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# HOUSING AND HOME IMPROVEMENT IN THE CARIBBEAN

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By

ELSA HAGLUND  
FAO HOME ECONOMIST

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
AND  
THE CARIBBEAN COMMISSION

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FOREWORD

The present work is the second in a series of booklets on home economics for the Caribbean. Like the previous booklet on The Economics of Family Life in the Caribbean, this text is intended for the use of teachers and leaders in their work with schools and adult groups.

The present booklet deals with one aspect of home economics, housing and home improvement, in itself a wide subject. Here it has been limited to specific problems of interest to teachers and extension workers in their work in schools and communities. Emphasis has been placed on the modest home, which is generally the most common kind of home in the area. Much that is said about such homes will apply to homes of more well-to-do people as well. Certain aspects of housing which are relevant to homes of the latter type have not been considered.

In the preparation of this booklet, invaluable assistance was rendered by Dr. Lydia J. Roberts of the University of Puerto Rico, to whom the author's sincere thanks are due. For the section on building and building materials great help was provided by Mr. Donald Hanson and Mr. George R. Jordan, Housing Experts attached to the Caribbean Commission. Gratitude is also due to the Rev. Father E. Cheney, S.J., Above Rocks, Jamaica, who went through the entire manuscript and offered a number of practical suggestions, the fruit of his rich experience. Miss Mildred Johnson, on secondment to the Caribbean Commission, worked closely with the author in the preparation of the booklet.

Since rapid developments are taking place in the field of housing, some of the information contained in this publication may soon be outdated. There may also be a need for expanding some parts of the booklet and for revising others so that a second edition will fulfill better the needs of the area. The author would therefore welcome helpful suggestions for the improvement of the booklet, so that all may benefit from combined experience and knowledge. Home Economics teachers and other social workers in the field of home economics in the area who study and use the present text are therefore invited to send to the Home Economics Section of the Food and Agriculture Organization of the United Nations (Rome, Italy) suggestions and comments which can be taken into account when a second edition is being prepared.

The production of the present booklet is a joint project of the Food and Agriculture Organization of the United Nations and the Caribbean Commission. Photographs were reproduced and drawings were made by the Food and Agriculture Organization.

Elsa Haglund,  
FAO Home Economist.

The general arrangements and convenience of the home and surroundings also affect the unity of the family and its happiness considerably. A home with a place in the house or yard where children can plan and carry on their chosen activities will be one where they are happy to be and like to bring their friends. A clean, tidy, attractive home, however humble it may be, is one to which the father is glad to return and where he is glad to spend his leisure time. A home in which the members of the family can gather for social and recreational activities and where they can receive their friends helps to develop good family and community relationships.

It is, of course, the ideals and standards of the people who live in the home that determine its spirit and the level of living of the occupants. But, as has been seen, the house and its surroundings, and even the housekeeping, can influence these standards and the behaviour of those who live in it.

It is difficult for people with small incomes to have everything that could be desired in a home; but even the most modest home should be designed to provide the requisites for decent and wholesome family living. In this booklet some of the ways in which the house, its furnishings, and its care and up-keep can foster good family life will be considered.

## CHAPTER II

### FUNDAMENTAL NEEDS OF THE FAMILY IN THE HOUSE

In planning the building of a house or selecting one for rent the needs of the family that will live in it should be carefully considered.

#### 1. Selection of site

The site of the house is of great importance. If a new house is being built for the family, and the family is free to choose its location, there are several important things to consider.

First of all, the site must be a healthy one. The land must be well drained to keep excessive dampness away and to protect the house against flooding during heavy rains. Swampy land breeds mosquitoes and makes the home unhealthy for the inhabitants. The immediate surroundings should be clear of heavy vegetation that may harbour snakes and furnish a breeding place for mosquitoes and other insects. The place chosen should be one where there will be a breeze and protection from the heat. Shade trees on the site will be an advantage as they will help to keep the house cool, but heavy trees that can be easily uprooted and can destroy the house during hurricanes should be cut down.

The proximity to facilities of various kinds must also be considered. Most important is an easily accessible water supply. Nearness to stores and trading centres and to schools is also very important.

A third, but often neglected, factor in choosing a site is the neighbourhood and the standards of the people living in it. A family should try to select one in which the people have good standards of cleanliness and sanitation, and moral and social habits that will make them good neighbours, with whom the family will be willing to have its children associate.

It may be difficult to find a site that meets all these requirements, but an attempt should be made to choose the one that has most of them. Families that are not free to choose a site should make the one they have meet these requirements to the greatest possible extent.

## 2. Facilities for normal living

For satisfactory living, suitable facilities should be provided for all activities that are, or should be, carried on in the home. These include:

- i. Sleeping accommodation for all members, which provide comfort and a reasonable degree of privacy.
- ii. A place to cook, prepare and store foods and to wash the dishes.
- iii. A place to eat meals where all members can sit together as a family.
- iv. A place where the members of the family can come together as a unit and where they can receive their friends; where children may study and parents read or relax.
- v. A place to wash and bathe.
- vi. A place to do the laundry.
- vii. Facilities for keeping belongings such as clothing, equipment and other personal effects.
- viii. Facilities for disposal of garbage and human excreta in a sanitary way.
- ix. A safe and accessible water supply.
- x. A place for children to play and for the family to sit and carry out some activities out-of-doors.

These are minimum essentials at any level of living. The housing requirements to meet them will now be considered. Those will relate particularly to families in modest circumstances that must economise in space and equipment. Families with more resources may add to these essentials and those that cannot now obtain them can use them as goals which they may strive to attain.

### (a) Size of the house

The size and composition of the family should be a determining factor in deciding the size of the house. It can be agreed at the outset, however, that the building of one-room houses should be entirely discontinued. There are now far too many one-room houses in the area. These might possibly suffice for a young couple without children, but with any

increase in the size of the family there is need for expansion. Consequently, many families find themselves living under crowded conditions in one room. Some houses built by the Government in Curacao are for the exclusive use of a certain limited number of people. When the family increases in number, it must, according to the plan, move to a larger house that meets the requirements of the larger family. With the present shortage of houses, building material and land in the area, it is seldom possible to carry out such a scheme on a large scale, and the result is the overcrowding of families in houses that are too small.

### (b) Facilities for sleeping

Such one-room houses as now exist should be enlarged whenever possible, but if not, arrangements should at least be made to furnish some degree of privacy, especially for sleeping. This can be done by a partition which is high enough to afford privacy, but leaves enough space at the top to allow free circulation of air. Better still is a sturdy, movable screen, preferably a folding one, that can be removed during the day.

In building a new house, a living-dining room, two bedrooms and a kitchen, should be planned for whenever possible. At least there should be one bedroom, and the house should be built so that another may be added when funds are available and it is needed. This two-bedroom house with living-dining room and a kitchen provides the minimum space in which a family consisting of parents and children or other adults of both sexes can be accommodated so as to provide for decent living. If possible, the bedrooms should be at least 8 x 10 feet in size and the living-room a little larger.

Such an arrangement allows the parents to have one bedroom with no other occupant except a baby or child under two years. The other bedroom would serve for the girls or other women, and the boys or any other males would sleep in the living-room. If, however, there are small children who should go to bed early, they might have the bedroom, while the parents sleep in the living-room. Small children sleep more quietly if they are not in the same room as adults. They should, however, be within hearing distance of their parents.

At present only a minimum of houses in the Caribbean provide accommodation of this kind. With limited space and large families, many people of different age groups are crowded into one room, and several people not only share one bedroom, but also one bed, and many children sleep on the floor. The baby sleeps with the mother at the risk of being suffocated.

The goal of a minimum of three rooms in addition to the kitchen cannot of course be achieved at once, but is one toward which both individual families and planners of government housing projects should strive.

(c) Living-dining room

In modest homes one room must serve both as living-room and a place for eating meals. It will serve, first of all, as a place where the family can meet for common activities, which help to develop a cooperative spirit among the children and to bind the family closer together. The social life of the family includes the visits of neighbours and friends. It is especially important that children should be able to invite their schoolmates and friends to their home, rather than seek their company on the street.

The social life of the family can also be enjoyed in the open air, in the yard, on the verandah or on the doorsteps. With shade provided by trees and sufficient privacy given by shrubs and hedges, the yard can be used for various purposes during a considerable part of the day, weather permitting. The verandah offers shade for outdoor activities in warm, humid climates, but to be cool and comfortable it should be open to allow for the free movement of air. The space beneath houses raised to a certain height on piles can be utilised for "outdoor" living during the daylight hours. In planning a house, provision should be made for this out-door living space as an addition to the necessarily small living room area.

The living-dining room should also be planned to provide space and facilities for all the family to sit together at meals. At present the general habit in many homes is to sit down and eat wherever there is a place to sit. This may be the doorstep, a stone in the yard or, for the father, a chair at a small table in the living room. Members of the family do not sit down and eat together as a family. The mother has no control over what the children eat or how they eat, and the children receive no training in table manners. This pattern does not encourage regularity and punctuality at meal times. Family members miss an opportunity for pleasant fellowship with one another. Though there may be several small tables in the house, there seldom is a table large enough to accommodate the whole family.

The living-dining room should normally be nearest to the kitchen. It should be provided with a table large enough to accommodate all the family. An example of a space-saving table large enough for this purpose is shown on page 152. Seats for each member of the family are also necessary, and simple stools, floor benches and wall benches can serve this purpose where floor space is limited. These too may be built at home if desired, as described in Chapter VIII - Plans and Descriptions of Home Improvement Projects.

(d) Storage facilities

Nothing contributes more to good housekeeping standards than adequate storage facilities. At present, these are largely lacking in the majority of homes. Clothing is generally stored in the bedroom, in trunks and on shelves, or hung on the wall or over furniture. With the limited floor space available in many houses, there is not enough room for large cupboards. Because of the tendency to give first place to the furnishing of the living room, there is often not enough money left for providing storage for clothes and other personal effects in the bedroom.

In homes without a refrigerator, the storage of fresh food presents such a problem that in practice only food for the day is purchased. Even staple goods such as sugar and rice are often bought daily. When insects are prevalent and storage space is lacking, bulk purchase is inadvisable though it is more economical to buy in large quantities at least for the week.

Equipment is stored in the living room and in the kitchen. The most common cupboard is the one for storing and displaying glassware in the living-room. With its glass door it is often the most elaborate piece of furniture in the home. There may also be a meat-safe (screened-in cupboard) in the living room or in the kitchen, but there are few other places for storing either food or equipment.

In planning a house careful thought should be given to storage facilities as they are important both for the protection of property and personal effects and for the convenience and orderly appearance of the home. Without them, it is impossible to keep the home tidy.

When a house is being constructed, closets and cupboards should be built in. Closets for storage of clothing may be built into the wall dividing two bedrooms so that part of the cupboards opens into each room and storage facilities are provided in both rooms. (see Figure 1).

(e) The kitchen

Special thought should be given to the kitchen, in many respects the most important room in the house. In old times the kitchen played an important role in the life of West Indians \*. It was not only the place for preparing and eating meals, but it was also the place

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\* Dom Basil Matthews, O.S.B.: "Crisis of the West Indian Family". Extra Mural Department of the University College of the West Indies, 1953.

where the visiting neighbours were received and where the social activities of the family took place. Nowadays the kitchen is too often the most neglected part of the house.

Even when new houses are erected, often little thought is given to the kitchen. The money for building purposes is spent on other parts of the house so that there is little or nothing left for the kitchen and the housewife has to prepare the food for the family under inconvenient and unsanitary conditions. This is a serious mistake in terms of family welfare.

When planning the house a decision must be made as to whether the kitchen is to be a separate building or a part of the main house. In hot climates the kitchen is often separated from the house proper so that the heat and odour from it will not penetrate the living space. This does not, however, protect those who work in the kitchen from the heat. If it is decided to have the kitchen in a separate building, the communicating passageway to the house must be protected to some extent against sun and rain. When the housewife has to do all or most of the work herself, the kitchen and place where meals are eaten should be close together. The tendency in new housing developments, therefore, is to make the kitchen an integral part of the house, or even part of the dining room area. (See Figure 2).

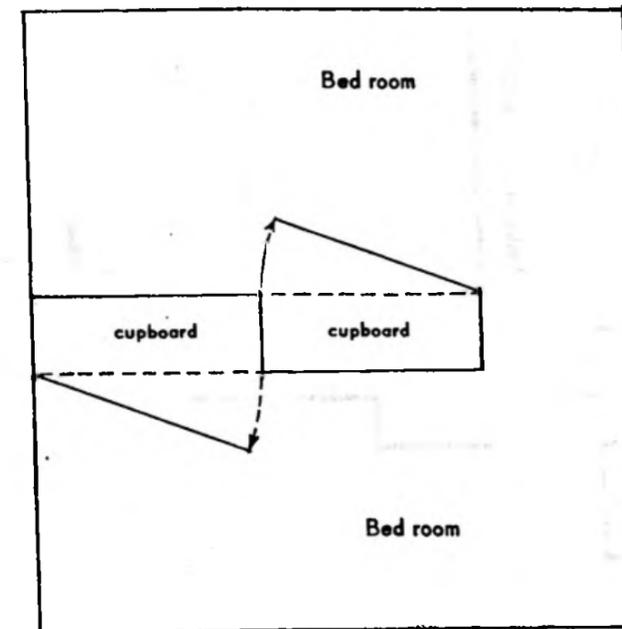


Fig. 1: Built in cupboards dividing two bedrooms.

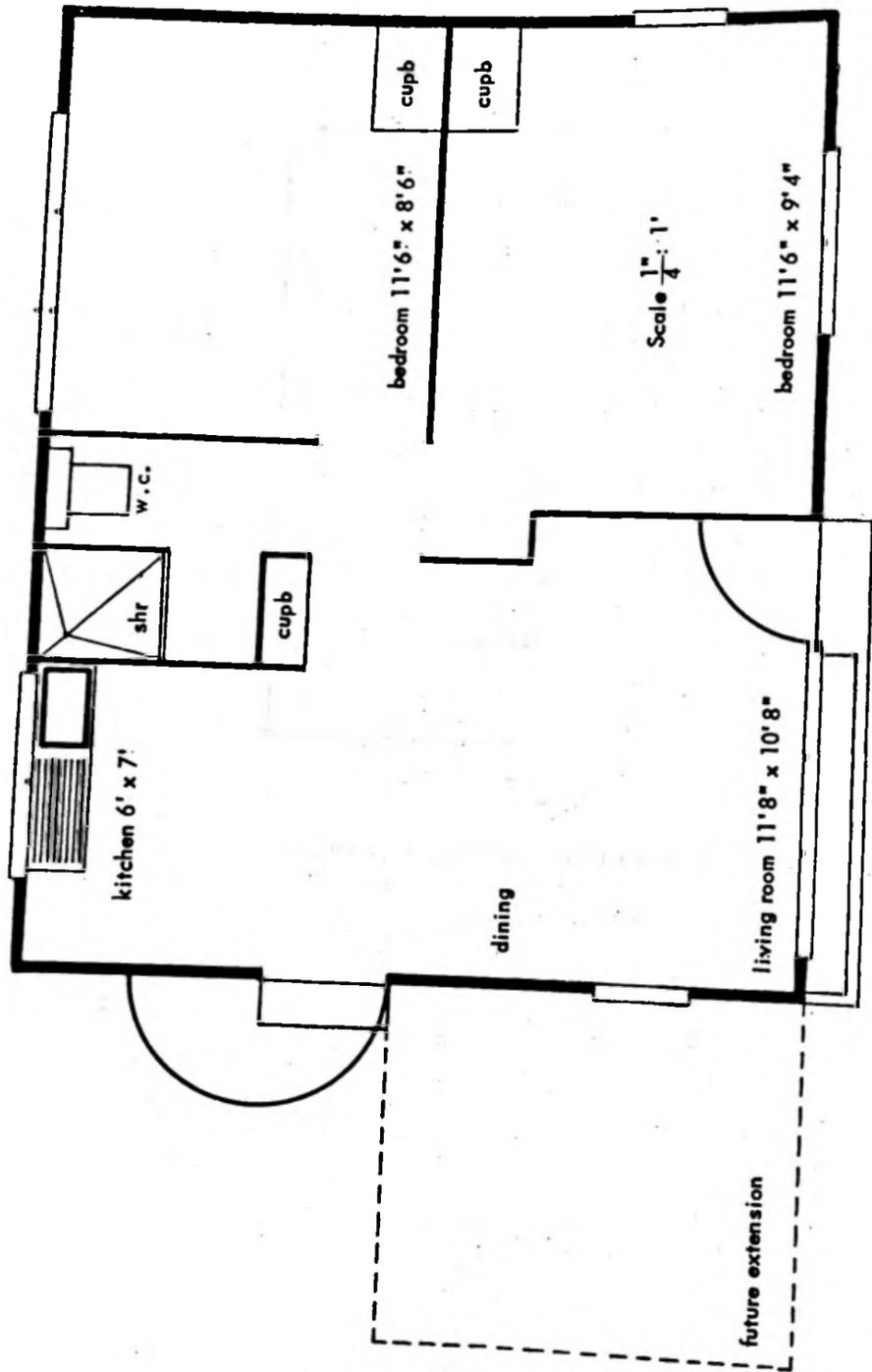


Fig. 2: Low-cost housing project, British Guiana. Kitchen forming part of the living room.

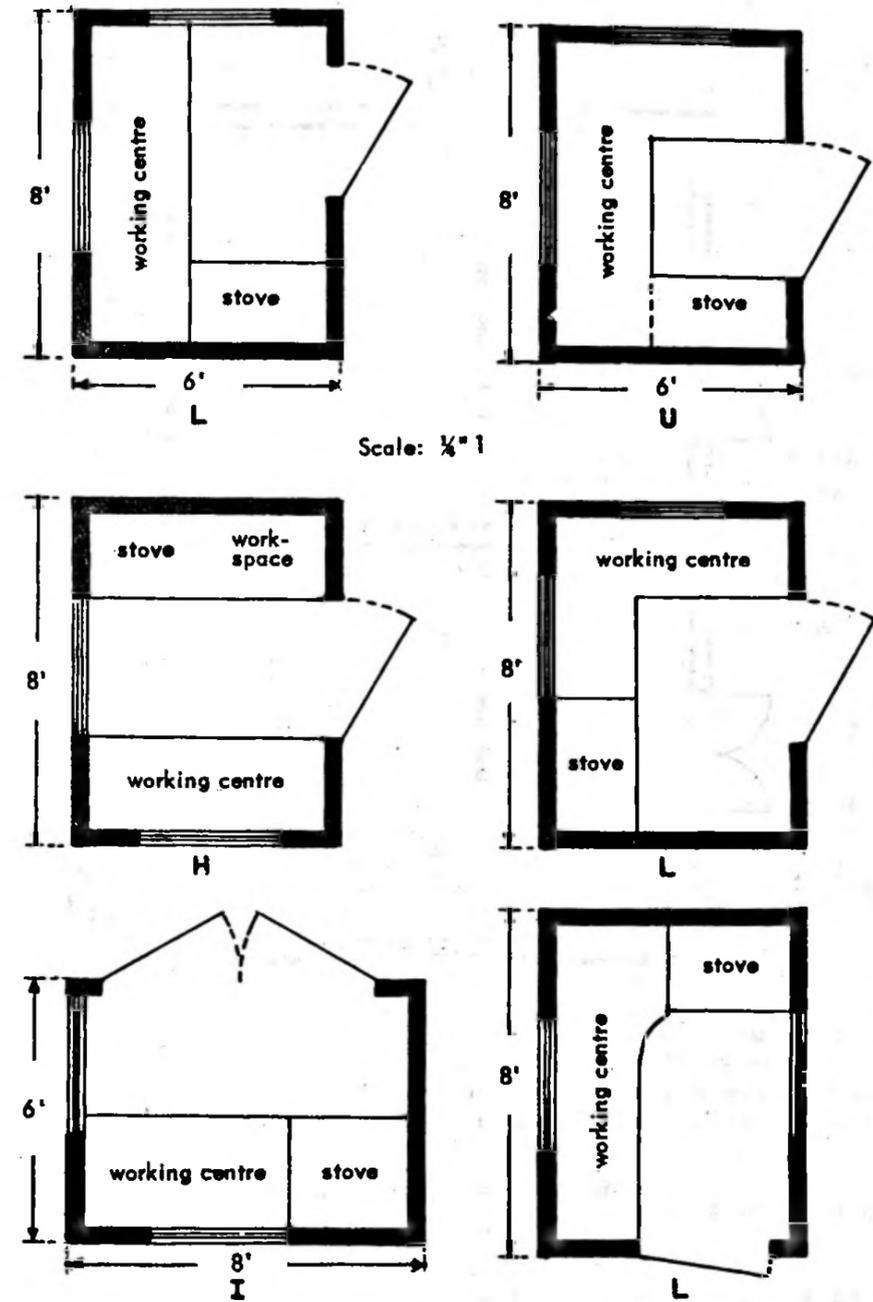


Fig. 3: Different types of kitchen with the same floor space (6 x 8 feet).

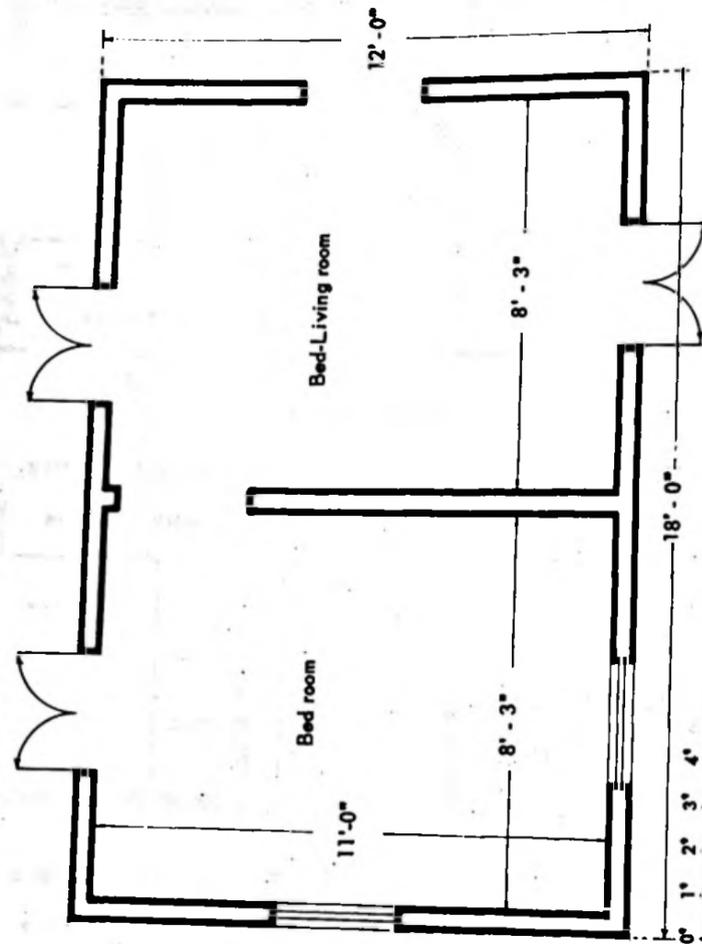


Fig. 4: 2 room house without kitchen.

The plan for the kitchen should provide for built-in facilities for all activities carried out in it. These include:-

- i. Working space for the cleaning and peeling of vegetables, and the cutting and mixing of foods, and space to rest dishes when serving foods.
- ii. Cupboards for storing foods, cooking utensils, and dishes, unless space is provided for these in the dining area.
- iii. A sink or a substitute for washing dishes.
- iv. A stove or a place for it, if one is to be bought.
- v. A cupboard for keeping brooms, mops and other cleaning implements and materials.
- vi. Space for a table for eating if the kitchen is attached to the house and is large enough to allow for it.

A suitable size of a kitchen for a three-room house is 55 to 60 square feet (7 x 8 ft.) or a little larger.

In planning the kitchen consideration should be given to the following points:

- (1) The stove should be close to the place where food is prepared.
- (2) There should be space on either side of the stove for resting pots and pans.
- (3) The area for cleaning and preparing food should be close to water and sewage.
- (4) The working surface must be large enough for cleaning and preparing food and for washing up, and it should be of a convenient height - 32" - 36" or 80 - 90 cm. It is economical and practical to combine the working areas so that they can serve a double purpose, e.g., the space beside the stove can be used both for cleaning and preparing food and for stacking dirty dishes.
- (5) Cupboards and drawers should be designed for the goods to be stored in them.
- (6) Working areas and storage facilities should be arranged so that they are near each other and unnecessary labour on the part of the housewife is avoided.

Four types of kitchens are shown in Figure 3 with the main areas of work arranged as a U, an L or in a single or two parallel lines. These arrangements minimise the distance between the various working areas.

(f) Water supply

An easily accessible and safe water supply is one of the amenities that it is hardest to do without. The water supply in some urban areas in the Caribbean does not present any problem as pipe-borne water is available and may be collected at stand-pipes in various places. In many rural areas, however, standpipes are few and far between, or worse still there is no pipe-borne water and water has to be drawn from rivers or streams which are often polluted by people and animals.

During the dry season, and especially in times of severe drought, a shortage of water occurs in many countries that sometimes makes rationing necessary. Where pipe-borne water is available it may be shut off for most of the day; sometimes there is water for only one hour in the morning, during which time housewives or children line up to fill their buckets.

Water has sometimes to be transported from distant places or even imported from neighbouring countries; in such cases it has to be bought. In Curacao with its long dry seasons sea water is distilled to remove the salt and render it suitable for human consumption. This is an expensive process and the cost of water is therefore, comparatively high.

i. Collection of rain water

In places where there is a shortage of water, the collecting of rain water becomes most important. Gutters of galvanised iron or bamboo should be fitted to the roof of the house and connected to covered drums. These drums should be tarred inside and painted on the outside as a protection against corrosion. The tarring will also help to keep the water cool. If the drums are placed at a suitable height it is possible to lead water into the house.

In Belize, British Honduras, "vats", i.e. big wooden tanks, are seen in many yards. The water collected from the roof is led into the vats through pipes of galvanised iron. There is either a faucet at the bottom of the "vat", or water is led into the house through pipes. These vats are often tarred inside to protect the wood from rotting and are painted white on the outside.

Where there is adequate rainfall (at least 60 inches a year), houses built of concrete with a strong enough roof can be fitted with a water catchment. If the roof has a slight slope a cistern can be installed to store water. The cistern is best made of concrete and like all water containers should be satisfactorily covered and off the ground. The use of roof catchment in the U.S. Virgin Islands is considered to be an important factor in the low disease rate in those islands.

In Saba, Netherlands Antilles, large concrete tanks are built on the ground close to the house. (Photographs 1 and 2). In some countries rain water is stored in huge concrete tanks for the use of the public. One commendable example of how the problem of water storage can be solved through community effort is found in Sarteneja in British Honduras, where the villagers pooled their resources of labour and materials and built a tank large enough to store water for the whole village.

ii. Water piped into the house

Wherever it is possible, water should be piped into the house to avoid the heavy work of carrying it from far away or even from nearby sources. (Photograph 3). Care should be taken to have one tap in the house or yard at a height convenient for placing a bucket underneath it. With a roof catchment, water can easily be led to the desired place in the house. If there is a pipe-borne water supply near the house, the extra cost of running a pipe into the house may be well worth paying. Provided a pump is available, a pipe can be run from a private well or tank on the ground. The rain water is led through wooden spouts to a hole covered with a grating on the side of the tank. The common practice of painting the wooden spouts with lead-paint should be avoided as it may cause lead poisoning.

iii. Safe water

It is important that all water containers be satisfactorily covered to prevent pollution from dirt and animals and the breeding of mosquitoes.

Where it is possible to obtain well water, the well should be built in a place where the water cannot be polluted by overflow from latrines or by animals. The borehole or deep well should be lined with water-tight material. There should always be a cover over the top to give protection against pollution, and to prevent accidents.

In communities with a good public water supply, the water is generally purified and chemicals are added to make it safe for drinking. In places where there is a risk that the water is polluted, and in the event of epidemics, all water for drinking purposes should be boiled. The clarity of water is no guarantee of its purity, as it is often thought to be.



Photograph 1

Water collected from the roof is led into a large tank. Fine grating for the opening into the tank prevents leaves and animals from getting into the tank (Saba).

Photograph 2

A pump has been attached to this tank, making it possible to lead water into the house (Saba).



Photograph 3

Water is stored in large drums and pumped up into the drum below the ceiling (British Honduras).

There should always be some water stored in the house. A suitable water container that will help to keep the water cool can be made from a nail keg lined with cement. The container should always be kept covered. For the making of such a water container see Photograph 5, and the description given in the chapter on Home Improvement.

(g) Disposal of human excreta

In rural areas it is still common to find insanitary latrines (Photograph 6) or houses with no latrines at all. In some places latrines are placed over the river or close to it, thus causing pollution of the water which may also be used for laundering and bathing, and even for household purposes. The use of the seashore or the fields for the disposal of human excreta increases the risk of hookworm and the spreading of infectious diseases. These are health hazards that should be eliminated.

In new housing projects special arrangements are made for the installation of water closets and building of septic tanks. But there are many places where such conveniences are not within the reach of the people (or of the community). For such places the pit latrine, if properly built, installed and cared for, is a satisfactory arrangement. The latrine, usually placed in the yard, should be at least 20 feet away from the house and the kitchen. In congested areas the building of latrines should be planned in cooperation with the neighbours to ensure the most sanitary arrangements for all. The aim is to have a latrine or preferably a water closet for each individual family, so sited and constructed as to avoid any possibility of polluting a water supply.

In Puerto Rico, aluminium latrines are furnished by the Health Department free of charge under certain conditions. These are basically pit latrines with a concrete foundation and an aluminium superstructure. In a resettlement scheme in St. Vincent, the installation of latrines was made mandatory and each householder was provided with a concrete box-seat and floor plate at cost price. This sum was added to the loan of materials made to the householder to build the new home, and had to be repaid monthly.

To be satisfactory, the pit latrine should be 16' - 20' deep. This will prevent unpleasant odour and also prevent the hole from being filled up too quickly. A post hole digger or auger is best used to dig the hole. There should be a concrete slab about 2½ to 3 inches thick and about 3 feet square to cover the hole and serve as a base for the concrete box-seat. The base and the seat must be fitted together so as to prevent access of rats, flies and mosquitoes. Different types of latrines are shown in Photographs 8 to 10.

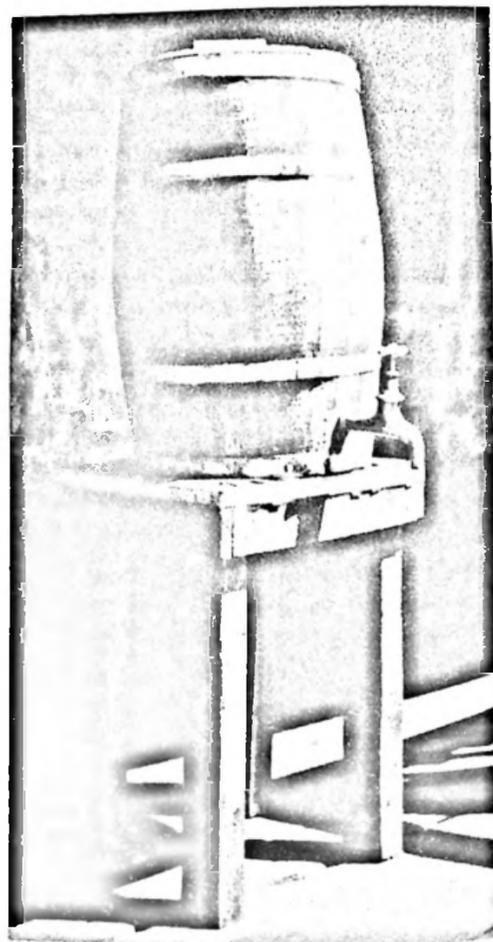


Photograph 4

A concrete stand in the correct height and with two wash basins. The water being pumped into the house from a tank provides running water for laundering.

Photograph 5

Water container made from a nail keg, lined with concrete.  
Photo: Dr. van Bochova,  
St. Eustatius.



Where there are no social objections, the borehole latrine or squat privy can be used instead of the pit latrine, because it is cheaper and simpler, and just as sanitary. The hole should be covered by a concrete slab, which should have a hole surrounded by grooves. There is no box-seat attached. A wooden or metal cover can then be slid over the hole in the concrete slab when it is not in use, thereby ensuring darkness, protection against accidents and access of flies. Four posts or bamboo poles can be placed at the corners of the slab and vines grown to form protective walls. An individual family can provide itself with this type of latrine with a minimum of materials and assistance. When the hole is almost filled, which would take a matter of years, two men can move the concrete slab to another hole. This type of latrine can be provided by self-help methods at the same time as house building or repairs are under way\*.

Instructions for building a pit latrine are found on page 203.

The Health Department in most places will be able to furnish further details, if necessary.

"It is not sufficient to provide latrines in rural areas. The people must be educated to use them as the connection between disease and faeces disposal is not fully understood. In the Marbial Valley in Haiti a film cartoon on hookworm made the people aware for the first time of the relationship between disease and the insanitary disposal of excreta and they then began to build latrines" \*.

Different devices may be used for covering the pit. For one such device used in Antigua, see Photograph 10. As these devices do not always function properly, it is important that every effort be made to educate the young people in the proper use and care of the latrine, and especially to convince them of the need to replace the cover before leaving.

#### (h) Bathing facilities

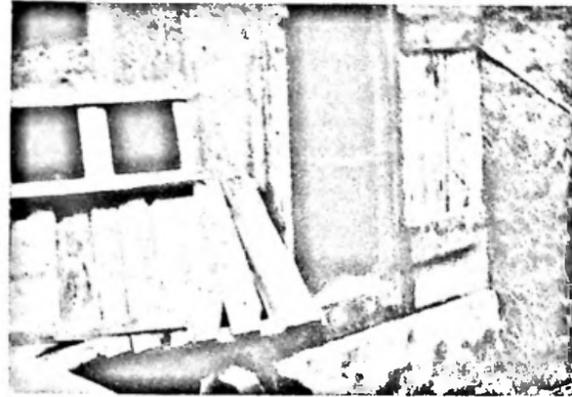
In new housing projects, which provide running water in the home, provision is made for shower baths. As these require little space they are suitable for small houses. When there is no running water in the house, a tub is used for bathing in the bedroom or in the kitchen. Men and children often bathe in the river or in the yard, where some sacking is put up to afford a minimum of privacy. In some places there are public baths serving the whole community. The sanitary condition of the public baths is not always what it should be and some families object to using them.

\* Caribbean Commission. Aspects of housing in the Caribbean. Port of Spain, Trinidad, 1957.

POOR AND GOOD TYPES OF LATRINES

Photograph 6

Dilapidated and unsanitary type of pit latrine.

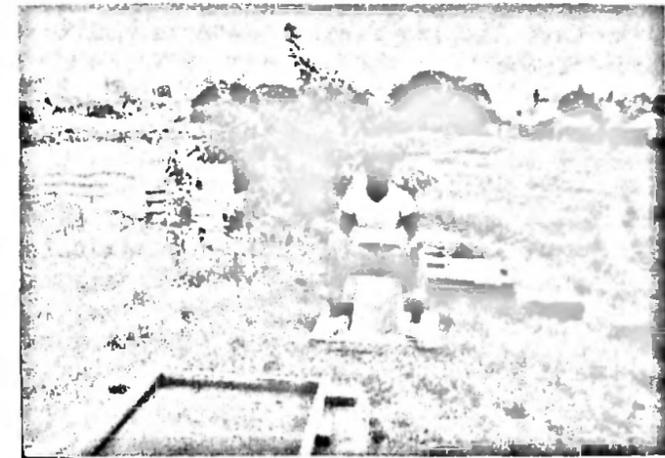


Photograph 7

Latrine over the sea.

Photograph 8

Sanitary, fly-proof latrine with precast units of concrete floorlab and concrete box.



Photograph 9

A concrete floor slab in the making and a completed floor slab and concrete box seat (Antigua).



Photograph 10

So-called fowl coop type latrine with flap out exposing opening into the pit (Antigua).

Even when good public bathing facilities are available, it is an advantage to have bathing facilities attached to one's own house, since it is not always possible to send children or aged and ailing people to the public bath. If possible, bathing facilities should be located in the house itself. Even if there is no running water in the house, a space that affords some privacy for bathing is needed. A concreted space, which may be no more than 3 to 4 feet square, may serve as a washing place. It should be a few inches lower than the rest of the floor and have proper drainage. In this space the common method of bathing by pouring water over the body, may be followed, or people may bathe in a tub placed on the floor. In any case, a wash basin placed at a convenient height should also be available, with water and soap within easy reach, for washing the face and hands, or for taking a sponge bath. The bathroom should be well ventilated. In two-storey buildings it is most convenient to have the bathroom close to the bedrooms. Improvised showers can also be made in the yard if desired. For a detailed description see page 193 Chapter VIII, Figures Nos. 21 and 22 refer. A plan and description of an improvised washroom in the yard is shown in Chapter VIII, Fig. No. 20 in the section on Home Improvement.

(i) Laundry facilities

Facilities for laundering at home are often lacking. In rural areas, washing is often done in the river. When there is a steady flow of running water from the mountains the river water may be fairly clean, but in many backwaters the water is likely to be polluted both by human and animal excreta. Women washing clothes in the river thus run the risk of infection from whatever type of disease organisms the water may carry. Many streams are infested with bilharzia.

The difficulty of carrying enough water to the home makes it difficult to change this method of washing clothes. Washing in the river has also a psychological value, since the drabness of the work is counteracted by the companionship of other washerwomen. An example of how the old habit of working together can be maintained under conditions which save labour is the public washing centre in Soufrière, St. Lucia. Several washtubs supplied with running water are placed together at a convenient height and with protection against rain and sun. When such public washing centres exist they provide suitable facilities for many families.

Doing the laundry at home saves time and labour if sufficient water is available. It can be done out-of-doors, as it commonly is now, but better facilities than those existing at present are needed. Instead of placing tubs or other containers on the ground, a strong bench should be built long enough to accommodate two tubs, one for washing, the other for rinsing the clothes. Tub of galvanised iron are durable and economical to use. The bench should be of the right height to enable the woman to avoid stooping. A washboard should also be provided.

If there is an ample water supply, stationary tubs can be built of concrete or other material at the back of the house, and water piped into them. This makes washing a much easier task for the housewife. (See Photograph 4).

Though the actual process of washing requires little space, the drying of clothes needs more space, and this should preferably be protected from rain. When houses are built on stilts, the drying of clothes can be done in the open space below the house. With houses of the apartment type provision should be made for a communal, covered drying space. A good clothes line is also needed which may be either of special wire made for this purpose (not barbed wire) or rope.

CHAPTER III

BUILDING THE HOUSE

Assuming that the things that a house should provide for are known, a plan can be made showing how all of them are provided for and the arrangements of facilities in relation to each other. The kitchen should be as close as possible to the dining room while the bedrooms should be close to the bathroom. Passage through one bedroom to get to another should be avoided.

In order to reduce the building cost, the structure of the building should be simple without unnecessary corners that will tend to cause leakages. The aim should be to get as much floor area as possible within the wall structure. There should be little or no dead space. In small houses it is of particular importance that doors and windows be so placed that they do not reduce the space available inside the house. Doors and shutters that open outwards rather than inwards are to be preferred.

The structure of the house should be such that it can be enlarged when necessary and possible. The overall size of the house and the size of the rooms will depend on the funds available for building. If possible, bedrooms should be at least 8 x 10 feet in size, the living room a little larger and the kitchen about 55-60 square feet (7 x 8 feet or a little larger). Several different layouts for 2-3 bedroom houses are shown in Figures 4 - 8.

1. Building materials

Thought should next be given to the materials with which the house is to be built. The availability and cost of materials, and the housing customs in the area must be considered, as well as the advantages and disadvantages of the various materials.

(a) Wood

Wood is the most common building material in the Caribbean, especially in countries where forests abound such as British Guiana and British Honduras. (Photographs 11 and 12). The quality of the wood varies from the famed greenheart in British Guiana to very soft woods of low resistance to insects and weather. In British Honduras pine and the wood of the Santa Maria tree (Calaba) are commonly used for building purposes. Pine from British Honduras is also being used in aided self-help housing programmes in Jamaica.

