in the loss of heat *already produced*, and that given an efficiently insulated storage tank enough hot water for an ordinary household for the day can be obtained by burning a small independent boiler *for two hours out of the twenty-four*, with a consumption of about a third of a hundredweight of coke weekly. In addition it has been proved by experiment that a coating of 3 in. of slag wool on the sides and 6 in. over the top of an ordinary 25 gallon hot-water cylinder attached to a kitchen range will keep hot water for thirty hours after the fire is out. Felt and cork composition is the best insulating material now on the market for storage tanks.

By the generosity of one of its members, the Sub-Committee was able to test an American gas cooker imported for the purpose. Though some of the claims made for it were not substantiated, on the whole it did its work well. The oven is well raised on legs, with the hot-plate at the side. The special feature of this cooker is that the oven is insulated, and has a ventilation control lever which closes the air inlet and outlet, at the same time automatically shutting off the gas supply, thus converting it into a fuel-less cooker. There is a thermometer in the door which shows when the temperature has reached the desired degree and to what extent the heat is retained during the completion of the cooking with the lever closed down. The advantages are that food is not burnt and joints do not lose weight, while basting is unnecessary. The disadvantages are that it takes from 30 to 40 minutes to heat the oven, which, in this cooker, loses heat somewhat quickly.

It should, however, be possible to improve the insulation and the action of the ventilation control lever with a very great gain to efficiency.

Comparative Value of Fuels.—A comparison of the money value of different fuels is desirable, but difficult. An accurate estimate of the amount of each kind of fuel required in order to give the same amount of service, comfort and satisfaction in lighting, heating, cooking, and supplying hot water, would solve the problem as to which kind of fuel is

cheapest to use in each district, and would also make it possible to decide at what price one fuel may be considered as equivalent to another. Something more than a comparison of the relative scientific efficiency is wanted: the psychological factors underlying comfort, convenience, and cleanliness must be taken into consideration, and these might, of course, vary from person to person. Practical experiment is being carried out (see Appendix, Scheme 20) by Mr. A. H. Barker.

At a certain police barracks a short while ago the coal ration was converted into a gas ration, and the equivalent amounts, after considerable inquiry and research, were fixed as one ton of coal and 5,800 cub. ft. of gas.

Separation of the Functions of a Kitchen Range.—It is a fallacy to suppose that because a fire is needed for one purpose it will be an economy to use it for other purposes as well. Every function performed by a fire means an addition to the fuel bill. For instance, a boiler for hot water behind any grate will increase the coal consumed by 30 per cent. or more, and this whether hot water is required or not. The same applies to the kitchen range, which is only economical when *all* its functions are being performed *all the time.* It is better, therefore, to separate these functions, and to burn fuel only when required for each separate purpose.

Central Heating and Hot Water Supply.—If the waste heat is utilized from a factory, this is financially practicable, and is found to be efficient; but experiments hitherto made with plant, fuel and labour specially provided for the purpose, have proved too expensive to be generally adopted. For central heating, the system is particularly good, as the water is always of an even temperature. The water supply to each radiator *should be separately controlled.*

Central hot water supply is the most satisfactory system. The water is in constant circulation, consequently there is no waste of time as water flows immediately the tap is turned on. It is absolutely labour-saving, and hot water is obtainable day and night. In two housing schemes where there is a central hot water supply, it has been found that the average daily consumption per household is fifty gallons.

Independent Boiler.—This seems to be the cheapest system of supply yet devised, especially if the two-hour method is adopted as mentioned before (see p. 6).

To secure the efficient working of this method, the hot water system should be so arranged that it is absolutely impossible to draw cold water from it before all the hot water is exhausted; also the pipes should not be circulating pipes, but simple draw-offs from the upper part of the storage tank. Mr. A. H. Barker's experiments have proved that when the storage tank is placed at the highest point of the hot water system with the outlet for hot water at the top and the inlet for cold water at the bottom of it, circulation does not take place either in the tank or pipes, so that the cold water remains at the bottom of the tank and does not readily mix with and cool down the hot.

Water stationary in the pipes will, of course, lose heat, but the loss from this is negligible in comparison with that from constant circulation. The storage tank should be tall, and, if possible, cylindrical in shape, with a capacity of 40 gallons. The insulation should be of felt and cork composition from 2 to 3 in. thick on the sides, and 3 in. on the top of the tank, and should cost about £1. Half a hundredweight of fuel per week is enough for a boiler supplying a storage tank of this size.

This idea has the great merit of cheapness, but it also solves other difficulties. In summer-time the boiler can be lighted last thing at night, so that the scullery, if the boiler is there, is not heated during the day. In the winter it may warm the scullery in the mornings, or it may be lighted at any time when clothes need airing or drying. A coke boiler is also a convenient means of burning rubbish, always a difficulty where cooking is done by an open range or a gas cooker. As compared to a boiler behind the living-room grate or the kitchen range, its advantages are obvious.

Types of Cooking Stoves.—A small stove of Larbert type is popular in some districts, especially in the south; it need not be lighted except at the time when actually needed. Where a gas cooker is preferred, the tenant should *have a choice of sizes* to suit the size of the family.

The disadvantages of the types of combination ranges are mentioned elsewhere (see pp. 3 and 8); the other usual types of stoves, etc., are dealt with later.

II. Recommendations

1. *Short Walking Circuit.*—The house should be arranged and fitted so that centres of activity such as the sink, cooking stove and larder, are placed in such a relation to one another that unnecessary steps are saved, and a short walking circuit is secured when preparing meals and doing other household work.

2. *Expert Advice.*—The house plan in its preliminary stages, should be submitted to someone capable of giving expert advice in these practical matters. The architect, whether man or woman, is not necessarily the person best fitted for this, neither is the ordinary housewife, nor yet the trained teacher of domestic subjects, but someone who combines to some extent the qualities of all three, and in addition understands the value and principles of modern costing systems, "scientific management," or motion study and hygiene.

3. *Use of the Living-Room.*—The living-room is a place for the family to live in and should not be the workshop of the housewife; it should therefore be well equipped with a good sitting-room grate instead of a cooking range. As already stated, a combination grate is an undesirable compromise; it is appreciated merely as an alternative to the ordinary range, is seldom used for cooking, consumes more coal than a sitting-room grate, and as the flues must be cleaned whether cooking is done or not, a great deal of unnecessary dust and dirt is created.

4. *Cooking in the Scullery.*—Provision should be made for all cooking, whether by coal, gas or electricity, to be done in the scullery, instead of, as at present, in the living room. This will save a great deal of unnecessary running about on the part of the housewife, and will also make the living-room more comfortable for other members of the family who wish to use it as a sitting-room. This arrangement will not necessarily increase the fuel bill if suitable fittings are selected.

5. *Position of the cooking stove.*—The cooking stove of whatever kind, should, whenever possible, be placed against the wall which is at right angles to the scullery window, away from draughts and preferably to the right-hand side of the sink.

6. *Ventilation.*—The steam, smell and heat resulting from the use of a gas cooker are certainly the cause of headaches and discomfort. Where a coal range is fixed the chimney acts as a ventilator, and when a gas cooker is installed some special means of ventilation, in addition to the window, should be provided to replace the chimney.

A long stovepipe flue taken directly from the gas oven is not recommended, as it is likely to cause a forced draught in the oven, with consequent waste of heat and gas, and does not remove the hot air from the much more frequently used hot plate. A ventilating flue about 9 in. by 4 in. should be placed above the cooker and carried upwards alongside or into the nearest chimney stack opening directly into the open air at as high a point as possible. It should, in fact, be a flue which could be used as a chimney if one were necessary, but it must not share a chimney used for other purposes.

A hood will render the arrangement more efficient. It should extend at least a foot beyond the area of the hot plate at the front and sides in order to collect the products of combustion from both it and the oven; the lower edge should be 6 ft. 6 in. from the floor, else the housewife will stand with her head in the humid air which the arrangement is designed to remove.

7. *Installations for Cooking, Heating and Hot Water.*—An efficient cooking, heating, and hot water installation should possess the following selection points:

(*a*) It should warm the living-room for eight months of the year, but *not* in warm weather.

(*b*) It should warm the parlour, or a bedroom if there is no parlour, quickly and economically for short periods when required.

(*c*) It should warm the largest bedroom economically, if necessary night and day, in case of sickness.

(*d*) It should provide, but not in the living-room, for the drying and airing of clothes whenever necessary in winter or summer.

(*e*) Sufficient heat for cooking should be available whenever and in whatever quantity required, without unduly raising the temperature of the room at any time of the year.

(*f*) Hot water should be supplied to bath, sink and lavatory-basin, at any time and in any quantity as and when wanted between 6 a.m. and 11 p.m. the whole year round, and

a supply of 40 gallons should be provided for. Whatever source of heat is used it should be so arranged as not to over-heat the living-room or scullery, particularly in the hot weather.

(*g*) Assuming that the tenants of the houses are of the skilled artisan class, fittings should be selected of a size and capacity which, with reasonable usage, need not consume more than 2 cwts. of coal *or* 650 cub. ft. of gas weekly all the year round. If the type of installation uses less coal, then a proportionately greater consumption of gas may be allowed for and *vice-versa*.

8. *Home Workshop.*—The scullery should be properly equipped, and large enough to use as a home workshop where all the household jobs may be done. Accommodation should be provided for keeping all tools and utensils, and a *short walking circuit* with easy access to all centres of activity is of the utmost importance. There should be a door opening into the living-room and another into the entrance lobby also if possible, and the floor level should be the same in each place.

9. *Dresser.*—The kitchen dresser should never be placed in the living-room.

10. *Kitchen Cabinet.*—A shelf table at a convenient working height with drawers and a cupboard or shelves below, is a necessity in the scullery. There should be a clear space beneath in order that the floor may be washed. With a range of shelves above on which to keep cookery ingredients the fitting would cost no more than a dresser, and would be a useful substitute for the more expensive kitchen cabinet.

11. *Cupboards.*—Great care should be exercised in the placing of these. In the bedrooms they should never be fitted in such a position that the bed must, in consequence, be placed inconveniently or in a draught. Bedroom cupboards should be deep, carried up to the ceiling, and fitted with a wide high shelf, having a separate door on which boxes or other things not in general use may be stored ; this is a great convenience, especially where there is no boxroom. In the living-room the cupboard should be placed in such a position that people sitting by the fire are not disturbed when it is opened ; if it is intended for books, etc., it may have glass panelled doors in its upper portion.

12. *Slot Meter.*—Pennies must frequently be inserted, therefore this should be within easy reach. It should never be placed on a high shelf or in a dark place such as the coal store.

13. *Shelves.*—These are seldom sufficient and usually are in the wrong place. The highest in the scullery should not be more than 5 ft. 6 in. from the floor ; ten inches to a foot is sufficient distance between shelves, and six to ten inches is wide enough. A space of three-quarters of an inch should be left between the back of the shelf and the wall to facilitate cleaning and prevent the harbourage of vermin. Saucepan shelves should be placed about 5 ft. 6 in. from the floor and allow air to pass into the pans ; narrow slats of hard wood or rustless metal are best for this purpose.

14. *Sink.*—A deep sink is best ; it should rest upon cantilever brackets built into the wall and its height, measuring *from the bottom inside*, should be 26 in. from the floor.

15. *Drainer.*—This should be placed to the *left* of the sink.

16. *Plate Rack.*—This is of little use unless there is a good hot water supply for rinsing. A metal rack is sanitary, and it should be placed above the drainer. A wooden rack will not chip the crockery, but may become foul with soapy water unless the rinsing is carefully done.

17. *Skirtings.*—The use of skirting boards in sculleries, bathroom and other places with washable floors is not to be recommended. Instead, the composition, tile, or cement floor should be carried about 9 inches up the wall to form a skirting. It should join flush with the plaster so that there is no dust collecting ledge and the corners should be rounded.

18. *Larder.*—For storing perishable food, a cupboard or " safe " built into the scullery wall, ventilated through a grating opening *direct* into the fresh air and covered with wire gauze, would be a sanitary and convenient arrangement. The walls and shelves should be built of washable impervious material, and the door into the " safe " should be as air-tight as possible. A hook for meat would be an advantage and the shelves should be twelve or more inches wide. The larder should be quite distinct from the storeroom, in which, were it provided, many things now kept in the larder would be placed.

19. *Storeroom.*—This may be under the stairs and need not open off the scullery ; it should be well ventilated and supplied with plenty of shelves.

20. *Perambulator and Bicycle Store.*—The tenant is sure to own one or the other, perhaps both ; a dry place for them, preferably in the house, should be provided.

21. *Coal Store.*—The door of the coal store should not open into the house, but should be reached from outside, preferably under cover. Although perhaps desirable, a large coal store, especially in urban neighbourhoods, is seldom necessary ; a bunker to hold half-a-ton would probably meet the average case, and when accommodation for other things is so badly needed and is so expensive to provide, it is waste to use valuable space for an empty coal store.

22. *Bathroom.*—This in itself is one of the most labour-saving devices possible. *It is essential that it be fitted with a lavatory basin,* thus saving the labour of carrying water to the bedrooms and of taking slops away. The scullery or home workshop is in such constant use that it is inadvisable to place the bath there. If the bathroom is on the ground floor it should be possible to enter it from the lobby, to avoid passing through the living room or scullery.

Where there is a ground-floor bathroom, a hot-water supply by means of the gas wash-boiler is not recommended because :

(*a*) The system does not provide constant hot water to sink and lavatory basin.

(*b*) Gas wash-boilers are only 35 per cent. efficient in fuel consumption, therefore the system is extravagant.

(*c*) Where it is necessary to fill the bath by gravity, the boiler must be raised so high that it is most inconvenient for boiling clothes. It is possible to surmount this last difficulty by a syphon contrivance, but the other difficulties remain. The supply of hot water must be *constantly* available.

23. *Washhouse.*—Provision should be made for doing the laundry at home and, where possible, a separate room should be fitted for this purpose, accessible from the house under cover, but not opening directly into it. It should have wash and rinsing tubs with hot and cold water laid on, and waste pipes connected with the drain. The ordinary brickbuilt copper is very extravagant in fuel, as well as difficult to fill and to empty. A portable one with steam escape should be fitted, and should have taps for filling and emptying. There is a great saving in fuel if the boiler can be filled with hot water, and this can easily be done if the hot-water tap has a round mouth to which the tenant can attach a piece of hose-pipe. Failing a separate room for use as a washhouse, the copper should be placed in the scullery, preferably next the sink, beneath a hinged flap-table on the right-hand side. The deep sink will then be useful as a washtub. Some means of drying and airing clothes should be provided in the scullery or washhouse. The bar and pulley is useful, but there should be some means of applying heat other than the gas cooker. Space should be allowed for the mangle.

24. *Instruction in the Use of Appliances.*—Many tenants are not able to discover for themselves how best to manage new patterns of cooking ranges, etc., nor are they likely to understand how best to treat the patent floorings, wall-coverings, etc., which are found in new houses. Much dissatisfaction and damage to property is the result, and would be prevented if large property owners, whether municipal or otherwise, would employ qualified rent collectors whose training has included instruction in domestic subjects and the management of household appliances. On their weekly rent-collecting visits the tenants could consult these experts on such points. Good results, for instance, cannot be obtained with a gas cooker if pans covered with soot are used, yet many housewives do not understand this and similar facts. The more progressive gas companies have a staff of visitors, able to assist any housewife in the economical management of her gas appliances; the scheme has been found financially sound, and would be equally so if applied to all household fittings and adopted by house property owners.

25. *Tests.*—Efficiency tests for all domestic heating, cooking and hot-water apparatus are much needed. All Housing Authorities and other large buyers, before buying, should have such tests made for them at some laboratory fitted and staffed for the purpose, such as that of lighting and heating engineering at University College, Gower Street, London, W.C.

26. *Insulation.*—All hot-water storage tanks should be efficiently insulated to prevent waste of heat. It is essential that oven doors should be insulated, whether the cooking is done by coal or gas. In the case of gas cookers insulation of the rest of the oven is also desirable.

III. Selection Points

Note.—These selection points are intended to act as a specification for the guidance of buyers and manufacturers; the standard is not rigid, as requirements vary according to the district and the available funds. There are few, if any, existing appliances which possess all the points suggested; if, however, a satisfactory number are possessed by the apparatus under consideration, it should be found to be labour-saving, economical in use, and as near as may be, foolproof.

The Sub-Committee is much indebted to Miss Marion Fitzgerald and Mr. E. D. Simon for permission to quote gas cooker selection points, in respect of the simmering burner, from *The Smokeless City*.

With Mr. A. H. Barker's permission, his fuel efficiency test for gas ovens has been added to the selection points. This test may be carried out by any non-technical person, and all other points may easily be verified.

1. *COAL FIRES*

Note.—To get the best results from an open fire, it should burn furiously with all the draught possible as soon as it is lighted, and when the fire has taken well the draught beneath the grate should be absolutely cut off, and that into the chimney reduced. Good results may be obtained from each type of fireplace given below if perfect control of the draught, both under the grate and into the chimney, can be secured.

Barless Type.—The firebrick must slope forwards.

Barred Type.—1. The back should be of firebrick.

2. The bars should be as narrow as possible consistent with strength and durability.

3. The fire chamber should be narrow from back to front.

Points common to both types.—1. All surfaces should be plain and smooth, and cleanable with a damp cloth or furniture polish. No part should need blackleading or polishing.

2. The grate bottom should be removable.

3. The draught admitted under the grate should be under perfect control, so that it can be *absolutely* cut off when the fire is well alight.

4. The canopy should be adjustable, or there should be a damper to control the draught up the chimney.

5. Firebrick should be used for all parts of the interior of the fire.

6. Insulating material should be placed between the firebrick and ordinary brick, especially on outside walls.

7. The grate should be recessed into the wall as little as possible.

8. A trivet for the kettle should be provided.

2. *GAS FIRES*

Note.—Modern gas fires are perfectly hygienic, and are the most economical and labour-saving method of heating a room for *short hour periods*. For efficiency, there must be complete combustion of the gas, the fullest use by radiation and convection of the heat produced, and entire removal of the products of combustion.

1. All surfaces must be plain and smooth, and no part of the stove should require blackleading. It is better to have nothing which needs polishing, unless the housewife likes the appearance of bright metal sufficiently to outweigh the expenditure of energy. It should be possible to clean the surface with a damp cloth or furniture polish.

2. Must be silent.

3. Must give at least 45 per cent. to 50 per cent. of radiant heat, and have an overall efficiency of 60 per cent. to 70 per cent.

4. Safety taps are necessary which cannot be turned on accidentally, or by small children.

5. The stove must be constructed so that it may be kept clean, and so that dust, etc., which falls down the gas jets or air passages may be easily removed. Flues for gas stoves should have a smooth inside finish.

6. The burners should have a gas and air adjustment so that they may be regulated to give the best results with any quality and pressure of gas.

7. The back of the stove should be of fireclay brick.

8. Radiants of an open nature and of a depth which will not obstruct the radiation from the fire-brick are best.

9. Where the stove is set against the long wall of a room, radiation will be distributed

more efficiently if a slightly bow-fronted pattern is chosen.

10. The flue should be large enough, about 9 inches by 4½ inches, to take more air than is required to pass through the stove for supplying combustion.

11. The canopy should be raised from 4 to 5 inches above the radiants to prevent them from being cooled by cold air passing direct into the flue.

3. *COAL RANGES*

1. Should be independent, i.e., portable or self-setting.

2. The minimum size of the range should be 2 ft. 6 in. wide.

3. The range should stand on legs, with no harbourage for beetles.

4. The plates should be of cast-iron.

5. Flue pipe and closure plates should be of stout material.

6. All wearing parts should be easily replaceable.

7. Cast-iron parts should have plain surfaces preventing the collection of dust or grease. These should be treated to prevent rust and the necessity for blackleading.