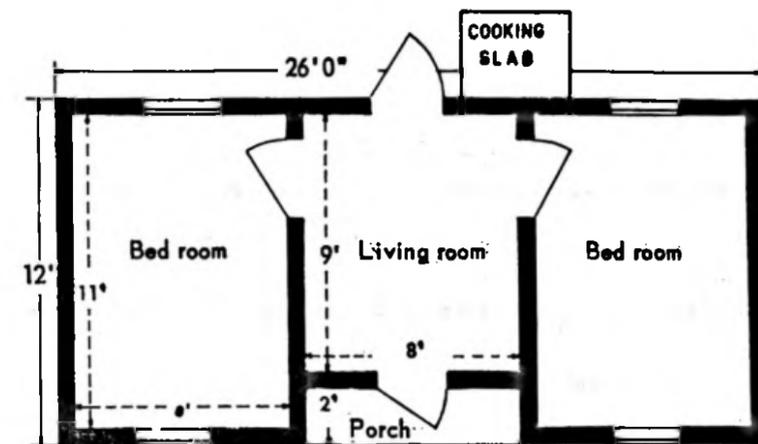


Fig. 5: 3-room house without kitchen.

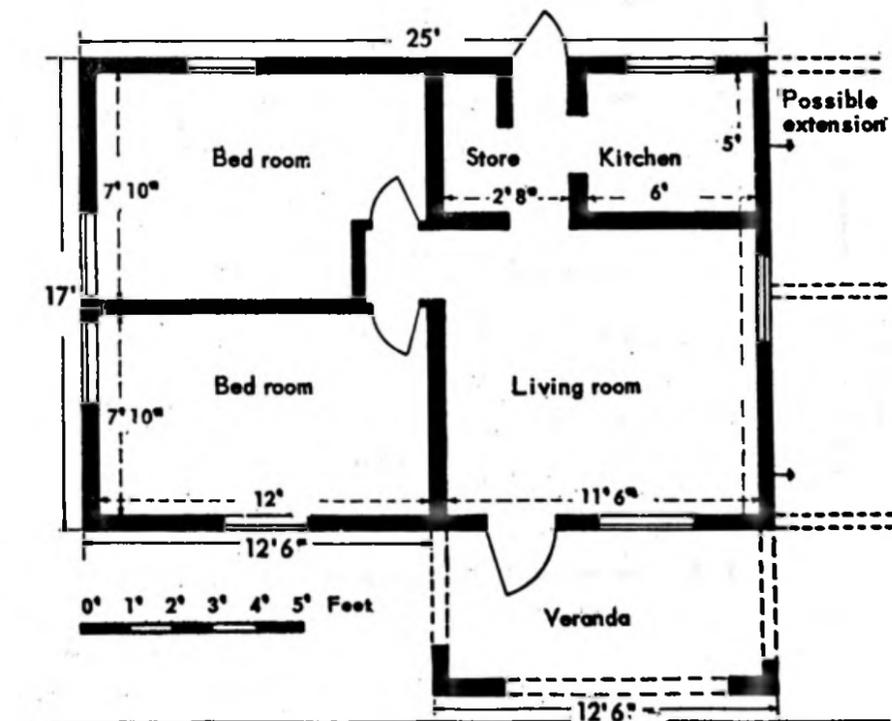


Fig. 6: 3-room house with kitchen.

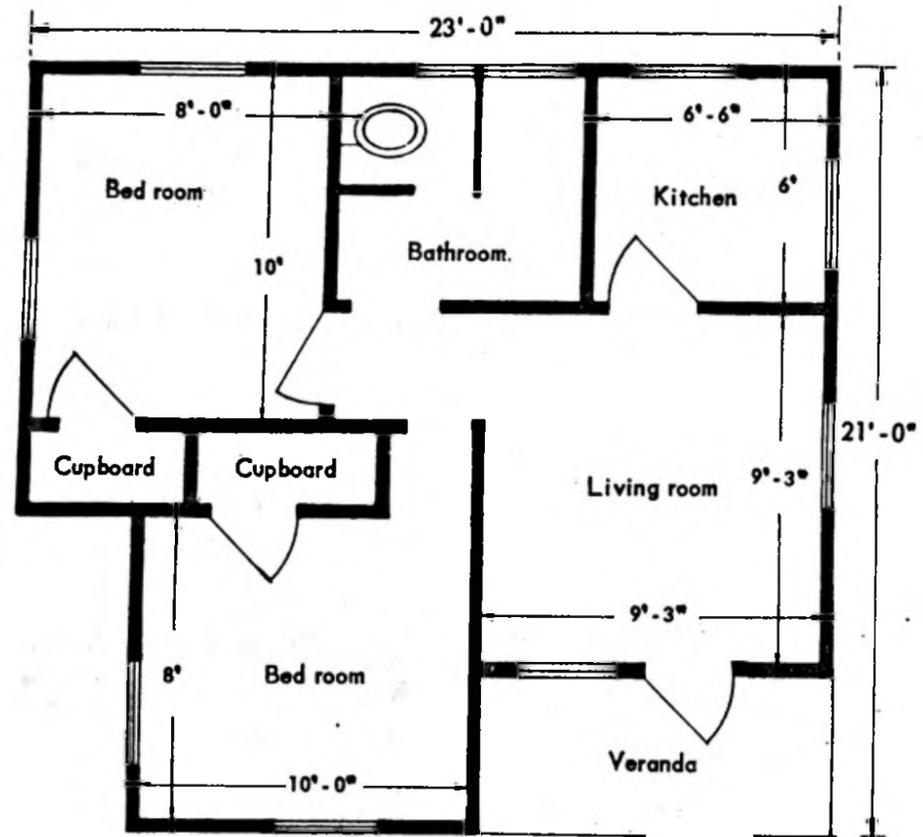


Fig. 7: 3-room house with kitchen and bathroom.

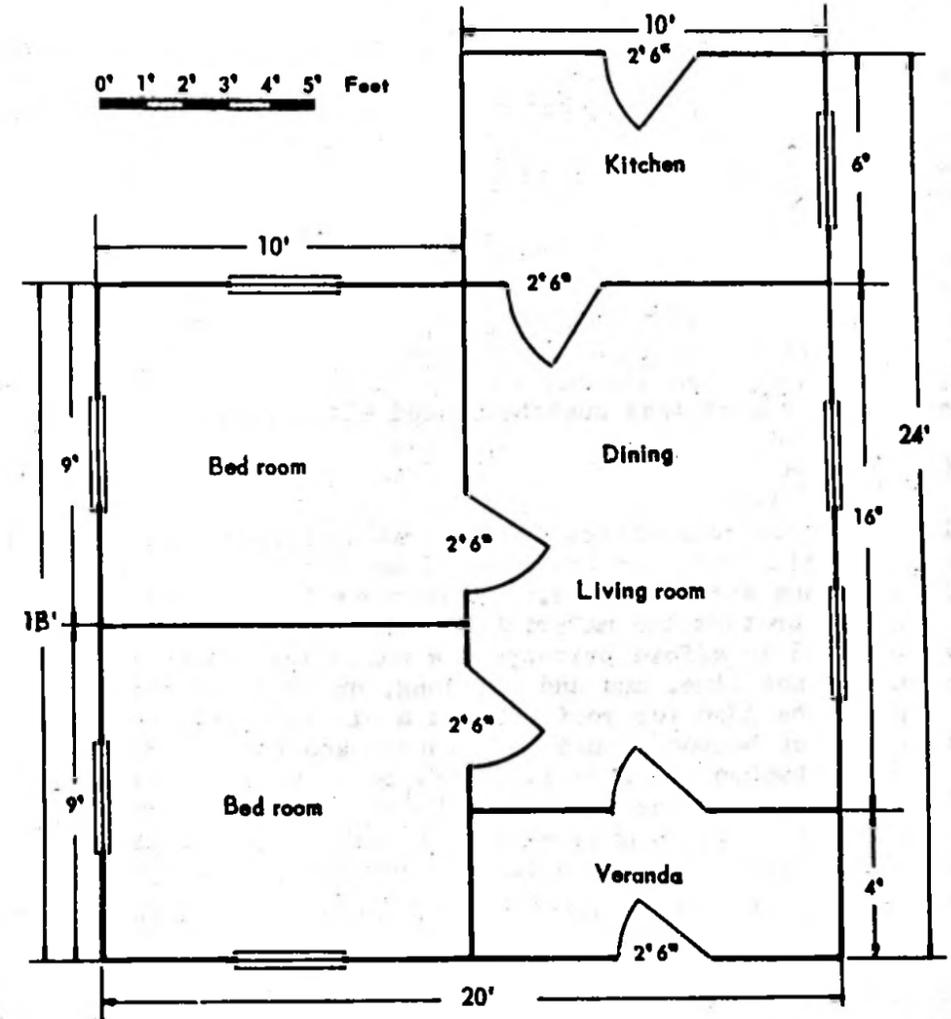


Fig. 8: 3-room house with kitchen.

Among the Maya Indians in British Honduras, poles of palmetto wood, or, as it is locally called, pimento wood, are used for building. The poles are sometimes covered with lime or mud or with mud that is whitewashed afterwards. A well-made thatched roof completes the attractive looking house shown in Photograph 13.

Wood is also used for making shingles. In St. Vincent, Dominica and elsewhere, wood shingles are made from naturally resistant wood (mostly white cedar) that does not need to be treated against termites or rotting. In British Guiana wallaba shingles have been used for many years. If properly cut so that the wood does not curl, the shingles make an attractive looking building. Wood shingles are used especially as a roofing material. If the shingles are well laid, the roof is attractive and quite durable. The shingles must be placed on sheathing made from a substantial wood and properly nailed to the rafters. In places where people can prepare the shingles themselves this kind of roofing is economical. In other places the cost is the same as for galvanised iron sheets and concrete tiles. If the shingles are not made from hard wood they must be coated with oil to protect them.

(b) Bamboo

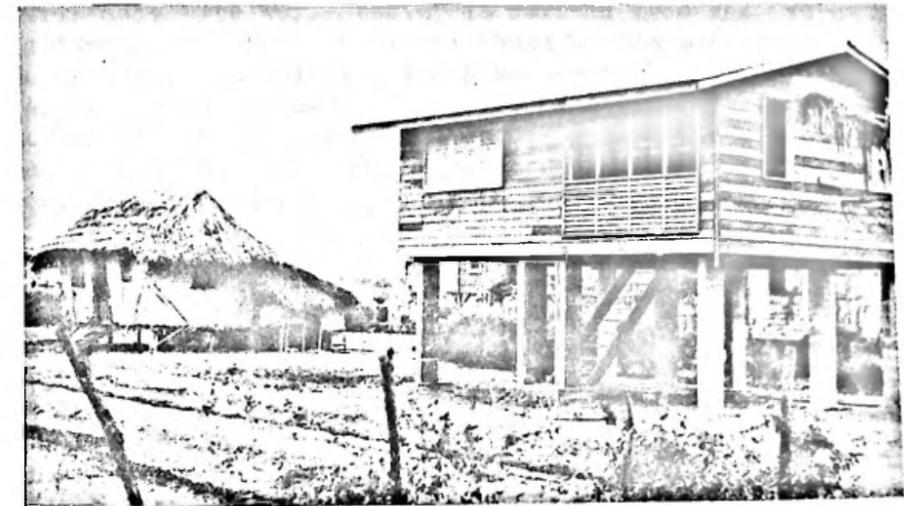
In many rural communities of the area bamboo (or wooden sticks) are used either standing upright or woven together. They are used mainly for kitchens and outhouses. (Photograph 14). To strengthen the walls and to protect the material from rotting and destruction caused by the weather and to afford privacy, the walls are often plastered with a mixture of mud and lime, mud and cow-dung, or lime and cement. "Bamboo can also be used for roofing. In a simple bamboo roof only straight lengths of bamboo should be selected and cut, washed and dried. When the bamboo is dried it should be split lengthwise and the little partitions at the internodes knocked out. The strips should then be placed in an under-and-over fashion to form a sort of tight lattice work. This type of roof may last for many years" \*.

For the best results, bamboo should be cut when it is dry. There is less destruction by insects when there is no sap. Practical experience indicates that bamboo should be cut during a dark night. Wherever it is practical, the bamboo should be soaked in river water to remove the sugar and thereafter left to dry.

(c) Wattle and daub, tapia and thatch

The East Indian population in Trinidad has preserved the skill of building an attractive house with wattle and daub. Sticks or bamboo strips are used for the walls. A mixture of materials such as mud, clay, cow dung, is used for plastering the walls. The wattled houses are not termite resistant except when termite resistant wooden sticks are used, as in British Honduras.

\* Caribbean Commission. Aspects of housing in the Caribbean. Port of Spain, Trinidad, 1957.



Photograph 11

Old and new house, the new one built under aided self-help scheme (British Guiana).



Photograph 12

Wooden Houses (British Guiana).

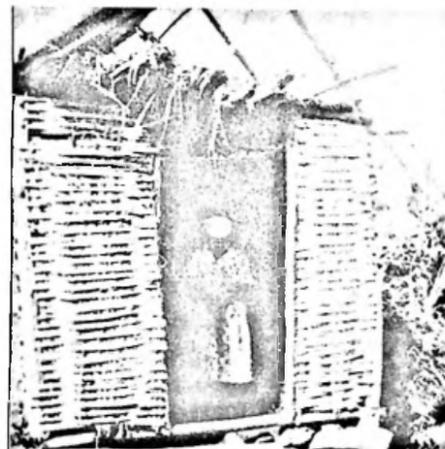


Photograph 13

Palmetto wood and thatch is used for temporary houses built after the 1955 hurricane, in Sarteneja (British Honduras).

Photograph 14

Bamboo strips are used for building this shed.



Photograph 15

House for labourers at Pomona (British Honduras).

Tapia houses are also commonly used as dwellings by the East Indians in Trinidad. The word "tapia" is derived from the Latin name for a grass used in building these houses. The tapia grass is resistant to insects. In building the house, a wooden frame is erected with tapia grass for the panels. A mixture of grass and sandy clay is then stuck on to the grass panels. Tapia is a better building material than wattle and daub, and houses so constructed are known to have stood for 100 years.

Another type of tapia house is being tried in St. Vincent. This consists of a complete timber frame with tapia panels. Tapia and earth are thoroughly mixed and laced between strips of round wood nailed to the wooden uprights. The walls are cement rendered on both sides.

There are various other fibrous materials available in the area that have long been used for building purposes. Bay-leaf, cabbage and royal palm leaves and lemon grass are used for roofing in many places. (Photographs 16 and 17). The thatched roof must be steep so that the rain water runs off easily. The thatched roofs made by the Maya Indians and the Amerindians in Central and South America give good protection against rain and sun and help to keep the houses cool inside. In dry weather, however, thatched roofing as well as wood shingles (unless made specially fireproof) constitute a great fire risk and have been prohibited in Curacao and in small towns in St. Vincent.

(d) Coconut

Coconut can be made into an excellent roofing material by interlacing the fronds of the coconut to make a slat. Layers of slatting are placed so that they overlap and are then tied to the roof. This type of roof resembles a shingle roof, and is attractive as well as durable. It is also waterproof and does not harbour rats. The method is so simple that even children can be taught to make the slatting\*.

(e) Concrete

Concrete is a most suitable material for the foundation of the house, and is used as such for houses made of different building materials. Reinforced concrete or concrete blocks are being used increasingly in the area.

\* Caribbean Commission. Aspects of housing in the Caribbean. Port of Spain, Trinidad, 1957.



Photograph 16

Houses built of palmetto poles and with thatched roofs (San Pedro, British Honduras).

Photograph 17

Rethatching the village church with bay leaves (British Honduras).



MAKING CONCRETE BLOCKS BY HAND



Photograph 18

A primitive way of making concrete blocks (St. Lucia).  
The mixture is being packed into the form.

Photograph 19

The block is formed - ready for drying.



HOMEMADE BLOCKMAKING MACHINE DESIGNED BY REV. FR. CHENEY, S.J.,  
ABOVE ROCKS, JAMAICA

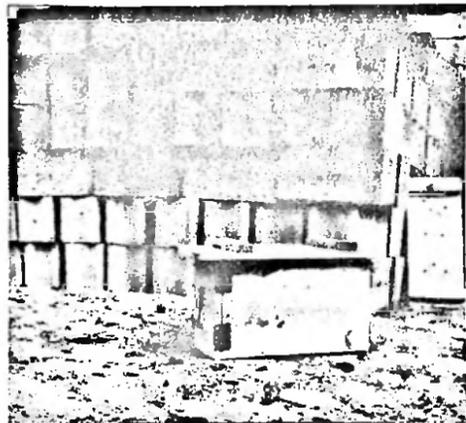


Photograph 20

The inner and outer cases.

Photograph 21

The block is being formed.



Photograph 22

The block is ready to be removed from  
the case and left to dry.



Photograph 23

The Governor of Puerto Rico making a concrete block.



Photograph 24

The making of landcrete blocks, St. Vincent.

Photograph 25

Landcrete house built by the Sugar Welfare Fund at Richfond (St. Lucia).



Photograph 26

Another type of landcrete house at Richfond (St. Lucia).



In the mortar and concrete work of small houses, cement and sand and stone are mixed in certain proportions: for mortar cement and sand in a 1-3 proportion, for concrete generally one part of cement to six parts of well-graded sand and gravel in volume, or one part of cement, two parts of sand and four parts of gravel or broken stones. In column and beam houses, where blocks provide certain walls, these can be made from one part cement, three parts well-graded sand and six parts gravel or broken stones. The dry ingredients must be carefully and evenly mixed before the water, which must not be salt, is added gradually. Since the mixture hardens quickly, it is important that the mortar be made in small batches - small enough to be used up within half-an-hour of the addition of the water. Concrete likewise should be poured as soon as possible after the water is well mixed in.

A primitive way of making concrete blocks is shown in Photographs 18 and 19. A simple block-making machine is shown in Chapter VIII - Drawing No. 29. (For description see chapter on Home Improvement).

When cement is available at a reasonable cost, concrete block houses become more common, as in Puerto Rico and Jamaica. Concrete blocks made in the correct proportions furnish a very strong building material. It is easy to learn how to make the blocks and the whole family can assist in the making of them. This is being done in many aided self-help housing projects. (Photograph 23.)

Concrete tiles and concrete slabs are durable roofing materials and are being used in many concrete houses. Concrete is also used for floors, especially in the kitchens, bathrooms and porches. By adding some colouring matter, such as red clay or red ochre, to the concrete mixture the floors become more attractive. Many new houses are made entirely of concrete. Concrete blocks are used for the walls with poured concrete for floors.

(f) Landcrete blocks

A cheaper kind of block is the landcrete block made under high pressure of rocky soil (marl) and cement in the proportion 20: 1. (Photograph 24). These blocks have been successfully tried in St. Vincent, St. Lucia and Dominica. In St. Lucia the cost of a block, 4" x 12" x 6", is about 5¢ - 6¢ (B.W.I.). One block weighs approximately 16 lbs. Landcrete blocks are most suitable where the dry season is long enough to have the blocks completely dried and the walls plastered before the rainy season starts. Houses built of landcrete blocks are shown in Photographs 25 and 26.



Photograph 27

Cutting the coralstone for building (Barbados).



Photograph 28

Old stone building in Saba, N. A.



Photograph 29

Housing project in Barbados.



Photograph 30

Bricks and concrete used as building material.

(g) Brick, tile and stone

Bricks of clay that have been fired in a kiln make an attractive building material, with qualities similar to concrete blocks. Century old brick buildings are still found in some islands, for example in St. Eustatius and Grenada. In some countries like Barbados, Martinique and Trinidad, hollow clay blocks are manufactured locally and used for building purposes. Tiles of burnt clay make a durable and attractive roofing material. Some old country houses in Grenada have tile roofing. In Barbados with its coral soil, the families participating in the Aided Self-Help Programmes are encouraged to build with coral stone. (Photograph 27). In Montserrat, Saba and other places, some attractive houses have been built of stone. (Photograph 28).

(h) Mud

Both bricks and landcrete blocks are inexpensive building material provided the necessary machinery is available. Mud is also used for floors. Earthen floors maintain a fairly constant temperature, somewhat below the mean air temperature, but are likely to be wet or damp most of the time. To be satisfactory, the mud must be carefully stamped by foot or tamped with a wooden or metal tamper to provide a smooth surface. This type of floor is difficult to keep clean and it tends to harbour many pests. By stabilizing the earth with cement or ash, riversand and cow dung in equal proportions mixed with water, the floors become less absorbent and easier to clean.

(i) Aluminium and galvanised iron

Among the newer materials used for building purposes are aluminium sheets. Aluminium is mostly used for building storage houses and occasionally for building family houses. Its most common use is for roofing.

Galvanised iron sheeting is common roofing material for both wooden and concrete buildings. As a protection against corrosion, galvanised iron roofs should be painted. Nails and bolts of the same material as the roof should be used. The joints should be sealed with a caulking compound so that water does not penetrate through the roof.

2. Advantages and disadvantages of various materials

(a) Bamboo, wattle and other fibres

These materials have the advantage that they can be obtained locally at little or no cost and houses can be built of them by the people themselves with the help of neighbours or friends. When well built they can be very attractive and comfortable. But they also have obvious disadvantages. They are fire hazards and they deteriorate rapidly. Thatch and other fibre houses readily become breeding places for rats and other vermin, and the roofs rot and leak after a while. Houses made of these materials will continue to be built however, so long as little or no money is available for better kinds of buildings.

Efforts should be made in such cases to improve the type of building; to find, if possible, ways of making the materials more resistant, and to inculcate in the people the idea that roofs need to be replaced every few years (every three years at least where there is much rain), and the walls kept constantly in repair.

(b) Wood

Wooden buildings have some of the same disadvantages as those made of fibrous materials. They can be readily damaged by termites and other insects, as well as by weather and by fire; there is also constant need for upkeep and repair of the house. On the other hand, wood is a material with which it is easy to work. It is easy to put fixtures into a wooden wall. Wooden floors are not cold and they are comfortable to walk on. The wood must, however, be well planed to prevent splinters from getting into the hands and feet.

Treatment of Wood: All wood should be well seasoned before being used in order to prevent shrinkage and the forming of any gaps that will collect dirt and furnish insects with a hiding place. In wood producing countries like British Honduras, the wood, while green, is dipped into a chemical and then put to dry. The boards are stacked, with space between each two layers to ensure free movement of air. This procedure will prevent marks from being made on the part of the wood that touches another part while drying. It also helps to destroy insects and borers.

Most woods should be treated to ensure protection against termites. There are different ways of achieving this, among which the following may be mentioned:-

- i. Painting the wood with a special solution of chemicals. This treatment, however, needs to be repeated periodically in order to maintain adequate protection.
- ii. Dipping the wood in specially prepared solutions of chemicals (which may be either hot or cold).
- iii. Dipping it in a solution under pressure.

The last method is the most satisfactory one. The dipping must be carefully done so that the chemicals may penetrate the wood thoroughly. If not, the process can be more harmful than helpful.

At Mango Creek in British Honduras wood is treated as follows: The wood is first air dried to put it into a suitable state for treatment with preservative and it is then placed in a tank. The air is pumped out to make a vacuum and "oeloure" salts are added. Pressure is built up and the wood is allowed to remain in the tank for 24 hours, during which time the solution penetrates into the grain of the wood. The solution is then drained off and the wood removed and stacked for drying.

There are various types of wood used for building purposes that are naturally resistant to termites. In British Guiana greenheart is famous for its hardness and its ability to withstand attacks of termites and weather conditions. Century old houses built of greenheart are still to be seen in British Guiana. As it is now being increasingly exported, greenheart has become an expensive building material. Many other highly resistant timber species are available in British Guiana as well as in other Caribbean countries. Palmetto wood (called pimento in British Honduras) is resistant to termites and to rotting to a certain extent.

The Public Works and Forestry Departments in the different countries should be able to furnish particulars about naturally resistant woods and about various methods of termite proofing that may be practised in the country. The additional cost of termite proofing if satisfactorily done is worth paying (less than 2 ¢ B.W.I. per sq.ft.).

In building a house care should be taken to prevent the entry of termites. Posts and stilts should be made from wood that is naturally resistant to destruction by termites and rotting, or suitably treated against such destruction. Where termite proof wood is not available, it may be more economical to use concrete pillars, with a metal shield on top, for protection of the wooden structure of the house. If materials other than stones or concrete are used, the shields should be placed below the wood. Hard wood posts treated with creosote, penta chloro-phenol or other preservatives may prove satisfactory.

To protect the wood from rotting it should never be placed directly on the ground. Protection is normally afforded by placing it on a concrete base. For protection against the weather, oil or paint should be used, especially with soft woods. Crank case oil (dirty oil from the automobile), which is cheap can be used for painting wooden rafters.

(c) Concrete, brick and stone

Concrete has the advantage of being a strong building material of special value for making foundations and erecting buildings in hurricane areas. Among its other advantages the following may be mentioned: there is no destruction by insects or by the weather; it is fire-resistant; the cost of maintenance and upkeep is low. Moreover, as concrete retains heat it is particularly suitable as a roofing material in places with extreme changes in temperature between day and night. In Trinidad with its cool nights, concrete helps to prevent the house from becoming chilly at night, and to retain some coolness in the day time.

There are, however, certain disadvantages in the use of concrete. One of these is the difficulty of putting up fixtures on the walls. This difficulty can be overcome by inserting wooden bars in suitable places when erecting the walls. Wood treated against termites should be used. Shelves and wall cupboards, can then be easily affixed to the wooden bars. Another device is the use of wooden plugs (rawl-plugs) which are inserted in a hole bored in the wall with a "concrete" drill. A hole the size of the screw is drilled into the wall, then a plug or a piece of wood is inserted into the hole, and a nail or screw is driven into the plug. Great care must be taken when making a hole in the concrete wall, so that destruction and unsightly marks are avoided.

Some people object to concrete because it is cold to walk on and especially for babies and toddlers to crawl on. This can be partly counteracted by proper water-proofing. The floor should be 6" above the ground with sand and gravel filled in underneath. Concrete floors are also hard on the feet. Mats made from straw or palm leaves will counteract this disadvantage and at the same time decorate the rooms. A concrete floor should be well smoothed for easy cleaning.

(d) Brick, tile and stone

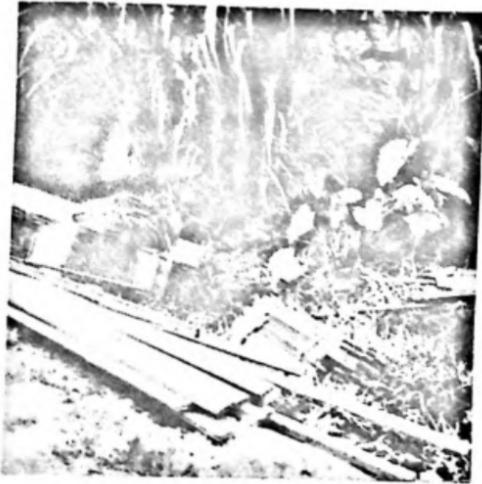
These are similar to concrete in their advantages and disadvantages. They are durable, insect repellent, easily kept in repair, and can be most attractive. Some wood is usually used in houses made of these materials, and it should be well seasoned and termite resistant.

(e) Aluminium and galvanised iron

It is easy to erect an aluminium house from prefabricated parts. The house remains cool inside. An aluminium building, however, is light and insecure in hurricane areas and it is difficult to put fixtures on the wall. Aluminium sheeting for roofing is a durable material and suited to a warm climate as it reflects the rays of the sun and therefore helps to keep the house cool. The roof must be securely bolted to the rafters in order to stand up against heavy winds. The nail heads should exert pressure on a considerably greater area than is customary with galvanised iron roofing. Failure to do this will result in damage in times of hurricane as the aluminium sheets will probably be blown off leaving the nails firm in the rafters. Special nails with large heads should be used.

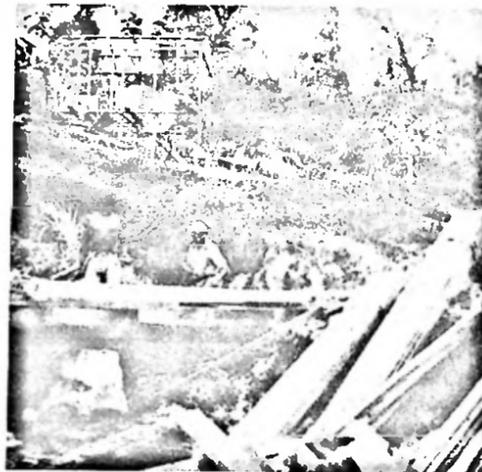
Galvanised iron is mostly used for roofing, but has the disadvantage of conducting heat easily. If painted white, however, more heat is reflected than from its natural surface. Corrugated asbestos sheets, which are fireproof, are also used for roofing.

A "PRECUT" HOUSE BEING ERECTED IN GRENADA



Photograph 31

The precut lumber arrives at the building plot in bundles.



Photograph 32

In three days the house is erected.



Photograph 33

The house, 14' x 9', is ready.

3. Prefabricated houses

One way of reducing building costs is the prefabrication of wooden houses. These have become popular in many places in the world, but hardly any prefabrication of houses in the true sense is found in the Caribbean. For most territories such houses would have to be imported from outside or from a central place within the area. Prefabricated parts of houses have, however, been used to a certain extent in St. Kitts. Precut parts of a standardised size are being increasingly used in Surinam and British Guiana, thus reducing both the cost and waste of material. The building of a precut house in Grenada is shown in photographs 31 - 33.

4. Practical details of building the house

Some practical questions may now be considered. In choosing building material, its availability and cost in the particular community will be determining factors. Wherever cement and sand can be obtained at reasonable cost they are the materials chosen because of their durability and resistance. Stone, brick or tile has the same advantages. The cost per square foot of concrete houses is sometimes similar to that of wooden ones, as in British Guiana, where on an average wooden houses cost B.W.I.\$3.20 and concrete houses B.W.I.\$3.00 per square foot. In other places with cheaper cement the difference in cost per square foot is greater.

In many places equipment for making cement blocks is made available by government agencies for use by the people. In some places, as for example in Puerto Rico, groups of about 15 families who need houses may form a small cooperative for building their houses. They buy the cement for all the houses at wholesale prices and together make enough blocks for all of these. Then they build foundations for all, next the walls for all, and so on until all the houses are finished. The cost is greatly reduced by this means and the result is sturdy, well-built houses.

Wood will doubtless continue to be used in countries where it is available at low cost. It should be termite treated, as indicated previously, unless naturally resistant. Even wattle and daub, and especially tapia, can, if well handled, make quite satisfactory houses when more expensive material is out of reach of the family.

Whatever building material is used, some things are important for all houses.

(a) Foundations

The foundations of a house must be made of strong, durable material, preferably of concrete or stone. If wood is used, it should be termite treated. Houses built with the prospect of removal to another site later are often placed on corner-stones or corner blocks.

It is important that the stones be properly laid and heavy enough to remain unmoved so as to keep the house in a level and secure position. A render of concrete around the house allows rain to drain off, and helps to protect the house from dirt and dampness and to prevent erosion of the soil. A hard surfaced path between the house proper and kitchen and outhouses and from the house to the road helps to prevent mud from being brought into the house. Such paths can be made of concrete or of stones and gravel.

(b) Roofs

Roofs, especially if made of thatch, should slant enough to carry off rain, and should be made water proof. Whenever possible they should be fitted with gutters that carry the water into a collecting tank. The roof should also protect the house from the sun. A material that reflects the rays of the sun and is a poor conductor of heat will help to keep the house cool.

(c) Floors

Floors should be made of strong, durable material such as cement or hard wood and be substantial enough to support the other parts of the house and any necessary equipment and furniture. They should be smooth and easy to keep clean. They should be built so as to exclude dampness, as described above, and they should be designed to exclude insects, rodents and other pests.

(d) Steps

A simple but necessary convenience are steps into the house. They are generally built of wood or concrete. The treads should be at least 11" to 12" wide and the risers of the right height. The sum of the width of the step and the height of the riser should not be over 18 inches nor less than 17 inches. Thus, for an 11 inch tread the riser should be 6 or 7 inches high, and for a 2 inch tread 5 or 6 inches. All treads should be of the same width and all risers of the same height in any single flight of steps. If the flight consists of more than 3 or 4 steps, it should be fitted with a strong hand-rail. The rail should be 36 inches in height from the centre of the tread, and should be smooth and round. (See Figure 9). Steps must be kept in good repair to be secure, especially wooden steps that rot easily.

All steps in a house should be built so that there is a similar size of all treads and risers. In walking up and down steps people adopt a certain rhythm and can easily stumble if the steps are not equal in size.

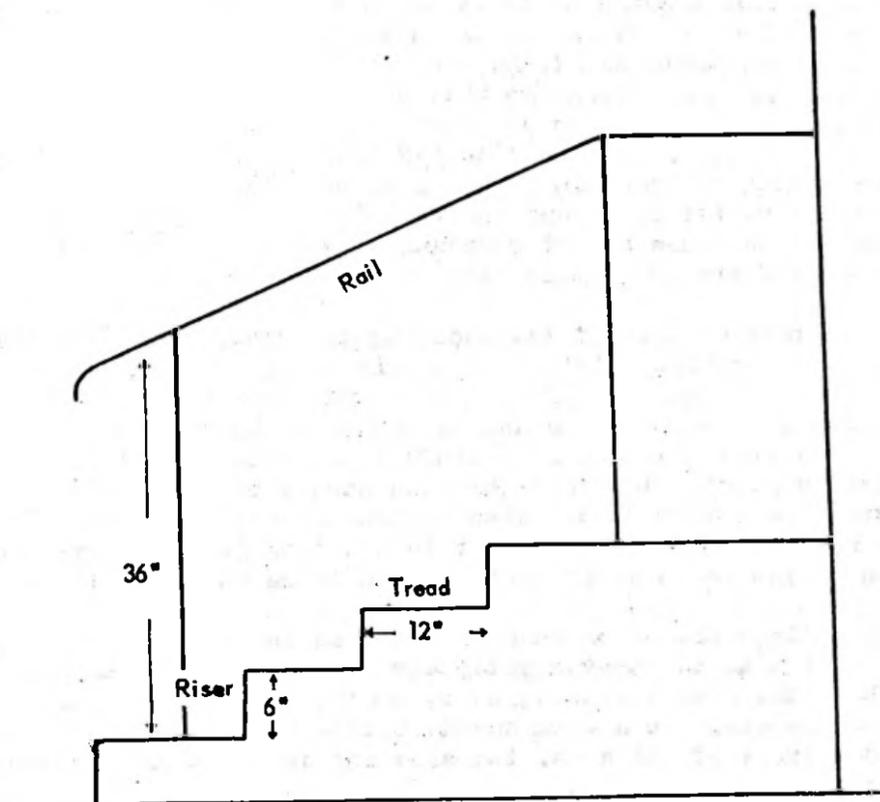


Fig. 9: Steps with tread and riser in correct height.

(e) Doors

The doors of the house should be large enough to allow for passage of furniture. A minimum size of 6'4" x 2'6" is required.

(f) Planning for ventilation and Protection from heat

In designing the house consideration must be given to climatic conditions. For a hot climate it is an advantage to keep the ceilings sufficiently low for window openings to reach to the ceiling line, permitting hot, humid air to be swept out by ventilation. There should also be enough openings that come to floor level thus permitting the air inside the house to be replaced frequently by external fresh air. Natural air currents will help to secure ventilation through openings that are suitably placed in relation to the wind direction, one set facing the wind for entry and one away from the wind for exit. The position of the house and of surrounding structures may all markedly affect the efficiency of this natural ventilation.

The rate of flow of the incoming air should never be blocked by barriers or walls. Partitions should not run across the direction of air flow. If some interfering structure cannot be avoided, it should have several openings and be separated by a space from both floor and ceiling. The wall openings (doors and windows) should be sufficiently large; together the size should be about 20% of the floor space, and they should also be free of obstructions. There is some evidence that the air flow is promoted if the size of the openings on the lee side is greater than those on the windward side.

Buildings placed on an elevation, as is common in British Guiana, will tend to enjoy greater air movement. The raising of the house above the ground also helps to protect it from moisture as well as from intruders. In a warm humid climate such as prevails in most of the countries of the area, the sleeping quarters should be on the side where they receive the benefits of prevailing breezes. Where it is possible to have a verandah for family gatherings, this should be so located that the family gets the advantage of the prevailing winds and, if possible, also of the scenery. With large doors that open up from the living room on to the verandah or porch which is built on the same level as the living room floor, the usefulness of both is increased.

The colour of the house also affects its coolness. Whitewash used on the exterior reflects solar radiation and can lower the surface temperature of the inner wall at night by as much as 3 to 4 degrees Fahrenheit. Apart from this, it can be considered a close rival of paint and yet it is much cheaper. Furthermore, it is easy to make and to apply, and its ingredients are usually readily available. The chief uses for whitewash are: to brighten dark

interiors, to cover stained and unsightly areas, to mark dangerous corners, to preserve exposed surfaces from the weather, and to colour exterior and interior walls. Colouring matter whose pigments are not affected by lime, such as yellow ochre, red oxide and copper salts, can be readily added. The appearance of a house can be greatly improved by extensive use of such a colour wash. A disinfectant can also be added for sanitary purposes.\*

The kitchen, like the rest of the house, should be protected from the heat. Free ventilation in the kitchen directed outwards from the stove is essential for the woman working in the kitchen. The stove should be constructed so as to minimise the escape of "wild" heat. Convenience of layout, with easy access to storage space, disposal facilities and serving area help to reduce labour. The food preparation area should be near enough to the stove to save unnecessary steps, but not so close that the heat from the stove becomes uncomfortable.

5. Some housing projects in the Caribbean area

A number of housing projects are in progress in the area. These are mainly undertaken by governments or government-sponsored agencies, by estates or companies, co-operatives and building societies, or as a private enterprise. Examples of housing in the Caribbean are shown in photographs 34 - 36.

(a) Government housing schemes

The purpose of these schemes is usually to provide housing for government employees or low-cost housing for low-income families, to rehabilitate families after destruction by hurricanes and fires, or to effect slum clearance. Houses built for the exclusive use of government employees vary in size and style. They remain the property of the government and are repaired and maintained by the government.

Low-cost housing for low-income families differs from territory to territory. The Pine and Bay housing projects in Barbados finance the erection of 1-4 roomed houses that are rented to the occupants on a monthly basis. The Morvan housing project in Trinidad is concerned with the construction of 1-, 2- and 3-bedroom cottages from locally produced building materials. The rental is set so low that it has to be subsidised by the government or the municipality.

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\* Caribbean Commission. Aspects of housing in the Caribbean. Port of Spain, Trinidad, 1957.

Low-cost housing schemes have been undertaken by the Government of the Netherlands Antilles and houses have been built for rent both in Curacao and in Aruba. In Antigua and British Guiana houses built by contractors on behalf of the Government have been made available under the hire purchase system. In Belize, British Honduras, houses have been built by the Government and rented to the occupier, who eventually becomes the owner of the house. For a 3-room house with kitchen and basement, a rental of B.H. \$17.50 is paid per month for a period of 20 years. This includes the cost of insurance and interest on the loan. The land is leased from the Government and so remains the property of the Government even after the period of repayment.

In British Guiana the Credit Corporation, a government agency, grants loans to applicants who are able to provide 10% of the building cost themselves, or who own property to that value. The Credit Corporation grants large loans at a low rate of interest and the loans are repaid by monthly instalments over a comparatively short period of time (up to about 15 years). The Corporation grants loans to Government employees as well as to other persons.

With increasing consciousness of the need for government action to improve the housing of low-income families, new housing areas are being developed and slums are being cleared. Sometimes, houses that are still usable are moved from a congested area to a new one. In other instances the inhabitants are moved to a new housing area, where sometimes not only houses are provided, but other necessary amenities are also available, such as roads, church and school buildings, health clinic and water supply. An example of such a new village is Molyneux in St. Kitts.

Extensive slum clearance schemes are in progress in Puerto Rico. There are both Federal Housing projects, providing apartments and cottages for rent, and Insular Housing programmes, under which the houses can be rented or purchased by instalments over a period of 20 years. Under the Reconstruction Administration of Puerto Rico, different types of houses, such as multiple, detached and duplex concrete houses and apartments, have been made available for sale on an instalment basis. The Homestead Commission of Puerto Rico has provided houses in rural areas, which are being sold on a 15-25 year amortisation plan.