8. Air should reach the fire only through the grate bars.

9. Should be convertible into an open fire by a pull-out hood.

10. There should be a movable fire-box grid-bottom.

11. The fire for the minimum size range as above, should be 5 in. in depth from back to front; the fire-box should be brick lined and 6½ in. wide.

12. The draught regulators or dampers should be simple and easily controlled and cleaned. The cleaning doors should fit closely, preventing the leakage of cold air into the flues.

13. Non-conducting material should be packed between the body of the range and the brickwork.

14. Where the range stands out from the wall, the plates at back and sides as well as in front and on top, except where required to use as a hot plate, should be insulated.

15. The oven should be not less than 15 in. wide, 16 in. deep, and 12 in. high.

16. Oven parts, especially if of sheet iron, should be removable and replaceable, without the necessity of taking the range to pieces.

17. The oven door should be insulated and lined with washable material; it should fit closely. An inner door of glass is an advantage and economizes heat, and a pedal opener is convenient.

18. Oven shelves must not tip when drawn forward.

19. The hot plate should be polished to prevent wasteful radiation of heat.

20. The hot plate should have at least two round covers, if possible with diminishing rings, fitting closely to prevent the leakage of cold air into the flues.

21. The first cost should be as low as possible *consistent with efficiency*.

4. *GAS COOKERS*

General.—1. *Efficiency test* for a domestic gas oven of the medium size usually supplied by a gas supply company.

(*a*) Take two copper saucepans 8 in. in diameter and 5 in. deep, weighing about 2 lbs. 12 ozs. each, and fitted with ordinary lids.

(*b*) Fill into each of them 5 lbs. of cold water at a temperature of 60° Fahr., taking the temperature with a thermometer.

(*c*) Take out the browning sheet of the oven and insert two grid shelves. Place one pan on each shelf, then light the gas and turn it up so that it burns at about the rate of 2 cub. ft. in 10 to 15 minutes. The oven *must be cold* when the pans are placed in it.

(*d*) *Immediately 2 cub. ft. of gas have been consumed*, remove both pans and take the temperature again of the water in each.

(*e*) Add together the amount of the rise of temperature in each pan; the total gives roughly an idea of the value of the efficiency.

> Thus: Oven No. 3, temperature of water put in, 60°. Temperature of water after 2 cub. ft. burnt; 1st pan 76°, (difference 1st pan 16°), 2nd pan 79°, (difference 2nd pan 19°); Total, 35°.

The approximate value of the efficiency of Oven No. 3 is therefore 35°.

A reasonable standard of efficiency is 35° or more.

Note.—This test is suitable only for internally heated ovens.

2. First cost must be as low as possible *consistent with efficiency*.

3. All parts must be durable and easily renewed.

4. Tenants should have the opportunity of choosing the size of gas cooker which suits their requirements.

Conservation of Heat

5. Both oven and door should be effectively lagged with non-conducting material. Slag wool from one to two inches thick according to the size of the oven should be sufficient.

6. To make it unnecessary to open the oven door for observation purposes whereby heat is lost, it is an advantage to have in the oven door a panel of unbreakable and non-conducting glass of sufficient size to show all the shelves in the oven.

7. The inlet and outlet of air to the oven should be automatically adjusted to the quantity of gas burned.

8. There should be no bars across the gas jets. The hot plate should not be solid.

9. Burners on the hot plate should be protected from draughts, and so arranged that all heat is directed upwards.

10. The griller should have a fretted plate to direct the heat downwards.

11. Burners on the hot plate should be of three sizes, so that small or large quantities may be cooked in pans of suitable size.

12. A ventilation control lever (see page 6), enabling the heated oven to be converted into a fireless cooker, adds to the first cost, but considerably lessens the expense of working in the long run.

Ease in Cleaning

13. No part of the cooker should need either polishing or blackleading, and it should be possible to clean all surfaces with a wet cloth and soap and water.

14. All surfaces should be plain with no flutings, which harbour dirt. All corners should be spooned or rounded.

15. The inside of internally heated ovens should be lined with enamel sheeting or other material, fixed without screws, and the corners spooned or rounded.

16. All burners should be removable so that they may be easily washed; boiled if necessary.

17. Beneath the hot plate there should be an enamelled crown tray with trough to catch spilled liquids.

18. The cooker should stand on legs, so that the floor beneath may be easily washed.

19. The oven should have locking grids and shelves all easily removable for cleaning.

Ease in Use

20. The oven should be raised a foot or more from the ground to prevent stooping.

21. The hot plate should be of a convenient height and need not be placed above the oven.

22. Plate rack should be double, so that plates may rest on edge. The lower rack should be of wire mesh, so that small utensils may stand upon it.

23. The grill should be reversible.

24. The burners on the hot plate should not choke when pans boil over.

25. The burners should distribute heat evenly over the bottom of the pans.

26. The taps should (*a*) not project in such a way that they can accidentally be turned on or off,

(*b*) have a safety contrivance, so that small children cannot turn them on or off,

(*c*) have a gas and air adjustment, so that they can be regulated to burn with any quality and pressure of gas,

(*d*) be adjustable to give a minimum flame for simmering which will consume as little as ½ cub. ft. per hour if required.

(Some continental stoves have a tap which turns until it reaches a stop at the minimum point for simmering).

27. There should be a simmering jet inside each burner in order to avoid moving a heavy pan from one burner to another.

Externally Heated Ovens

28. No oven will be classed as externally heated unless all products of combustion are prevented from entering.

29. Externally heated ovens should be well lagged.

30. The inner lining in their case must be of some heat-conducting material, otherwise the hot air will pass through the flue without giving up its heat.

5. *WASH BOILERS (GAS)*

1. Should be self-contained, i.e., independent or portable.

2. Should stand on legs, with space beneath for easy cleaning.

3. Should be made entirely of material which will not rust and need not be blackleaded.

4. The outer case should be preferably packed with non-conducting material.

5. The inner lining should be of good conducting and rustless material, with a rounded bottom.

6. There should be a close-fitting lid, which, if of wood, must have wooden pegs instead of

nails; if hinged, it must give complete access to the boiler, and the hinge must be made *entirely* of rustless metal.

7. There should be a flue pipe for consumed gases.

8. There should be a steam escape into the flue.

9. The gas burner should be of the bunsen type, constructed so that all possible heat shall be given off to the boiler, and by means of baffle plates none wasted up the flue pipe.

10. The burner should be fitted with a gas and air regulator.

11. A safety gas tap should be provided which cannot be turned on accidentally or by small children.

12. The draw-off water-tap should have a safety-cock which cannot be turned on accidentally or by small children.

13. The height to the top of the pan should be about 29 ins.

14. The capacity of the pan should be about 8 to 10 gallons.

15. A tap for filling and a connection with the drain for emptying, though not actual parts of the wash-boiler, should be provided by the landlord.

16. It should be possible to raise the temperature of 7 gals. of water in an 8 gal. size boiler from 60° Fahr. to boiling point with an expenditure of 50 cub. ft. of gas or less.

6. *WASH BOILERS (COAL)*

1. Should be self-contained, i.e., independent or portable.

2. Should stand on a closed base.

3. Should be made of cast-iron and be rustless, no blackleading must be necessary.

4. There should be a rustless lift-out pan, with a rounded bottom.

5. There should be a close-fitting lid, which, if of wood, must have wooden pegs instead of nails; if hinged, it must give complete access to the boiler, and the hinges must be made *entirely* of rustless metal.

6. The fire-chamber should be lined with firebricks, loose and easily renewed.

7. The firebars should be loose and easily renewed.

8. There should be a door to close the fire-chamber and secure perfect slow combustion.

9. Flue dividers or baffle plates should be fitted to make the heat encircle the pan and reduce waste up the chimney.

10. The flues must be easily cleaned.

11. There should be a cleaning door in the bend of the smoke pipe.

12. The draw-off tap should be provided with a safety-cock which cannot be turned on accidentally or by small children.

13. There should either be a steam escape into the flue, or an efficient condenser.

14. The height to the top of the pan should be about 29 inches.

15. The capacity of the pan should be from 8 to 10 gallons.

16. Where the wash-boiler is connected with the kitchen chimney a damper should be provided in the flue pipe which can be entirely closed when the boiler is not in use.

17. A tap for filling and a connection with the drain for emptying, though not actual parts of the wash-boiler, should be provided by the landlord.

18. It should be possible to raise the temperature of 7 gals. of water in an 8 gal. size boiler from 60° Fahr. to boiling point with an expenditure of not more than 4 lb. of coal and ½ lb. of kindling wood.

7. *HOT WATER INSTALLATIONS*

A.—GAS HEATED

These may be classed under three headings:

Type I.—Combined circulating and storage system, supplying sink and bath and providing means for obtaining small quantities of water hot enough for washing-up purposes, etc.

Type II.—Separate circulating boiler with a storage cylinder just above, supplying sink and bath.

Type III.—Separate unit system by reliable geysers over (*a*) the sink, (*b*) the bath.

Notes.—(*a*) Types I and II can be used in conjunction with (i.e., joined up to) or as an alternative to the coal range or sitting-room boiler.

(*b*) None of the systems includes a wash-boiler, which must be provided in each case.

(*c*) It is assumed that in all these figures given below the gas has a calorific value of 500 B.Th.U.

(*d*) The temperatures stated below should be taken *in the bath and at the sink* for large and small quantities respectively.

TYPE I.—*The combined circulating and storage system*

For the usual type of residence erected in connection with housing schemes this system may be regarded as the most simple to instal. It is quick and efficient in use. The boiler and storage are constructed as one unit, and

either small or large quantities of hot water are available quickly and almost automatically for household purposes, with an approximate gas consumption of from 5 to 30 cub. ft.

Selection Points

1. Small quantities of, say, 1 gal. at a temperature of 115° Fahr., or 2 gals. at 110° Fahr., should be available within, say, five minutes of lighting the gas, for an expenditure of 5 cub. ft. of gas.

2. Similar quantities at 160° Fahr. to 135° Fahr. in ten minutes, suitable for washing up greasy plates and dishes, for an approximate consumption of 10 cub. ft. of gas.

3. Larger quantities of water, from 10 to 20 gals., raised from cold to average bath temperature of 105° Fahr., should be available in from 15 to 30 minutes, with an approximate gas consumption of from 15 to 30 cub. ft.

4. A capacity of 12 to 14 gals. is sufficient for this class of work, and the cylinder portion of the apparatus may be connected with the kitchen range or sitting-room boiler if and where required.

5. A stop-cock should always be fitted in the supply from the cold storage tank to the boiler, which can be closed before the boiler or whole apparatus is removed for cleaning.

6. Proper means should be provided to enable the interior of the boiler and cylinder to be examined and cleaned and any lime deposit removed.

7. The gas burner should be (*a*) capable of swinging out to light; or (*b*) the base provided with a door enabling the burner to be lighted by means of a taper.

8. The burner should be removable, and means provided in the base for the removal of precipitate from the products of combustion.

9. A thermostatic valve can be fitted when desired.

10. All visible parts of the apparatus must have a non-tarnishable surface which does not require polishing.

11. The gas tap should be of a safety pattern which cannot be turned on accidentally or by children.

TYPE II.—*Circulating Gas Boiler and Storage Cylinder combination*

This is sometimes known as "The builder's set." Where space permits, this system may be usefully applied, the boiler, preferably of cast-iron, being placed upon a stand and the storage cylinder fitted immediately above it. It does not give quite such quick or efficient results as with Type I, owing to the transfer of heat units from the boiler to the cylinder above. It cannot be fitted over a sink owing to its height, but in all other respects it is satisfactory.

Selection Points

1. Small quantities of, say, 1 gal. at a temperature of 115° Fahr., or 2 gals. at 110° Fahr., should be available within, say, ten minutes of lighting the gas, for an approximate consumption of 7 cub. ft.

2. Similar quantities at 160° to 135° Fahr. in fifteen minutes, suitable for washing up greasy plates and dishes, for an approximate consumption of 11 cub. ft. of gas.

3. Larger quantities of water, from 10 to 20 gals., raised from cold to average bath temperature of 105° Fahr., should be available in from 25 to 45 minutes, with an approximate gas consumption of from 17 to 35 cub. ft.

Selection points 4 to 11 are the same as in Type I.

TYPE III.—*Separate Unit System by Geysers*

This system has the advantage of conserving the heat losses due to piping and storage, which are present with most other systems of hot water installation. Geysers may safely claim a 90½ per cent. efficiency in fuel expenditure.

A small geyser may conveniently be fitted over the sink in most houses, and a larger one over the bath. The disadvantages are that two geysers are required to be maintained instead of one boiler as in Types I and II, and the cost of maintenance of each individual appliance is greater. An additional gas supply and flue piping have also to be run in each house.

The fixing of flues to geysers in bathrooms requires special attention to secure against down-draughts, or too strong up-draught. The flue pipe should be carried into the open, as far above the geyser as convenient, terminating with a reliable non-corroding (either heavy sheet-iron or asbestone) cowl. Strong up or down draughts can be modified by a special flue or baffle, fitting with slots or openings formed round the side, which permit of the escape of steam from the bathroom, at the same time breaking the pull on the geyser flue proper. A baffle should *always* be fitted to a geyser flue.

Galvanized iron or plain flue piping should not be used in connection with gas boiler fitting, as replacements due to corrosion so frequently become necessary; an increased initial outlay for asbestone flues is well justified. The flue pipe should be carried up preferably alongside or into an existing chimney-stack, but must not share a flue used for other purposes.

Note.—Every bathroom should be amply ventilated by means of cast gratings or louvres placed at the ceiling level. It should not be considered sufficient to ventilate it by the opening of a window or door, which is more often than not the last thing to be desired by the person using the bath.

Selection Points

1. For the geyser over the sink a capacity of 1 gal. per minute is recommended, and it should be possible for it to supply 2 gals. of water at a temperature of 135° Fahr. for a consumption of, approximately, 5 cub. ft. of gas.

2. For the geyser fitted over the bath a capacity of 2 to 2½ gals. per minute is recommended, and it should be possible to heat 10 gals. of water from 60° Fahr. to 105° Fahr. for a consumption of 13 cub. ft.

3. The visible parts of each geyser should be of non-tarnishable metal which does not need polishing.

4. A stop-cock should always be fitted in the cold supply pipe which can thus be closed before the geyser is removed for cleaning or repairs.

5. The gas burner must be provided with a safety contrivance to prevent the gas being turned on before the water begins to run.

6. The gas tap should be of a safety pattern which cannot be turned on accidentally or by small children.

7. The gas burner should (*a*) be capable of swinging out to light; or (*b*) the base provided with a door, enabling the burner to be lighted with a taper.

8. Means should be provided in the base for the removal of precipitate from the products of combustion.

9. If the water supply is connected direct to the main, a geyser of the type which has a "broken" cold feed (that is, running into a funnel-shaped opening into the top) should be used to comply with the regulations of the Water Board or similar local authority. If fed from a cistern (again a "broken" supply) the ordinary type of geyser with direct cold feed may be used.

10. What is known as a condense pipe should be run from the condensation tray into the nearest waste pipe, to facilitate the removal of superfluous condensation and prevent it overflowing.

Note.—*Where the bathroom is on the ground floor,* a hot water supply by means of the gas wash-boiler is not recommended (see p. 10).

B.—SOLID FUEL HEATED

Note.—Solid fuel includes anthracite, coke, ordinary coal and household refuse.

Type I.—*The Independent Boiler*

In small houses these are particularly popular if the cooking in summer is done on a gas cooker. They are very convenient for burning rubbish. The size of the boiler should be selected according to the size of the cylinder or tank to be heated. The material forming the water-way should be selected to suit the water of the district where it is to be used. Where the water is hard the metal of the boiler may be of cast-iron or wrought-iron, with removable covers or manholes to facilitate the removal of lime deposits. Where the water is soft, such manholes are not necessary, but the metal of the boiler should be of copper, or of iron "barffed" or galvanized, to prevent the water from becoming coloured with rust. The connecting pipes must also be of copper. Pipes may be "barffed" internally in the same way as the boiler, but if it is necessary to cut them when being fixed, the "barffing" is chipped off and the pipes then rust and become unsuitable.

An expert should be consulted in choosing the size, material and construction for the particular district and use in view.

Selection Points

1. A draw-off tap with a sludge pipe from the bottom of the boiler is an advantage for running off the water from the whole hot water system.

2. The water-way should be on all sides of the boiler as well as across the top.

3. If the fire is intended to heat the room as well as the water, it may be open in front, but it should be possible to close it, and a front door with mica panels is useful.

4. It should be possible to use the boiler for heating pans or irons.

5. It should be possible to rake the fire with a shaking bottom instead of a poker, so as to prevent clouds of dust.

6. It should be possible to regulate the draught from the fire in front under the fire as well as in the chimney.

7. It should be possible to keep the boiler alight and provide 50 gals. of hot water daily at about 135° Fahr. with a daily consumption of, approximately, 21 lb. of coke, and corresponding amounts (i.e., in price and thermal value) of anthracite or other fuel.

8. The storage tank should be efficiently insulated with felt and cork composition or other suitable material.

TYPE II.—*Boiler behind sitting-room or kitchen fire*

Selection Points

1. The fire should be easily raked out and cleaned.

2. Where a manhole cover is necessary, it must be get-at-able without disturbing the whole fireplace.

3. The boiler should be able to provide 10 gals. of water at 110° Fahr. within an hour after lighting. (The temperature of the water to be taken in the bath.)

4. The storage tank should be efficiently insulated, preferably with felt and cork composition.

Note.—Neither of these systems includes a copper. (See Selection Points for gas and coal-heated wash-boilers.)

TYPE III.—*The "two-hour" system.* (*See pp. 6 and 7*)

Note.—The independent boiler needed for this is of the same kind as for Type I of the Solid Fuel Installations.

8. *SINK*

1. The depth should be 8 in.

2. It should be glazed inside and out, and smooth with rounded corners.

3. A plug should be provided and the overflow should be of the visible type.

4. It should be fixed on cantilever brackets built into the wall, with clear space beneath.

5. The height should be 26 in. from the floor, *measuring from the bottom inside.*

6. The wall at the back should be of glazed tiles or cement.

7. The water supply pipes should be set so that they do not form a harbourage for dust and vermin.

8. The taps should be placed 12 to 15 in. above the bottom of the sink.

9. *DRAINER*

1. Should be made of hard wood.

2. Should be sloped and grooved.

3. Should be at least 30 in. long.

4. The best position is to the left of the sink.

5. Is best removable, but if fixed there should be a red-lead flush joint to prevent accumulation of dirt where the drainer meets the sink.

6. A smooth level board may be placed to the right of the sink upon which to stack the crockery ready to be washed.

10. *BATH*

1. Should always be lined inside with porcelain enamel.

2. Should be well raised to facilitate cleaning the floor beneath.

11. *LAVATORY BASIN*

1. Should be of glazed earthenware.

2. The overflow should be of the visible type.

3. The soap dishes should be sloped to empty.

4. Should be placed on cantilever brackets built into the wall with a clear space beneath.

12. *TAPS*

1. Screw down, not lever taps, should be fitted.

2. The mouth should be circular.

3. Should be rustless, or non-tarnishable.

4. The cover of the tap should fit over the stuffing box, covering all exposed corners, nuts and threads, giving a smooth, easily cleaned surface.

13. *DOOR FITTINGS*

1. Iron Norfolk thumb latches with bolts are satisfactory.

2. Where door knobs are used, they should never be fixed to the lock bolt itself by a screw, as is frequently done, but should be fixed to the door frame with the lock bolt fitted into an internal socket (Pitt's Patent).

3. Locks on outside street doors should have keys of moderate size.

4. All fittings, including knockers, bell handles and letter boxes, should be rustless or non-tarnishable.

14. *WINDOW FITTINGS*

1. All fittings should be rustless or non-tarnishable.

2. Sash windows should always have a

hospital bead or draught rail fitted, to secure ventilation without draught when required.

3. Casement windows on upper floors should always have a projecting hinge central pivot or other contrivance whereby they can be cleaned from inside the house.