Hurricane Relief Housing and other Rehabilitation Schemes: Housing projects have been undertaken in areas struck by hurricanes, such as in Jamaica, Antigua, Grenada and British Honduras. In Jamaica the Hurricane Housing Programme renders assistance in the form of repair or reconstruction of houses damaged by hurricanes, or rehabilitation in cases of complete destruction of the houses. In Grenada some 2,000 pre-cut wooden houses have been erected by

the Government and offered free of charge to families who lost their houses in the 1955 hurricane. These houses, which have only one room with the size of 14' x 9', are intended as nucleus houses to be extended by the occupier as soon as he can.

The reconstruction of Castries, St. Lucia, after the fire in 1948, was carried out with Colonial Development Corporation funds. Three-storey buildings were constructed, with facilities for shops on the bottom floor and apartments on the two upper floors. These apartments are rented to the occupants on a monthly basis. Housing projects, for which the Colonial Development and Welfare Corporation is responsible, have been undertaken in Jamaica for the purpose of slum clearance, resettlement of squatters or sale.

(b) Estate and Company housing schemes

In British Guiana houses have been built by sugar estates from their own funds for the housing of nuclear workers. Similar projects have been undertaken by some estate owners in other territories as well. For the housing of extra nuclear workers on sugar estates in British Guiana, loans of up to BWI \$500 have been obtainable from the Sugar Industry Labour Welfare Fund for building houses on approved sites. The loans are free of interest and repayable within 10 years at a rate of not less than BWI \$1 per week.

A special effort to improve the housing of workers in the sugar industry has been made in several islands during recent years. In sugar-producing islands like Barbados, St. Kitts, St. Lucia, Antigua and Trinidad, houses have been built with money from the Sugar Welfare Fund. In some places loans for building purposes have been provided to the workers from the Fund, in others houses have been built for the workers, who can either rent them or acquire them under a hire purchase system. Workers in the sugar industry in Trinidad have built houses under an aided self-help scheme.

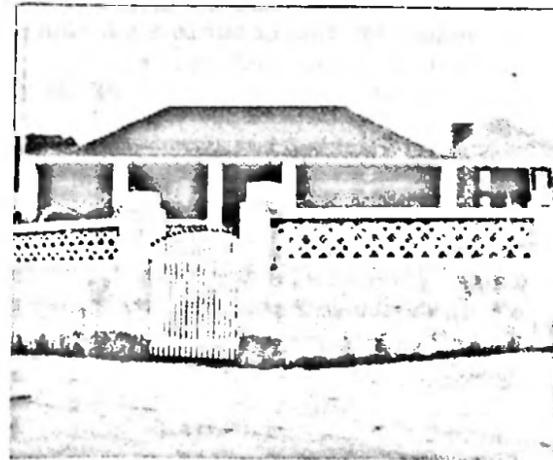
Housing is also provided for workers in some other industries, as for example, in the oil industry in Trinidad and Curacao. These houses are rented by the company concerned and remain its property. Other companies provide housing facilities for their workers as part of their remuneration, but these are often of an unsatisfactory kind.

(c) Building co-operatives and building societies

The use of standardised building parts and standardised house designs reduces building costs. This can be promoted by co-operation between interested individuals and in general such co-operation leads to cheaper houses.

Photograph 34

Typical house and wall surrounding the well-kept property (Saba).



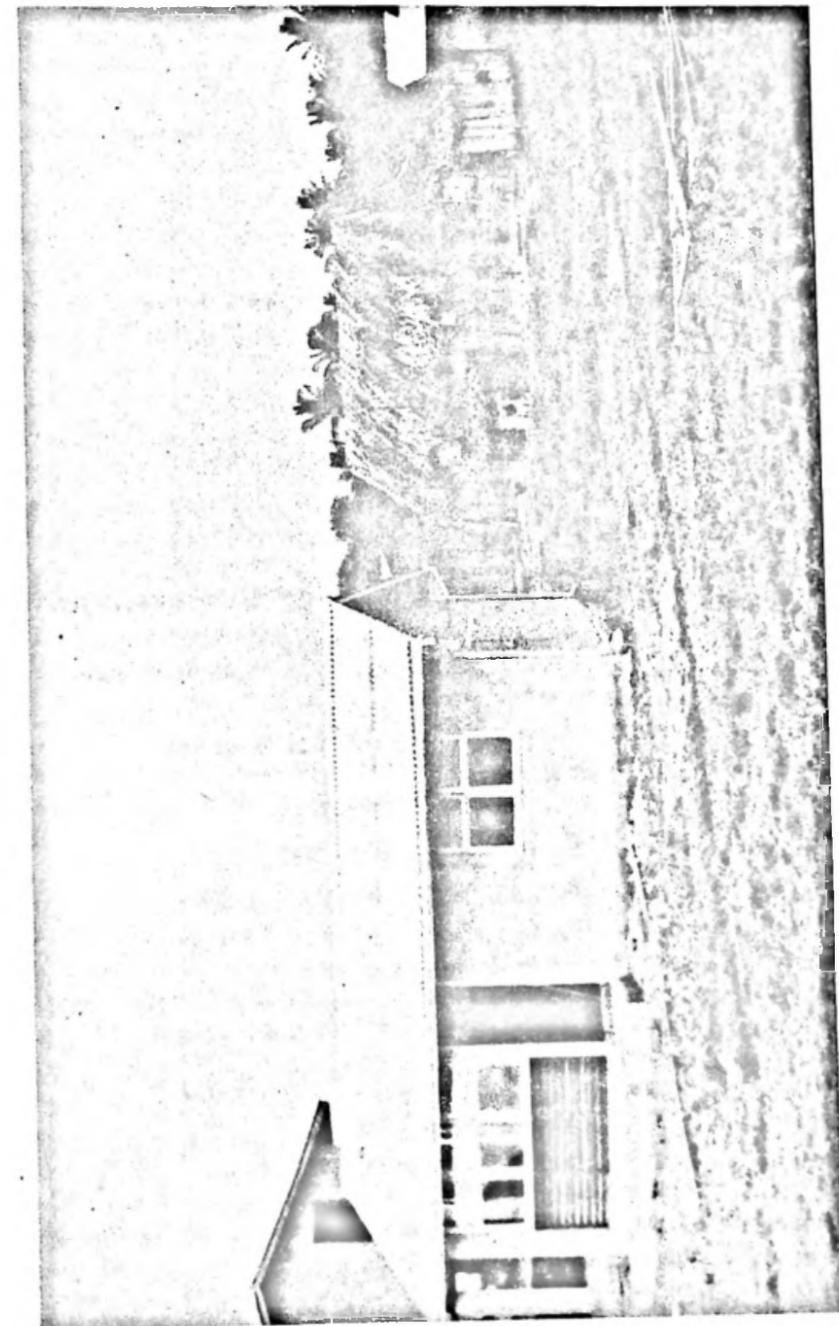
Photograph 35

Typical house in the Leeward Islands of the Netherlands Antilles.



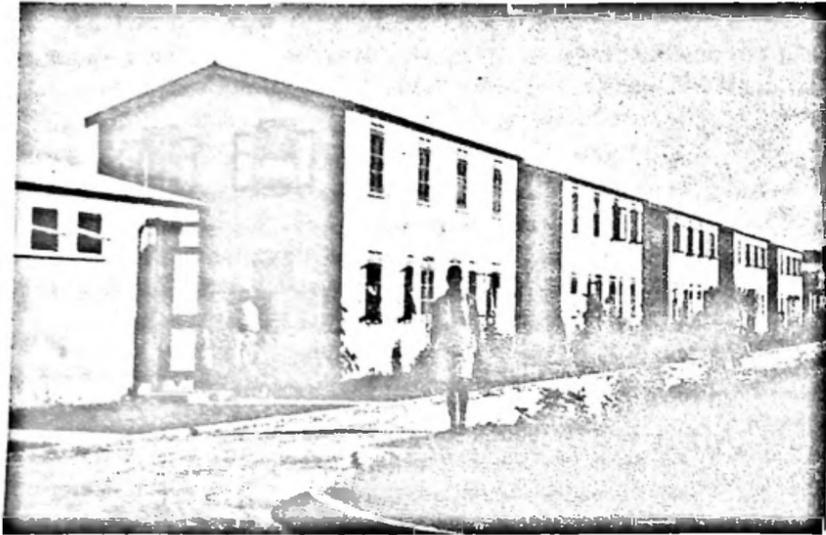
Photograph 36

House in colonial style (Aruba).



Photograph 37

Concrete block house in British Guiana.



Photograph 38

4-Unit houses. Public baths and toilets in foreground (Bay Estate, Barbados).



Photograph 39

Single unit houses (Bay Estate, Barbados).



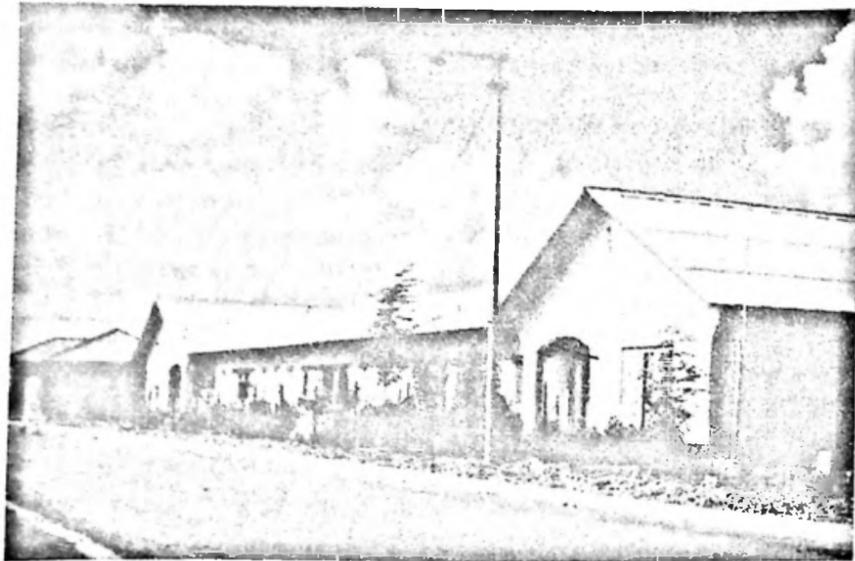
Photograph 40

Two-story houses (Curacao).



Photograph 41

One-family house (Curacao).



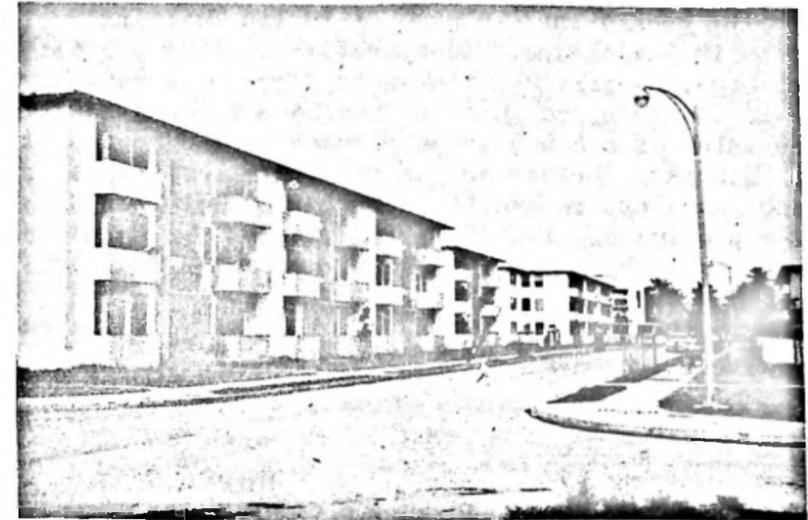
Photograph 42

Several-unit houses (Curacao).



Photograph 43

Housing development (Surinam).



Photograph 44

Apartment houses (Santurce, Puerto Rico).



Photograph 45

Apartment houses built by the Municipal Housing Authority (Rio Piedras, Puerto Rico).

In the Netherlands Antilles the Home Building Foundation has erected houses in Curacao and Aruba for sale on cash payment or on a regular mortgage basis. Low-cost houses have also been built in Curacao and Aruba by a Cooperative Society. These houses can be purchased by paying weekly instalments. A Public Building Society is also operating in Guadeloupe. Co-operative Housing projects exist in Puerto Rico, usually undertaken by a group of people with a common interest. The Trinidad Building and Loan Association lends  $\frac{1}{2}$  to  $\frac{2}{3}$  of the value of a house to be purchased or of the cost of construction. This rate depends on the locality in which the property is situated. These loans are repayable in about 11 years by monthly instalments of approximately BWI \$12 for every BWI \$1,000 borrowed. The repayment method is by shares, which mature in 11 years and pay off the mortgage. Similar to the Trinidad Building and Loan Association are the Building Societies in Grenada, St. Vincent, Dominica and Barbados. Banks and insurance companies also operate special loans for building purposes.

(d) Private housing schemes

Houses are being built either by the owner or by a contractor on behalf of an owner, or for sale to prospective owners. These are mostly situated on privately owned land, thus giving the owner full charge of the property and lasting benefit from it. When land is undivided as is common in St. Eustatius, or owned by the government or by an estate, less interest is displayed in building and maintaining houses.

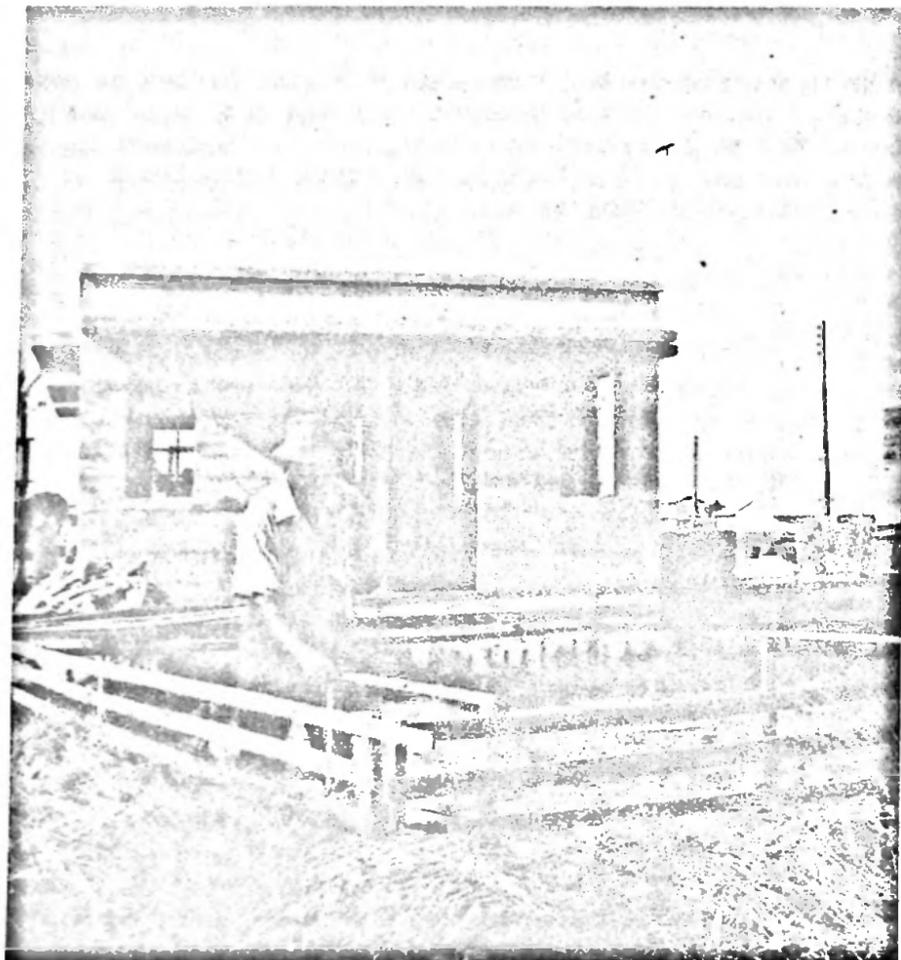
The owner of land desiring to build houses and with the necessary means generally utilises the services of a building contractor. There are contractors who erect houses of a standard design to keep the cost low. When completed, the buildings are placed on the market for sale. The prospective purchaser has the advantage of being able to see the house before deciding to buy it. Uniformity in design, with the possibility of bulk purchase of standardised parts and material, can be an advantage both to the builder and the purchaser.

(e) Aided self-help housing schemes

Another method of securing a house for a reasonable price is through Aided Self-Help Schemes, by which the government places land, material, instructors and public services at the disposal of low-income families who furnish their own labour for building the house, making concrete blocks, etc. By thus reducing the cost of labour to a minimum, the entire building cost remains low and people who otherwise would not be able to build a home can do so. Church groups, Credit Unions and other voluntary bodies may furnish the same kind of assistance as the government. The material provided is paid for in monthly instalments over a period of years. Besides reducing the cost of

the house and enabling a larger house to be built for the same amount of money, this method encourages participation by all members of the family who, having worked on the building of the house, take a special pride in maintaining it in good order. A house being built under one of these aided self-help schemes in British Honduras is shown in Photograph 46.

In most housing projects one-family houses of two or more rooms are built. This is in accordance with the habits of most people who prefer to live in a one-family house, with some land space available for the use of the family. In densely populated areas and especially in urban centres where land is scarce and expensive, single unit houses must give way to the less expensive two-storey and apartment houses, which permit a more economic use of building space. A compromise between the single unit house and the apartment house is the "duplex house" and the "row house", with each family occupying a self-contained part of the house. These houses require less land, are cheaper to build and can, if properly planned, afford more privacy for each family than the single unit house in an overcrowded area. Each housing unit should have its own kitchen and sanitary facilities, not shared with other families.



Photograph 46

House built under an aided self-help scheme in Cinderella town, British Honduras. The owner arranging his garden plot.

## CHAPTER IV

### EQUIPPING AND FURNISHING THE HOME

When the house has been built, the next problem is to equip and furnish it with the necessities for living. Careful consideration should be given to the needs of the family. It is useful to make a list of the things considered essential and to find out the cost of each item. If a limited amount of money is available, it may not be possible to acquire everything needed at once, and it will be necessary to determine which items should be given priority. Other items can be added as more money becomes available. It is possible, moreover, to make or improvise many serviceable articles, as is illustrated in various sections of this booklet.

By postponing for the time being the buying of items that are not absolutely indispensable, it may be possible to secure a better quality of material when money becomes available. Each piece of furniture and equipment should be practical and suitable for its purpose. It should be durable and easy to keep clean, and in keeping with the size of the room. Care should be taken not to over-furnish the home. Over-furnishing is not only uneconomical, but also inconvenient, as enough free space is not allowed for work and play. Articles of furniture that serve more than one purpose are space-saving. Bulky furniture creates a crowded effect in a small room. In furnishing the home, consideration should be given to future needs of the growing family.

A suggested list of minimum essentials for decent living is given in Table I, page 63. Some of the items may not be essential in some situations and others might be regarded as indispensable. In general, however, the items listed are those which most families would find it difficult to get along without. In column 2, some of the items that can, if necessary, be made at home or improvised, are indicated. If money is limited a family may prefer to make these for temporary use until they can afford to purchase something better.

#### 1. Furnishing the bedroom

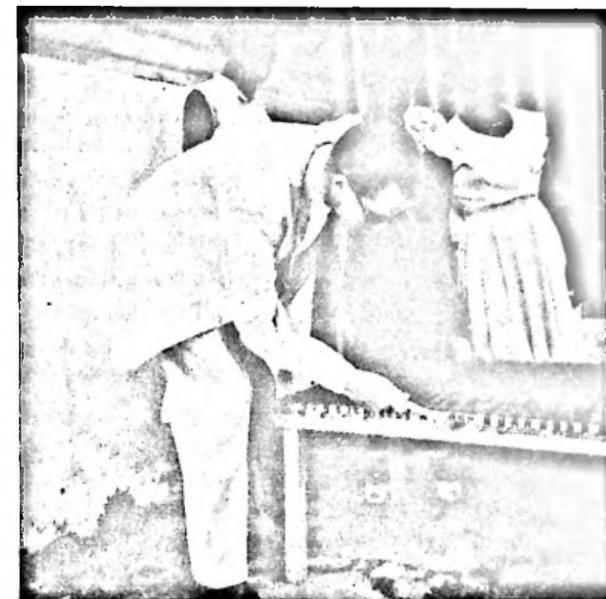
Among the first essentials are sleeping facilities for all members of the family. Since about one-third of life is spent in bed, the bed should be such as to give the body the support and comfort needed for restful, healthful sleep. The essential parts of a bed are the base or framework, the springs, the mattress, and the bedding. The head and footboards, especially the large and fancy ones, are expensive, and since they are unnecessary, no money should be spent



Photograph 47

A small model cottage built by the Housing Unit, Jamaica, and furnished by the students of the Second W.I. Home Economics Training Course.

Photo: Jamaica Film Unit



Photograph 48

The Governor assisting with the making of beds (Antigua).



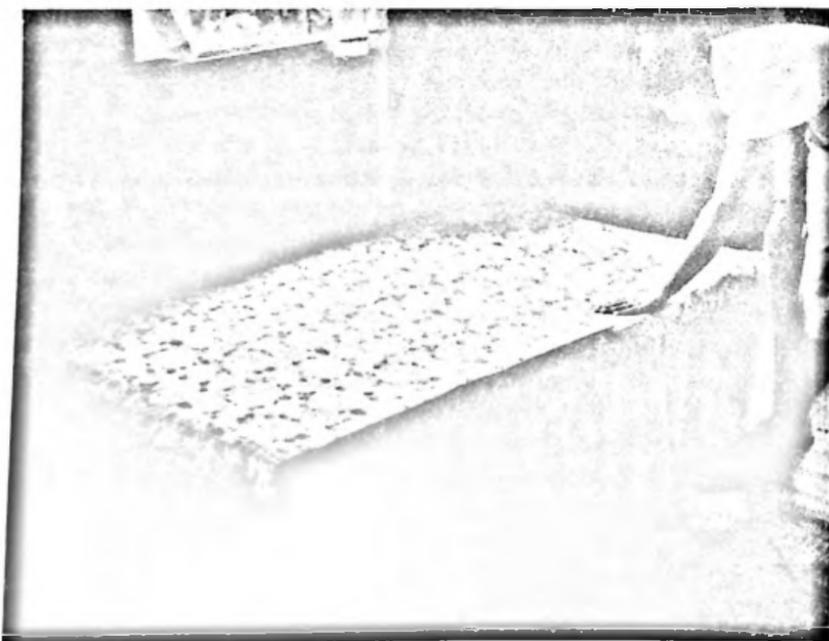
Photograph 49

Nest of beds (Dominica).



Photograph 50

Two beds in the nest of beds. First W.I. Home Economics Course. Photo: Jamaica Film Unit



Photograph 51

The nest of beds serves as a couch during the day. First West Indies Home Economics Course. Photo: Jamaica Film Unit



Photograph 52

Baby bed made from two flour bags. First W.I. Home Economics Course. Photo: Jamaica Film Unit

on them if funds are limited. The metal framework, with metal springs, is easy to keep clean and free from insects, but wooden frames, preferably of hardwood and with metal springs, are also satisfactory. The frames can, if desirable, be made at home with a saving in cost. The springs should be well constructed, and covered with a durable material such as burlap, or straw mats, to protect the mattress from being torn. If wire springs cannot be afforded for all beds, a heavy canvas fastened to the base can be used in their place. Canvas, however, is also expensive. For a still cheaper substitute, strips of burlap can be woven to make a good spring. (Directions for making this are given on page 149). This burlap spring has the same advantage as a canvas one except that it is more difficult to protect against bed bugs.

The bed should be long and wide enough for comfort. A suitable length is 6 - 6½'. The width for a single bed is about 3', and for a double bed 4 - 4½'. The height of the bed should be such that it is easy to clean the floor under the bed. About 18 - 20 inches is a suitable height.

A well-made mattress makes a bed more comfortable. If a ready-made mattress cannot be afforded one may be made of ticking or other heavy material and filled with coconut fibre or cotton. Rags should not be used for filling as they do not make a comfortable mattress and are also difficult to keep clean. It is practical and economical to have an extra cover on the mattress which can be removed easily and washed.

#### (a) Space-saving beds

In small houses where space is very limited, space-saving beds can be used. There are of two types, double decker beds and "nests" of beds. A double decker bed is suitable for children, and leaves space in a small room for children to play and keep their belongings. The beds must be sturdily built and with sufficient space between the upper and lower beds for the child in the lower one to sit up without knocking his head on the upper one. These can be made at home if the father or someone in the family is handy with tools.

A nest of beds consists of two or three beds so designed that they fit under each other. If covered during the day they may serve as a couch, and at night the under beds are drawn out and thus provide sleeping accommodation for three persons. This nest of beds is especially suitable for the living room where it provides sitting space for several persons. It may also be preferable to the double decker bed in the children's bedroom. Directions for making the nest of beds are found in the section on home improvement. A nest of beds in the making, and one ready to be used as a bed-couch are seen in Photographs 48 - 51.

The baby should have a separate bed. A simple bed can be made from one half of a barrel (split lengthwise) and placed on a sturdy stand. An inexpensive bed can also be made from two flour bags, with a wooden frame to keep the bottom flat. This bed can be hung in a corner, or beside the mother's bed at night, and does not require any floor space. (Photograph 52). A wicker basket also makes an attractive baby's bed and is easy to carry the baby in when necessary.

A mattress for the baby's bed can be made in compartments with one side easily opened so that the filling can be removed, the cover washed, and clean filling replaced.

#### (b) Bedding

For every bed one to two sheets, a pillow, a pillow-slip, and a light blanket or other cover, are needed. At least one extra sheet and pillow-slip for each bed is desirable to allow for washing. In the tropics, however, it is often possible to wash and dry bedding and put it back on the beds the same day and thus get along with the minimum amount. It costs no more in the long run, however, to have enough bedding for a change.

A spread to cover the bed during the day is desirable as it adds to the attractiveness of the room. It should be a simple one made of cotton that can be easily washed. In areas where only a light cover is needed, either the blanket or bedspread might be dispensed with if economy requires it.

#### (c) Closets, cupboards or other places to keep belongings

There should be a place in each bedroom for hanging clothes such as dresses and men's coats and pants, and also drawers or shelves for keeping underwear and other personal belongings. Built-in closets and cupboards, as described in Chapter III - "Building the House", are the best and most economical, both in money and space. These cost less than buying a cupboard and the money saved can be used for other essentials. If the house is already built without them, simple cupboards can be made from crates and boxes or from inexpensive woods. (Photographs 53 - 56). A cupboard should be high enough to allow the dresses to hang free from the floor; six feet is a good height. It should be deep enough (approximately 18") for the clothes to hang on hangers on a rod that is placed lengthwise across the cupboard. If there is space available for a large cupboard, this could be divided into two parts, one for hanging clothes and the other with shelves for storing linen and underwear. Two rods at the bottom for shoes and a rod for a curtain will complete the cupboard.

If a bedroom is large enough to be divided into two, a clothes closet can be used as a partition with half of it opening into each part of the room as shown in the diagram. (Figure 10). The same arrangement can be used to separate part of a large living-room for use as a bedroom. The part of the cupboard on the bedroom side can be used for clothing, that on the living-room side for books, glasses and other things normally kept in this room.

If wood is scarce or too expensive, and boxes and crates not available, an improvised hanging press can be made by simply affixing two shelves to the walls (for storage of hats, etc.) with a rod under the shelves for hanging clothes. A curtain will protect the clothes and add to the attractiveness of the room.

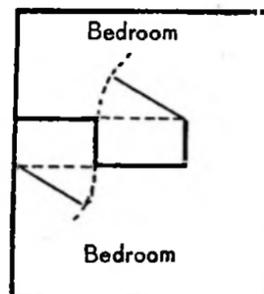


Fig. 10: Clothes closet used as a partition.

## 2. The living-dining room

The essential furniture of the living room is a table large enough to accommodate all the family at meals, chairs or benches in sufficient numbers for all to sit at the same time, and a lamp unless the house is lit by electricity. A small table to hold the lamp is desirable, as are also shelves for books and other articles. Some pictures on the wall and simple window curtains help to make the room attractive.

### (a) Table

In a small house a space-saving table is desirable. In houses with strong walls, the table can be hinged to the wall so that it occupies no floor space when not in use. (See photographs 57 and 58). A folding



Photograph 53

A simple cupboard.



Photograph 54

Another simple cupboard.



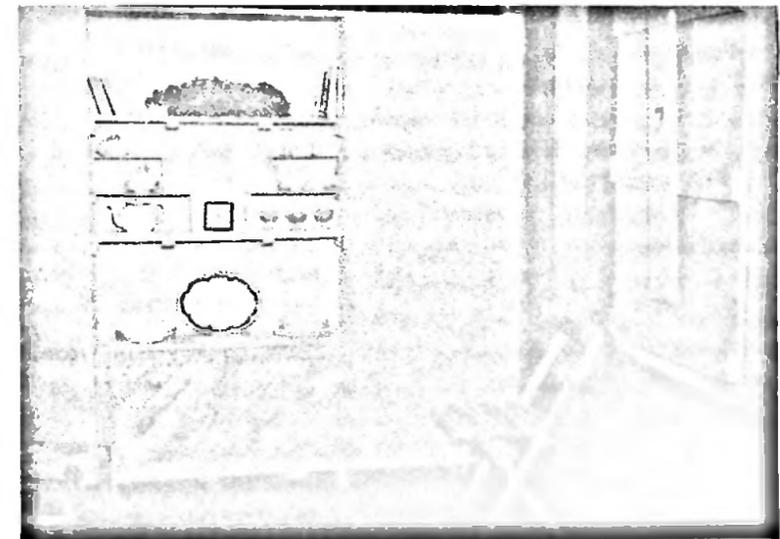
Photograph 55  
Clother cupboard (St. Kitts).



Photograph 56  
Vegetable cupboard (Dominica).



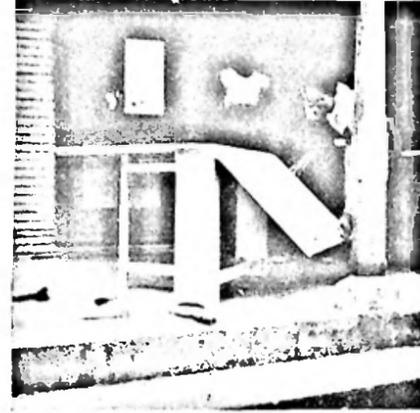
Photograph 57  
Combination table - cupboard, and folding chairs made by the First W.I. Home Economics Course.  
Photo: Jamaica Film Unit



Photograph 58  
Table top serves as door for cupboard. Centre of a partition cupboard from living room side. First W.I. Home Economics Course. Photo: Jamaica Film Unit



Photograph 59  
Detail of folding table in the making.



Photograph 60  
Both leaves attached to folding table.



Photograph 61  
One leaf of the table is in use.



Photograph 62  
Folding table in its full size.



Photograph 63  
Folding table when not in use.

table, with two leaves hinged to a centre piece that need not be more than 8 inches deep and about three feet wide, will also save space. When both leaves are raised the table is three feet by five feet in size. (See Photographs 59.- 63, and directions for making one, page 152). In addition to providing room for the whole family to eat together, a large table will also furnish necessary working surface for cutting material for dressmaking, and for children to do their homework at night. Small tables are sometimes preferred to the large table, but it must be remembered that the small table serves a very limited purpose, and if placed in the middle of the room takes up valuable floor space and often blocks the passage between the doors. A small table at the side of the room to hold the lamp is useful, but even this may be dispensed with if space is limited and a shelf made to hold the lamp.

(b) Chairs

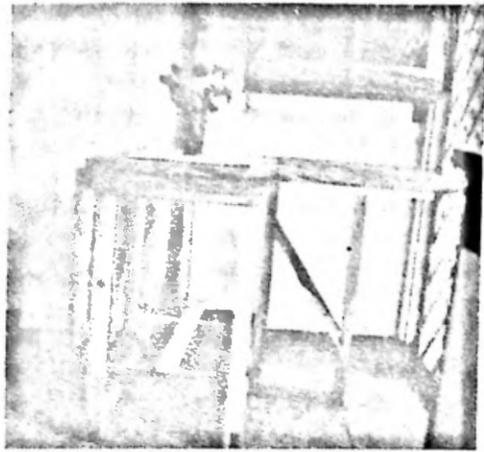
If the family is large, and the room small, it is necessary to consider space-saving seating arrangements. Bulky chairs take up too much space and make the living room look cramped and crowded. They also make it impossible to have enough seats for everybody. If chairs are bought, they should be small but strongly built. Simple stools or benches may provide most or all of the seating. These may be made at home, painted, and padded, and fitted with a cover made of bright coloured washable material that will make them look attractive. If possible, some of them at least should have a support for the back. Improvised seats may also be made from empty nail kegs or boxes. The keg is smoothed and painted, the top padded and covered with oilcloth or heavy cloth. The cover can also be made removable so that the space inside may be used for storage. Children often use such covered box seats to hold their school books and materials. A quite comfortable "easy" chair may be made from a barrel, as shown in Photograph 72. One or two of these in the living room or for use on the verandah add to the comfort and attractiveness of the room.

Not all the chairs and stools need be kept in the living room. One or two may be kept in each of the bedrooms, and others on the verandah during the day, and possibly one in the kitchen if it is large enough. Different types of stools and chairs are shown in photographs 67 - 73.

(c) Arrangement of furniture

The furniture in the living room should be arranged so as not to block the passage, and to leave as much free space as possible. The large folding table should be against the wall. A bouquet of flowers or pretty leaves or grasses on the table lends a touch of colour and attractiveness to the room. The chairs should be so arranged as to form a grouping for people to sit and talk together or read.

A SLIGHTLY DIFFERENT FOLDING TABLE

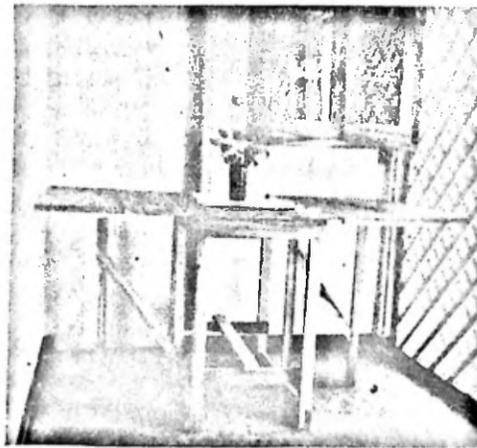


Photograph 64

One leaf is expanded.

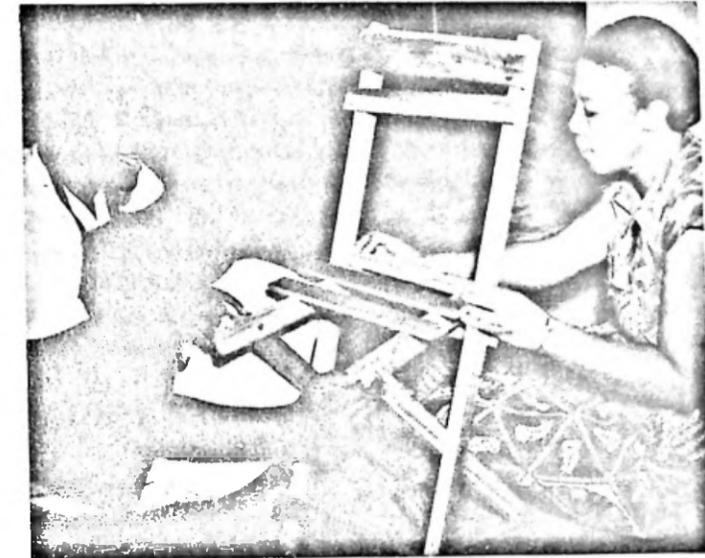
Photograph 65

Both leaves are expanded.



Photograph 66

When folded the table takes little space.



Photograph 67

A folding chair in the making. First W.I. Home Economics Course. Photo: Jamaica Film Unit



Photograph 68

The chair, folded.



Photograph 69

The folding chair ready to be used.

ANOTHER TYPE OF FOLDING CHAIR - FACTORY MADE



Photograph 70

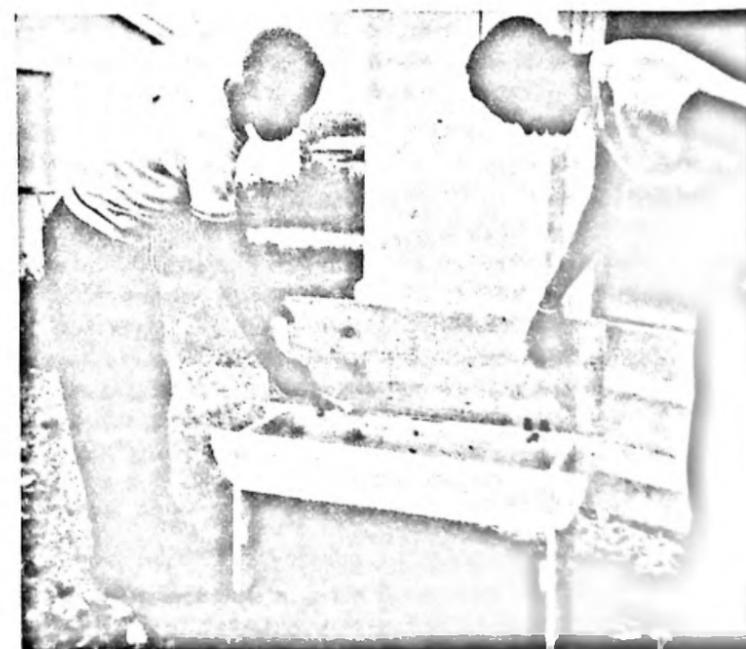


Photograph 71



Photograph 72

Barrel seat (St. Kitts).



Photograph 73

Bench with storage space.

PART OF THE LIVING ROOM IN A DEMONSTRATION HOUSE (St. KITTS)

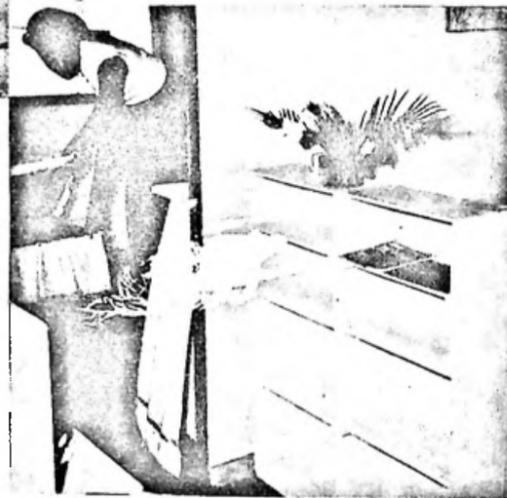


Photograph 74

"Nest of beds" covered with burlap bedspread. Double face bedside cupboard.

Photograph 75

The same cupboard seen from the other side.



Photograph 76

The two beds in the "nest of beds".

(d) Pictures

Some pictures on the wall make the room more attractive, though too many have the opposite effect. Suitable pictures may sometimes be obtained from magazines or from advertising material. Simple frames may be made for these, or they may be merely mounted on cardboard, and a "frame" made by pasting a narrow band of plain coloured paper or cloth around them. Pictures should be hung to form a part of the furniture grouping. A simple picture, or a group of two or three small pictures, may be hung on the wall above the nest of beds or over the table. It is important to hang pictures on an eye-level so that they are easy to see; they should not be hung so high that one must crane one's neck to see them. If they are not exactly the same shape and size, they should be arranged so that the centres are level, as seen in Figure 11.

(e) Use of colour in furnishings

Colour affects the lighting of the room, its apparent size, and its feeling of warmth or coolness. Dark colours make a room seem smaller; light ones make it appear larger. Similarly, "warm" colours such as dark green, dark blue, rose or red, make the room seem warm. "Cool" colours such as ivory, light yellow, peach and light green make it seem cool and also brighter. In the tropics "cool" colours for walls and ceilings and also for the outside of the house give the most restful and pleasing effect.