4. Casement fasteners should be well cranked.

5. Casement stays should be adjustable, noiseless, and foolproof (i.e., impossible for the window to swing freely or creak on its hinges in a wind).

6. Where economy is the main consideration, a stout pin stay or cabin hook, with two or three eyes, will form a substitute for the more expensive casement stay.

IV. Appendix

Reports of Visits to Housing Schemes

(*Made by Members of the A.T.D.S. and the Hon. Secretary of the Sub-Committee.*)

SCHEME I

Visited September, 1921.—The houses are nearly finished, but unoccupied. The district is a rural one, and there is neither gas nor electricity. Water is laid on to the houses. The kitchen ranges are in the living-rooms, and are of the usual open fire or Lancashire type, with the oven high and at the side. Two, or possibly three, pans can be boiled over the fire if the grate is filled to its full capacity. The oven has a corrugated bottom. Hot water is supplied to sink and bath from a boiler behind the fire, and the fuel consumption is estimated by the builder at 2½ cwts. per week.

The houses are nicely planned as regards bedroom accommodation. The scullery is meagrely fitted with a few shelves, and there is the usual open dresser in the living room. The coal store is good, but there is no place except the larder in which to keep household stores of any kind.

Except the hot-water supply, there is nothing which can be considered labour-saving.

The hot-water cylinder is enclosed in a big ugly cupboard in the largest bedroom, and no other cupboard is provided.

SCHEME II

Visited September, 1921.—This is a Rural District Scheme, but in an industrial neighbourhood. The cooking range is in the living-room; the tenants would have preferred to cook in the scullery, but gas is expensive and so is laid on for lighting only.

The dresser in the living-room is disliked, as it gets very dusty. Each tenant uses it as a book-shelf or for the best china, and keeps the crockery in common use in the scullery.

All water used on washing day has to be carried, also the wash tubs must be emptied by hand.

The larder is under the staircase, a very dusty arrangement. There is no other store-room.

In the non-parlour type the living-room is badly planned for comfort, as the range is across a corner and the dresser has the whole width of the room between it and the scullery door, consequently the occupants must be asked to move whenever the fireplace is attended to or anything put away on the dresser.

The hot-water supply and the bathroom are much appreciated.

SCHEMES IV, V, AND VI

Visited October, 1921.—These are three Public Utility Schemes, all under practically the same management, and built before the war. The tenants are mainly middle-class or superior artisan in type, and most of them use their living-rooms as sitting-rooms. In most of the houses a combination grate had been fitted; frequently this was at the tenant's request, and an additional rent was willingly paid. The grate in question is of the type which has an open fire with an oven at the side, and is very labour-saving as regards cleaning, there being no need for the blacklead brush, and the flues are easily managed and cleaned. I gathered that very little cooking is done in the living-room; frying is never done there, as the sparking fat makes the grate dirty, and as the grate is only 10 inches wide, not more than one pan may be boiled there at a time. The combi-

nation grate is therefore invariably supplemented by a gas cooker in the scullery.

For hot-water supply a gas-heated installation has been fitted in the bathroom with combined storage and circulating system, which supplies water for the bath only. A hot bath costs threepence, but a tenant assured me that four baths could be obtained for fourpence if taken in succession. Hot water, if wanted in small quantities, must be boiled on the fire.

All the houses are fitted with a portable gas-heated wash-boiler.

In no case is there any special means of ventilation provided to carry away the smell, steam, hot air, and products of combustion from the gas cooker.

SCHEME VII

Visited November, 1921.—A Public Utility Society Scheme organized by middle-class people of small means who desire a small servantless house.

The living-rooms contain neither dresser nor kitchen range; the scullery is used for cooking and all other household work. Shelves are insufficient, and the sink is ill-provided with a very small drainer. The tenants, of course, are in a position to employ a workman to fit shelves, so these defects can be remedied.

All cooking is done by gas in the scullery, and the tenants choose and fit their own gas cookers. Two tenants have a cooker which is fitted with a safety gas tap which cannot be turned on by small children, and they both said that it saves much trouble where there is a toddling baby.

The hot-water system is supplied from a boiler behind the barless grate in the living-room, a bath being obtained in an hour and a quarter after pulling out the damper.

The parlour and a bedroom have gas fires.

Two tenants volunteered the information that 5s. per week was a generous allowance for gas for all purposes. One of these tenants used the bedroom fire night and morning when dressing and bathing her baby.

SCHEME VIII

Visited November, 1921. A Public Utility Society Scheme with tenants of a similar type to those of Scheme VII.

There is no kitchen range, all cooking being done by gas in the scullery. The dresser, with drawers as well as open shelves, is fitted in the scullery, which is thus conveniently arranged with everything at hand for all domestic jobs.

The hot-water supply is from a gas installation with separate storage tank and a thermostat valve. The hot water is supplied through taps at sink, bath, and lavatory basin. Two tenants assured me that a hot bath can be obtained first thing in the morning within half-an-hour after lighting, at a cost of twopence, and that with a further expenditure of twopence it is possible to have a continual supply all the morning for washing up and all other purposes. The circulator is still giving satisfaction after several months' use.

Barless grates are fixed in the living-room and parlour, which give a minimum amount of trouble in cleaning as they are entirely without metal-work.

Both tenants estimated their weekly expenditure on gas at 5s.

SCHEME X

Visited September, 1921.—This is a Public Utility Society Scheme promoted since the war by a large manufacturing firm for housing their workers.

The important feature of the scheme is that all the houses have hot water and central heating supplied from the works, where the waste heat is used by means of calorifiers to heat the water required.

The amount of hot water used is about fifty gallons per day per house, and the weekly charge for hot water and central heating is 2s., which the tenants think quite reasonable. The charge does not cover the cost unless a night shift is being worked, as otherwise it entails extra fuel and labour.

There are only two fireplaces in each house, and this saving of expense went towards the first cost of the installation.

The water is always at about 150° Fahr., and is supplied to sink, bath and lavatory basin.

Central heating is installed in the parlour and two smaller bedrooms; it is easily controlled by a stop-cock at each radiator. The best bedroom has a coal grate, but I was told by the tenants that they intended to sleep in the radiator-heated bedroom in the winter. The radiator in the parlour is liked, but the open fire is regretted. The radiators are invaluable, especially in summer, for airing and drying clothes.

The living-rooms are fitted with a combination grate of the type which has an oven over the fireplace. Only one tenant used her grate for cooking, and this because she had had a load of wood very cheap. The other tenants used their combination grates merely for warming the room. It seems a pity to instal an expensive cooking range merely for this purpose.

The sculleries are all fitted either with a gas-cooker bought by the tenant, or with a small portable coal range of Larbert type. One tenant, who works all day in the company's office, does all her cooking on the little Larbert range, lighting it only when necessary, and finds the arrangement cheap and satisfactory. Another tenant, who keeps an account of money spent, told me that her weekly expenditure on gas was 1s. 2d., and that she used it to cook all meals for herself and her husband, who came home for midday dinner. The cooker she used was really a small enclosed griller which will boil five medium-sized pans on the top if required, and when closed can be used as a small oven.

Portable gas coppers are fitted in the sculleries, and are found very economical, as the tenants fill them with hot instead of cold water. The above estimate of 1s. 2d. included one boiling of the copper for the weekly wash.

The scullery walls are of rough cément blocks whitewashed, and are not liked. The flooring in the scullery is of cement, the dust from which is carried all over the house by the feet. There is no skirting board, and it is impossible to wash the floor without making a dirty mark along the walls. It would not have been difficult, when laying the floor, to have rounded the corner where it joins the wall and carried it up a few inches to form a washable skirting.

SCHEME XI

Visited January, 1922.—This is a Public Utility Society Scheme. Of labour-saving devices there are five which are worthy of note.

1. Spooned skirting boards, i.e., the house is all built of concrete, including these skirtings, which are rounded off at the floor, thus leaving no place for dust to collect.

2. In some of the houses they have a combination range in the living-room, which looks very attractive. It is tiled, with an oven over the fire-box, and a boiler behind; it consumes about 2 cwt. of coal per week, and feeds a family of four or five easily, heating the water, the room, and *all* cooking being done on the stove. I was assured that it did not make the living-room too hot, but that the stove is apt to cause trouble. The cooking is done over two boiling-rings on top of the oven.

3. A bath was fitted in the scullery, covered by a hinged table which can be lifted up.

4. Electricity is laid on for lighting and for ironing.

5. There are Yorkshire pulleys to draw up to the ceiling on which clothes may be dried and aired.

SCHEME XII

Visited November, 1921.—This is a Local Authority Scheme of several hundred houses of varying size and type. Fifty per cent. of the houses have kitcheners in the living-room, the rest are fitted with a sitting-room grate, having a boiler behind for hot-water supply. The houses are fitted alternately, i.e., one with a kitchener will be flanked by two with parlour grates in the living-room and *vice versa*. Every house has a gas cooker.

Unfortunately, my first visit to the scheme occurred rather late in the afternoon, which is a bad time for interviewing housewives, and I saw four tenants who were only able to see me at the door.

The first tenant had a kitchener, which I was told was quite satisfactory. I asked whether she would prefer to cook in the scullery by gas, and have a parlour grate in the living-room like the house next door, and she replied that no doubt it would be very nice, but that she could not possibly afford it; her own work was cheap, but money was scarce. She used the gas cooker in the early morning.

The second tenant who has a kitchener in a non-parlour house said much the same thing, but complained of the great amount of dirt in the room, and the time it took to blacklead and polish the grate.

The two other tenants both had parlour grates and gas cookers, and were completely satisfied with the arrangement. Each declared that with the saving of coal effected by the parlour grate they had more money for the gas cooker, and in their opinion their arrangement cost no more in fuel than that next door. One tenant complained that all cookers were the same size, and that hers was extravagant because bigger than she needed.

Estimates of the weekly fuel consumption were unobtainable.

I thought the scheme would be well worth another visit to investigate further the relative cost of fuel for the two different systems, and also to discover which system was most popular. I therefore went again in June, 1922, and called on the four tenants I had seen at first, and also on the resident house property manager and four other tenants.

The first tenant was of much the same mind as when I called there before. The kitchener was useful, as she had to have a fire for her young baby. Later on she was afraid cooking by it would be bothersome, as a nursery guard would be necessary, and she would be obliged to move it every time she attended to the oven or fire. She liked the hot-water supply, but did not like the weekly flue cleaning and the trouble of polishing and blackleading the grate. She used the gas cooker occasionally, but could not say how much it cost. Her coal consumption was 5 cwt. per month, the exact quantity being verified from the coal merchant's book. This included fuel used in the wash-boiler. An unknown quantity of wood was burned in addition.

There was a cupboard, with glass doors above, in the living-room, which was much appreciated; there was no dresser. The scullery was fitted with two shelves only, and these were level with the top of the door. The sink was a nice deep one, but the drainer was on the right-hand side. There was no back lobby, and the back door opened close to the sink which, consequently, was in a direct draught. The gas cooker was in a very bad light. The back door and a second window could easily have been put in another wall. If this had been done, the sink, which was a good deep one, could have been arranged more conveniently and would not have been in a draught, and the gas cooker would have been in a good light. The only entrance to the coal store was in the scullery; it was unventilated and unlighted, and contained the slot meter, a dirty arrangement, as it was necessary to walk over the coal in order to insert pennies. The larder was fairly large and opened off the scullery.

The second tenant had changed her mind regarding the kitchener since I saw her before, and was sorry she had not chosen a house with a parlour grate. She required 2 cwt. of coal a week, and did all the cooking she could by gas, for which she paid about 2s. per week more.

The two other tenants who had parlour grates were still completely satisfied with the arrangement. One estimated her coal consumption at $1\frac{1}{2}$ cwt. per week, but could not estimate the quantity of gas used. The other could not say how much coal she used, but thought 5s. per week was the amount spent in gas. She also said that she had to burn a really hot fire in the living-room for two hours before she could get a really hot bath.

The fifth tenant interviewed had a parlour grate in the living-room and liked the arrangement. She could not estimate her coal consumption, but thought she used about 5s. worth of gas per week. In this house there was the usual lack of shelves, the drainer was in a bad position, but the sink was a nice deep one. Like the first house the gas cooker was in a bad light and the scullery window and back door could have been placed in a better position. The cupboard with glass doors, similar to the others provided in all the living-rooms, was much appreciated and was a really pretty piece of furniture.

The sixth tenant disliked her kitchener exceedingly, and said she would have chosen a parlour grate if she had realized what she was doing and had been able to wait; but as she, with her husband and two small boys, were living in a small back bedroom for which they paid £1 per week, she was in a hurry to move. She used about 2 cwt. of coal weekly, but did all her cooking by gas in the scullery and could not estimate how much she used. She pointed out that the kitchener with its soot and dust had made the walls and ceiling of the living-room dirty and they already needed redecorating.

The seventh tenant had a kitchener with which she was very dissatisfied. She said it had consumed an average of 3 cwt. of coal per week all through the winter, and she had used 5s. worth of gas weekly as well.

The eighth tenant had a parlour grate and liked the arrangement. She endorsed the other tenants' views and experience, but thought that 3 cwt. of coal weekly was a high estimate.

The visits were all paid at haphazard in order to get a fair sample of the ideas of all the tenants; I did not know until I asked which system the tenant had in her house.

Several tenants said that rather than light a fire in the living-room in summer for a bath,

they preferred to heat water in the portable coal wash-boiler and carry it upstairs in buckets.

It was suggested by several tenants that a small portable cooking stove of Larbert type would be convenient if fitted in the scullery.

The resident house property manager, whose house is fitted with a parlour grate, said that all cooking done in his house was by gas and cost 3s. per week ; he considered that people who spent more than that were extravagant and managed badly. A fire in the bedroom for about an hour every night cost another 1s. weekly. He believed that the non-kitchener houses were most popular.

Two tenants had asked to have the kitchener removed and a parlour grate installed, but this had not been done. No applications had been received to have the parlour grate removed. The living-rooms in the kitchener houses required redecorating more often than the others.

Coal in this district is 2s. 10d. per cwt. ; and gas is about 5s. per 1,000 cubic feet for slot meters.

SCHEME XV

Visited May, 1922.—This is a Rural Authority Scheme where no gas is available. I visited two houses of the parlour type which have their kitcheners in the scullery ; both tenants liked the arrangement and found it very convenient.

The first occupier was unable to estimate her coal consumption. The hot-water supply from a boiler behind the range is quite satisfactory. The range is of an ordinary type of no special make, has an oven low down at the side with the hot plate above, can be opened or closed with a pull-out hood, and the bars may be raised at will. It cooks satisfactorily, but there is nothing labour-saving about it.

The larder is extra large, and opens off the scullery. It contains the only shelves in the house. There is no provision in the scullery even for pans which consequently must be kept upon the floor under the sink.

The sink is shallow, made of white glazed earthenware, resting upon a couple of up-ended drainpipes and therefore difficult to clean underneath. The drainer is, unfortunately, to the right-hand side, but the wall behind is nicely finished with cement. The other house of the pair, which are semi-detached, has the drainer to the left. The wash-boiler is an ordinary brickbuilt one, with no steam escape, fitted into the corner of the scullery farthest from the sink and hot-water tap.

The living-room has two nice wall cupboards about four feet from the floor on either side of the fireplace. The picture rail and skirtings are good, and the woodwork is stained a pleasing colour. There are no rounded corners. There is a dado rail, the material and labour for which would have been better used for shelves in the scullery.

The second house is exactly like the first, except that space which would have housed a perambulator has been sacrificed to make a porch. The occupier is a working woman with five children. She likes the kitchener in the scullery and does not light the living-room fire until the evening, as husband and children are out all day. At night the children do their lessons in the warm scullery while she and their father enjoy a little peace and quiet in the living-room. Her weekly coal consumption she estimates at 2 cwt. The bathroom and separate lavatory upstairs are much appreciated, especially in case of illness.

SCHEME XVI

Visited December, 1921.—This is a Public Utility Society Scheme, promoted by a large manufacturing firm for their employees.

No. 1. Mrs. S., six in family.

Accommodation: Small sitting-room, large living-room, scullery, three bedrooms, bathroom containing bath, basin and w.c. Staircase with easy steps. Height of rooms 8ft. There is electric light.

In the scullery there is a gas ring and clothes boiler. The hot-water supply is by means of a boiler at the back of the cooking stove, with a cylinder in a cupboard in the bedroom, and hot water is laid on to scullery and bathroom.

Cooking is done in the living-room on a combination range of the type with an oven at the side and hot closet above. The fire is similar to an ordinary sitting-room grate with sloping firebrick back. The flues are cleaned twice a week ; fuel consumption, 1½ cwt. weekly. Blacklead is required only on the oven bar, which burns.

Mrs. S. likes the range very much and does all her cooking on it; she makes no difficulty about cleaning the flues twice a week, and approves of the fire being so low

down, as it warms the feet better and gives a cosy, pleasant appearance to the room. A range of this type would be easily understood by a southerner, but to a woman in the north, accustomed to a Yorkshire range in which the fuel must be poked under the oven in order to heat it, this type of range would present difficulties, as the treatment accorded to the Yorkshire would choke the other.

There is a good-sized cupboard in the living-room built at the side of the fireplace, and one over the staircase opening into a bedroom.

The sink in the scullery is well placed with draining board and table on either side.

The bedroom floors are of red patent concrete, and Mrs. S. prefers linoleum; but if properly treated the concrete would polish.

Improvements which could, in my opinion, be effected:

1. There are ledges and ornamentation everywhere, which are dust traps, i.e., raised patterns on the oven door and stove, etc. Eliminate and have plain.
2. A plate-draining rack in the scullery.
3. Another short cupboard over the staircase, opening into the second bedroom.
4. Putting the bath, basin, and w.c. into separate compartments, especially the basin and w.c., so as to make two private washing places; teeth are cleaned in the scullery and probably much more is done there now than will be done in the future, when people have grown to *like* privacy.
5. The beds take almost all the floor space in the two smaller bedrooms. Strong wire-meshed berths, such as were used in the Red Cross trains, would appear useful in many houses, as they take up less space and would provide a bed for each person, besides a chance of sweeping the floor. It may be argued that berths are unhygienic, but they might be placed on the wall away from the draught and this would enable the window to be more frequently open at night.

No. 2. Mrs. H., three in family.

The house is larger and higher than the other, with rooms 8 ft. 6 in. in height. All the fittings are the same except:

1. The w.c. is in a separate compartment.
2. The bedroom floor is of wood.
3. There are two cupboards over the staircase instead of one, and these open one into each bedroom. Unfortunately, some space has been wasted at the top of each, where a shelf might have been put for Sunday hats.
4. The cylinder cupboard is larger, but needs shelving.
5. The back door opens into a passage under the stairs where there is room for the pram, and the living-room is divided from the scullery.
6. The sink has a draining board, but no fixed table at the side.
7. The floor is of white concrete, the dust from which is carried all over the place by the feet.
8. The larder has a casement window which lets in dust and flies, as there is no wire gauze.

Owing to financial restrictions many ideals have had to go.

SCHEME XVII

Visited May, 1922.—This is a Municipal Housing Scheme. All the non-parlour houses and many of the parlour houses are fitted with a combination grate in the living-room. Every house has a gas cooker in the scullery.

Seventeen tenants of different types, living in various models of houses, were visited.

Two tenants had an ordinary Lancashire range with the oven high at the side and an open fire with a boiler at the back. Both tenants disliked their appearance, objected to having them in the living-room and would have preferred a combination range for that reason. They both disliked the trouble of keeping the range clean, but said it was quite satisfactory for cooking and hot-water supply. Each used the gas cooker a good deal. One said that her coal consumption was 5 cwt. per month, and this included a parlour fire each evening. The other tenant could make no estimate.