Stronger brighter colours should be used in smaller amounts for accent. For example, curtains in the living-room may be made of printed material, with perhaps orange and dark green predominating. The covers of the stools or benches could then be made of one of these colours. The effect is more pleasing than that produced by using a totally different colour such as red or blue.

3. The kitchen

The kitchens that now exist are seldom provided with any built-in facilities, such as stoves and sinks. These have to be provided by the family itself.

(a) Stoves

It is still very common in the Caribbean for women to cook over an open fire in the yard. To work in a stooping position is tiresome and a waste of energy. The hazard of the open fire is shown by the frequent cases of children being burnt when crawling close to the fire. The clothes of the cook can be set on fire easily. The smoke created by the open fire is also harmful to the eyes. The open fire causes waste of fuel since only a small proportion of the heat goes into the cooking process. When the cooking is done indoors it is important, for the health and comfort of the women preparing the food, that as little heat as possible escapes from the stove to the room. In choosing the

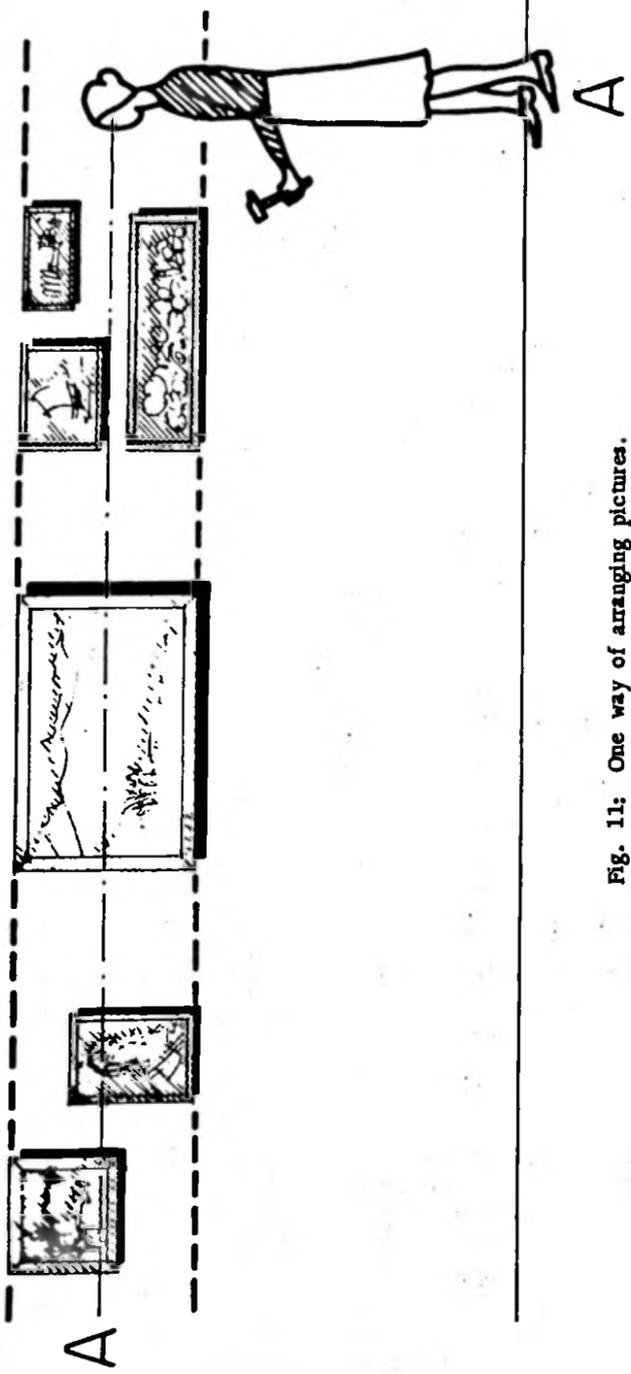


Fig. 11: One way of arranging pictures.

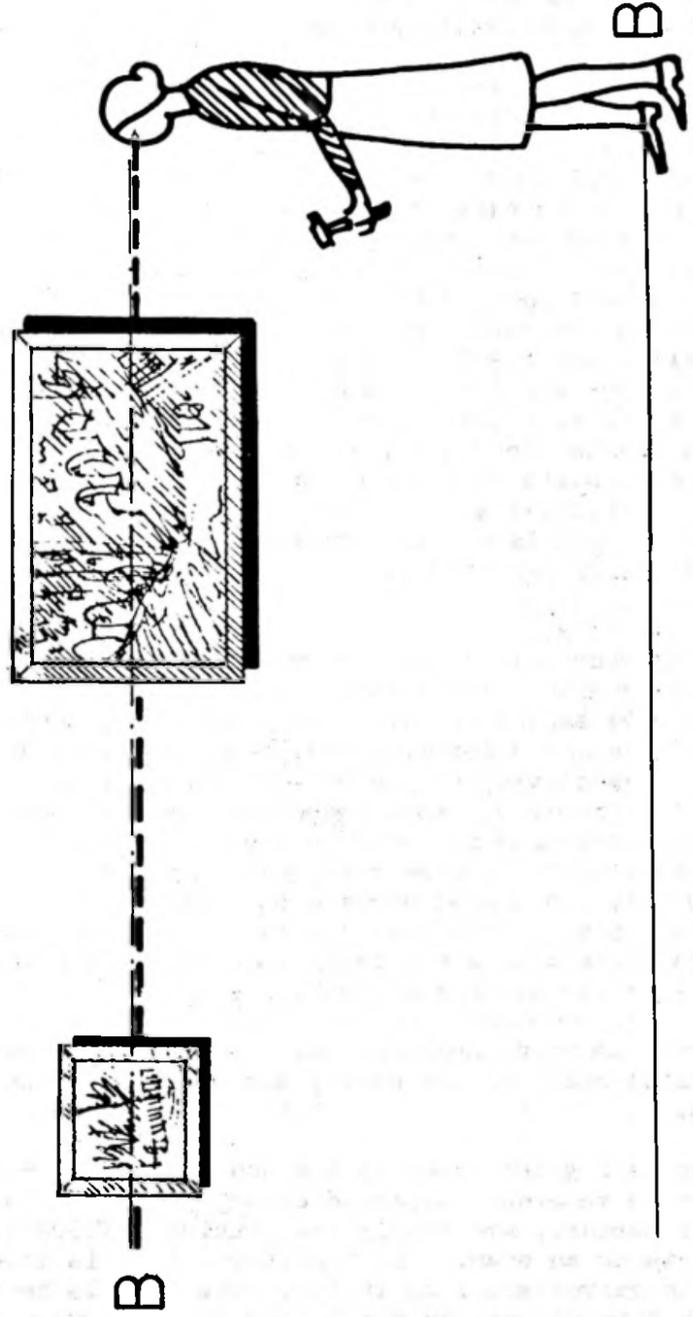


Fig. 11 (a): Another way of arranging pictures.

type of stove to be used in the kitchen, consideration must be given to the availability and cost of fuel. When charcoal is available a coal-pot or a charcoal range (the Mexican stove) may be the most economical. Care must be taken to see that the coalpot and the range are placed at a correct height to facilitate easy work. A suitable height for a range is 30 to 32 inches. If it is placed at a lower level, too much backbending is required and if placed too high it becomes difficult for the worker to lift the heavier pots to the cooking surface.

When charcoal is not available or is expensive, a stove which burns wood, sticks and other combustible material may be more economical. To function properly, such a stove should be constructed so that it has enough draught without consuming an unnecessary amount of fuel, and it must have an outlet for smoke. The "Dover" stove, made of cast iron, is such a stove. Modern types of "Dover" stoves have an enamelled surface for easier cleaning, and the site of combustion is insulated except for the parts actually required for heating purposes. An inexpensive stove, built after the same principles as the "Dover" stove, is the "smokeless Chula", as designed by Dr. Raju of India. This stove can be built of the same material, chiefly clay, that the East Indians in Trinidad and British Guiana use for their common "chulas". (For a complete description of how to build a smokeless stove, see page 212, Drawings No. 30, and photographs at end of Chapter VII refer).

In areas where oil or gas is reasonably cheap, oil and gas stoves are more commonly used. These stoves have generally two or three burners. The more expensive types are fitted with an oven. A two-burner stove is adequate for most families. Kerosene oil is also used as fuel for Primus stoves, a type of stove that is very economical to use if cared for properly. It is necessary to pump the stove, but this must not be overdone in order to avoid the risk of explosion. The oil container must never be refilled while the stove is still hot from previous use. In places where electricity is available and funds permit, electric plates or stoves may be preferred. It is easier to keep a kitchen clean when electricity is used for cooking, and no space is required for storage of fuel.

Fuel such as wood, charcoal and kerosene oil should be stored within convenient reach of the stove, but not so near as to be likely to catch fire.

An oven is a great asset to the housewife. Modern stoves are often fitted with an oven. Separate ovens, which can be placed over the oil or gas burners, are fairly inexpensive. There are various ways of improvising an oven. The Montserrat oven is made of a wooden box, lined with galvanised iron inside. The oven is heated by placing a coalpot with burning coal on the bottom of the oven. The baking pans are placed on rods above. Another type of oven can be made out

of a kerosene oil tin, this being placed over the coalpot or over the oil burner. Ovens in rural areas are often built in the yard from stones and mortar. If kept in good repair these are excellent for baking bread.

(b) Working table

A suitable working table should be fitted with drawers and possibly with cupboards underneath for storing of utensils and equipment. The working surface should be about 5-6 square feet. A suitable height is about 32-36". The working tables can be used not only for food preparation but also for dish washing, and washing and ironing of clothes, if necessary. Hardwood is a suitable material for the working surface. It should be oiled, but not painted, to be most useful. If soft wood is used, a covering of sheet metal will prevent rotting and make it easier to keep the table clean.

(c) Facilities for dish-washing

In kitchens with running water and sewage a double sink for washing and rinsing dishes is a great convenience. The sinks can be made from different materials such as procelain, which is attractive and easy to keep clean, concrete, which is durable but more difficult to keep clean, or enamelled iron, which is easy to clean but gets chipped easily if not carefully handled. A good sink should be of a reasonable depth so that it can also be used for soaking and washing clothes if so desired. It should be fitted with a plug to enable it to be filled with water and it should have a small grating over the outlet to prevent solid matter from going down the waste pipe. There should also be an overflow pipe to prevent accidental flooding and a bent waste pipe, shaped like a U or S, to prevent any gases or smells passing into the house from the drains outside. This bent part is called a "trap", because, owing to its shape, some water always remains in it when the sink is emptied. (See Figure 12). Sinks should be fitted with a draining board on each side, the board being level on the side where the used dishes are placed, and grooved and slightly sloping towards the sink on the other side so that water quickly drains away. Hardwood is a suitable material for drain boards. Concrete is apt to cause breakages during the washing-up due to its hard and slippery surface.

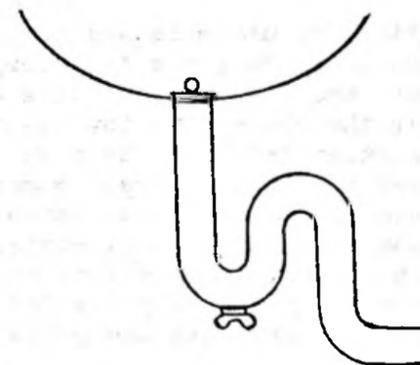


Fig. 12: Showing water trap under sink.

In kitchens without running water and sewage, two dishpans are more convenient than sinks. These can be of enamelled or galvanised iron, or plastic. Galvanised iron is durable and inexpensive. Aluminium should not be used for dishpans since washing soda easily destroys it. The height of the table for washing up should be such that it prevents stooping. If a sink is installed, this should be approximately 36 inches from the ground, whereas if dishpans are used the height of the table should be about 30 - 32 inches.

To make the washing up area more convenient, a plate rack can be placed above the sink for drying and storing dishes in everyday use. The rack should be covered to protect dishes from flies and roaches.

For this purpose the sides can be covered with meshwire and a meshwire door hinged to the front top added. (Figure 13).

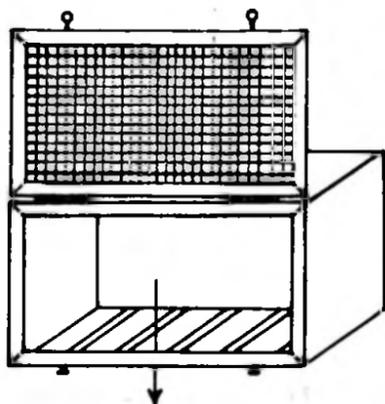


Fig. 13: • Platerack with screened door.

#### (d) Storage

Storage facilities for utensils and food must be provided in the kitchen. There should be "a place for everything and everything in its place". Dishpans and cleaning utensils should preferably be stored on shelves under the place used for washing-up. When there is a cupboard under the working table, it is most convenient to store pots and pans and larger equipment there. Racks for placing frying pans, baking sheets, pie dishes and other larger dishes in a vertical position will save space and also make it easier to keep equipment in order. Small equipment can be placed either on hooks inside the door of a cupboard or in drawers, preferably divided by removable partitions. All cupboards should be designed with the goods to be stored in them in mind.

For storage of dry goods, covered containers are needed. Fresh foods like root vegetables and fruits can be stored in a simple cupboard made of a wooden box with shelves and door of chicken wire for air circulation. (Photograph 56). If the shelves slope slightly inwards, the provisions are prevented from rolling out. For storage of leafy vegetables such as spinach, and lettuce, etc., which should be kept in as cool a place as possible, a wooden nail keg lined with cement will be a good substitute for a refrigerator. The vegetables can be kept in a paper or plastic bag hung on a hook screwed into the cover of the container, which is filled with a little water. (For description of making a water container see Chapter VIII - Drawing No. 19).

For storing easily perishable foods, a meat safe with fine meshwire on at least three sides is necessary. With limited floor space a hanging meat safe made out of a wooden frame or with bailing strips (metal strips) and meshwire can be used for storing small quantities of food.

#### (e) Cooking utensils

The most common materials used for making cooking utensils are aluminum, enamel and cast iron. Vessels made of aluminum can be used for preparing most foods, but are not suitable for frying. Washing soda must not be used for cleaning aluminum vessels. It is most economical to buy heavy aluminum that will last longer. The handles should be insulated and properly attached to the pans. The tight fitting cover should also have an insulated handle to prevent burning of the fingers.

Enamelled saucepans are attractive and easy to keep clean. They must be handled carefully to avoid chipping. They should not be used for frying. Cast iron is the most suitable material for frying. An iron pot is useful also for the making of soups, stews, one-pot dishes and for cooking foods like dry beans that require a long-time for cooking. Utensils made of cast iron are inexpensive and durable if cared for properly. They must always be dried thoroughly before being put away to prevent corrosion. Baking utensils such as bread pans, cake pans and baking sheets are made either of aluminum or iron sheeting with a tinned surface. This surface can easily be destroyed by scratching with sharp materials such as knives, steelwool and scouring powder. Once the surface is destroyed there is a great risk of corrosion.

It is useful to have pots and pans in two to three different sizes.

#### (f) Small equipment and utensils for preparation of food

Mixing bowls are made from a variety of materials, such as china, earthenware, glass, enamel, aluminum and plastic. China and glass can be used for all purposes. Aluminum vessels must not be used for stirring batters with eggs, as the metal is apt to discolour the mixture, but larger aluminum bowls are suitable for making bread. Enamelled utensils

are useful for all purposes as long as the enamel is not chipped, in which case it becomes dangerous to use them. Plastic bowls are light and easy to clean if made of the right kind of plastic that is not destroyed by heat. Where the calabash is available, it provides inexpensive bowls and pans for mixing, storage and cleaning of foods.

Good kitchen knives which can be used for cutting meat, bread and vegetables, are important. A smaller knife for peeling and cutting vegetables is also useful. The knives should preferably be of stainless steel and of good quality so that the edge will remain sharp. The blade should be properly inserted in the handle with bolts. The handle should be well designed so as to be convenient to hold. Hardwood, like rosewood, is a suitable material for the handle as it does not need to be painted. Paint used on softer woods easily comes off in the washing and the wooden handle may easily crack. Kitchen spoons for stirring, etc., are made of wood, aluminum or enamelled iron. Wooden spoons are cheap and suitable for many purposes. A strainer of aluminum or enamelled iron is useful, but one can easily be made from a tin can or calabash perforated with a nail.

(g) Dishes and utensils for eating

Dishes for eating and serving food are made of china, glass, enamel and plastic. Medium sized (luncheon) plates are the most useful, and are easy to wash and to stack. Porridge bowls are suitable also for soups and puddings and for the serving of food. All dishes should be of a simple design with only a little decoration. Plastic plates and cups are often made of breakable material and must therefore be treated with the same care as china. Cutlery such as knives, forks, spoons and teaspoons are most durable if made of stainless steel. If a simple design is used, stainless steel cutlery is more attractive than silver plated cutlery which has to be polished frequently, gets scratched easily and loses its silver coating. Knives and forks made in one piece are more durable than those with a different material for the handle.

(h) Equipment for ironing

Flat-irons which are heated over a coalpot are inexpensive, last for a long time and do not use much fuel. More convenient is the "goose" iron heated by coal burnt in the hollow inside of the iron. Once it is hot it remains so as long as there is any coal burning, but it is difficult to regulate the heat. This type of iron is rather heavy and therefore most useful for pressing heavy material like men's suits. Irons heated with kerosene oil are convenient but expensive. An electric iron is less expensive, but its use is limited to urban areas with electric current available all day. A sturdy wooden table with a plain surface may be used as an ironing board.

(i) Cleaning utensils

Galvanised iron is a durable and inexpensive material for all cleaning utensils, but is not suitable for utensils used in cooking and preparing food. Enamelled basins are easy to clean but easily destroyed by rough handling. Plastic material has become increasingly popular in the last years, soft types of plastic being useful for various types of basins. The equipment needed for cleaning includes a broom and a dustpan, both with long handles to render it possible to sweep without bending. (Figures 14 - 17 ). For scrubbing wooden and concrete floors

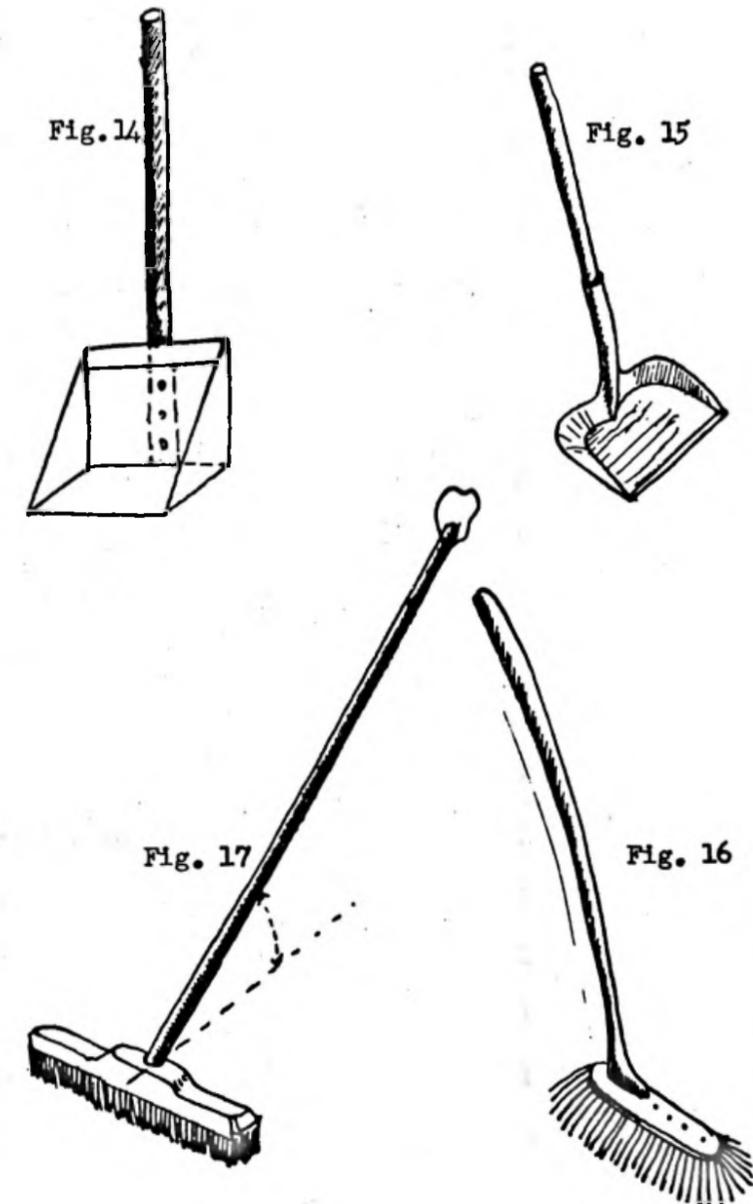


Fig. 14: Dustpan made from half a tin can with a long handle attached.  
Fig. 15: Commercial dustpan with long handle.  
Fig. 16: Brush for sweeping with long handle.  
Fig. 17: Scrubbing brush with long handle.

a hard brush fastened to a long handle will save time and labour. A soft brush is needed for surfaces that are oiled, painted or covered with linoleum; for unpainted wooden surfaces a hard brush is necessary. Some of the tools needed can be made quite cheaply at home, e.g. coconut fibre brushes, brooms and dustpans.

All equipment to be used in the home should be suited to the particular job to be done. Broken pieces of equipment that cannot be mended should be discarded as they can cause accidents.

TABLE I  
Minimum Essentials for Decent Living  
For a Family of Six

	Number	Can be made or improvised
<u>Kitchen</u>		
Stove or fireside with flues to carry off the smoke and with at least two cooking places	1	x
Container for storing fuel	1	x
Covered containers for staple supplies such as rice, sugar, coffee	6	x
Cupboard or other storing space for fruits and vegetables	1	x
Cupboard for storing cooking utensils	1	x
Food safe for perishable foods	1	x
Table or other working surface	1	x
Iron pot or substitute	1	
Large pot or can	1	
Frying pan	1	
Large bowl	1	
Water container with cover	1	x
Butcher's knife	1	
Peeling knife	1	
Cooking spoon (wood)	1	x
Cooking spoon (metal)	1	
Plates or pans	2	

	Number	Can be made or improvised
<u>Kitchen (cont'd)</u>		
Cooking fork	1	
Chopping board	1	x
Vegetable brush or substitute	1	x
Strainer	1	x
Grater	1	x
Sinks or pans for dish washing	2	
Dish towels	3	
Dish cloths	2	
Container for soap	1	x
Cutlass	1	
Tray	1	x
Market basket	1	x
Garbage can	1	x
Scrubbing brush	1	x
Large pail or can	1	
Cloths for cleaning	4	x
<u>Facilities for Laundering</u>		
Basket or other container for soiled clothes	1	x
Tub or washpan	1	
Washboard	1	

	Number	Can be made or improvised
<u>Kitchen (cont'd)</u>		
Clothesline	1	
Clothespins		
Irons	2	
<u>Desirables</u>		
Ironing board	1	x
Small cupboard for laundry equipment, etc.	1	x
Ironing sheet or board cover	1	x
<u>Facilities for Making and Mending Clothes</u>		
Pair of scissors	1	
Tape measure	1	
Sewing machine, owned or access to one	1	
<u>Living-Dining Room</u>		
Large table	1	x
Seats (chairs, stools or benches)	6	x
Lamp	1	
Plates	6	
Cups	6	
Glasses	6	
Spoons	6	
Knives	6	
Forks	6	

	Number	Can be made or improvised
<u>Living-Dining Room (Cont'd)</u>		
Shelf or cupboard for storing crockery	1	x
Box or drawer for storing cutlery	1	x
Table cloth or place mats - 1 set	1	x
<u>Desirables</u>		
Extra dishes for servings:		
Plates	2	
Cups	2	
Glasses	2	
Spoons	2	
Forks	2	
Knives	2	
Bowls (serving dishes)	3	
Curtains of plain material	1	
<u>Bedroom (or Bed-Living Room)</u>		
Double bed	1	x
Single beds	3	x
Cot or bed	1	x
Mattresses or thick pads	5	x
Lamp	1	
Sheets	5	
Clothes cupboard	1	x

	Number	Can be made or improvised
<u>Desirables</u>		
Pillows	6	
Pillow cases	6	x
Bedspreads	2	x
Mirror	1	
Dressing table or shelf	1	
Bedroom utensil or pail	1	
<u>Facilities for Washing and Bathing</u>		
Basin	1	
Pail or bucket	1	x
Shower or large tub	1	x
Towels	6	
<u>Facilities for Cleaning</u>		
Broom	1	
Dustpan	1	x

CHAPTER V

THE WORK OF THE HOUSE OR HOUSEKEEPING

Management of a house, or housekeeping, involves a large number of different tasks. It includes cleaning and tidying the house and surroundings; making beds; cooking and serving the meals, washing the dishes and disposing of the garbage; washing and ironing the clothing, bedding and other household textiles; sewing and mending clothes; cleaning cupboards and keeping them in order; and care of children. Often all these tasks must be done by the housewife alone, or by her with the help of the children and the father of the family to the extent of their capacities and time they have available. To do all these effectively, and keep the home orderly, attractive and in good running order, requires careful planning and organisation. The saving of unnecessary labour is of particular importance in a hot climate and will result in less physical and mental strain.

1. Conserving human energy and avoiding fatigue

Work in the house can easily be very strenuous and fatiguing, especially for the legs, the feet and the back. The carrying of water, sewage and fuel consumes much energy. Standing in a bent position while washing the dishes requires more energy than standing erect. Stooping to work in a bent-forward position can produce physical changes in the back, joints and muscles, with pains and diminished capacity for work as the result. Standing too long at a time, especially on a cement floor or other hard surface, puts a strain on the feet, causes pain in the feet and back, and often results in "foot trouble". Reaching for things on high shelves and lifting heavy things from low shelves also add unnecessarily to the strain and fatigue of house work. Many of these strains can be avoided by attention to certain aspects of equipment and work habits.

a) Arrangement of equipment to make work easier

The first step in making housework easier is to arrange things in the house to be as "step-saving" and labour saving as possible. To effect this (1) all surfaces in the house should be as smooth as possible and easy to keep clean; (2) equipment and materials should be kept as near as possible to the place where they will be used, for example fuel should be near the stove, water and food supplies near the working surface where food is prepared, and the garbage can close by; (3) the cupboards should be arranged so that it is easy to find things in them. Pots and pans and cooking utensils should be close to the working area so that it is not necessary to walk across the kitchen to collect them. With ideal arrangements a housewife should be able to prepare a meal without moving from the working area, save for a few steps to the stove.

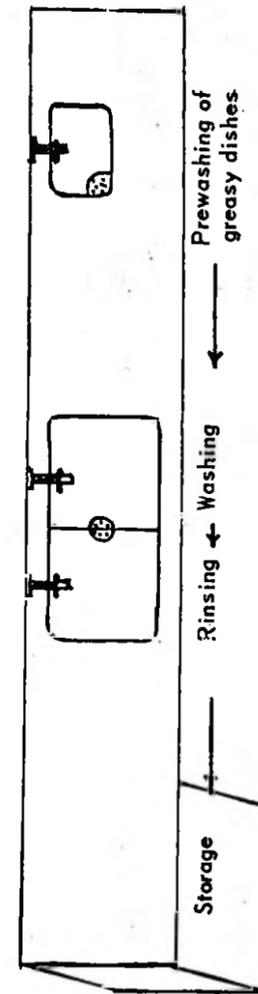


Fig. 18: A good order for dishwashing when sinks and separate sewage disposal are available.

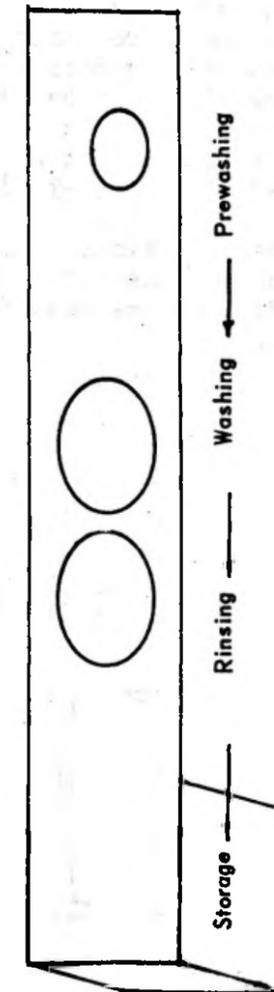


Fig. 19: The same sequence of work, but with dishpans for washing and rinsing and a small pan or bowl for prewashing.

Sufficient space for work in the correct sequence also saves time and energy. In dish-washing for example, space is needed for stacking dirty dishes, for prewashing of greasy dishes, washing, rinsing, draining and storing of clean dishes. (Figures 18 - 19).

(b) Height of working surfaces and shelves

The height of the stoves, and working surface should be adjusted to the height of the woman. They should be at a level at which she can work easily without either stooping or stretching. For a woman whose height is 5'5", a good height is about 34 inches. All stoves and cabinets should be built with toe space underneath so that the housewife can stand comfortably close to the place of work. The storage cupboard should be arranged so that the contents may be within sight and easy reach when needed. The greatest height of a shelf that a person of normal height can reach without standing on his or her toes is 190-200 cm. (72"-76") above the floor. (Figure 20).

Shelves for items in frequent use should be placed much lower and heavy items should be placed so as to permit lifting for as short a distance as possible.

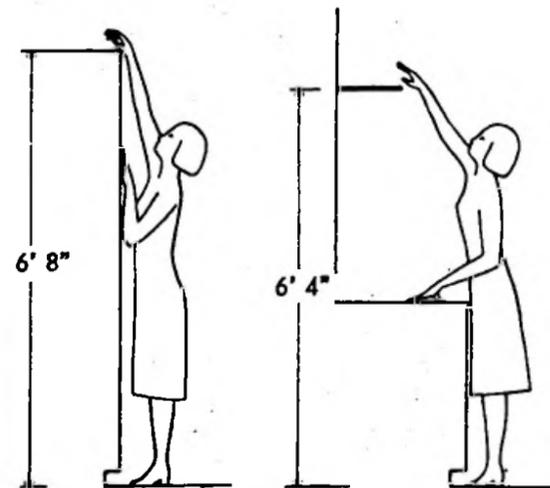


Fig. 20: This is as high as a person of normal height can reach.

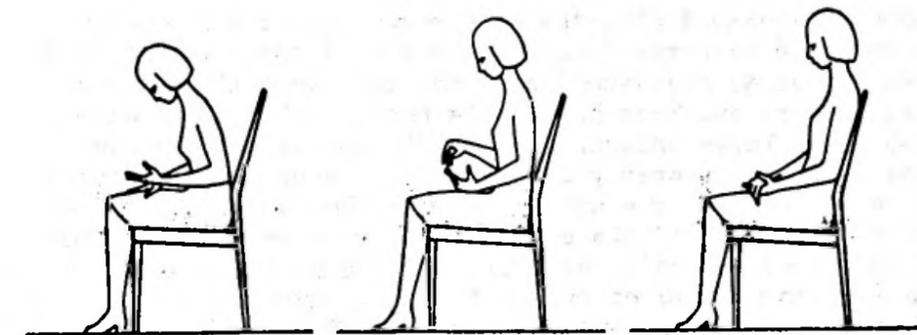


Figure 21: This chair gives support for the back. The feet rest properly on the floor.



Fig. 22: Working table with pull-out shelf.

(c) Position at work

It is desirable to do as much as possible of the work sitting. Sitting is convenient when the worker can gather all the material and equipment close to herself and remain seated for a while, as with such activities as cleaning fish, preparing vegetables, cutting meats, stirring batters and ironing. It is necessary to have a comfortable seat, which is large enough, (Figure 21) and of suitable height so that the feet rest properly on the floor. A suitable height for most people is 16" - 18". The stool or chair should be light, but steady to sit on. The back of the chair should give good support and the feet should rest on the floor while sitting erect or in a bending position either forward or backward. For convenient work while sitting, the work surface should be about 24" - 26" high. A shelf in the working table that can be pulled out at this height is most useful. (Figure 22).

For cooking food, washing dishes and doing most of the kitchen work, it is more convenient to stand. For activities that do not require much strength, it is best to stand erect and with relaxed shoulders. A good general rule is that the distance between the elbow and the working surface should be 4" when the upper arm is hanging down and the lower arm is bent forward. (Figure 23).

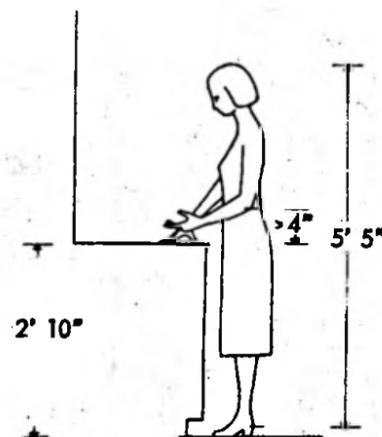


Fig. 23: The distance between the elbow and the working surface is 4".

In addition to the practice of sitting whenever possible, further relief for the feet can be obtained through proper shoes and a resilient surface on which to stand while working. The shoes should have low broad heels and be loose enough for comfort, yet offer necessary support for the feet. Discarded dress shoes with high heels cause unnecessary discomfort and fatigue. Cement and unyielding floor surfaces are hard on the feet. A small mat or rug on which the housewife stands at work will do much to lessen fatigue.

2. Organisation of work

The next step is to organise in an orderly programme, the tasks to be done. Some require to be done daily, others weekly or at other intervals. It is well to divide the weekly tasks so that they fall on different days and thus do not entail too much extra work on a given day. For example a plan might be as follows:

- Monday: Collect and sort clothes, bedding and other things needing washing. Do any mending and repairs needed.
- Tuesday: Wash clothes, starch when necessary and put to dry.
- Wednesday: Iron clothes, air, fold and put them away.
- Thursday: Give bedrooms and living room their weekly cleaning.
- Friday: Give kitchen, including cupboards a thorough cleaning.
- Saturday: Do any necessary cleaning and tidying of the yard and surroundings. Do shopping and preparations for Sunday.

This list is, of course, suggestive only. Each family will need to make a plan to suit its own situation. The important thing is to make a plan. It should, however, be a flexible one that can be adjusted if occasion demands it. The ideal is to do a good job with the least expenditure of energy, in the shortest possible time. To achieve this end it is essential that all the family cooperate, for example, by being on time for meals which will save the housewife's time.

### 3. Care and cleaning of the home

It is the responsibility of the householder to maintain and if possible to improve the house in which he lives and to make it into a functional and attractive home. The constant care and upkeep of the home are as important as its planning and furnishing. To give a pleasing appearance the home and its surroundings must be kept clean and tidy. The yard should be well-kept and brightened with some pretty flowers and the porch provided with an inviting chair or bench that extends a welcome to family and friends.

Anyone entering the house comes first to the living room, often the pride of the housewife. Whatever can be spent on furnishing and beautifying the home often goes to this room, while so often the rest of the house is neglected. It may be kept neat and tidy, while beyond it tidiness ceases, the bedrooms and kitchen being disorderly and even dirty, and the backyard littered with garbage and rubbish. The real test of good housekeeping is the cleanliness and tidiness of the back yard, the kitchen, and the bedrooms, rather than just the front yard and the living-room that are visible to the public.

#### a) General principles of cleaning

Some general principles of cleaning will be discussed first, and then the procedure for cleaning different rooms and areas of the house will be considered.

##### 1 Care of floors

The treatment of floors will depend on the type of material of which they are made as well as on the kind of equipment available. Mud floors are not desirable but where they exist they must be swept and kept dry. It is most important to keep these floors free from cracks to make sure that there is the minimum of dampness. Occasionally they have to be relevelled and then plastered. Before this is done it may be necessary to inspect the drainage. Any cause of dampness should be removed immediately.

Concrete floors, unless smooth, are very difficult to clean. It is good practice to clean and scrub them daily. Use a good hard brush and start scrubbing from the furthest corner. Wet a small area at a time and scrub with the brush using a circular motion. Dry with a cloth. Repeat until the whole floor is clean. Avoid splashing with a large quantity of water; this may form dirty pools on the floor and the wall may also be splashed. Concrete floors require a thorough wash at least once a week.

Wooden floors should be swept daily. All grease marks and food and other spills should be attended to promptly. For sweeping select a broom with a comfortable handle for the worker, and make sure that the wind does not scatter the dust again. The dust should be swept away in front or beside the worker, never toward her, and collected in a dust pan and disposed of promptly.

Plain wooden floors that are much used need a good scrubbing once a week or more often. In some places it is the practice to scrub with a "scraper" - this is a flat piece of metal with a somewhat sharp edge. This should be avoided as constant use of the "scraper" damages the wood. It is better to use a stiff brush on which some soap is rubbed. The floor should be wet with a cloth and then scrubbed with the brush following the grain of the wood. Scrubbing across the grain roughens the wood. Too much soap should not be used as this may eventually discolour the wood. Only a small section of the floor should be scrubbed at a time and be wiped thoroughly before another section is dealt with.

Polished floors should be rubbed daily and polish must be rubbed in occasionally. The polish should be well rubbed in. A good cheap polisher can be made from a small piece of burlap and a small oblong piece of heavy wood, with an old broom stick for the handle. Restaining may be undertaken during "spring" cleaning. For restaining it is necessary to remove the old polish first. This can be done easily by washing the floor with kerosene oil (away from a flame) or with water and vinegar. Wooden floors should occasionally be examined for weak boards which should be replaced at once.

Linoleum should be mopped with a detergent or with soap and luke-warm water, then rinsed and allowed to dry.

##### ii. Cleaning of walls

Walls should be dusted and all traces of cobweb removed. Occasionally it may be necessary to wash painted walls or to remove finger marks and other stains. In washing the walls the housewife should use a clean cloth wrung out of water, rub on some mild soap or detergent and starting from the bottom work upwards until the whole area is covered. The idea of starting at the bottom is to prevent any water trickling on to dry dirty wood-work which would cause a stain. The soap or detergent should be removed by using a clean cloth wrung out of clean water.

Cracks in the walls and damage caused by termites should be dealt with promptly. During "spring" cleaning it may be necessary to repaint the walls. It is a good plan to start from a definite corner and then deal with the rest of the wall in an orderly way.

iii. Cleaning equipment

Cleaning equipment such as buckets, brooms and cloth should be thoroughly cleaned and dried after each use. Cloth for cleaning floors, should be properly hemmed to avoid tearing of the edges. Newspaper is useful for cleaning many surfaces such as glass windows, metal fixtures and enamelled surfaces.

(b) Care of the bedroom

i. Daily care

The daily care of the bedroom includes making the bed, cleaning the floor and tidying the room. Each member of the family, except the youngest children, should be trained to open their beds on rising, and to straighten the sheets and plump the pillows, so that the bed looks tidy, until it is made later. A few minutes should suffice for the necessary daily bedroom tasks. A normal routine would be as follows:

1. Empty the bed-pan or slop-pail if one has been used, wash it, and put it in the sun to make it fresh and odourless.
2. Make the bed. Be sure that the surface is smooth and the spread hangs evenly on all sides.
3. Clean the floor with a broom, polishing mop or wet mop, according to the type of floor.
4. If there are floor mats shake these out of doors, and replace them on the clean floor.
5. Tidy the bedside table if there is one, and any dresser or chest that the room contains.
6. See that all clothing and belongings are put in their proper places.
7. If there is a kerosene lamp in the room carry it to the kitchen so that it may be filled if necessary and the chimney cleaned.
8. Before you leave the room look around to see whether it appears clean, tidy and inviting.

ii. Weekly cleaning

Once a week the bedroom needs extra attention. The following is a suitable order of procedure.

1. Put all bedding and mats in the sun while you clean the room. Turn the wrong side of coloured materials up to avoid fading of the right side.
2. Clean the walls with a long-handled brush to remove any cobwebs or dust.
3. Shift the furniture sufficiently to give the floor a more thorough cleaning and reach all the corners.
4. Inspect the bed frames to be sure there are no insects. If insects are found they should be killed with a mixture of kerosene oil and DDT. This mixture can be applied to crevices with a feather.
5. Examine the mattress for rips or tears and mend any found. Torn mattresses encourage vermin.
6. Clean the mirror if there is one.
7. Change sheets and pillow slips. Note if the bedspread needs washing and, if so, see that this is done in the next laundry.

Children, both boys and girls, should begin early to take responsibility for their own rooms. Quite young children can be taught to pick up their clothes, to open their beds, and to take mats out of doors to be shaken. Later they can help their mother or an older sister or brother make the bed, and finally can take full care of the room. If the room is theirs they will learn to take pride in having it always clean and attractive.

iii. Cleaning of wardrobes, closets and other cupboards

These will have to be turned out periodically, checked for vermin or termites, cleaned, aired and repacked. This will be a good time to give the woodwork any attention it needs, such as repainting or repolishing. Warm humid climates encourage the growth of fungi which destroy, discolour or etch a wide variety of materials. This deterioration may even occur inside a closed container if it were last opened in a particularly warm, moist atmosphere. It is essential, therefore, that storage space be kept dry and clean.

(c) Care of bathroom, washplace and lavatory

Bath tub and wash basins should be cleaned immediately by the person who has used them. Once a day a thorough cleaning is necessary. A detergent is most effective for this purpose, or, if there is a rough surface such as cement, a good scouring powder or even fine sand can be used. When not in use the bath tub and wash basins should be kept dry. Brushes, cloths and other cleaning equipment used for the lavatory should be kept apart from other household equipment. After they have been dried they can be stored in a cupboard in the lavatory or near by.

Mirrors can be cleaned with special window polishes, methylated spirit or more cheaply by using damp newspaper. Wet towels should be put out in the sun to dry and, whenever needed, clean towels should be at hand.

(d) Care of the living-room

The living-room should be cleaned, dusted and tidied daily. As soon as a meal is over, the table should be cleared of all food and dishes, and the table top washed or rubbed clean with a moist cloth. Furniture should be dusted. A soft cloth or duster folded to form a pad and used in a circular motion is most effective. When dusting work from top to bottom, and try to collect the dust in the cloth. Avoid scattering the dust around. Mats, or rugs, if there are any, should be shaken out of doors, and the floor cleaned with a dust mop or wet mop. Then the furniture should be put into proper order. It is also necessary to give flowers daily attention. Usually the water needs to be changed daily otherwise it becomes unple sant.

Once a week an extra cleaning is needed. Walls should be wiped down with a long-handled brush, pictures wiped, and cupboards cleaned and put in order. Furniture should be moved enough to give the floor a more thorough washing. If there are cushions, chair covers or other textiles in the room they should be checked to be sure they are perfectly clean, and washed if needed.

(e) Cleaning the kitchen

Special attention should be given to cleaning the kitchen. Even if it is not part of the main house, it is an essential part of the home. It is the place where food is stored and prepared and where the eating utensils are kept. Unsanitary conditions in the kitchen may be a health hazard, as foods may become infected and flies may breed and cause spread of infectious diseases.

First in importance is the proper washing of dishes and caring for food, which are considered later. After dishes are washed, and put away, the kitchen should be put in order, the floor should be swept or washed, the stove cleaned, the cupboards tidied, the garbage pail emptied and everything put into its proper place. Once a week, or more often if needed, the kitchen should be given an extra-thorough cleaning.

i. Care of stoves

Various types of stoves need to be cared for in different ways. Stoves burning wood must be kept free from ashes and soot. Iron parts may be rubbed over with paraffin or oil to prevent corrosion. Enamelled surfaces should be kept clean and protected against scratching and against acids. Plates on electric stoves must be kept absolutely clean and smooth to prevent waste of current. The burners on oil and gas stoves should be kept clean and free from soot by washing them in water with some detergent added. Care must be taken not to use strong cleansing agents and not to keep iron parts of the stove too long in water as this may destroy the protective elements on the surface and the iron becomes subject to corrosion.

ii. Care of sinks and cupboards

Sinks should be cleaned after each use. Periodically they should be given a thorough cleaning with hot water and soda to dissolve fat that may have accumulated in the drain-pipes.

The kitchen cupboards need some daily attention. All food cupboards, especially, must be checked to ensure that the food is in good condition, properly protected against insects and rats. Once a week they need to be thoroughly turned out, washed and examined for signs of insects. Where there is a refrigerator, this should be defrosted when nessary, and cleaned and aired frequently.

iii. Dishwashing

This is commonly regarded as drudgery, and is the most disliked task of the house. This attitude could be avoided to some extent by having an orderly and labour saving system. A suggested method is as follows:

In a family where there is no paid help, each member of the family can carry his own soiled dishes to the kitchen, scrape any refuse into a common container, wipe off the plates with a piece of paper or leaves and sort them into suitable piles - plates, cups, bowls, utensils, etc. This takes about one minute of each person's time and saves the housewife many trips to and from the table. Dishwashing, for a right-handed person, should be done from right to left, i.e. the dishes are stacked at the right of the worker, washed with the dish-cloth or brush in the right hand, the dish in the left and passed to the left side for rinsing and drying. (As already shown in figures 18 and 19).

Warm water with washing soda, soap or detergent should if possible be used for washing and hot water for rinsing. Detergents are economical since only a small quantity is needed. If hot water is unavailable then a disinfectant such as chlorox, or pittchlorox (about 1 table spoon to one gallon of water), should be used. By allowing the kitchen equipment and utensils to dry in the air before they are put away, the wearing of towels and laundering costs are reduced. Dishpans, sinks, drain-boards and other equipment for washing up should be properly cleaned and dried after each use. Here are some suggestions for the treatment of certain materials:

1. Equipment such as knives and forks with a wooden handle should be washed quickly and never be left in water, since this might cause the wooden handle to swell and the blade to become loose.
2. To keep their edges sharp, kitchen knives should be stored separately from other equipment, being placed in a rack where the edges do not touch each other.
3. To avoid scratching of silver and other soft materials, forks, knives and spoons should be washed carefully and stacked separately.
4. To protect easily breakable material, hard wash boards such as those made of concrete, marble or porcelain should be covered with a soft cloth.
5. To clean aluminium pans boil some vinegar water in the pan. Never use soda for aluminium.

6. To clean iron rub with scouring powder.

7. To clean enamel, fill the pan with water and a little soda or chlorox and heat slowly.

#### iv. Disposal of garbage

The dustbin should be emptied at least once every day and thereafter cleaned and dried. All scraps from the kitchen that are to be used for animal feeding should be kept in separate containers, or used in a compost if possible.

In many places, particularly outside urban areas, there is no organised garbage collection, and people follow the unsatisfactory practice of throwing rubbish into the sea or onto vacant land, or in the yard, where it may furnish breeding places for mosquitoes and attract rats. A dirty backyard can spoil an otherwise attractive house. In urban communities in which garbage is collected every day or on several days in the week, the householder should utilise the containers placed at the disposal of the public in certain places on the road. In some places garbage pans from individual homes are emptied during the night or day if placed on the sidewalk. In the disposal of garbage, especially when there is no periodic collection, certain rules should be followed:

- (1) All tin cans should be flattened before being buried in the ground to prevent the breeding of mosquitoes and to take up less space.
- (2) Combustible material that is not burnt in the stove should be burnt in an incinerator, which can be made from an empty drum, with holes for the air at the bottom. (See Chapter VIII Drawing No. 26).
- (3) Organic matter such as peeling and leaves, can be used for making compost that will enrich the soil. (See Chapter VIII, Drawing No. 28 for details of how to make a compost).

(f) Care of the yard

The yard and surroundings, especially the part behind the house, need the same care and attention as the house itself. Daily attention should be given to keeping it clean and orderly and once a week it should be cleaned thoroughly. There should be no tin cans, papers, or other rubbish lying about. Any tall grass which might allow water to collect should be cut, and any pools of water that have formed eliminated. The back porch or steps should be scrubbed, the latrine cleaned, and everything put in order, so that the back-yard looks clean and tidy. It should be a place where the family can sit or play and where they can receive visitors.

Fencing around each unit improves the general appearance and tidiness of a housing area. It also helps to give the individual owner a greater sense of responsibility for his own plot and encourages him to keep a neat garden. The cost of maintaining the house itself tends to be lower when there is fencing. A hedge is one of the cheapest forms of fencing.

(g) Control of household pests

Household pests are not only a nuisance but also a hazard to health as they can spread disease from the sick to healthy persons. They may also cause damage to food, clothing, furnishings and other belongings. Among the common household pests in tropical countries are mosquitoes, bugs, flies, ants, fleas, cockroaches, moths, silver fish and rats and mice. Housewives must wage a continuous battle to keep the house and premises free from them.

The most important means of control is absolute cleanliness in all parts of the house and surroundings. Most pests breed and thrive in dirt and filth. All cupboards should be thoroughly cleaned regularly, all the contents being removed before the cleaning. Everything put aside for storage should be spotlessly clean. Cedar shavings may be placed in clothes closets as protection against insects. Utensils used for food should be rinsed immediately, even if the washing is to be done later. Dirty dishes will attract cockroaches, flies and rats. All dry foods should be stored in tightly closed containers. Fresh foods such as meat, fish, milk and fat should be stored in screened food cupboards. Ground provisions and fruit should be kept away from the floor, in cupboards with a door fitted with chickenwire, or in a basket or box that can be hung from the ceiling.

(1) Mosquitoes

There are many kinds of mosquitoes. Some of them carry organisms which cause malaria, filariasis and other diseases. All kinds are objectionable. Mosquitoes usually lay their eggs in still or slowly moving water. In due course the eggs hatch into little wrigglers or larvae, which lie near the surface of the water in order that they may breathe. In a few days they turn into adult mosquitoes. The best way to get rid of mosquitoes is to prevent them from breeding. The breeding cycle - from the laying of the eggs to the emerging of the mosquito from the water - varies from 10 - 20 days according to the temperature. Householders should therefore examine the area around the house every 10 days or so, looking for breeding places and eliminating these if found.

Every householder should see that there is no stagnant water around. Holes dug during the building of a house should be filled in. Long grass under which mosquitoes can breed, should be cut and very thick trees should be pruned. Roof gutters should be cleaned regularly to prevent them being choked with leaves and harbouring standing water. No empty tin cans, bottles or other containers should be left where they can collect water. Rubbish should be burned or buried. The latrine should be kept clean and always covered while not in use. Water containers should be kept covered with wire gauze or strong cotton material.

Small slow-moving streams and swamps cannot be dealt with so easily. Channels must be dug so that water flows more swiftly and in this way eggs are prevented from hatching. The planting of quick-growing tree seedlings, e.g. eucalyptus, cassia, wattle, helps to drain swamps. By throwing cut grass into small slow-moving streams regularly, eggs and larvae can be destroyed. Kerosene oil poured into ditch water can also prevent the breeding of mosquitoes.

In areas in which there are mosquitoes that carry disease, it is wise to have wire gauze shutters over the windows, and shut these an hour or so before sunset. It is also wise to sleep under a mosquito net. The house should be sprayed with DDT periodically (about every six months). Spraying is sometimes done free of charge by the Health Department, and full advantage should be taken of this service. Plenty of sunshine and fresh air, let into the house through large enough windows and doors, helps to keep pests under control.

ii. Flies

Flies are both filthy and dangerous. They breed in decaying matter such as manure and human excreta. Adult flies lay their eggs in such matter and the eggs hatch into little worms or "grubs". In a warm climate the grubs become full-grown flies in about 10 days, and are then ready to fly to the house where they alight on any exposed food, on the baby's face or even his mouth. The flies carry on their feet filth from their breeding place, and any disease germs which may be in the filth. Dysentery, typhoid and other diseases are spread in this way.

The way to get rid of flies is to prevent them from breeding. No garbage, human or animal excreta, or other decaying material should be left exposed. Latrines should be kept covered at all times. Food refuse if not used, should be buried in a compost heap, which should be covered with fresh earth each time material is added. Since it takes about ten days for the grubs to hatch into flies, manure piles can be prevented from becoming breeding places by spraying them with DDT every tenth day. Another preventive measure is to dispose of the manure before the flies can hatch. Lizards, toads, and other insect-eating animals help to control flies and should be protected.

In addition to doing whatever possible to prevent flies from breeding, precautions should be taken to see that any that do appear cannot reach food or the baby. All food, milk and water should be kept covered at all times. The baby should have a net over its bed when it is put to sleep.

iii. Ants

Special care is necessary to control ants. The best way to get rid of them is to find their nests and destroy them. This is not always possible, however, and the next best step is to keep them from entering the house, and from getting into food. The food safe should not touch the wall nor any other piece of furniture, as ants may crawl into the safe that way. Spiders' webs can also be used by ants in the same way. The legs of food-safes should be placed in double tins, with water in the outer tin only, so that the wood will not rot. A little disinfectant or paraffin should be poured into the water to prevent mosquitoes from breeding in it.

iv. Cockroaches

To eliminate hiding places for cockroaches, all cracks in walls should be filled in with cement, clay or paraffin for concrete, mud and wooden houses respectively. Cockroaches can be poisoned by a mixture of boric powder and sugar or maize meal or sweetened milk. An effective insecticide is chlordane (also called "Velsicol 1068") which may be used periodically for wiping shelves and working surfaces. After the surface has been washed frequently the cockroaches may stay away for weeks.

v. Rats and mice

To prevent rats and mice from entering the house, all holes in the walls should be stopped, and also rat and mouse holes in the out buildings and yard. In addition to this, keeping a cat or using traps or rat poison will help to keep them under control. Care must be taken that no household animals can get at the rat poison.

CHAPTER VI

SOME ADVANTAGES IN MAKING IMPROVISED  
FURNISHINGS

1. Some advantages in making improvised furnishings

Throughout the previous Chapters various possibilities for making use of available resources, as well as for helping oneself, have been discussed. Houses are being built under aided self-help schemes, the people themselves supplying the labour. Thus it is possible for families with limited means to build a larger house than they could otherwise afford.

With limited funds available, it becomes difficult if not impossible to provide for all the needs of the home. Everyone knows the importance of certain minimum essentials, such as beds for everybody, seats for everybody and a table large enough for the family. Without enough money to buy all the furnishings at once, one must either wait until there is enough money or make some improvisations that will suffice for the time being. A handy man and woman can, from comparatively cheap material and with the help of a few tools, make some simple furnishing that will fill the most urgent needs of the family. Not that we want everybody to become a carpenter, nor do we want to take away the trade from the skilled workman, but when funds do not permit the buying of what is needed, we should not be content without these essentials. A home-made sturdy bed, is better than no bed at all. A simple stool, even if it is made from a box, is better than no seat at all for some one in the family. By making some simple articles ourselves, we may be able to put money aside for buying additional items for which skilled workmanship is needed. It may thus be possible to obtain a better and more durable product.

The improvement of the home should be the concern of both husband and wife. The wife, for example, must be able to determine the type and size of storage facilities needed, the best arrangement of equipment to save steps while preparing the food, etc. The husband must be willing to assist in providing these things.

By working together on the actual making of various necessities for the home, the members of the family may become more attached to their homes and more willing to shoulder responsibilities for other members of the family. The satisfaction of achievement that we all feel from having made something with our own hands must also not be overlooked.

In this way our home improvement projects not only become the means of improving the material side of the home, but also become a means of improving the spirit of the people living in the home. Just as beds are important not only for themselves, but as a means of providing for healthy moral living, so are storage cupboards important for the orderliness of the home. With no place to hang clothes, keep one's shoes, etc., it becomes impossible to protect belongings and to make the home the inviting place it must be if the family is to spend time there, rather than to seek comfort and consolation in places away from home. Another means of bringing the family together is the table large enough for the family to gather around at mealtime as well as other times. Facilities for eating together, working and playing together, will be a means of uniting the family. Working together as a family towards the improvement of the home may be the one means of reaching our goal of stabilised family life in the Caribbean.

2. Selection of wood for home improvement projects

For the making of furniture, it is important to select suitable wood. The wood should be of medium hardness. A hard wood is difficult to work with, and will easily split, especially if handled by unskilled labour. A soft wood, on the other hand, will easily show marks from the use of hammer and other tools. Of local woods in the Caribbean, cedar and cypre are woods of medium hardness which are easy to work with, and give a nice finish to the product. Local pine and imported white pine are also suitable woods for the making of simple furnishings. Mahogany gives a beautiful finish, but is too expensive to use for simple home improvement projects.

When buying wood one can buy planed or unplaned wood. The wood can be planed on either one or both sides. Planed wood is often referred to as dressed, surfaced or finished wood. The boards are usually  $\frac{1}{2}$ ", 1" or 2" in thickness, and are cut into lengths of 8, 10, 12 feet, or even up to 20 feet. The width of the lumber is usually 4, 6, 8, 10 or 12 inches. These dimensions apply to the undressed lumber and will be less when the boards are dressed. Thus a 1" board will actually be about  $\frac{3}{4}$ " thick when dressed, and a 6" wide board will be about  $5\frac{5}{8}$ " wide after dressing. When ordering lumber the dimensions are given in a certain order; first the thickness, then the width and lastly the length. Lumber is usually sold by the board foot. One board foot of lumber is a board of 1" thickness, 12" wide and 12" length. A board that is 1" thick, but only 6" wide and 12" long, contains only  $\frac{1}{2}$  board foot. A board with 2" thickness by 12" by 12" contains two board feet.

In estimating the amount of lumber to be bought one must always allow for a certain amount of waste through planing and cutting the wood. It will, for example, not be possible to get 4 strips each of 3" wide from a 12" board. It might be possible to get three strips of 3" width from a 10" board, which will cost less than the 12" board. To save lumber one must, before buying, carefully consider both the thickness, the width and length of the board. Careful measuring and marking before cutting will prevent waste of wood. Where sawmills exist it may be possible to buy lumber in shorter lengths at a cheaper rate. Second grade lumber may be usable for certain projects, especially for the unskilled worker to practise on. It is important, however, that the lumber be well seasoned and straight. Wood that has become warped during the drying process is unsuitable for the making of any furniture. If unseasoned wood is used, it will shrink and warp during the drying process and the furniture may lose its shape and fall apart easily. If not naturally resistant, wood should preferably be treated against destruction by termites and other insects. This can be done by coating the finished product with a liquid wood preservative, a number of which are available.

### 3. Tools for home improvement

For the carrying out of simple home improvement projects and minor repairs in the home a few tools are necessary. Among the essential tools are: saw, hammer, plane, square, rule, chisel, screwdriver and paint brush.

All tools must be kept in good order to offer lasting and efficient service. The tools should preferably be kept hanging in order to safeguard the cutting edges. The metal parts should be oiled frequently to prevent corrosion. Tools that have become rusted should be cleaned immediately when the rust is discovered. Kerosene oil may be applied to the spot and after a little while the rust can be removed by rubbing the spot with emery paper. All traces of the kerosene oil must be removed with a dry cloth before the tool is rubbed with machine oil.

Tools must be kept sharp in order to do a proper job. To sharpen chisel and plane blades use an oilstone with a few drops of oil spread on the surface. Hold the tool to the stone so that its cutting edge rests slantingly and evenly against it. Rub the blade on the stone backwards and forwards or with a circular movement until it is sharp. (See Figure 24). If the cutting edge is worn or damaged, it will be necessary to regrind it on a grindstone.

### (a) The saws

There are many kinds of saws. The most common is the carpenter's handsaw, which can be used for most ordinary activities. The Crosscut saw has the cutting teeth so filed that the saw cuts at both sides and is used for cutting across the grain. The saw teeth are set alternately to the right and left. Figure 25 shows how they are shaped to form sharp cutting points.

The Ripsaw has all the cutting teeth filed on the front side and cuts in one direction only. It is used for cutting wood lengthwise (along the grain). The teeth are almost vertical in the front (See Figure 26).

The Backsaw or Tenon Saw is made with a rigid steel reinforcement attached to its top edge to form a "back". The teeth of the backsaw are shaped like those of the crosscut saw. Having a thin blade and fine teeth, it is suitable for fine cuts like joints, mitre corners and others. (Figure 27).

The Compass Saw is used to cut circles. (Figure 28).

The Hacksaw is used to cut steel. (Figure 29).

Before cutting the wood careful measurements must be made to avoid waste. Using a square or a ruler, a line is marked on the wood with a lead pencil, where the wood is to be cut. Allowance should be made for the loss of wood in cutting and planing.

#### How to saw

When using the saw, the handle should be grasped lightly. Very little pressure is required. Start to cut by placing the cutting teeth nearest to the handle of the saw on the line marked. Proceed with upward and downward movements. Maintain the saw at an angle of 45° to the wood that is being cut (Figure 30). Note that the cut must be made along the waste side of the marked line.

### (b) Measuring tools

The try square is used for marking lines square across the work. It is necessary in checking the squareness of boards and constructions. The try square consists of a metal blade fitted so as to form a perfect right angle to the straight edge of a heavier piece of wood or metal. The blade is usually stamped in one-inch gradations and their fractions, which makes the try square a measuring tool as well as a squaring tool. (Figure 31). In squaring a piece of wood the handle of the try square should be held firmly against the face of the wood and the blade run along the edge. Any deviation from the square can be seen by sighting the edge (Figure 31 b-d).

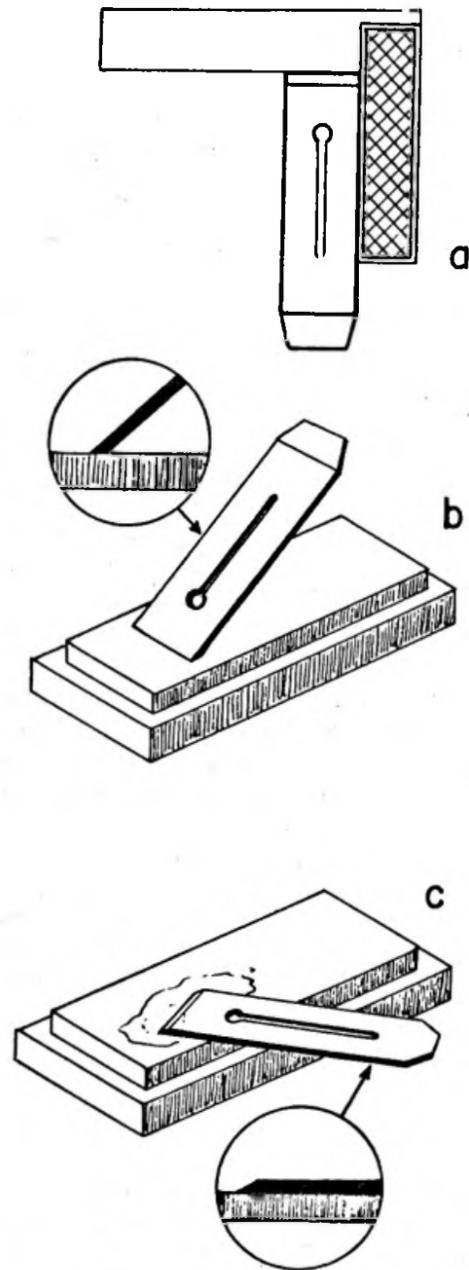


Fig. 24: Sharpening a plane blade.  
 a. Checking the edge for squareness.  
 b. Use a circular motion holding the blade on the slant of the beveled cutting edge.  
 c. The straight edge must be kept flat on the oilstone.

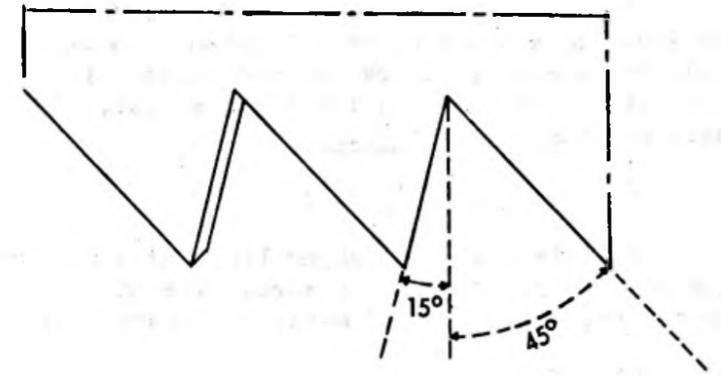


Fig. 25: Cross cut saw.

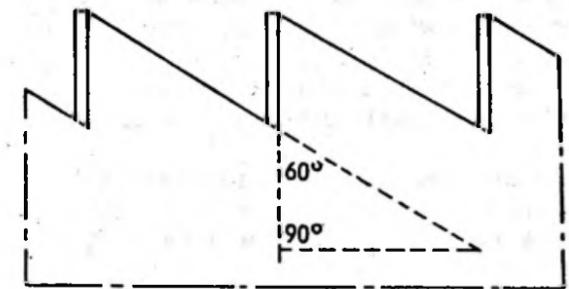


Fig. 26: Rip saw.

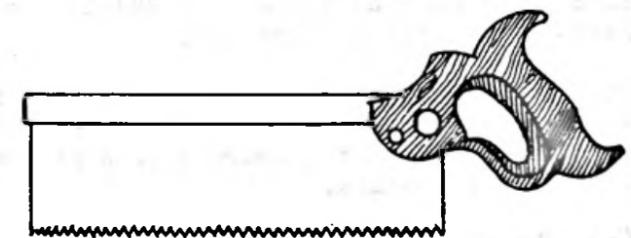


Fig. 27: Tenon Saw.

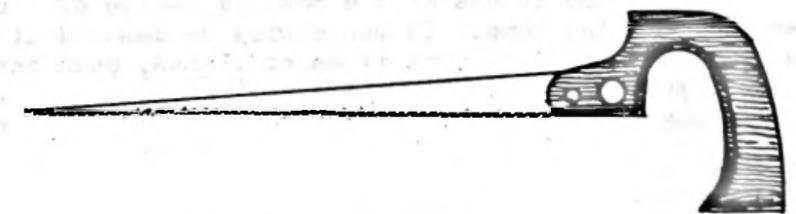


Fig. 28: Compass Saw.

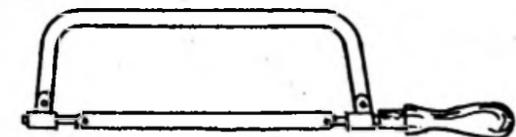


Fig. 29: Hacksaw.

In squaring, one should remember that there are two sides and two edges to a piece of wood. Select the better side and plane it flat, "face side". Check for squareness along entire length. Plane other side flat and parallel to face side. Other useful measuring tools are rulers and folding rulers.

(c) The marking gauge

This is used for making lines at a uniform distance from the edge of a board or piece of work. The adjustable marker can be set for the required depth of marking (Figure 32).

(d) The hammer

A useful hammer for carpentry work is one with a head and a claw. The face of the head is slightly rounded, called a "ball face", to prevent marring the wood when the head of the nail is driven down flush with the wood. The hammer should be strong, with a sturdy handle. The hammer should never be used for striking hard metal. The head should always be kept clean, otherwise it may glide on the head of the nail and bend the nail.

It is an advantage to have both a large and a small hammer. To use a small hammer for large nails will soon destroy the hammer and the nails will bend. A heavy hammer, on the other hand, is tiresome to use on small nails and may easily make marks in the wood. When nails are to be driven into hard wood, or small pieces of wood, a hole should first be made in the wood with a gimlet (Figure 33) or a brace and bit (Figure 34) to prevent the wood from cracking.

Hold the hammer at the end of the handle and use firm strokes on the head of the nail (Figure 35).

When pulling out a nail, place a piece of wood under the hammer and while holding the head of the nail with the claw, pull backwards towards yourself (Figure 36). A pincher is also a useful tool for pulling out nails.

(e) The plane

The plane is one of the most expensive of the tools used for carpentry in the home. It can easily be damaged if not given proper care. There are different types of planes, each one used for a special purpose. The jack plane is the most commonly used. All planes consist of a number of different parts. (Figure 37).

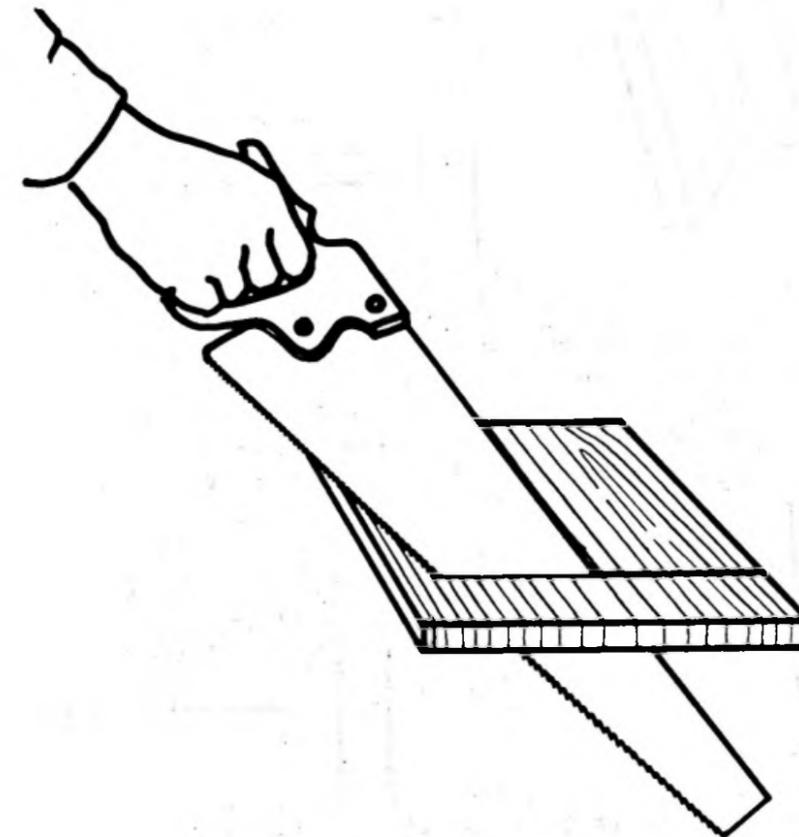


Fig. 30: How to cut wood.

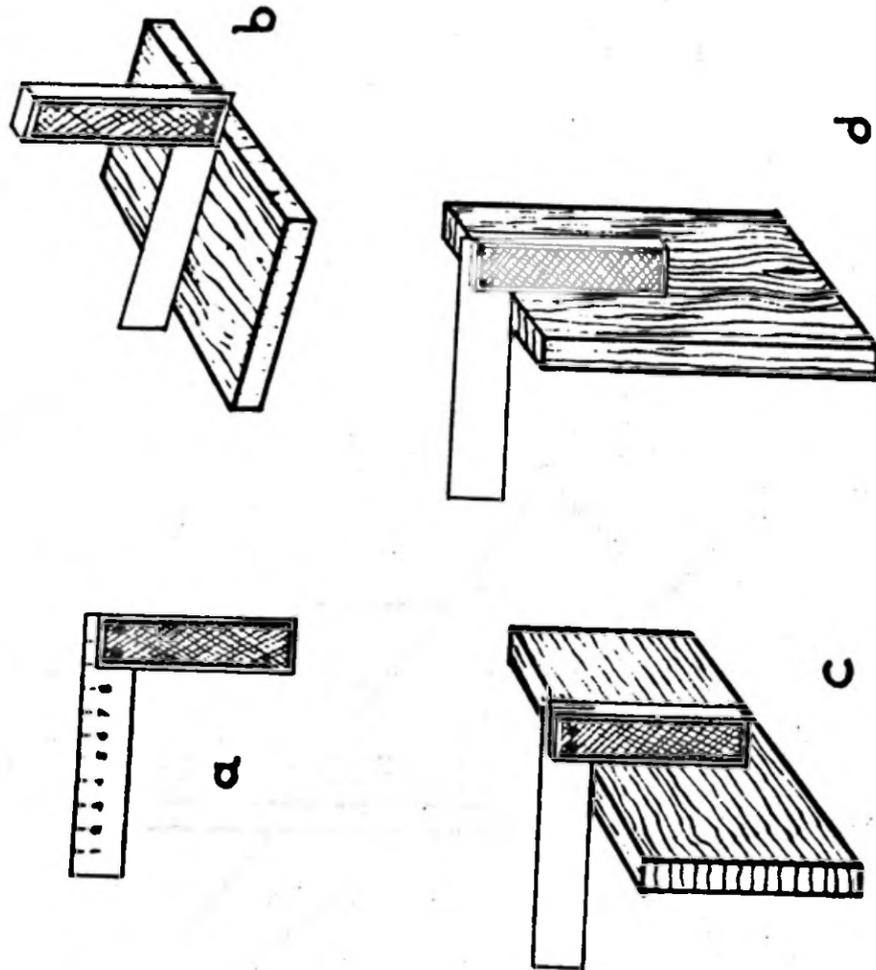


Fig. 31:  
 a. Try square.  
 b. Testing the face of the board.  
 c. Testing the edge.  
 d. Testing the end for squareness.

For efficient planing hold the plane with the right hand and press with the left hand on the front part of the tool. Always plane in the direction of the grain and make long movements forward, pressing the wood. When bringing back the plane to the original position, do not press on the wood as that will soon make the plane dull. Short strokes should also be avoided.

In order to keep the plane iron sharp this must not be rested on the sole of the plane or the cutting surface. Rest the plane on the side. When not in use, the plane iron should be retracted and the wedges released.

The spokeshave is used for planing curved outside edges (Figure 38).

(f) The chisel

The chisel is useful in making joints, inserting hinges, etc. The chisel must be kept sharp and never be used for anything except its purpose. The amateur carpenter must be warned not to use the chisel for opening tins or removing nails. A smaller, wooden hammer called a mallet should be used with the chisel (Figures 39 and 40). It is a good idea to use both hands when operating a chisel. The work should be held securely in a vice or with clamps (Figure 41) so that both hands of the worker are free to handle the chisel.

(g) The screwdriver

This should fit the screw, otherwise the tool may be damaged if used on screws that are too big. If a screw driver is too large, the wood may be damaged, (Figure 42).

(h) The paint brush

The paint brush must always be cleaned after use. From one day to another the brush may be kept in water to protect it from hardening and thus spoiling the hair. For proper cleaning, warm soapy water can be used, or if oil paint has been used the brush should be cleaned in kerosene oil or turpentine. Store the paint brush with the brush end up to keep it in shape.

(i) Sandpaper

There are different grades of sandpaper; coarse, medium and fine. The sheets are usually 9" x 11". Each sheet may be divided into four or six pieces. Prepare a small wooden block 2½" x 4½" to serve as a support for the sandpaper. Cover one side of the block with a piece of sandpaper and hold the ends at the top of the block. Always sandpaper in the direction of the grain, never across the wood.

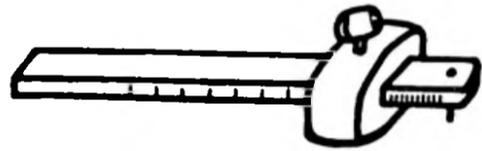


Fig. 32: Marking Gauge.

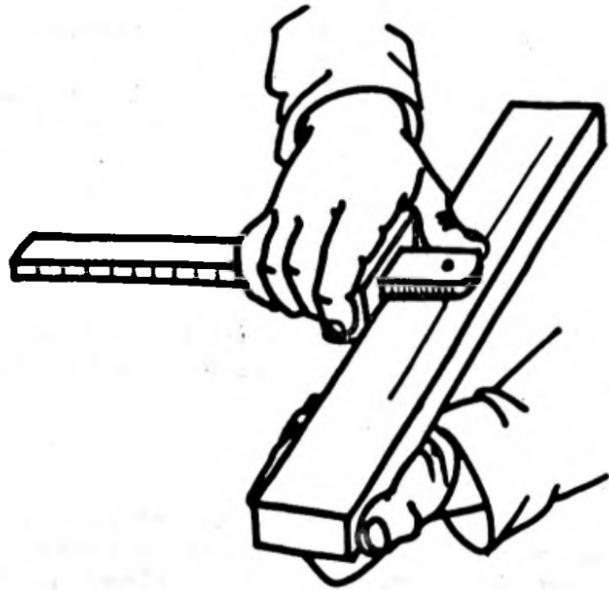


Fig. 32a: How to use a Gauge.

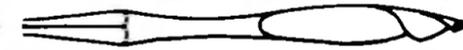


Fig. 33: Gimlet.

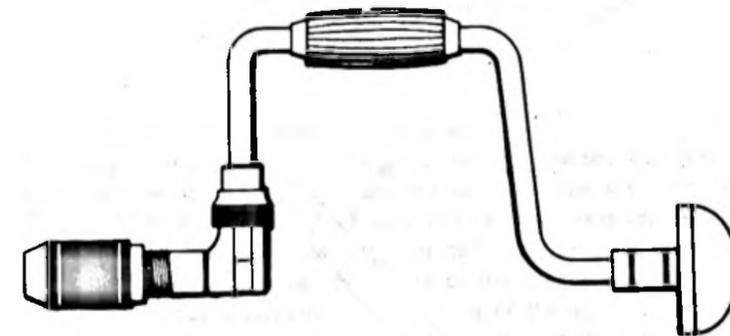


Fig. 34: Brace and Bit.

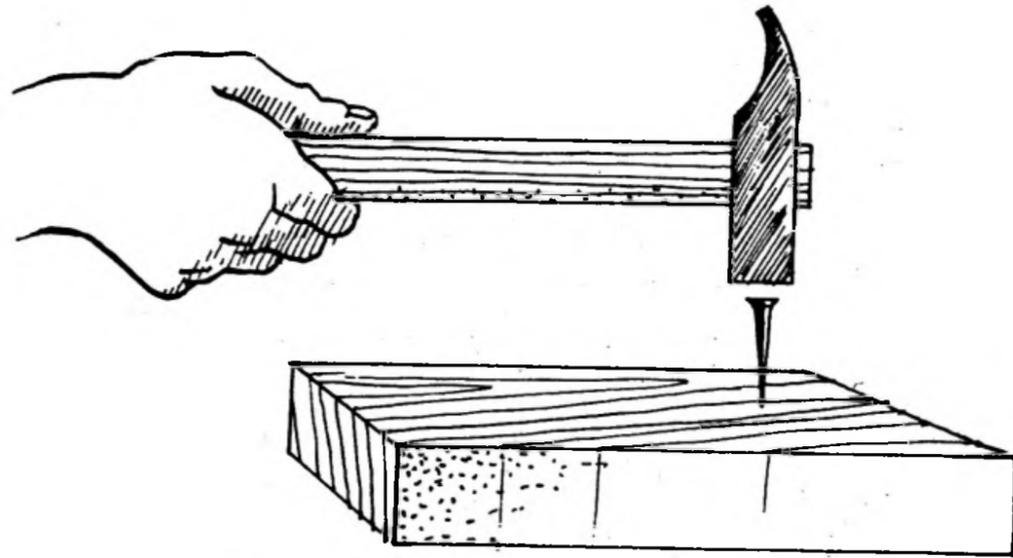


Fig. 35: How to hold a hammer.

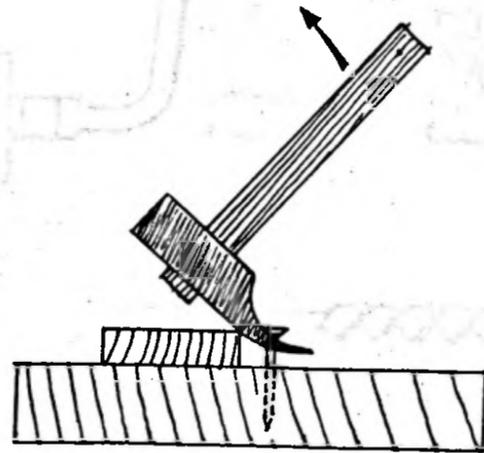


Fig. 36: How to pull out a Nail.