The other fifteen tenants all had a combination range, of the type with an oven at the side of an open fire with a sloping fire-brick back, and they all said that when the flues were understood the range was very satisfactory, and that the oven was good for pastry. The hot-water supply was good, and I was told that there was no need to keep the damper out unless a bath was needed. They liked the appearance of the range, and found it no trouble to keep clean, as it was enamelled all over except the fire bars. The flues seemed to need cleaning from every week to every three weeks, according to the amount of cooking done. All objected strongly to the soot; they said they had to cover everything up, as if for the sweep, on flue-cleaning day. No one used the range for frying because of

the sparking grease, and the open fire was disliked for boiling pans. Even the miners' wives who got their coal at 6½d. per cwt. do a certain amount of cooking by gas. Two tenants pointed out that the grate was a low one, and therefore children could not be left alone in the room without a fireguard, which would have to be moved every time the oven was attended to. Others objected to the low grate and oven, as they said they had to bend to lift pans, etc.

All the tenants, when asked, said they preferred to cook in the scullery where the sink, etc., was handy; they did not want to run in and out of the living-room attending to the fire. The miners' wives in particular said they did not like having to dry and air clothes in the living-room. A miner's clothes must be washed and dried every night, after he comes home.

The houses are all fitted with portable wash-boilers having a steam escape and heated by coal or gas. The agent told me that gas boilers are more satisfactory from the estate management point of view, as they are cheaper in first cost, not so liable to damage, and broken parts are more easily renewed.

The usual estimate of weekly fuel consumption was 1 cwt. of coal at 2s. 4d. and 1 cwt. of slack at 1s. 8d. (small coal, not dust). Most of the tenants used about 2s. to 3s. worth of gas per week, but many used more, and estimates were difficult, as pennies were put in the slot meter when required and no account kept. Gas in this district is a penny per 15 cub. ft. with a slot meter, and no charge is made for hire of the meter or cooker. Several tenants volunteered the statement that cooking was as cheap by gas as by coal.

The houses are particularly well designed, with rooms of good size and shape, but there is the usual lack of appreciation of the importance of detail which is to be found in practically all such housing schemes. With the same amount of money and a little knowledge and forethought, the houses could have been arranged so as to save the housewife an enormous amount of useless labour.

In all the houses the only shelves in the scullery were at the height of the top of the door; there were only two shelves and the slot meter was placed on one of them. The sinks were nice deep white glazed ones, but rested on drain pipes instead of cantilever brackets, and were placed at varying heights with no reference to the comfort of the housewife, but depending on the length of the available pipes. There was only one small drainer, which was fixed indiscriminately at either side of the sink. All the sculleries had been finished with rough brick or cement breese walls without skirtings; the floors were of cement and a rounded corner could have easily been contrived, but was not. Consequently it was impossible to wash the floor without smearing the whitewashed wall. The living-rooms all contained a cupboard just large enough to hold the cylinder; the tenants would have preferred a larger cupboard, big enough to dry or air clothes, which could have been arranged in many of the houses without extra cost, as there was a useless space of about 9 in. between the end of the cupboard and the wall. Most of the tenants would rather have had the cylinder in the bathroom or scullery. Nobody wanted an open dresser in the living-room, the shelves of which were used for books or spare china; they would have preferred, instead, more shelves in the scullery and a closed cupboard in the living-room.

In one type of house a space is provided for the pram next the front door, which, however, is hung so that when open it closes up the entrance to the recess. In two of the types the bathroom was downstairs, and in these no lavatory basin was fixed and was greatly missed. One bathroom opened off the lobby at the foot of the stairs, which seemed a good arrangement; the other opened off the scullery and contained the wash-boiler but no wash-tub. This wash-house-bathroom was small, with a cement floor, and its walls finished as in the scullery; the tenant thought it cold and inconveniently placed for a bathroom and too small for a washhouse. She did her washing in the scullery and would have preferred the boiler near at hand.

In one house the wash-boiler was placed against the scullery wall 2 ft. from the corner; it could as easily have been placed *in* the corner, where it would have been much more convenient. The gas cooker in the same scullery, in spite of the protests of the tenant, had been placed as close to the back door as possible, where she and it were in a direct draught. There was plenty of space on the opposite wall where it would also have been in a good light and more convenient in every possible way. The larder in the same house opened off the entrance lobby; it could

as easily have had a door into the scullery, and then there would have been room in the lobby for a pram, for which no other space had been provided.

Each house had a shoot opening into the coal store, but I was told that not one had ever been used. The tenants pointed out that in order to use it, coal would have to be delivered in bags, and that to empty a bag into an opening 4 ft. or so in height is not easy. The dust made by the falling coal came through the crack of the door, and the coal was broken in falling. Altogether, it was cleaner and less troublesome to carry the bag into the coal-house and empty it gently.

SCHEME XVIII

Visited January, 1922.—This is a Public Utility Society Scheme, built before the war. Most of the houses are fitted with a combination range in the living-room of the type which has an oven above and a hot-water boiler behind. All cooking is possible by it if it receives proper attention, but almost invariably the gas cooker is preferred and used when it can be afforded. This is largely due to the labour entailed in taking the range to pieces for cleaning, and fixing it together again; and the whole process was generally spoken of as "a man's job and not a woman's."

The fact also that the range must be taken to pieces *in the living-room* is a great disadvantage. Generally speaking, this type of range necessitated more efficient care and labour than the housewife is willing to give. If the flues are not very frequently cleaned, successful heating is impossible, and when not used for cooking, but merely for hot water, an adequate supply is seldom obtained owing to this trouble entailed in cleaning.

Where the range is in the living-room the tenants generally prefer to do without a fire in summer, and use the gas cooker if one is provided.

It was impossible to ascertain whether the saving in coal effected by doing without the kitchener is balanced by the extra gas for cooking, nor was it possible for the tenants to estimate their weekly fuel consumption.

Very little blackleading is required, as the combination range is largely composed of firebrick with tiled hearth and sides.

The floors are of wood blocks closely fitted, so that little covering is required, and they are easily cleaned and polished.

The windows are all casement, but many would prefer sash windows and object to the amount of time spent in cleaning small panes of glass.

Many tenants would prefer a larger back kitchen or scullery in which there would be sufficient room to wash and dry clothes, thus avoiding the necessity for using the living-room and staircase for drying; this should be sufficiently large to take a gas boiler, mangle, gas cooker, sink, store cupboard and a rack on pulleys for drying clothes.

As a general rule it was thought that one large living-room is not as desirable as two small ones, especially where there are young people.

SCHEME XIX

Visited May, 1922.—This scheme was built during and before the war for a Public Utility Society in a mining district. The tenants are of various classes. The houses are of several types, but with rather small rooms; pretty to look at, but not very conveniently planned; the bedrooms in many cases are merely attics. The living-rooms in a number of houses are fitted with a combination range having the oven above the fire, and their appearance is much appreciated. Hot water is supplied to bath and sink from a boiler behind the fire, and every house has a gas cooker in the scullery. There is electricity for lighting and electric irons are used.

The first four houses visited were occupied by better-class tenants, and in every case they preferred to cook in the scullery by gas, and used the grate merely for hot water. One of the disadvantages of this type of combination range is that when the hot plate is lowered for cooking, the fire must be constantly replenished with small quantities of coal, otherwise the oven heat is not constant. Another disadvantage is that hard coal only should be used and the bituminous coal of the district is not suitable, so the fire gets clogged.

One tenant said she had used the range until her baby was a year old, but then was obliged to get a fire-guard which had to be removed every time she attended to the fire or oven, so she gave it up and cooked in the scullery instead. She also said that cleaning the flues was very dirty and troublesome, as

the inside of the oven must be removed and carried into the open, where the clinging soot must be brushed off. Unfortunately this must be done whether the range is used for cooking or not, otherwise the fire smokes.

The other three tenants did not use the range because they did not like to cook in the living-room.

One tenant estimated her weekly fuel consumption at 1½ cwt.; and this included an occasional parlour fire. I gathered that the parlour fire would have been more used if the fire had not caused labour.

The sculleries seemed very small and had only two shelves, level with the top of the door. The sinks were white glazed ones, but shallow, and the drainers often placed upon the wrong side for no apparent reason. There were gas coppers placed near the sinks in some houses, but there appeared to be no standard of arrangement aimed at by the builder.

Finding that the combination grate was not very popular, I decided to investigate further, and on the second visit ten calls were paid. I made a point of visiting all the tenants I could hear of who used the combination range for cooking; there were only three of them. The first was completely satisfied with the arrangement, and said she liked both range and dresser to be in the living-room, there being no room for them in the scullery. She found the grate very economical and used 2 cwt. of coal per week, which included the wash-boiler, but there was no parlour fire.

The second tenant praised the range very much. She could only afford to use the gas cooker occasionally, but did not regret it. Her winter consumption of coal was 2 cwt. a week, in summer it was 1 cwt. or less, and she eked it out by burning all her rubbish. She cleaned the flues once a week and complained of the consequent soot and dirt. She would prefer a larger scullery with the range and dresser there, and in that case could do without a parlour, as the children always did their lessons in their bedrooms, and the parlour was seldom used. She would have liked a store-room in addition to the larder, which she described as a "glory hole" into which everything had to be thrust.

The third user praised the stove also, and said that until coal got so dear she did all her baking by it, but now she buys her bread. She also uses a gas cooker. The family is a large one and some work at the coal-pit. According to the shifts worked, the fire is often needed for very long hours, and 3 cwt. per week is used. This includes a coal wash-boiler and parlour fire.

The only other estimate of 3 cwt. a week was in a house where there were five children under six years old. All the cooking was done by gas, but there was much hot water needed.

The seven tenants who did not use their ranges gave as their principal reason that they preferred not to cook in the living-room. Estimates of gas consumption were impossible as no account was kept of the pennies put in the gas meter. The usual coal consumption, if the grate was not used for cooking, was 1½ cwt. per week, and 2 cwt. if cooking were done. The flues must be cleaned once a week if cooking is done and about once in three weeks if it is not, and all complained of the dirt and trouble involved. All were greatly pleased with the hot-water supply.

Several tenants complained that the range drew badly, but thought that this was because it was not properly fitted. Two said that a greasy vapour was given off when cooking was done, which condensed on the polished furniture and had to be wiped off.