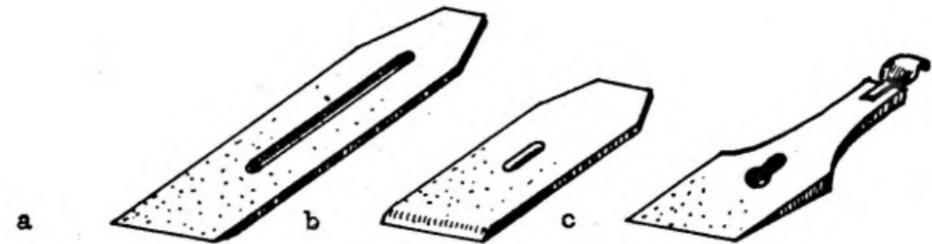
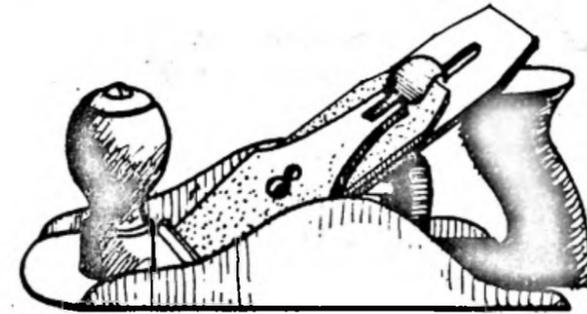


Fig. 37: Plane

- a. The plane iron is the blade or cutting edge.
- b. The plane iron cap or chip breaker is the piece which fits over the plane iron. It goes on the side opposite the beveled edge and down within 1/16 of the cutting edge and is held in place by plane iron screw.
- c. The lever cap holds both pieces in place. The plane has two adjustments.
- d. The lateral adjusting lever adjusts the cutting edge parallel to the bottom.
- e. The adjusting nut determines the thickness of the shaving to be removed. Both adjustments can be tested by running the fingers along the bottom edge of the plane or by sighting across it.

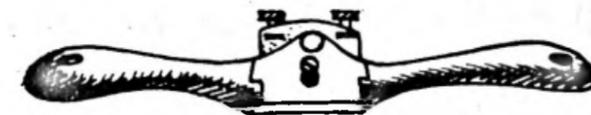


Fig. 38: Spokeshave



Fig. 39: Chisel.

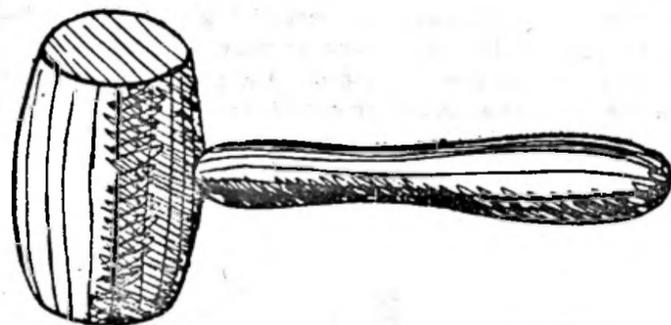


Fig. 40: Mallet.

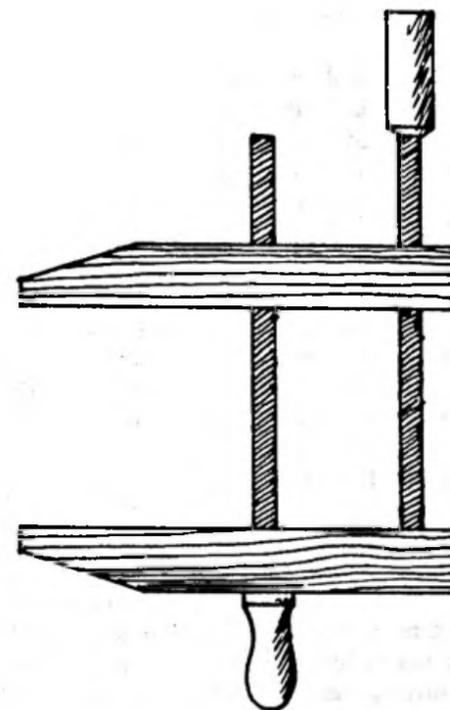


Fig. 41: Wooden clamp.

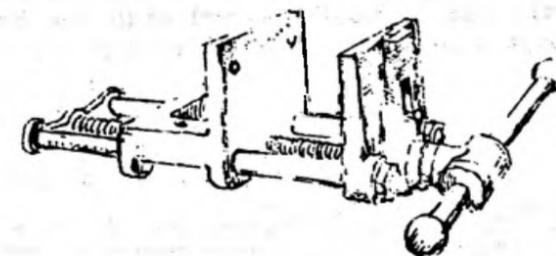


Fig. 41a: Bench vise.

#### 4. Fastening devices

##### a) Nails

Nails range in size and style. The size of nails is stated by the sign "d" and read penny. A 2"d" nail is a very small nail; a 10"d" is a common nail 3" long; a 100"d" nail is a huge spike. Common nails have standard diameters, but small nails can be purchased in many diameters. Nails are sold by the pound. The common nail is an "all purpose" nail. Usually the diameter of the head is approximately three times as great as that of the nail itself. The enlarged head serves to prevent the head of the nail from being driven through the board. The common nail is used on rough work but not on finish work. The finishing nail or wire brad, has a much smaller head than the common nail. It should be used on all finish woodwork when the head is set below the surface of the wood. The lengths vary from 3/6" to 3". Standard wire gage numbers are used for the diameters. The larger the gage number, the smaller the diameter of the nail.

In selecting the kind of nail to use for a job, there are several things to consider. First, the length of the nail should be about three times the thickness of the piece of wood being nailed, whenever possible. In nailing two pieces of the same thickness, enough of the nail is left extending through the wood for clinching. When nailed to a thicker piece of wood, the point of a short nail does not have a chance to hold tightly enough. Second, the diameter of the nail should be small enough so that it does not split the wood. If it seems best to use a large nail in thin wood, a pilot hole, should be drilled and the nail driven through it. The diameter of the hole should be smaller than that of the nail. This is often necessary when driving a nail into hardwood. By applying soap to the point of the nail the job is made easier still. Third, the appearance of the finished work is important. If strength alone is desired, a nail with a large flat head should be used. But if a finished appearance is desired, a nail with a small flat head should be selected so that it may be "set". This is done by placing the end of a nail set squarely on top of the head of the nail, and then driving the nail into the board with the hammer (Figure 43)

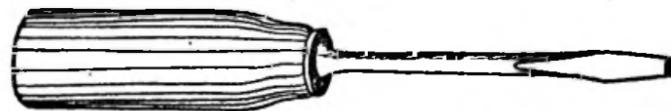


Fig. 42: Screwdriver.

Nails placed directly in line with the grain and close together tend to split the board. Nails driven in at an angle provide greater holding strength than those driven straight into a board. The practice of sloping the nail is known as toeing. (Figure 44).

When a nail is driven through the wood the point can be bent over on the opposite side. This is known as clinching. (Figure 45).

##### (b) Screws

Screws are used for the same purpose as nails in many instances. Screws have greater holding power than nails, and may be removed with greater ease, without danger of splitting the wood. By using screws, the strain caused by heavy hammer blows is eliminated. Screws are more expensive to use than nails, and require more time and effort to apply, but better results are obtained. The length of screws varies from 1/2" to 6" and there are many different diameters for each length. The diameter is stated in gage numbers. Unlike the nail, the smaller the gage number, the smaller the diameter of the screw. The flat head screw is the most widely used. It is so made that the head of the screw sets evenly with, or slightly below, the surface of the wood. A few screws, well placed, will produce a stronger joint than a large number, poorly placed. The length of the screw should be about twice the thickness of the first or top piece of wood. They should not, however, extend through the second piece of wood.

A screwdriver should be selected which fits snugly into the slot in the head of the screw.

##### (c) Bolts and washers

Bolts are used for sturdy constructions. It is necessary to drill a hole of the same size as the bolt through the connecting pieces of wood. The bolt is then held in place by a nut and washer.

##### (d) Hinges

The most common type of hinge is the butt type.

#### 5. Methods of joining wood

##### (a) Nailing and screwing

Nailing is a quick and cheap method of joining wood, but the nails can work loose and the nail heads can easily show. Screwing is more satisfactory, but it leaves the head of the screw showing unless a plug is used to hide it.

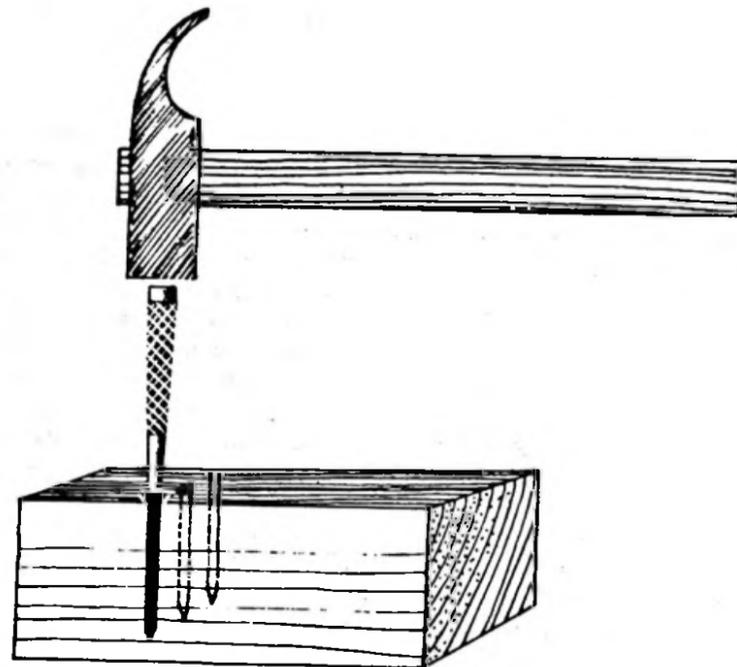


Fig. 43: Setting a nail with a nailset.

(b) Glueing

Glueing forms a secure bond when the bearing surface is adequate. Glues gives excellent results when side grain is against side grain, but not when end grain is against end grain. There are various types of glue, the most common types being the animal glue, casein glue and Weld Wood resin glue.

The animal glue is sold in flakes or granulated form (pearl glue). It must be soaked in water and heated in a double-boiler glue pot or other suitable container. It must be used while hot so that the glue will easily penetrate the pores of the wood. Casein glue and Weld Wood resin glue are available in powder form and have to be mixed with water. No more than is needed for the day should be mixed at any one time.

Before the glue is applied make sure that the surfaces to be glued together fit perfectly and are free from dirt or any other foreign matter. After applying a thin layer to both surfaces to be glued, the pieces should be held tightly together with suitable clamps. This should be done as quickly as possible, before the glue has started to congeal. Caution must be taken not to spread glue over the outside surfaces as it is difficult to remove and may stain the wood.

(c) Types of joints

Because many joints do not provide an adequate bearing surface, it is often necessary to use additional mechanical support to hold the sections together.

(i) The plain edge or plain butt joint

This joint is used on inexpensively constructed articles. One edge of wood is simply placed against another, and held in position by glue, nails or screws (Figure 46).

This joint pulls apart readily and offers no resistance to warping.

(ii) The mitre joint

The mitre joint is frequently used for square corner joinery. Two pieces of wood are cut at 45° angles and then held together by nails or glue (Figure 47).

(iii) Rabbeted joints

Rabbeted joints offer a little additional reinforcement over the plain butt joint since one piece of wood fits into the stairlike form of the adjoining piece, thus giving added bonding area. (Figure 48).

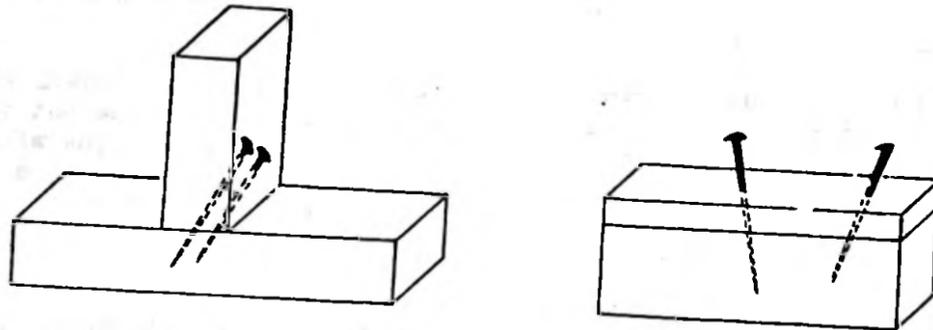


Fig. 44: Toenailing.

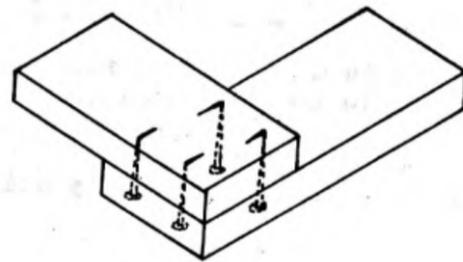


Fig. 45: Clinching nails across the grain.

(iv) The tongue and groove joint

This joint has a projection on one edge of the wood, and a matching groove or depression on the other. This joint is commonly used for drawer corners and for joining sections of solid wood panels laid side by side (Figure 49).

(v) Lap joints

In construction work it is frequently necessary to have two boards cross each other on the same plane so as to form an even surface. By cutting away the upper half of one board and the lower half of the other board at the point of intersection, and putting together the two lapped pieces, the upper and the lower surfaces become flush. It is important that all measurements be carefully made and that cutting lines be sharp and accurate. Caution must be taken not to make the cut too large, as this will result in a loose and sloppy joint.

There are different types of lap joints, such as the end lap joint where the ends of the wood are lapped over each other, and the crosslap joint, where the boards intersect between the centre and the end (Figure 50).

(vi) The dado joint

The dado joint consists of a groove that is the width of the edge of the board to be inserted. The board then fits in place to form a shelf (Figure 51).

(vii) Dowel joints

These consist of small holes drilled in each edge of the wood into which hard wood dowels (small pegs of wood) are inserted. Dowels may be used to join wood edge to edge, or to join legs to rails (Figure 52).

(viii) The mortise and tenon joint

This joint is made by cutting away wood to form a square or rectangular projection called a tenon which fits into a corresponding groove, known as a mortise, in the other piece of wood. This is a strong construction for joining table or chair legs to side rails, etc. (Figure 53).

- References:
1. Bedell and Gardner: Household Mechanics
  2. Douglass and Roberts: Units in Hand Woodworking
  3. Gillespie: Home Furnishings
  4. Shea and Wenger: Woodworking for Everybody
  5. The Museum of Modern Art: How to Make Objects of Wood
  6. University of Puerto Rico: Simple Home Mechanics.

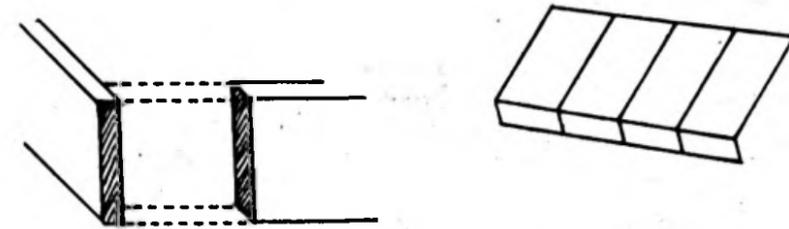


Fig. 46: Plainedge joint.

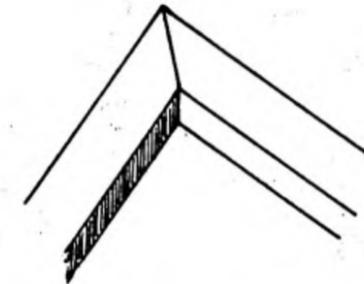


Fig. 47: Miter joint.

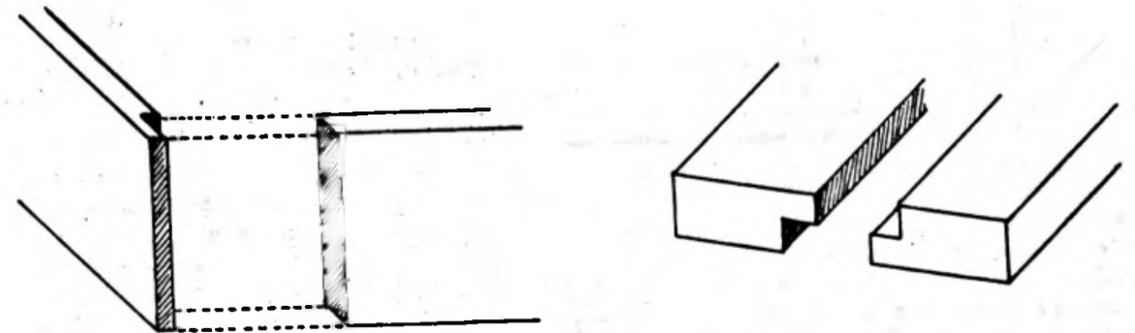


Fig. 48: Rabbeted joints.

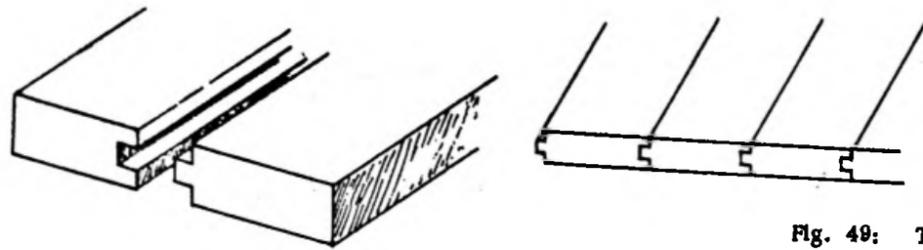


Fig. 49: Tongue and groove joint.

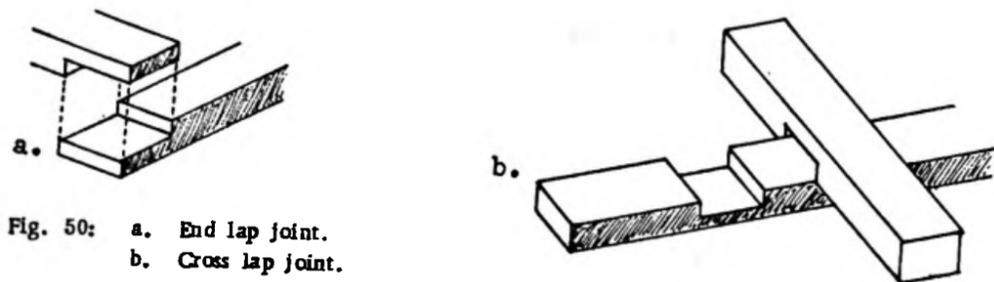


Fig. 50: a. End lap joint.  
b. Cross lap joint.

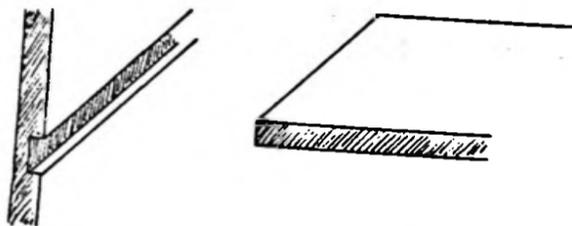


Fig. 51: Dado joint.

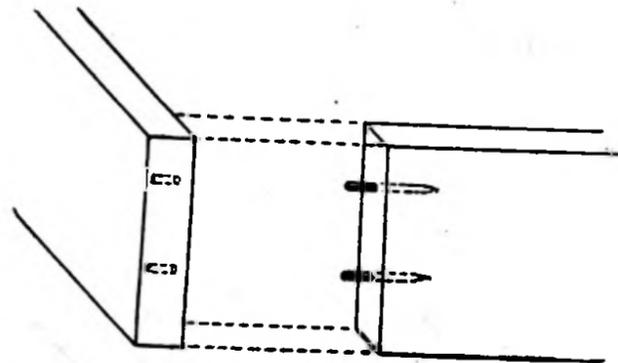


Fig. 52: Dowel joints.

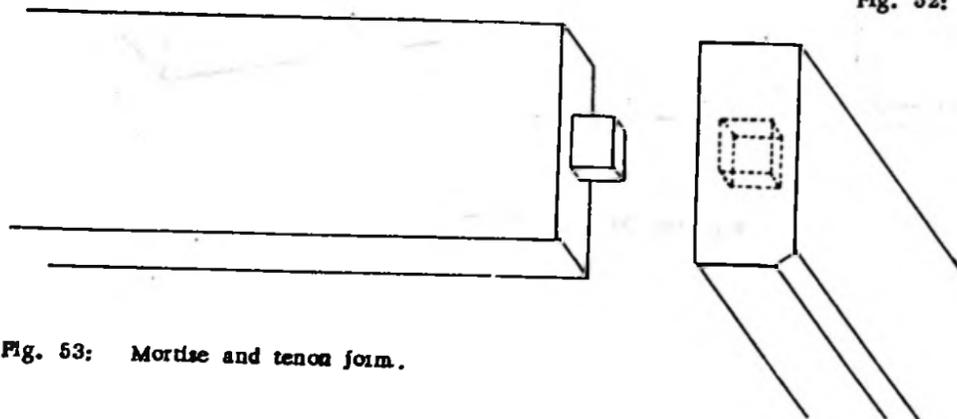


Fig. 53: Mortise and tenon joint.

CHAPTER VII

TEACHING THE SUBJECT OF HOUSING  
AND HOME IMPROVEMENT

The material in the foregoing chapters has been presented for the benefit of the teacher or other person working for the betterment of family living in the community. How he will use this knowledge will depend on the conditions and resources in the locality and the particular group with whom he works. This means that he must become familiar with the situation in that community. He should go throughout the area, noting the type of houses, the conditions of the surroundings, and the general housing situation. He should visit housing projects, if there are any, and talk with housing authorities about their programme and plans for improvement. The teacher will thus gather facts about the overall housing situation in the country, the various projects that are in operation, and the policies involved in regard to payment of rent and mortgages, lease or purchase of land, etc. The teacher should visit the homes of his students or other persons with whom he works, and see for himself the conditions and problems in individual homes. On the basis of these observations, he should plan his teaching programme with the view to helping effect needed improvements to the fullest extent possible. How he attacks the problem will depend on the group and its housing needs.

In this discussion let us assume that the teacher is working with adolescent girls in a school or home economics centre. For other groups the procedure would need to be adapted to suit the maturity, sex and problems of the individuals concerned.

The subject to be taught can properly be considered under three headings (1) Planning and building the house, or selecting one to rent; (2) Furnishing and equipping the house; and (3) Living in the house.

1. Planning a house to build or rent
  - a) Setting up a real family situation

It should be emphasised at the outset that teaching is not just telling. It is rather facing students with problems and leading them to think and work out solutions for themselves. The subject of housing may well be introduced by presenting the problem of a family typical of the locality. This might be a young couple, just married and about to set up house-keeping. This has the advantage, that a start can be made with the smallest house and the minimum of furnishings and equipment, and additions made to them as the family increases. The disadvantages are that it can justify starting with but one room, a procedure which is being discouraged, and that it requires more teaching time to have the family increase one by one and the house enlarged accordingly.

The approach may also be made through the problem of a larger family unit, faced with the need for a home, as for example, a family whose house has been destroyed in a hurricane and everything in it lost. The family should be given names and personalities. It might, for example, be described as that of a Mr. and Mrs. Jones and their five children, namely Harvey, aged 18; Jennie, aged 11; Ella, aged 9; John, aged 6 and a baby of 1½ years. A brother of Mr. Jones, Harry, aged 20, also lives with the family. Mr. Jones and his brother Harry both work at some occupation common in the locality and enjoy an average weekly income. Such a family presents all the problems of housing that need to be considered.

b) Shall the family build a house, or rent one?

This can lead to the discussion of the advantages and disadvantages of renting or building, the types of houses available, and their rental cost, and the possibility of building their own house through an aided self-help housing scheme. How far this discussion is carried will depend on the maturity of the students. With older youths and adults, it may be one of the most important aspects to emphasise. With younger children it may be touched on more lightly. Whether it is decided that the family will build or rent, the next question will naturally follow:

c) Where shall they build the house, or look for one to rent?

Under this topic all the important factors to be considered in deciding on a location, as presented in this text, can be elicited from the students through skilful questioning. They might even take a trip to find a location that meets the requirements. Since it will, however, be impossible for all families to find one that meets all the requirements, they could consider how to make the site that is available - as for example the one where the house that was destroyed had been - meet the requirements as nearly as possible. Having selected the site, their next step is:

d) How shall they plan the house?

This will raise first of all the question of what we do in the home for which a house must provide. Even young children will bring out the facts that we cook, eat and sleep in the house and sit and talk there with family and friends. This, in turn, raises the question of:

e) How many rooms and what rooms are needed for the Jones family?

The ideal that would probably first be arrived at would result in a nine room house, consisting of a kitchen, dining-room, living room and five bedrooms - one for the parents and baby and single ones for each of the other children and the father's brother. But it would at once be seen that the small resources of the family would not allow for so large a house. The students would then be faced with the problem of the minimum number of rooms in which the family could live in decency and reasonable comfort.

They would soon decide that there must be a kitchen, but that the family could eat in the living-room, or kitchen if it is large enough - thus saving one room.

Then the question of how they could sleep would arise. Discussions should bring out (1) the necessity of father and mother having a room to themselves - except for the baby; (2) the need for separation of the sexes in sleeping. The students could then be given the task of planning where the various members could sleep. They could draw rough plans of the house and work out the sleeping arrangements for the eight persons. They would, of necessity, arrive at a two-bedroom house with a living-dining room and kitchen, as described in this text, and could discuss the question of which members should have the bedrooms, and which sleep in the living room and the reasons therefor.

f) Size and arrangement of rooms

Having decided on the number of rooms, they could then consider the size of the rooms, the relation of the rooms to each other, whether the kitchen should be part of the house or a building apart, the location of doors and windows and other problems in the arrangement. The students could draw floor plans showing how they would arrange the rooms. These could be discussed, and the one that seems the best arrangement chosen. Then the group together could make a fairly large plan or model of the house, which they could use for further planning and furnishing. A miniature house could be made of corrugated board or other heavy material allowing one inch to represent one foot (or larger if space allows). The walls should have openings for windows and doors, and a roof that is hinged or removable so that the inside of the house can be seen and worked in from above.

g) Planning storage space

The students could then discuss the need for storage space for equipment and personal belongings, and for a place to wash and bathe, and put them into their model house. The need for water might lead them to decide to put gutters on the roof to catch rain water, and to make a tank to collect it. The necessity of providing a latrine, its location, and how it is built to be animal and insect proof could be fully considered, and if possible, a trip made to see a good one, or one in process of construction.

The purpose of these discussions is to awaken a consciousness of the importance of proper housing among the students and their parents. Having become home-conscious, the family might become willing to allocate a more appropriate share of the income to the house, or the family might be able to extend the house or make certain improvements.

How much is taught about materials used and other details of construction will depend on the group, but it should include at least the necessity for a good foundation, a smooth floor without cracks, a sound

roof, preferably with some slope to shed water, and good strong walls. How these are effected will depend on resources and customs in the locality.

## 2. Furnishing and equipping the house

### a) What furnishings are essential?

With the house built, the next problem would be to furnish it. Presented with the limited income of the family, the students could discuss the minimum number of things needed for decent living. They might start with the needs for the bedrooms and living-dining room, leaving the kitchen for a separate topic later. What do the family need for sleeping? This discussion will bring out the facts: the father and mother may prefer a double bed; that the baby should have a separate bed and the reasons why; and that each of the others should sleep alone.

For the living-dining room, through discussion, the students would arrive at the minimum needs of a table large enough for all the family to eat together, and chairs or other seats for all to sit down at once. This would lead to a discussion of the importance of these in promoting good family relations.

### b) What do they cost if bought?

The minimum list of furnishings for sleeping, and the living-dining room then would be: 1 double bed, 1 baby bed, 5 single beds, 1 large table, and 8 chairs or other seats. One mirror should also be included. With this list the students should visit a store and find the prices at which the articles could be purchased. This would furnish opportunity to discuss quality and standards in selecting the various items.

### c) What can the family do if they have not enough money to buy all of them?

When the total cost is arrived at it will be found to be more than the family can buy at once. What can the parents (or members of the family) do? Shall they buy on the instalment plan? If not, why not? Can they get along without some items. Hardly, as they were chosen as the bare minimum. Could they make or improvise some items? Yes. Here the ideas for making the various items described in Chapter VIII - Plans and Descriptions of Home Improvement Projects should be presented. The students might decide to buy a double bed for the parents and the mirror, and to make the rest, namely: a baby bed, a nest of 3 beds, two canvas cots, a space-saving table, a bench to seat 3 persons, 2 or 3 stools, and 2 or 3 chairs. Models of these made to scale could be put into the cardboard house to show size and arrangement (See Figure 54). These miniatures can be made from cardboard or any other sturdy paper. As it is only the size and not the design that matters, it is easiest to make the beds in the shape of a box, in the case of the nest of beds with the front side open; cupboard and stools can be made after the same pattern.

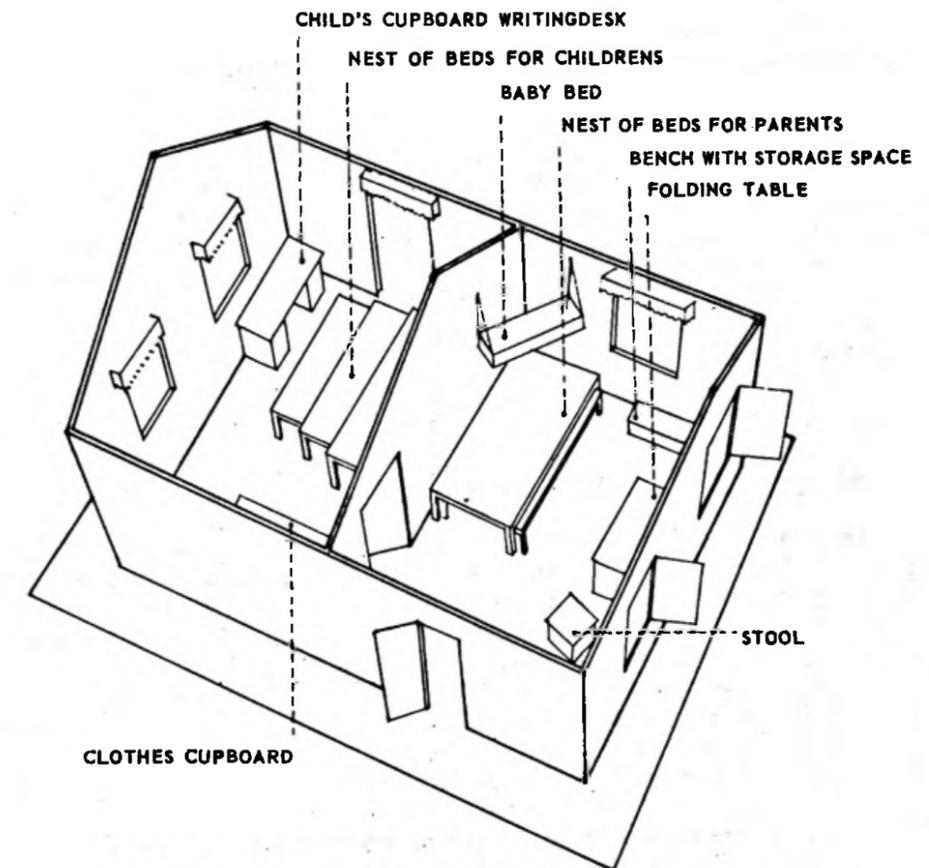


Fig. 54: Miniature house with furnishings made to scale.

The students could also make as many of the items as time, resources and the number of students permit. Members of the class might take the roles of the different members of the Jones family, and decide who is to make the various items. For example, father might make the table, his brother Harry the nest of beds and the children the single beds, benches and stools. Two or more students might represent each family member to facilitate the work. If the teacher has more than one group of students, all groups could participate in making the items.

d) Needs of the kitchen

In a similar manner the needs of the kitchen should be discussed, and the cost of the various items, if purchased, obtained. Then the items that could be made or improvised would be decided upon. As many as possible of these could be made by the students and the ones that need to be purchased assembled with them to show the total kitchen equipment. Wherever it is possible to undertake some practical improvement project, this should preferably be done in cooperation with the woodwork or manual training class. A start may be made with the making of some simple items, and, as more skill is acquired, more difficult ones may be undertaken.

e) Practical work in making and using furnishings

In planning these projects a typical home should be kept in mind. The size of the house could be drawn upon the floor of the schoolroom or out in the yard. The size of the essential furnishings can be drawn on newspaper or old wrapping paper and placed within the boundaries of the "house" or lines may be drawn with chalk showing the size of the furnishings. By letting the students move about inside the "house" they will find out if it is possible to reach the windows, get to the clothes in the closets and see that nothing is blocking the passageway between doors, that there is necessary space available for the furnishings, etc.

When all furnishings and equipment for the house are completed, they should be arranged within the marked space. Better still, of course, would be to arrange the furnishings in a house similar to the one planned, if this were possible. In either case parents and others can be invited to visit the set-up, and the students given the opportunity to explain why and how the things were made and their cost as compared with the same items if purchased.

These activities will emphasise the need for proper planning before buying. Having had the experience of planning for a growing family while at school, the students will, when later on in life they are faced with the real problem of furnishing a home, remember and benefit from the experience.

The purpose of this programme is, of course, to inspire the students, their parents and others to apply the teachings to the improvement of their own homes. This should be kept in mind throughout the programme and students encouraged to undertake home projects and to enlist the interest

and aid of their parents in trying to make their own homes meet, as nearly as possible, the standards set up in their discussions. The items of furniture made by individuals in the class can be ones they need at home, and they should be allowed to take them home after they have served their purpose in the exhibition. It would be expected that parents and other adults who see the exhibition would be stimulated to make things for their own homes. Facilities at the school or centre might be made available for them to use, and perhaps work groups or classes formed for which the teacher might offer his services as the leader or instructor.

3. Living in the house; housekeeping

With the house built and furnished the next consideration is how to make the house into a home. This logically introduces all the aspects of family life, feeding and clothing the family, their recreation and social life, the care and guidance of children; the relationships of family members; and the work of the house or housekeeping. The last is the aspect which will be considered in this booklet. The others will be treated in independent texts. The part that good housekeeping plays in helping to foster wholesome family life should, however, be emphasised in this section whenever appropriate.

a) Methods of approach to the topic

One method of approach in this matter of good housekeeping is to raise the question of what makes a house seem inviting and attractive, and a pleasant place in which to be. The situation might be presented to the students by a question like: Have you ever gone to a home where you felt at once as if it were a place where you would like to stay? What was there about the place that made you feel that way? This discussion could bring out the points that (1) the first essential in making an inviting home is that it be clean and orderly, not only in the living room and front of the house, but especially in the bedrooms, kitchen and back yard (2) that the furniture, pictures and other effects be pleasingly arranged and (3) that a splash of colour in a seatcover, cushion, curtain or a bouquet of flowers or bright-coloured leaves will add to the attractiveness.

b) Work involved in running a home

Then will follow the question of the work involved in running a house and making it clean, attractive and a place where the family can live comfortably, healthily and happily. The students may be asked to list the tasks that housekeeping involves, as:

1) Feeding the family:

Buying of food or securing it from the garden;  
Preparing and cooking the food;  
Setting the table and serving the meal;  
Clearing the table, washing the dishes, putting them away;  
Disposing of garbage.

ii) Cleaning and tidying the house and surroundings:

Daily and weekly care of the living-dining room;  
Care of bedroom; making the bed; tidying the room; weekly cleaning;  
Cleaning of the kitchen, the yard and surroundings; and so on for other household activities.

Confronted with the many tasks that housekeeping involves, leads to the question as to how they can be done most effectively with the least expenditure of time and effort, so that all members may have free time to read, play and enjoy life. This will call for consideration of:

- i) Arrangement of kitchen and equipment and planning of work routines to save steps, time and energy;
  - ii) Sharing of tasks by all family members according to their ability and time available from work or school responsibilities;
  - iii) Methods of doing the various household tasks efficiently and well; how to clean floors, make beds, wash dishes, do the laundry and other routine work.
- c) Sharing of work by family members

When the question of sharing responsibilities comes up for consideration, a panel representing a council of the various family members might be given the problem for discussion, as one hopes it might be done in a real family. Faced with the list of all the tasks that need to be done daily, weekly or occasionally, they could consider how the tasks could be apportioned among the various members. They might, for example, decide that all members should be responsible for keeping their own belongings in order - for example, by hanging up clothes, putting away books or toys; making their own beds, or helping with it in the case of the youngest; and carrying their own dishes to the kitchen after meals. Other tasks would be apportioned according to ability and time available. Even the 6-year old can have special responsibilities. She can help her older sister to make her bed, dust some of the furniture, bring in wood, and do other light tasks. Naturally the housewife will still carry the main load of housekeeping as it is her full-time job, while for the others it is an extra one in a working or school day. Nevertheless, if each member is responsible for certain daily and weekly tasks, it will greatly lighten the workload of the housewife, make a smoother running, more orderly and inviting home, and develop a family feeling through sharing in the making of the home.

d) Practical work

Practical work in the classroom or centre can teach the students how to do the various tasks efficiently and well. They should learn by doing how to clean floors, make a bed, tidy the room, set a table, wash dishes and do other types of work. They should be encouraged to go home and do the tasks similarly in their own homes.

The test of the effectiveness of the teaching of better housing and home improvement is the extent to which it carries over into the homes. The teacher should, therefore, visit the homes of the students regularly, encouraging them to apply what they learn. These home visits will also help the teacher to judge the effectiveness of his teaching.

Not only in regular home economics classes can the subject of housing be taught. Certain aspects of housing can well be integrated with other subjects in the school curricula. The drawing of floor plans, the cutting out of furniture according to scale, or the making of miniature houses and furniture requires careful measuring and calculations, and may be one way of putting arithmetic into practice. Classes in woodwork are excellent channels for the improvement of the homes of the pupils provided the instructor is interested and has an understanding of the actual needs of the homes.

In this chapter the teaching of housing to the adolescent, and, through him, to his parents has been considered. The subject of housing and home improvement is of such great importance that it could well fit into any adult education programme.

4. Application to adult groups

In an adult group consideration should be given to the effects of unsatisfactory housing conditions such as overcrowding, children sleeping with adults, sick people sleeping in the same room as others, and children sleeping unprotected on the floor. Not only the physical health, but also the mental health of the family should be considered; the lack of privacy and opportunity for undisturbed work and rest which may be the cause of irritability on the part of the parents towards their children, of husband towards wife and vice versa. The effect of unsatisfactory housing conditions on the moral health of the family should also be considered. There may well be a relationship between the absence of privacy with no segregation of sexes and generations, and the pattern of sexual behaviour on the part of many children, who are apt to imitate the behaviour pattern of the grown-ups.

It is not only the economic conditions of the family which determine the standard of the home. The careful planning of the house and its furnishings is necessary to ensure a maximum benefit from it. But planning is not the end; we have to live in the house in accordance with the plans. Superstition and false standards as to what is essential and non-essential influence the use and the furnishing of many houses. Only through proper education can such a situation be changed for the benefit of each member of the family and the community to which he belongs.

USE OF CUT-OUT FURNITURE \*

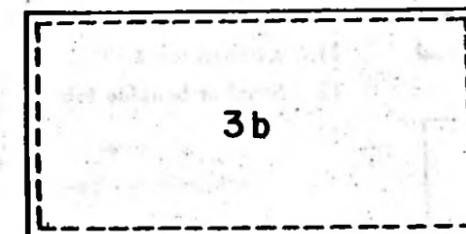
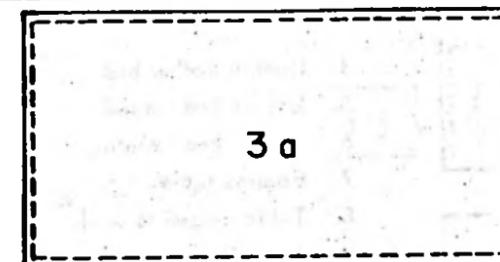
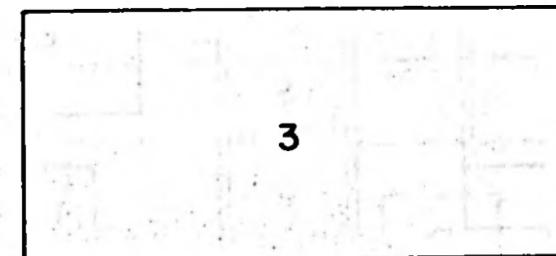
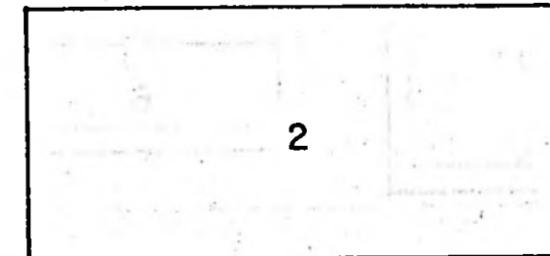
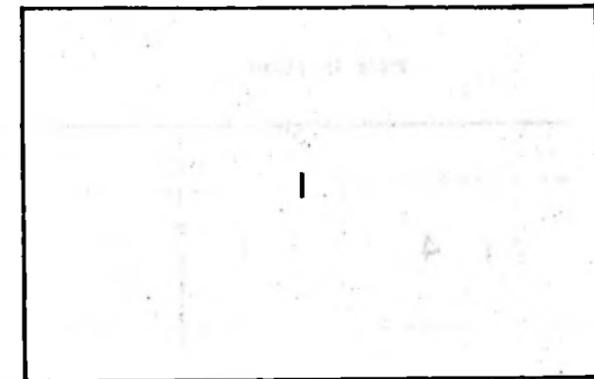
The cut-out furniture on the following pages (Plate 1) can be used with floor-plans (Plates 3 and 4) in the same scale  $\frac{1}{2}'' - 1'$ , in showing how to arrange the various pieces of furniture in a particular room or rooms.

Make a copy of the cut-out furniture that you want to choose for your house. Cut them out and place them on the floor-plan as shown on page 133.

If you want to draw an actual floor-plan of a particular house, measure the walls and draw an outline in the scale  $\frac{1}{2}'' - 1'$ . Measure the size of windows and doors and the distance between them and the wall corners. Mark the size and location of windows and doors on the plan.

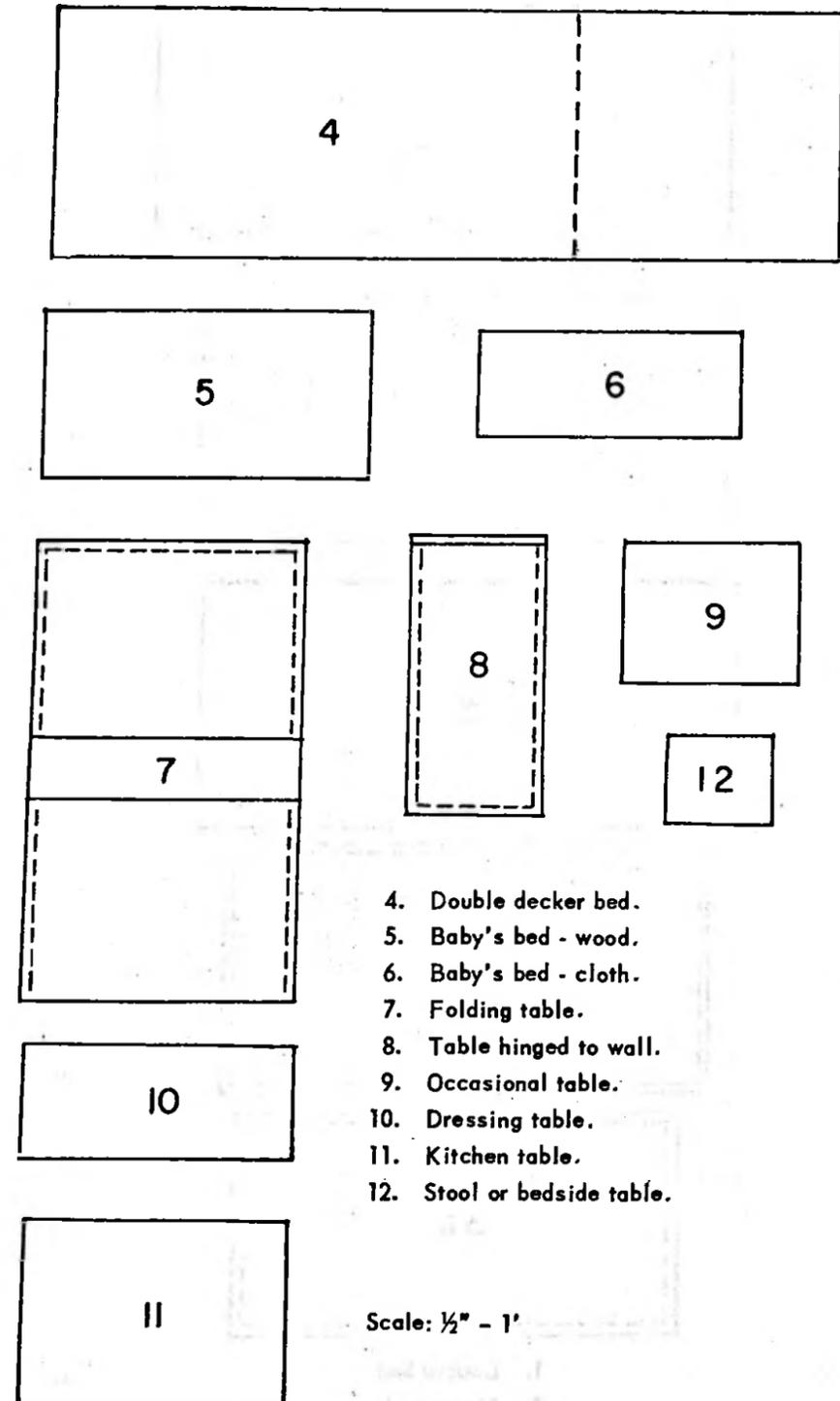
\* Plates 1, 2, 3 and 4 are reproduced on pages 128 - 135 for easy reference. The full size plates to be used in practical work are in the pocket at the end of the book.

Plate 1: Cut out Furniture - Scale:  $\frac{1}{2}'' - 1'$



- 1. Double bed.
- 2. Single bed.
- 3. Nest of beds.

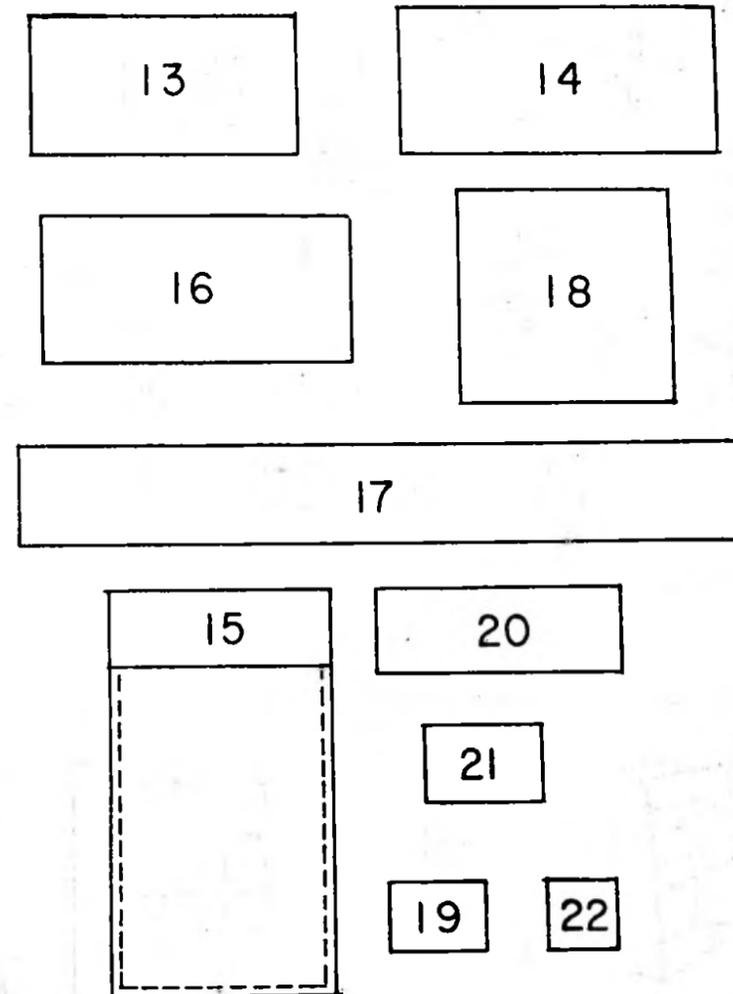
Plate 1: (Contd.)



- 4. Double decker bed.
- 5. Baby's bed - wood.
- 6. Baby's bed - cloth.
- 7. Folding table.
- 8. Table hinged to wall.
- 9. Occasional table.
- 10. Dressing table.
- 11. Kitchen table.
- 12. Stool or bedside table.

Scale: 1/2" = 1'

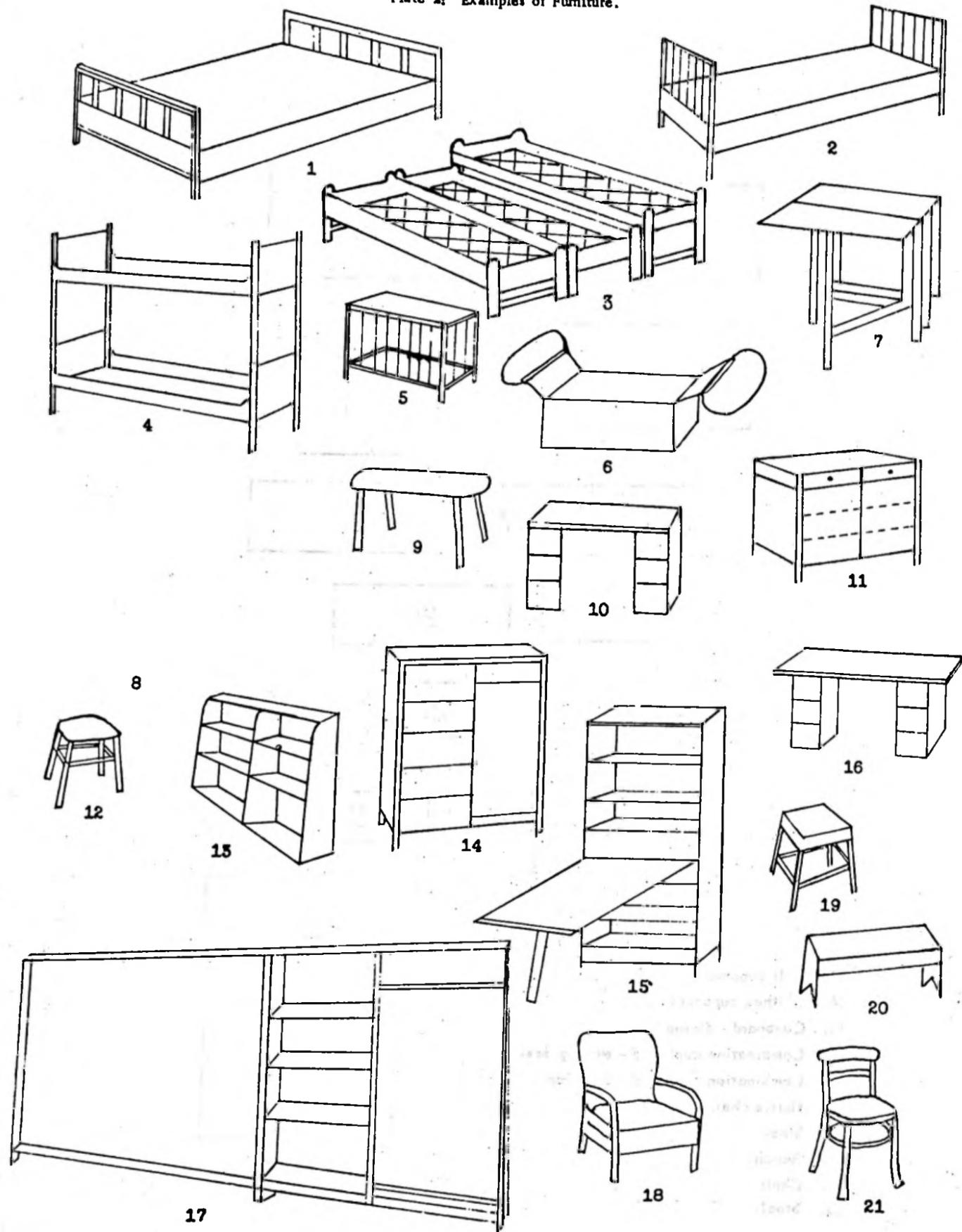
Plate 1: (Contd.)



- 13. Wall cupboard.
- 14. Clothes cupboard.
- 15. Cupboard - dining table.
- 16. Combination cupboard - writing desk.
- 17. Combination cupboard - partition.
- 18. Morris chair.
- 19. Stool.
- 20. Bench.
- 21. Chair.
- 22. Stool.

Scale: 1/2" = 1'

Plate 2: Examples of Furniture.



List of Furnishings and their Approximate Need of Floor Space\*

1.	Double bed	48" x 78"
2.	Single bed	32" x 72"
3.	Nest of beds	32" x 72"
		32" x 65"
		30" x 58"
4.	Double decker bed	32" x 72"
5.	Baby bed - wood	23" x 43"
6.	Baby bed - cloth	15" x 36"
7.	Folding table (Expanded)	36" x 60"
8.	Table hinged to wall	18" x 36"
9.	Occasional table	18" x 24"
10.	Dressing table	12 - 15" x 36"
11.	Kitchen table-storage-cupboard	24" x 36"
12.	Stool or bedside table	12" x 14"
13.	Wall cupboard	18" x 36"
14.	Clothes cupboard	18" x 42"
15.	Cupboard-dining-table (expanded)	30" x 57"
16.	Combination cupboard writing desk	18" x 42"
17.	Combination cupboard partition	12" x 96"
18.	Morris Chair	26" x 28"
19.	Stool	10" x 12"
20.	Bench	10" x 32"
21.	Chair	10" x 14"

\* See Plate 2

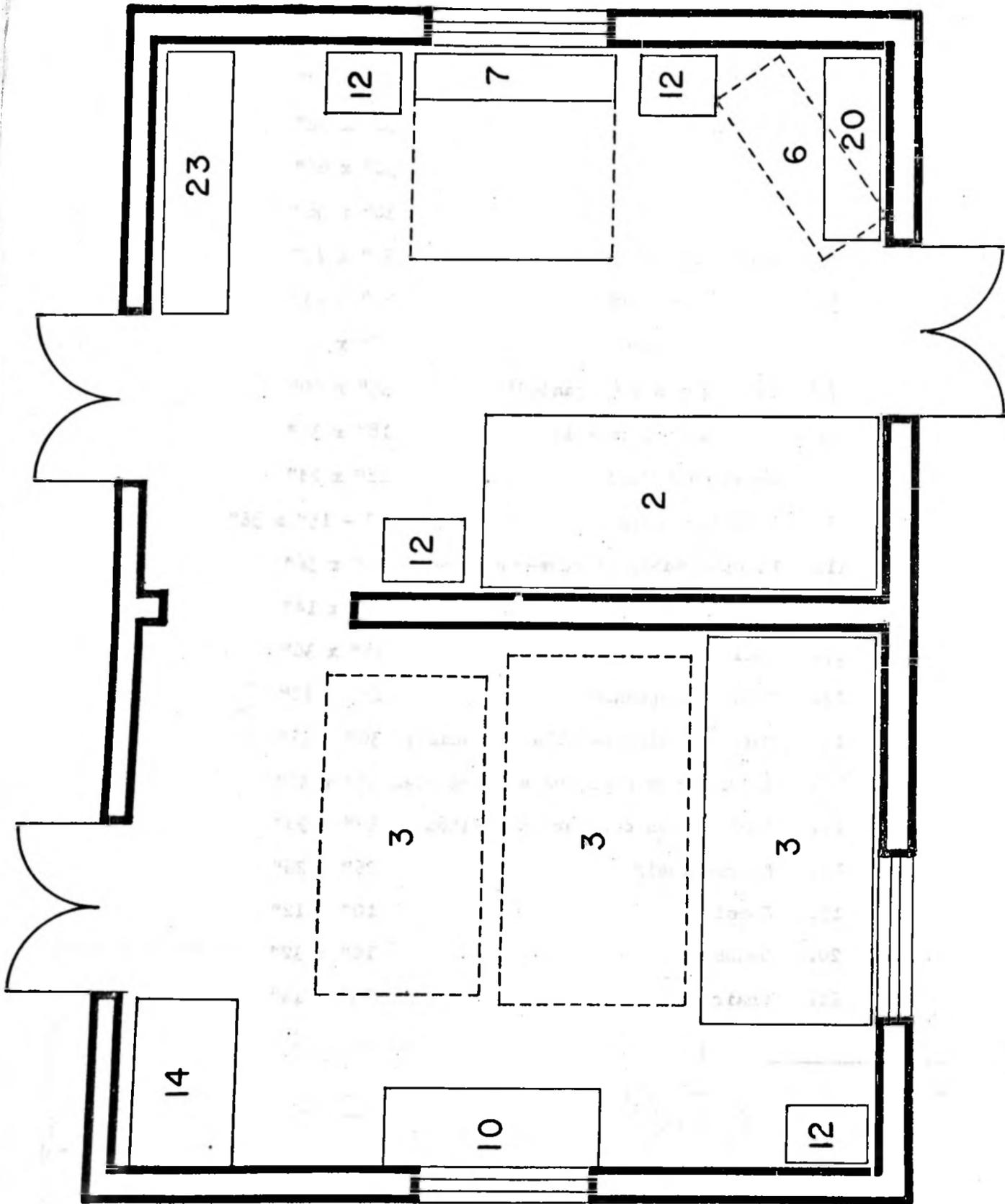


Plate 3: 2-room house.

Scale: 1/2" = 1'

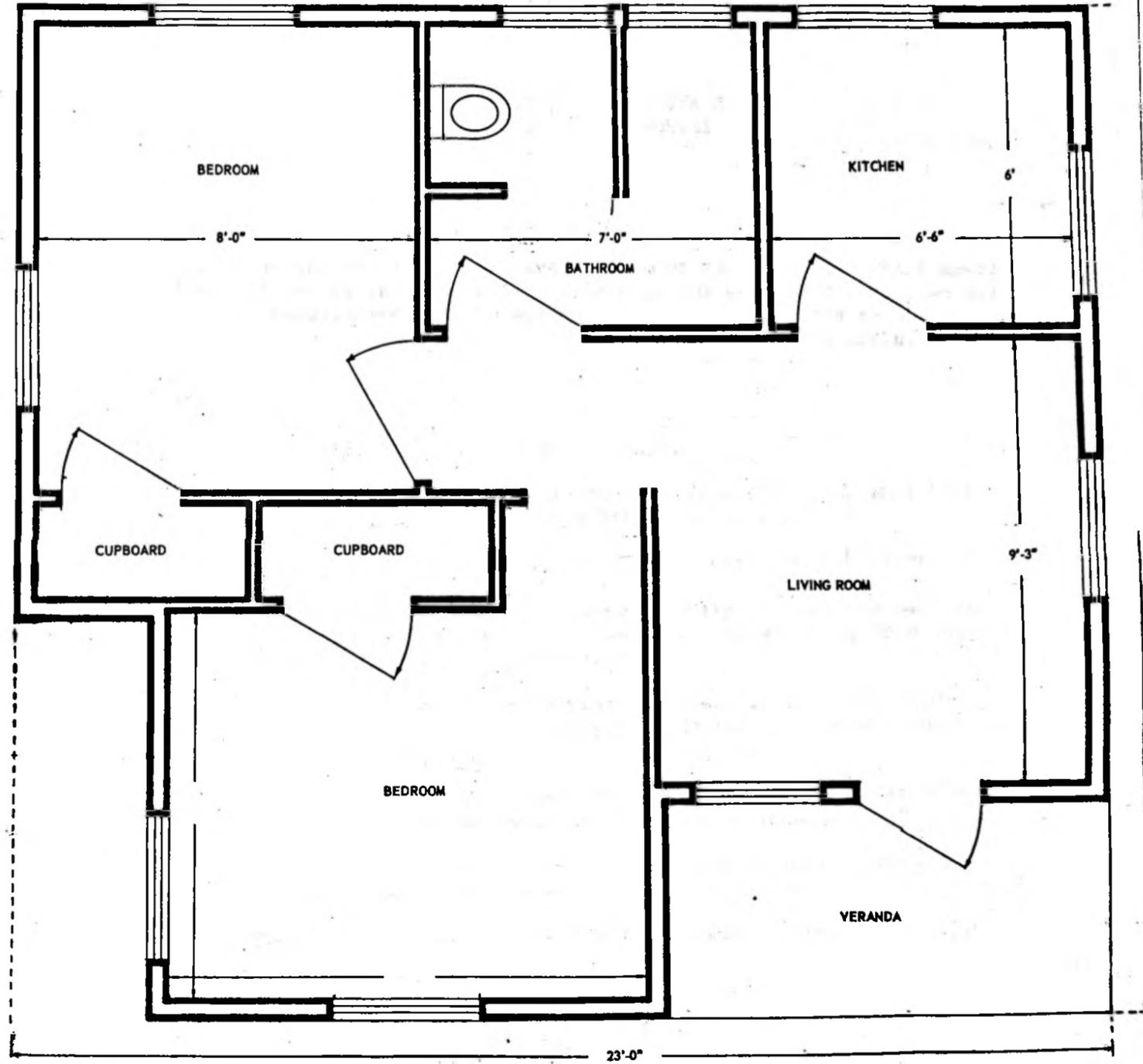


Plate 4: 3-room house.

CHAPTER VIII

PLANS AND DESCRIPTIONS OF HOME  
IMPROVEMENT PROJECTS

The present chapter contains drawings and descriptions of some items that could possibly be made by even the unskilled person with the help of a few tools and with inexpensive material at his disposal. For the more skilled worker, two drawings of more complicated items are included. (Diagrams 9 and 11).

1. Baby's bed

Materials:

2 lengths of board 1" x 1" x 36"  
2 lengths of board 1" x 1" x 15"  
2 round wooden rods 17" long

2 yards strong cord  
2 flour bags  
Nails 3/4" and 1/2" long

Tools:

Ruler  
Pencil  
Try square  
Saw  
Hammer  
Chisel

Sandpaper  
Scissors  
Sewing machine  
Needle  
Plane

Method of making the bed:

1. Cut 2 pieces of flour bag 36" x 15".
2. Join both pieces along the width using a flat fell seam thus getting one long strip 72" x 15" (Diagram 1 (a)).\*
3. Cut 2 pieces 36" x 15" for the sides. (Diagram 1 (b)).\*\*
4. Find the centre of the 72" piece of material and the centres of the two 36" pieces. Pin them together starting from the centres and working away from them.
5. Machine stitch, making a flat fell seam around the three sides. By so doing, the shape of the bed will be obtained. (See Diagram 1).
6. Reinforce the ends of the 72" piece with a 6" piece of material. Stitch it to each end forming a 2" wide hem.
7. Insert the prepared rods which should each have 2 grooves one inch away from each end.
8. Tie cord to groove to the desired length. (See Diagram 1).

Method of making the bed frame:

In order to keep the bed open, a wooden frame is placed in the bottom.

1. Cut strips of wood to the correct lengths.
2. Join the strips using end lap joint. (See description on page 133).

\* If the flour bag is more than 36" long, the long strip may be more than 72", allowing a deep hem at the end.

\*\* These strips must be exactly 36" long.

3. Apply a little glue on the joints before nailing them together.
4. Sandpaper to make a neat finish.
5. Cover the frame with a piece of discarded cloth.
6. Place the frame in the bottom of the bed which is now ready to be hung in a corner of the room.

1. Baby's bed.

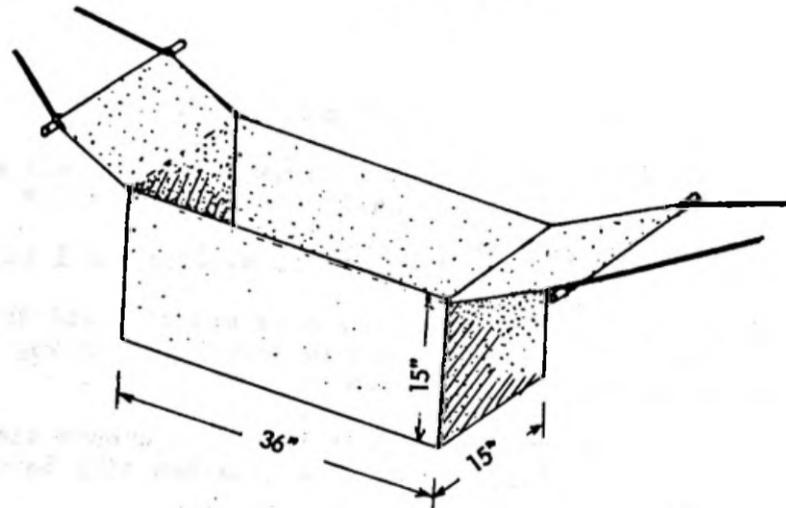


Diagram 1

**Notes:** Drawing and descriptions for making Baby's Bed from "Simple Home Mechanics", University of Puerto Rico, 1953.

(Baby's bed)

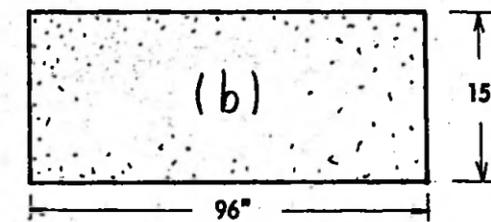
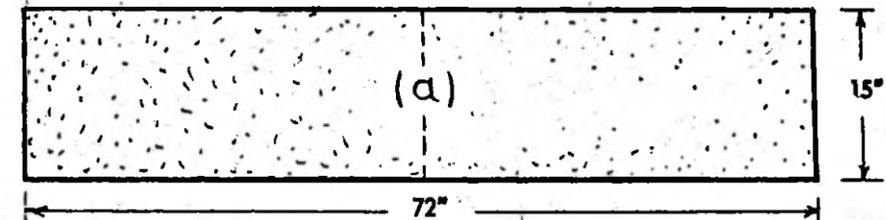


Diagram 1(a) and 1(b)

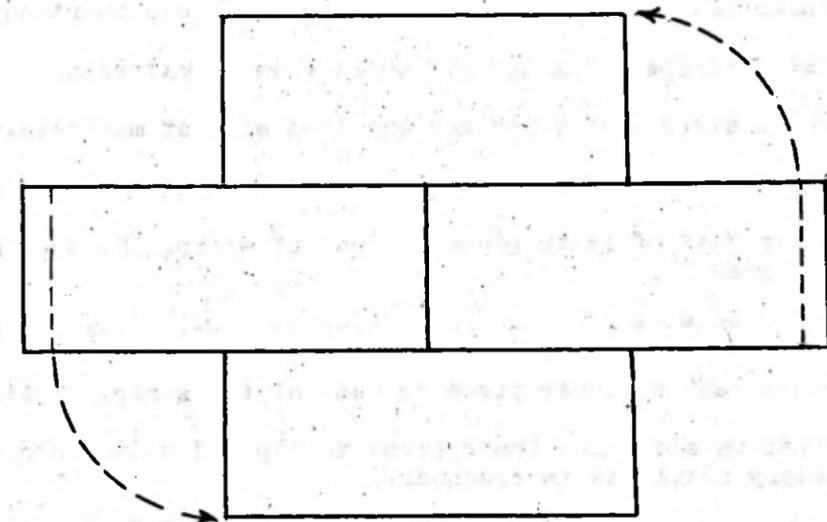


Diagram 1(c)

2. Mattress for Baby's bed

Materials:

2 flour bags  
thread

cotton tape  
stuffing such as coir or  
straw

Tools:

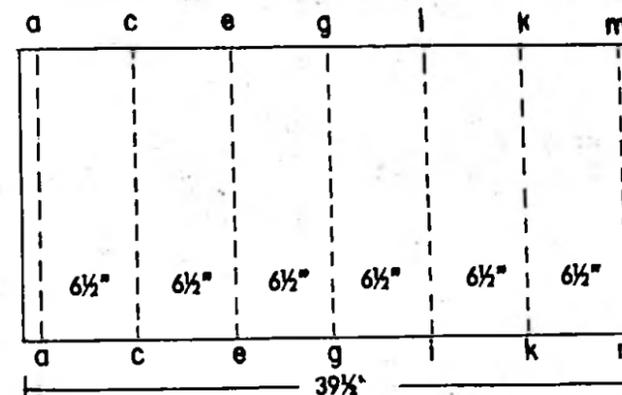
Ruler  
Pencil  
Needle  
Pins

Sewing machine  
Scissors  
Thimble

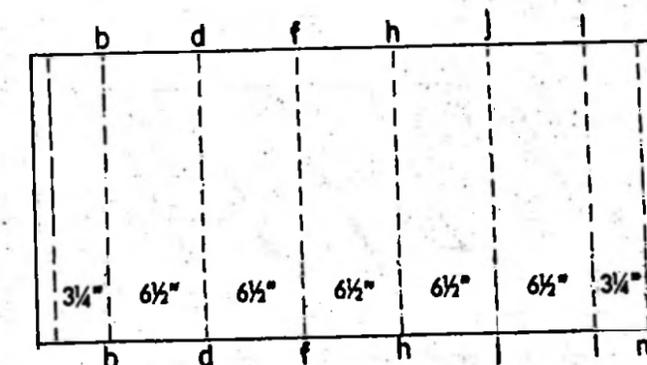
Directions:

1. Cut one flour bag into 2 strips, each one  $39\frac{1}{2}$ " x 16" (Thus allowing  $\frac{1}{2}$ " for the seams).
2. Mark one strip into 6 parts, each one  $6\frac{1}{2}$ " wide, allowing  $1/4$ " for the seams at both ends. This is for top of the mattress.
3. Mark the other strip into 7 parts, as follows: the two end parts  $3\frac{1}{4}$ " each allowance for seam; the other 5 parts  $6\frac{1}{2}$ " each. This is for the bottom of mattress.
4. Cut the other flour bag into strips 16" wide. Stitch together two strips to obtain a strip 54" long.
5. Mark this long strip into 12 parts each  $4\frac{1}{2}$ " wide. This is the inner piece that divides the mattress into compartments.
6. Cut 2 strips 16" x  $3\frac{1}{2}$ " for short side of mattress.
7. Cut 1 strip  $39\frac{1}{2}$ " x  $3\frac{1}{2}$ " for one long side of mattress.
8. Cut 1 strip  $39\frac{1}{2}$ " x 7" for the other long side of mattress.
9. Baste "aa" of inner piece to "aa" of strip. Stitch on machine. (Diagram 2).
10. Baste "bb" of inner piece to "bb" of bottom strip. Stitch.
11. Baste "cc" of inner piece to "cc" of top strip. Stitch.
12. Continue attaching inner piece to top and bottom strips alternately until end is reached.

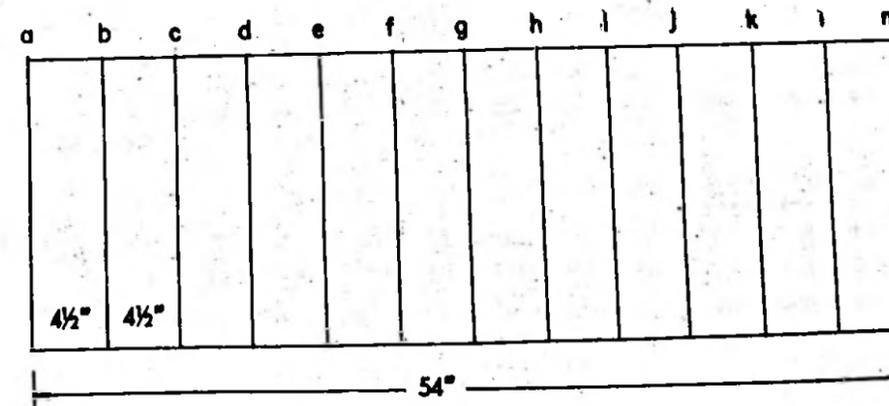
2. Mattress for baby's bed.



Top strip



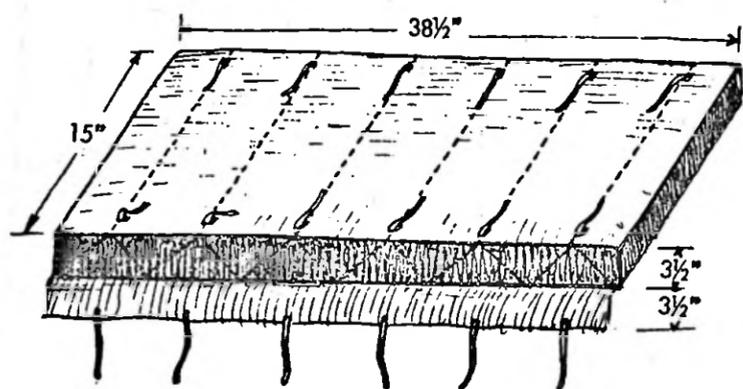
Bottom strip



Inner piece

Diagram 2

13. Baste strips 16" x 3 1/2" to the end of mattress. Stitch.
14. Baste strip 39 1/2" x 3 1/2" to one long end. Stitch.
15. Baste one side of strip 39 1/2" x 7" to one side of other long end. Stitch.
16. Turn other side of strip to a 1 1/2" deep hem that will overlap the bottom front of the mattress, thus protecting the filling. Stitch.
17. Cut 6 pairs of 6" long cotton tape.
18. Stitch tape on to front and bottom of mattress at equal distances apart. (See Diagram 2 (a)).



Mattress showing sections.

Diagram 2 (a)

Note: It is easier to obtain a nice finish of the mattress if all the selvages are on the open side of the mattress.

### 3. Nest of Beds

#### Materials: Wood

- |              |                                 |
|--------------|---------------------------------|
| Largest bed: | 2 boards 1" x 3" x 72"          |
|              | 2 boards 1" x 3" x 32"          |
|              | 2 boards 1" x 3" x 32" (braces) |
|              | 4 boards 2" x 2" x 20" (legs)   |
| Medium bed:  | 2 boards 1" x 3" x 65"          |
|              | 2 boards 1" x 3" x 32"          |
|              | 2 boards 1" x 3" x 32" (braces) |
|              | 4 boards 2" x 2" x 15" (legs)   |
| Small bed:   | 2 boards 1" x 3" x 58"          |
|              | 2 boards 1" x 3" x 30"          |
|              | 4 boards 2" x 2" x 10" (legs)   |

Screws: 2" - 6 dozen, or bolts and washers - 4 dozen

Nails: 1" - 1 1/2" - 1/2 pound

Aluminum paint

Bailing wire or burlap

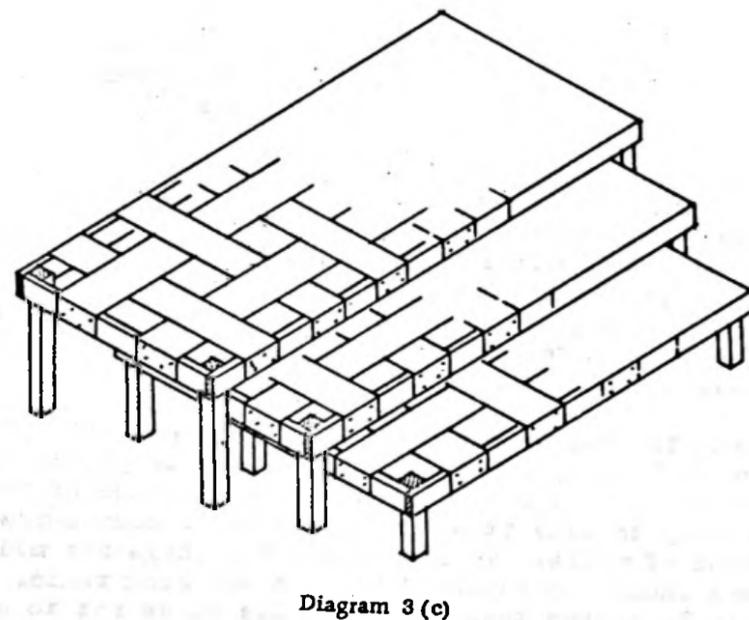
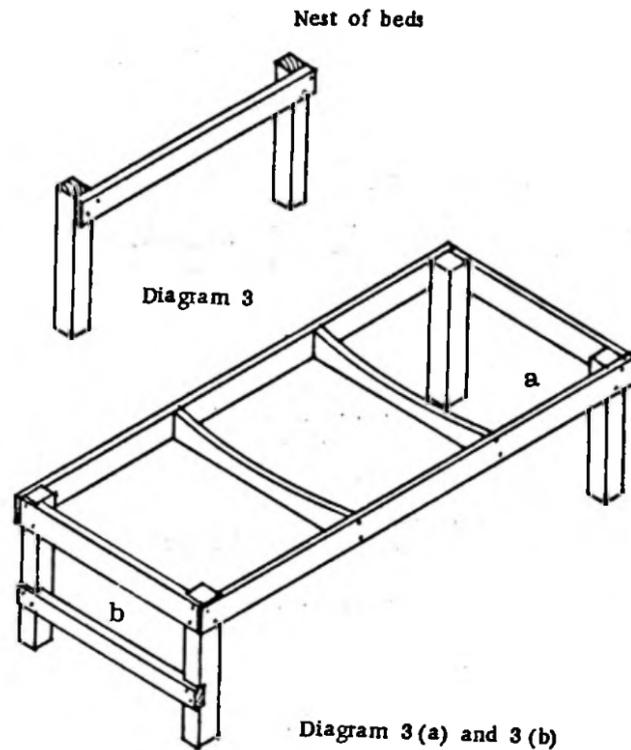
#### Tools:

Saw  
Hammer  
Plane

Brace and bit  
Screw driver  
Square

#### Method of making the bed:

1. Cut two long rails 1" x 3" x 72"
2. Cut two short rails 1" x 3" x 32"
3. Cut four legs 20" long
4. Connect two legs to the ends of the rail 32" long and the other two legs to the other rail 32" long using screws or bolts and washers. (Diagram 3).
5. Connect the two prepared sides of the bed with 72" long rails as shown in Diagram 3 (a). The frame may be joined by half-lap joints which not only improve the appearance of the frame but also help to make it stronger, in which case screws must be used instead of nails. To strengthen the large and medium bed two braces should be inserted between the long rails. The braces should be curved towards the middle so as not to cause discomfort.



Where the strength of the wood and of the connection made by the screws fastening the frame to the legs is doubtful, the bed may be strengthened by a brace on the legs across the two ends of the bed as shown in Diagram 3 (b).

6. Proceed in the same way with the second and third beds.
7. Springs can be made out of different, often discarded materials, such as bailing wire (steel bands that come round big boxes and crates), burlap (sack) or canvas.

The bailing wire closely woven together makes a very strong spring for the larger beds. The burlap cut into strips 8" wide and folded to make strips 2-3/4" wide, also woven together makes a good spring for the smaller bed. It is soft enough to make a mattress unnecessary.

Bailing Spring

Materials:

Strips of bailing preferably 1" wide  
Nails 1"  
Aluminum paint

Tools:

Pliers	Shears
Hammer	Paintbrush
Saw	

Method:

1. Straighten and cut 13 strips of bailing 76" x 1", and likewise 36 strips 36" x 1".
2. Nail the long strips to one end of the bed frame.
3. Stretch with pliers and nail to the other end, leaving the nails half way out.
4. Weave in the short strips and then nail tightly at both ends.
5. If necessary pull the long strips with pliers, then nail firmly.
6. Protect the sharp ends by covering with strips of bailing.
7. Apply a coat of aluminum paint on both sides of "spring".\*

\* Notes: If the bailing wire is corroded rub with emery paper, then clean it with kerosene oil. Wipe off before applying paint.

4. Folding Table

(3 x 5 feet)

Materials: Wood

- 2 boards 1" x 6-3/4" x 28" for sides
- 4 boards 1" x 2" x 32" for connecting bars
- 2 boards 2" x 2" x 8 1/2" for feet
- 4 boards 1" x 2" x 23" for gate legs
- 2 boards 1" x 2" x 29" for gate legs (uprights)
- 1 board 1" x 8" x 36" for centre top
- 2 boards 1" x 1" x 8" for fastening centre top to sides
- 2 boards 1" x 26" x 36" for drop leaves
- 4 boards 1" x 1" x 24" for table top edge

Other:

- 4 pairs of hinges 1 1/2" Sandpaper
- 32 screws 1 1/8" for hinges 1" Polish
- 8 screws 1 1/8" for fastening centre tops to sides
- Nails - headless - one dozen
- Nails 1" - 1/4 lb.
- Glue

Tools:

- Plane Gauge
- Saw Clamp
- Hammer Screwdriver
- Square Chisel and mallet

Instructions:

1. Cut the wood in the correct lengths.
2. Plane the wood.
3. Prepare the legs for the table side. Make a groove 1" deep and 6-3/4" wide, with the help of a chisel and mallet.
4. Fit the sides of the table into the mortise in the feet.
5. Cut two holes in each side piece for the connecting bars 2" above the feet and cut two holes 2" from the top.
6. Insert the connecting bars in the mortise and make sure that the bars fit tightly.