In all, out of fourteen tenants interviewed, only two could be said really to use the combination grate for the purpose for which it was intended.

A good parlour grate with a boiler behind, would serve the purpose equally well, be much less trouble to clean, and its first cost would probably be less than half that of the combination range.

The tenants who used gas coppers agreed that it cost 2d. (30 cub. ft.) to bring a boiling of clothes from cold to boiling point.

Tenants who had a bath in the scullery did not like the arrangement, and said they had to choose between a bath and a meal, it being impossible to have both.

The upper casement windows could only be cleaned from outside by someone standing on a ladder, and this was found very inconvenient, as well as expensive, as people of small means cannot afford to spend about thirty shillings on a ladder long enough to be of use. The window cleaner, therefore, earns a nice little income on this estate.

The doorsteps, made of red glazed bricks with rounded edges, were really labour-saving and had worn well.

SCHEME XX

Visited June, 1922.—This scheme is particularly interesting, because some of the houses are specially fitted so that practical observations are recorded whereby the actual amount of fuel needed in a household may be discovered. The experiment will take two years.

I visited Mrs. X, who is at present taking observations of gas consumption; later on, her house will be fitted with coal appliances, and she will go on living on the same scale and find out how the cost of one compares with the other. Four meters are fitted for: (1) the gas cooker; (2) the hot-water circulator; (3) gas fire in the living-room; (4) gas fire in the workroom upstairs. Mrs. X reads the meters every week and keeps a careful record of the gas used and of the number of hours she burns the gas fires. She is a dressmaker and lives by herself, doing her own housework. She has her meals in the sitting-room and eats a hot breakfast with bacon, etc., a hot lunch, and a hot dinner at night. She is always out on Sundays so very little gas is used that day either for cooking or heating. She thought that cooking for two people could be done for very little more than for one.

The gas cooker was plain outside with no bright parts. The oven measured 14½ in. wide by 13 in. deep and 23 in. high from the bottom of the tin. It was lined with a bright metal which Mrs. X said was quite easy to clean, and was insulated also. It would have been more convenient had the oven been raised higher and the hot plate placed beside instead of above it. The weekly winter gas consumption for cooking varied from 153 cub. ft., in which week there was a visitor to dinner, to 82 cub. ft. This included a small amount of water for washing up. In summer a little less is used, as cold food and fruit is liked. Mrs. X said that at first she had had a slot cooker provided by the gas company, and that it averaged about 80 cub. ft. per week more for doing the same work, and took longer to cook things, especially pastry, which required an extra seven or eight minutes.

The gas circulator was used for hot baths, a certain amount of washing up, and the weekly wash. The highest weekly consumption was 183 cub. ft. and the lowest was 49—the latter was in the spell of hottest weather, when she took cold baths, and did no laundry. The average amount of hot water used daily was eighteen to twenty gallons.

Gas fires.—The one in the sitting-room is used for breakfast, about half-an-hour, lunch, on cold days, about the same time, and in the evenings, but not on Sundays. The highest consumption per week in cold weather was 118 cub. ft. and the number of hours lighted was 6¼.

In the workroom upstairs, a bedroom of moderate size, the consumption of gas in the same week was 584 cub. ft., and the number of hours was 32¼. This fire was a smaller size than the sitting-room one.

Gas in this district for quarterly meters is 5s. 4d. per thousand cub. ft.

The wash-boiler was an 8 gal. coal-fired portable one, with hinged lid and a steam escape into the flue. Mrs. X said that she always lighted it with ½ lb. wood and 3½ lbs. of coal, and filled it with cold water from the tap above. It would come to the boil in ¾ hour, after which she could get a further eight gallons of warm water hot enough to wash flannels without any additional fuel.

The sink was a comfortable height, and proved on measurement to be 26 in. from the bottom inside to the floor. It was set in a draughty place next the back door.

The floor of the scullery was of cement, rough and dusty, with neither skirting or rounded corners. The walls were rough and white-washed. It was impossible to wash the floor without making a dirty mark along the wall.

The shelves in this Scheme are, as usual, about 6 ft. 6 in. from the floor, with the gas meter placed on one of them. The sinks are supported on drain pipes instead of cantilever brackets, and the drainer is only about 18 in. long, and for no apparent reason, placed on the wrong side.

Later I went to the gas company's showrooms to see the type of cooker supplied by them and find out why it consumed so much gas. I found that it was neither lined nor insulated. It measured 16 in. wide by 12½ in. deep, by 24 in. high, but its effective size for cooking was the same as the oven Mrs. X is now using; the extra space is sheer waste as the oven shelves are the same size.

V. Summary of the Report

THE Garden Cities and Town-Planning Association, wishing to give the widest possible publicity to the contents of this REPORT ON LABOUR SAVING IN SMALL HOUSES, has undertaken the responsibility for the present reprint from the pages of *Garden Cities and Town-Planning*. This summary may, perhaps, serve the purpose of those who have opportunities of securing notices in the local Press of the towns in which they live.

The General Inquiry (pp. 1-7) explains the procedure adopted by the Sub-Committee and the scope of its work. For the present all electrical appliances for cooking and heating were put aside, owing to the high cost of current in most districts. Labour saving is of most importance to those who are least able to pay for expensive apparatus, and does not always involve additional appliances, but rather the wise arrangement of the various parts of house or room so that in making use of them the occupants are put to the minimum amount of physical or mental strain. Many clever devices for mechanical operation of domestic processes increase labour rather than reduce it; the object should be to eliminate the need for work where this is possible. The chief centres of activity should be in good relation to each other. The sub-committee found, in its visitations of twenty housing schemes, that in these matters there was much to be desired, and the Report, therefore, deals with the points which were uppermost in the minds of the visitors and makes proposals accordingly.

The subjects dealt with may be divided as follows:

I.—Efficiency Tests of Cooking, Heating, and Hot-Water Supply installations, especially in view of their Labour-saving value, their Durability and their Fuel economy (p. 2).

The prevailing preference for making the scullery the domestic worshop, rather than the kitchen which is used as a living-room; the popularity of the combination grate as against the old-fashioned kitchen range (p. 3).

The question of draughts and fumes from the gas cookers and heaters as well as the convenient position of doors (p. 3).

Storage accommodation and convenience for laundry work (p. 4).

The average consumption of coal and gas for domestic purposes and the comparative value of fuels (pp. 4-6).

II.—Recommendation on a large number of subjects, beginning with "short walking circuit," passing on to installations for Cooking, Heating or Hot Water; including proposal for the right placing of dresser, cupboards, shelves and larder. The Bath-room and the instructions for the use of appliances are included in this section.

III.—Selection points and the more detailed consideration of individual appliances with a view to enabling readers of the REPORT, builders, architects, etc., to see that these essentials are observed in all fittings they select. These points cover, chiefly: Coal Fires, Gas Fires, Coal Ranges, Gas Cookers (pp. 11 and 12), Wash-Boilers, Hot-Water Installations, both gas and solid fuel heated (pp. 13-17).

For Sink, Drainer, Bath, Lavatory Basin, Door fittings and Window fittings "selection points" are also given (pp. 17 and 18).

IV.—The Appendix contains very useful particulars of individual visits to a large number of Housing Schemes, and should be studied in order to obtain the first-hand opinions of many housewives of experience whose practical views were of great value to the members of the Sub-Committee.

Information will be gladly given on any of the matters referred to in the Report to correspondents who will address the Honorary Secretary, Women's Section, Garden Cities and Town-Planning Association, 3, Gray's Inn Place, W.C.

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Garden Cities and Town-Planning Association

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"A Garden City is a town designed for healthy living and industry; of a size that makes possible a full measure of social life, but not larger; surrounded by a rural belt; the whole of the land being in public ownership, or held in trust for the community."

The Garden Cities and Town-Planning Association is a body of men and women of all parties who are interested in forwarding a constructive housing and town-planning policy. It initiated the garden cities of Letchworth and Welwyn, which are now controlled by their own companies and are, it is hoped, the forerunners of many similar cities in other parts of Great Britain. It believes that only by the creation of garden cities can permanent and economic relief be given to the aggregation of population in large towns and the consequent problems of slums and rural decay. This view has, in the last few years, received official sanction by the Report of the Unhealthy Areas Committee, by legislation, and in other ways, and the Association is actively engaged in the vitally important work of creating an enlightened public opinion on the whole question of housing, town-planning, and regional development. The garden city principle can be applied to every existing centre of population and must be applied if the best conditions for healthy living and efficient industry are to be secured.

Lectures.—The Association has a panel of expert lecturers, and arrangements can be made for lectures on Housing, Town-Planning, the Garden City, and cognate subjects. The lectures can be illustrated with lantern slides or cinema films if desired. A list of subjects will be sent on application to the Organizer at the offices of the Association.

Literature.—The Association issues leaflets, pamphlets, and books. GARDEN CITIES AND TOWN-PLANNING is published monthly, and is sent post free for a yearly subscription of 13s. 6d. All books on housing, town-planning, etc., and publications on social questions of all kinds are supplied at the published prices. A catalogue will be sent on request.

Library.—The Reference Library of the Association is open to all members free of charge. Particular care has been taken to make the Library as comprehensive as possible, and it contains a valuable collection of town-planning and zoning reports from all parts of the world, and also the periodicals of all countries dealing with housing and town-planning.

Lantern Slides.—The Association has the largest collection in the country of lantern slides illustrating housing, town-planning, and garden city principles. Sets can be supplied on hire at a nominal charge to members, and to others for a reasonable fee. Notes on the slides accompany each set.

Cinematograph Films.—Films which have been specially taken for the Association, of Letchworth, Welwyn Garden City, Hampstead Garden Suburb, Well Hall, New Earswick, Gretna, East London, and South Wales Housing, etc., are supplied on hire or for sale at reasonable charges.

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Membership.—Membership of the Association is open to all persons who are interested in housing and town-planning. The present membership of the Association consists of architects, engineers, surveyors, officials and members of Local Authorities, promoters of Public Utility Societies, students of town-planning, and of others who realize that the garden city movement is "the most important constructive social policy of the day." The annual subscription to new members is £1 1s., which includes subscription to the JOURNAL.

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