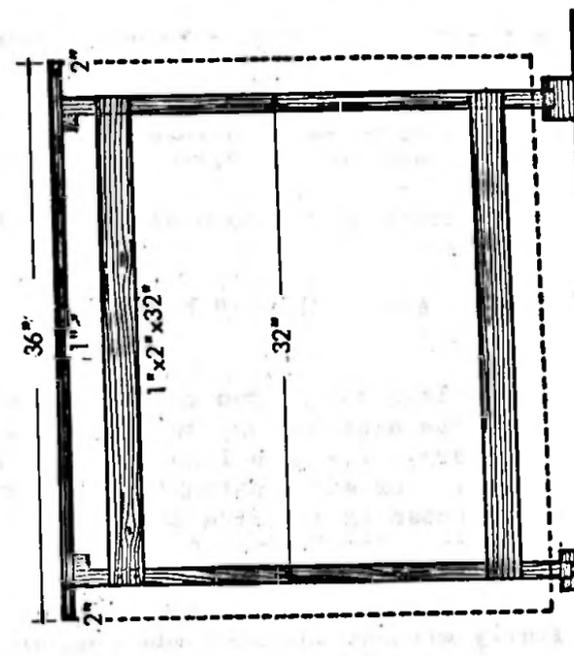


Diagram 4 (a): Table seen from the front.

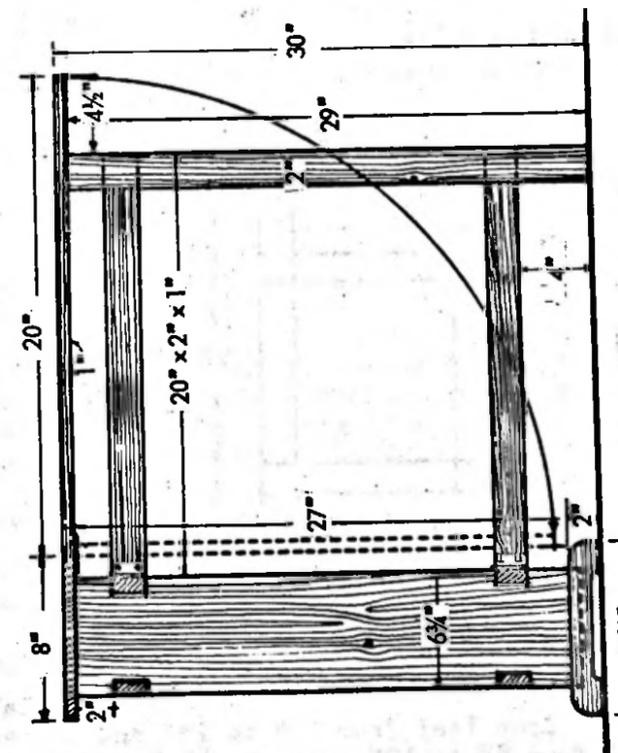


Diagram 4: Table seen from the side with one shelf expanded.

7. Attach one board 1" x 1" x 8" at the top on the inner side of each of the side pieces by screwing.
8. Attach the centre top to the structure by using glue and screwing from below through the 1" x 1" x 8" boards.
9. Prepare the drop leaves by dowelled joining and glueing together of boards to make each leaf 26" x 36".\*
10. Attach 1" x 1" x 24" strips at the edge of each leaf to strengthen the leaves.
11. Prepare the gate legs. Attach the 23" boards to the uprights by lap joints.
12. Hinge each of the gate-legs to the two connecting bars of the table, about 23" from the side boards, to ensure that the gate-legs lie flat to the bars. The gate legs can also be hinged to the sides of the table. For added strength the free ends of the 23" boards can be connected by an extra strip of wood 1" x 2" x 25", by end lap joints. See Diagram 4.
13. Attach drop leaves to centre top by use of hinges. Be sure that gate-legs slide freely without touching the hinges.
14. Round off the corners of the drop leaves.
15. Sandpaper and polish table.

(Folding Table)

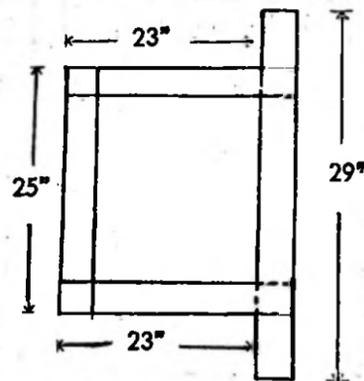


Diagram 4 (b): Gate-leg

\* Notes: If 12" wide boards are available it will save labour to reduce the size of each drop leaf from 26" to 24" and increase the size of the centre top from 8" to 12", making the size of the expanded table the same.

5. Combination Dining Table-Cupboard

Materials:

Wood: For the sides of the oupboard: 2 pieces 1" x 9" x 3'6"  
 For the top, bottom and shelves of the cupboard: 4 pieces 1" x 9" x 2'6"  
 Supporters for shelves: 4 pieces 1" x 1" x 8"  
 For the table top: 1 piece 1" x 2'6" x 3'6"  
 (3 pieces 1" x 10" x 3'6")  
 Crosspieces for table top: 3 pieces 1" x 2<sup>9</sup>/<sub>10</sub>" x 2'4<sup>8</sup>/<sub>10</sub>"  
 Leg: 1 piece 1" x 4<sup>1</sup>/<sub>2</sub>" x 2'5<sup>1</sup>/<sub>2</sub>"

Others: Hinges: 4  
 Hooks and Eyes: 2  
 Metal brackets: 2  
 Screws: 3/4" - 1 doz.  
 Nails: 1<sup>1</sup>/<sub>2</sub>" - 2 oz.  
 Glue  
 Paint  
 Brown shoe polish or wax polish

Tools: Saw  
 Plane  
 Clamp  
 Hammer  
 Tape  
 Square  
 Gauge  
 Sandpaper  
 Ruler  
 Screwdriver

Directions:

1. Cut and prepare 2 pieces of lumber 1" x 9" x 3'6" for the sides of the cupboard.
2. Cut and prepare 2 pieces of lumber 1" x 9" x 2'6" for the top and the bottom of the cupboard.
3. Assemble all four pieces for frame of cupboard. Glue and nail the pieces together. Use a clamp to secure correct shape.
4. Cut and prepare 2 pieces of lumber 1" x 9" x 2'6" for shelves. Mark off on the frame the position of shelves. Nail on supporters for shelves 1" x 1" x 8".
5. Cut and prepare 3 pieces of lumber 1" x 10" x 3'6" for cupboard door table top. Glue the pieces together to make one piece 1" x 2'6" x 3'6". Cut 3 bars 1" x 2'4<sup>8</sup>/<sub>10</sub>" x 2<sup>9</sup>/<sub>10</sub>" and screw on to table top in order to keep it level.
6. Hinge the door to the bottom of the cupboard.
7. Cut the leg 1" x 4<sup>1</sup>/<sub>2</sub>" x 2'5<sup>1</sup>/<sub>2</sub>". Attach to front of door (table) by hinge.
8. Sorew metal brackets to back of oupboard and screw on to the wall.
9. Polish top of the table with brown shoe polish or wax polish.
10. Paint the rest of the oupboard.



6. Table hinged to wall.

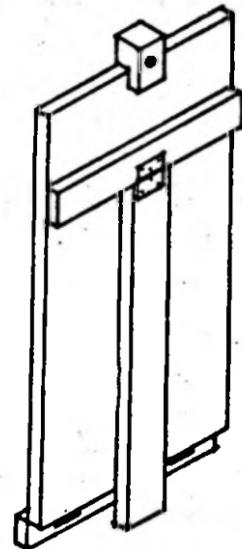
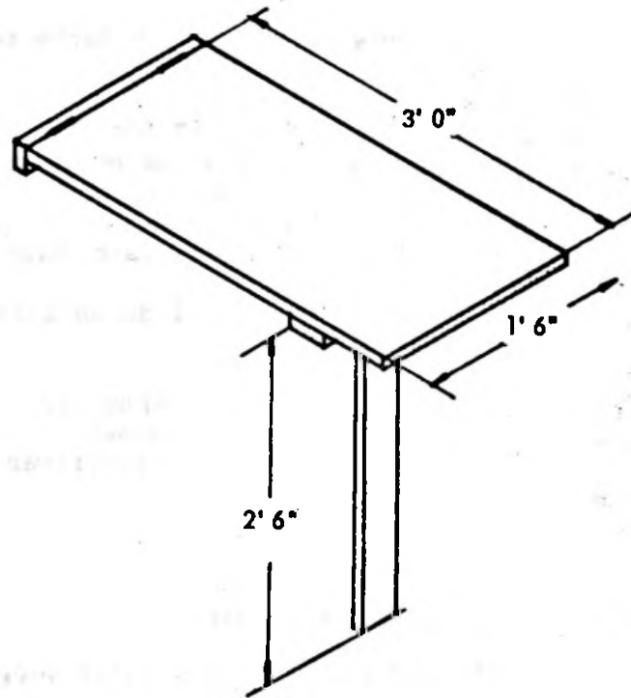


Diagram 6

Note: Drawing by Housing Board, Barbados.

7. Combination Cupboard - Writing Desk

Materials:

- 4 wooden boxes
- 1 piece of board 3'6" long and 3" wider than the depth of the boxes.
- Scrap pieces of wood for shelves and supporting rods.
- Nails  $\frac{1}{2}$ " -  $\frac{3}{4}$ " - 2 oz.
- Paint

Tools:

- |        |           |
|--------|-----------|
| Hammer | Square    |
| Saw    | Ruler     |
| Plane  | Sandpaper |

Instructions:

1. Select boxes of the same size.
2. Nail the boxes together in pairs - thus forming two sets of boxes.
3. Insert one shelf in the middle of each box.
4. Join the two sets of boxes by one piece of board, leaving some open space in the middle.
5. A rod for children's clothes can be inserted between the two sets of boxes, and rods for the shoes in one of the lower boxes.
6. The cupboard can also be used as a writing desk.
7. Sandpaper and paint cupboard.
8. Curtains that can be drawn to either side will make the cupboard more attractive.

7. Combination Cupboard - Writing Desk.

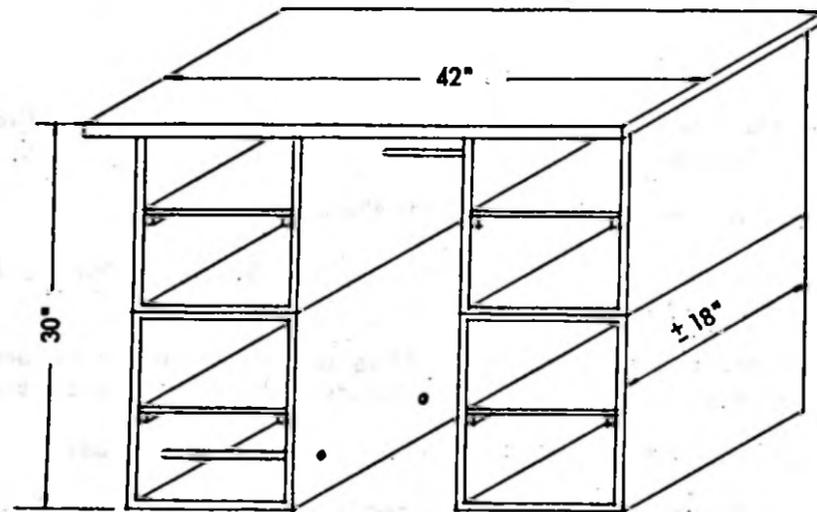


Diagram 7

8. Clothes Cupboard

Materials:

- For back of cupboard - 1 board 1" x 42" x 72"
- For 2 sides of cupboard - 2 boards 1" x 19" x 72"
- For reinforcing front and back - 6 boards 1" x 2" x 72"
- For top and bottom of cupboard - 2 boards 1" x 18" x 42"
- For reinforcing top and bottom - 6 boards 1" x 2" x 17 1/2"
- For partition - 1 board 1" x 18" x 72"
- For supports for shelves - 6 boards 1" x 1" x 18"
- For shelves - 3 boards 1" x 18" x 18"
- For supports for rod - 2 pieces of wood 1" x 2" x 2"
- For rod for hanging clothes - 1 old broom stick 23" long or 1 piece of wood 1" x 1" x 23"
- Nails 1 1/2" long - 1/2 lb.
- For front curtain - 4 1/2 yards cotton material 28" wide
- Cotton thread
- 3 small cup screws

---

**Note:** A large packing box of suitable size may be used for the cupboard.  
Plywood or scraps of board may be used for the shelves.

Tools:

- |        |                    |
|--------|--------------------|
| Square | Sewing machine     |
| Hammer | Scissors           |
| Saw    | Needle             |
| Plane  | Hand drill and bit |
| Gauge  |                    |

Instructions:

1. Cut 72" long boards to serve as back of cupboard.
2. Prepare two pieces of board 19" x 72" for the two sides and one piece of board 18" x 72" for the partition.
3. Measure and cut the following strips 2" wide:  
6 pieces 72" long to reinforce front and back of cupboard  
6 pieces 18" long to reinforce top and bottom of cupboard.
4. Nail these pieces as shown in Diagram 8.
5. Measure and cut 6 strips to support the shelves, each piece 1" x 1" x 18". Diagram 8 (a).
6. Nail the shelf supporters in place at the same distance apart on the partition side and on the left side of the cupboard. Diagram 8 (a).
7. Nail the partition and side pieces in place.

8. Clothes cupboard.

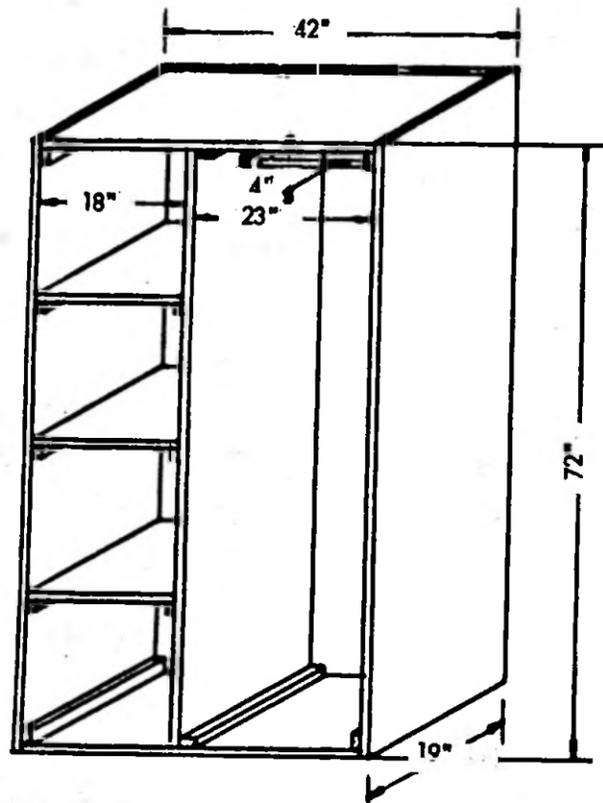


Diagram 8 (a)

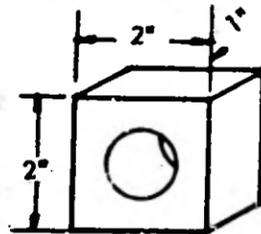


Diagram 8 (b)

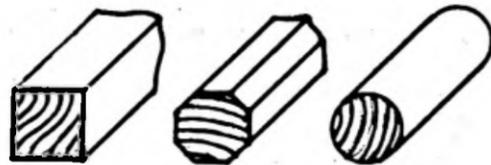


Diagram 8 (c)

8. Measure two boards 18" x 42" for the top and bottom of the cupboard. Nail in place.
9. To make shelves out 3 pieces of board 18" x 18" and place them on the shelf supporters.
10. Construct two supportors to keep rod in place for hanging dresses.

Make each 2" square. Use a hand drill and bit to make the centre hole 1" in diameter. (Diagram 8 (b)). If a broom handle is not available, follow these directions to make the rod. Measure a piece of wood 23" by 1" square. Use plane to take off the four corners making 8 sides. Plane down the eight corners and continue until the rod is almost round. Diagram 8 (c).

11. Fit the rod into the supportors and attach to the cupboard about 4" from the top.
12. Cover the front with a curtain. Use material that is washable and durable.

9. Cupboard with Shelves to pull out.

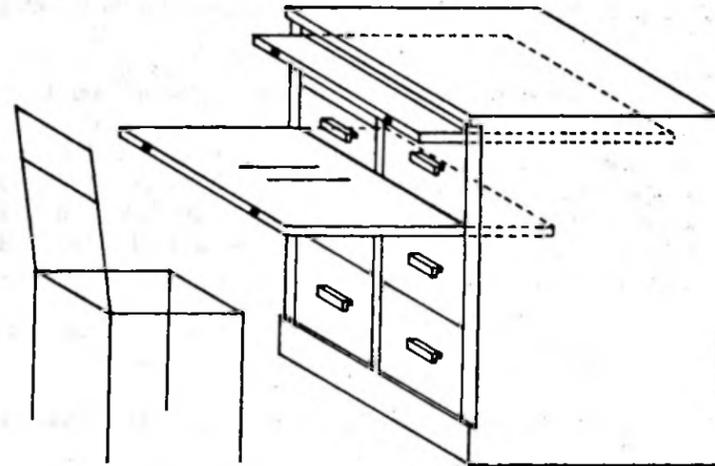


Diagram 9

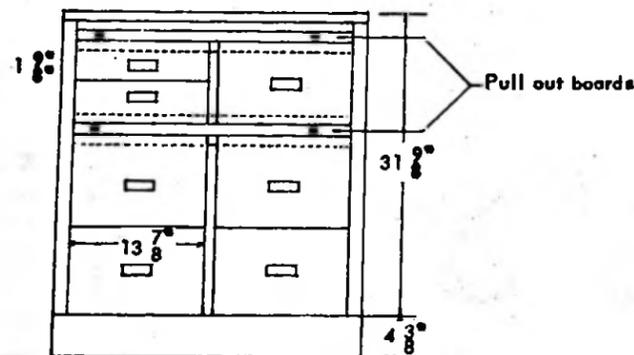


Diagram 9 (a)

10. Combination Cupboard - Partition

Materials:

Woods:

- For cupboard top: 1 piece of lumber 1" x 1' x 8'
- For sides: 2 pieces of lumber 1" x 1' x 6'
- For base: 1 piece of lumber 1" x 1' x 8'
- For partition sides: 2 pieces of lumber 1" x 1' x 6'
- For back and front: compressed cardboard: 1 piece 3'5" x 6' and 2 pieces 2'4" x 6'
- For cupboard door: 4 pieces of lumber 1" x 2" x 20"  
4 pieces of lumber 1" x 2" x 16 1/4"
- For shelves: 3 pieces of lumber 1" x 1' x 3'4"  
2 pieces of lumber 1" x 1' x 2'2"  
1 piece of lumber 1" x 1' x 2'3 1/2"
- For extra step shelves: compressed cardboard 5" x 12" and 8" x 16"

Other:

- Nails - 2 oz.
- Hook and eye - 1
- Screws for hinges - 16
- Cup hooks - 2
- Hinges - 4 (1 1/8")
- Paint

Tools:

- Plane
- Saw
- Square
- Tape
- Hammer
- Gauge
- Clamps
- Screwdriver
- Bit and brace
- Sandpaper

Directions:

1. Cut 2 pieces of board each 1" x 1' x 8'
2. Cut 4 pieces of board each 1" x 1' x 6'
3. Nail together bottom, sides and top of partition
4. Nail in two dividing sides of partition
5. Square corners and brace temporarily
6. Screw on the braces
7. Measure, out and fit compressed cardboard to partition
8. Cut 3 pieces of board each 1" x 1' x 3'4" to form shelves for living room side of partition
9. Fit shelves

10. Combination cupboard - Partition.

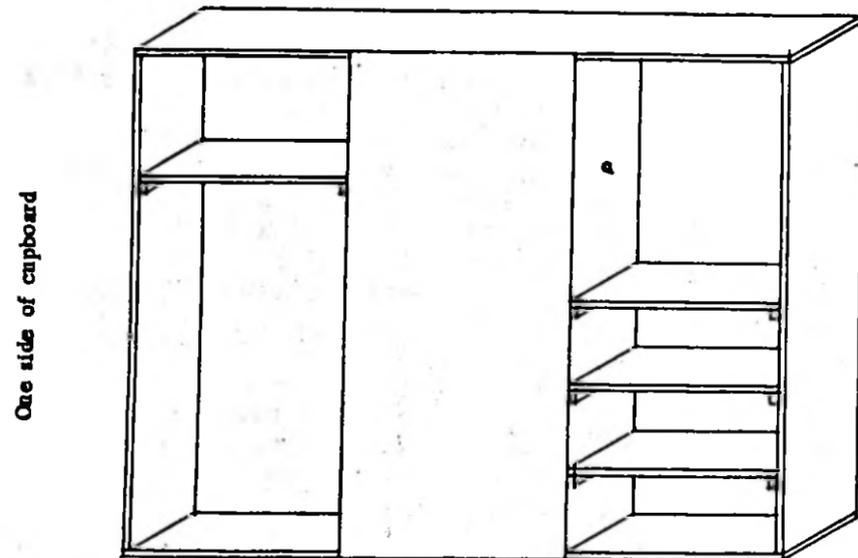


Diagram 10

Other side of cupboard

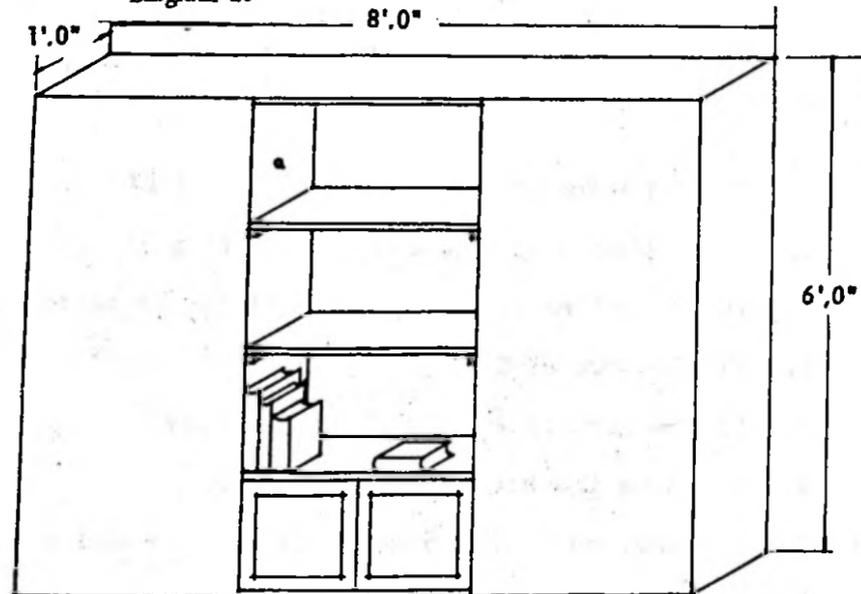


Diagram 10(a)

10. Cut 2 boards each 1" x 1' x 2'2" for shelves for dressing table side of partition
11. Fit shelves
12. Cut 1 board 1" x 1' x 27 $\frac{1}{2}$ " (2'3 $\frac{1}{8}$ ") for hanging cupboard shelf
13. Fit in step shelves made from compressed cardboard 5" x 12" and 8" x 16"
14. For cupboard door cut 4 strips of boards each 1" x 2" x 20" and 4 strips of board each 1" x 2" x 16 $\frac{1}{4}$ "
15. Construct framework of cupboard door
16. Tack on straw panels and hinge door
17. Sandpaper and paint cupboard

Note: Drawing by West Indian Home Economics Training Course.

11. Cupboard with ironing board.

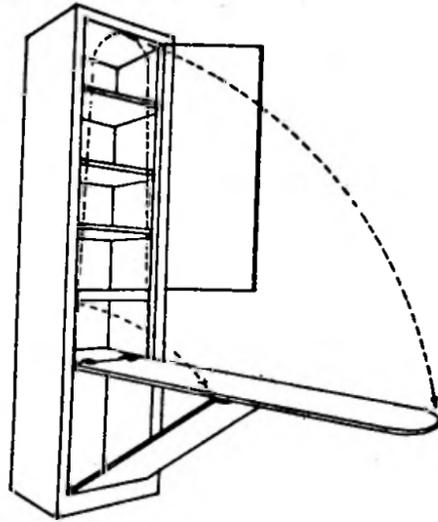


Diagram 11

11 (a). Wall shelf for kitchen utensils.

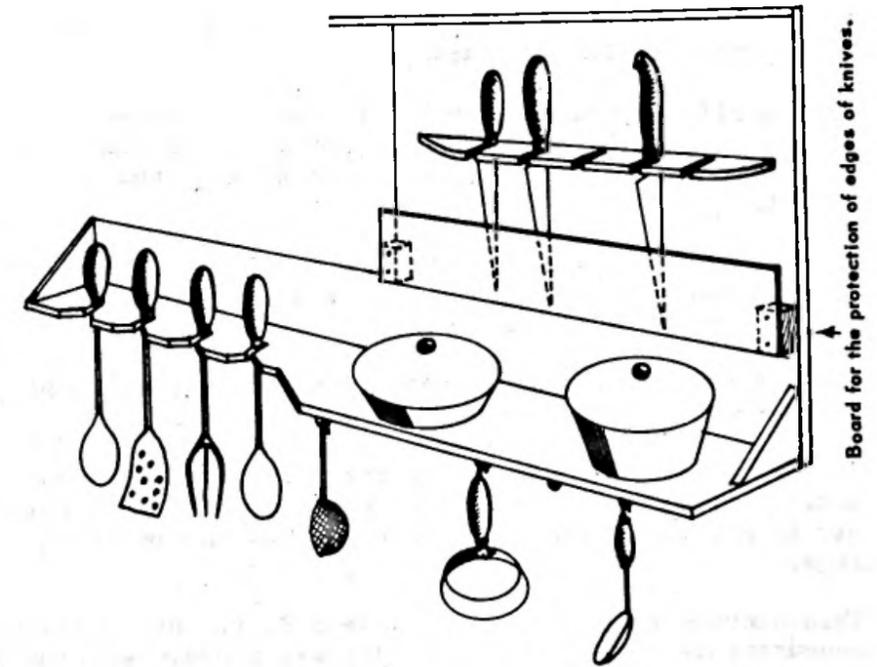


Diagram 11(a)

12. Vegetable Storage - Cupboard

Materials:

- 1 wooden box of convenient size
- Chicken wire
- Scraps of wood
- 1 pair of hinges
- Nails
- 1 box of tacks
- Hook and eye

Tools:

- Hammer
- Plane
- Saw
- Screwdriver

Directions:

1. Get a box of convenient size.
2. Stand it upright and remove the front. Mark shelves inside at convenient distances apart.
3. Nail shelf supports to the box at each of these marks. Be sure supports slant back slightly. These shelf-supports can be made of strips of wood about  $\frac{1}{2}$ " x  $\frac{1}{2}$ " and of required length.
4. In preparing the shelves, first construct a frame using end lap joints. Cover this frame with chicken wire, tucked well around the frame to make sure it is sturdy.
5. The shelves should be removable for occasional cleaning, therefore do not nail them to the supports.
6. The last shelf should be some distance from the base of the box. The box may be placed on wooden blocks or the bottom may be knocked out and the sides cut at the bottom to form legs.
7. This storage cupboard should have a door. Using the exact measurements of the front of the box, prepare a frame in the same manner as was done for the shelves. Cover the frame with chicken wire stretched tightly across and nailed well to the frame.
8. For neatness, cover the ends of the wire on the door with thin wooden strips.
9. Hinge the door to the box.
10. A hook and eye or other latch should be used for fastening the door.
11. Paint the box.

12. Vegetable Storage - Cupboard.

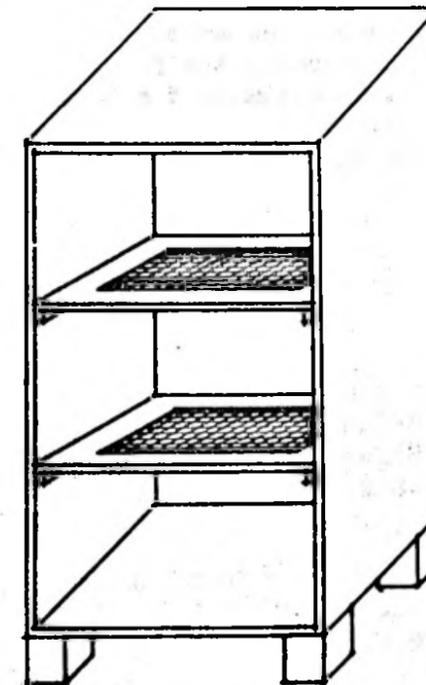
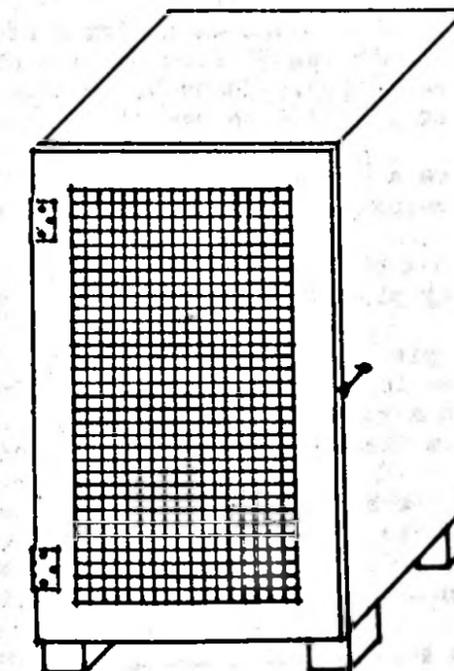


Diagram 12

Diagram 12(a)



### 13. Bench with Storage Space in the Seat

#### Materials:

- 2 pieces of board  $\frac{3}{4}$ " x 10" x 16" (legs)
- 2 pieces of board  $\frac{1}{2}$ " x 2" x 10" - to be nailed on the inside of each leg as supports for bottom
- 2 pieces of board  $\frac{1}{2}$ " x 5" x 30" for long sides of bench
- 1 piece of board  $\frac{1}{2}$ " x 2" x 32" for reinforcing the frame
- 1 piece of board  $\frac{1}{2}$ " x 10" x 30" for the bottom of the bench
- 1 piece of board 1" x 10" x 32" for the seat
- 2 pieces of board  $\frac{1}{2}$ " x 1" x 8" for reinforcing seat
- Nails 1" and  $1\frac{1}{2}$ "
- Glue
- 1 pair of hinges  $1\frac{1}{2}$ "
- Screws for hinges - 8
- Paint

#### Tools:

- |        |             |
|--------|-------------|
| Ruler  | Hammer      |
| Square | Sandpaper   |
| Saw    | Screwdriver |
| Plane  | Paintbrush  |

#### Instructions:

1. Cut 2 pieces of board  $\frac{3}{4}$ " x 10" x 16" to form the two legs of the bench. If boards of sufficient width are not available, glue pieces together to make the required size.
2. Reinforce the legs with strips of board  $\frac{1}{2}$ " x 2" x 10" nailed across each leg 5" from the top of the leg as shown in Diagram 13 (a). Shape the bottom end of the legs as shown in Diagram 13 (b) - to make them more attractive.
3. Prepare a board for the bottom of the bench  $\frac{1}{2}$ " x 10" x 30" by gluing pieces of wood together if necessary.
4. Nail this board to the legs using as supports the reinforcements already placed 5" from the top. See Diagram 13 (c).
5. Cut 2 pieces of board  $\frac{1}{2}$ " x 5" x 30" and nail firmly connecting the two legs already prepared. To reinforce this connection attach a strip of wood  $\frac{1}{2}$ " x 2" x 32" to the front of the legs 4" from the bottom. Diagram 13 (c).
6. Prepare a heavier board for the seat, 1" x 10" x 32". Glue two pieces of board together if necessary. In that case attach two strips of board  $\frac{1}{2}$ " x 1" x 8" two inches from the edge of both ends of the board on the inside.
7. Attach seat to bench using  $1\frac{1}{2}$ " hinges and paint the bench.

13. Bench with storage space in the seat.

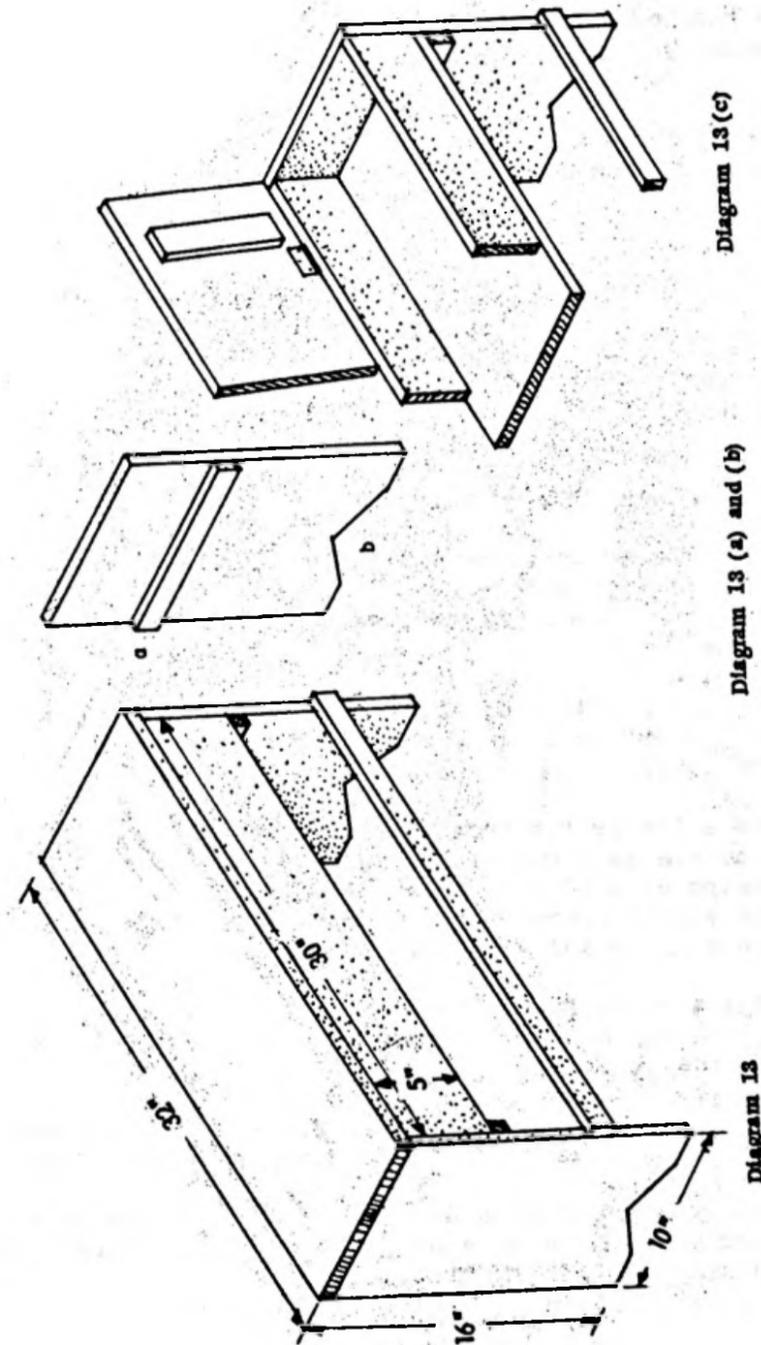


Diagram 13 (c)

Diagram 13 (a) and (b)

Diagram 13

14. Upholstered Stool with Storage Space

Materials:

- A small box about 12" x 14"
- 4 pieces of board 2" x 2" x 15" for legs
- 1 1/2" nails - 1 oz.
- Hinges - 1 pair - with screws (8)
- Thumb tacks (2 dozen)
- Paint
- A sack for the top
- Straw for stuffing
- Cotton material for cushion
- Thread

Tools:

- |           |                |
|-----------|----------------|
| Saw       | Screwdriver    |
| Square    | Sandpaper      |
| Hammer    | Paintbrush     |
| Chisel    | Sewing machine |
| Handclamp | Needle         |

Method of making:

1. Prepare 4 legs 2" x 2" x 15"
2. Select a box of convenient size and shape. At the bottom mark out on each of its four corners a square 2" x 2". Chisel out the four corners marked, making spaces to fit in the legs. Diagram 14(a).
3. Insert each leg to a depth of 3". Hold it in position with a hand clamp and nail screw each securely to the box. Diagram 14(b).
4. Prepare a lid or top from strips of wood left over from the box. Glue the pieces together. Trim the sides. Reinforce them with two strips of wood 3/4" x 2 1/2" x 10". Nail these two pieces leaving enough space from the edges so as to enable the lid to fit properly. Diagram 14(c).
5. Before attaching lid to stool reinforce the side of the stool to which the top is to be hinged. Nail a strip of wood along the back of the stool.
6. In order to enable the hinges to fit well, chisel out from the reinforced side two spaces 1/4" deep, the size of each hinge.
7. Screw hinges to lid at a distance to correspond to the spaces chiselled out in the side of the stool, then screw them to the side of the stool as in Diagram 14(c).

8. Sandpaper and paint legs of the stool.
9. To upholster the top out a piece of sacking 5" wider than the lid. Turn in the raw edges 1" wide and tack them on three sides leaving one side open to stuff the straw. Push straw in until sack gets taut. Tack the fourth side.
10. Make a cover of some cotton material, if so desired finish it with a ruffle; though it is more practical if given a tailored finish.

14. Upholstered stool with storage space.

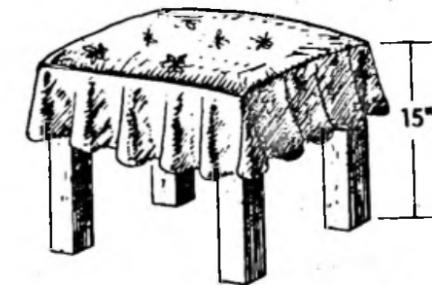


Diagram 14

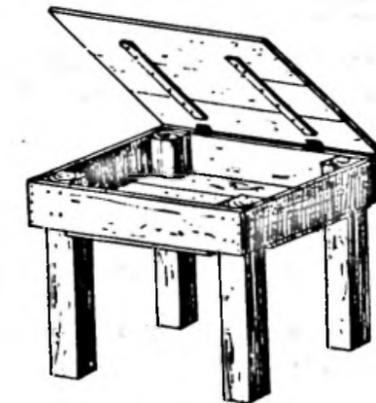


Diagram 14(c)

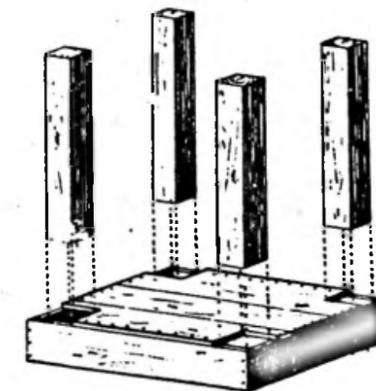


Diagram 14(a)

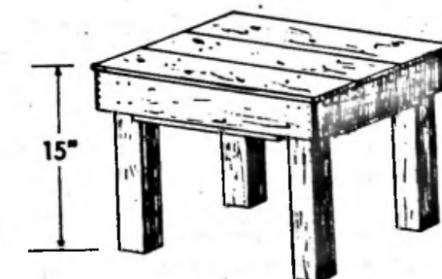


Diagram 14(b)

15. Chair with Backrest

Materials:

- 1 small box, about 14" x 14" and 5-6" deep
- 2 pieces of wood  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 17" for front legs
- 2 pieces of wood  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 19" for back legs
- 1 piece of wood  $3/4$ " x  $2\frac{1}{2}$ " x 13" connecting back supports
- Nails or screws
- 2 pieces of wood  $3/4$ " x  $1\frac{1}{2}$ " x 17" for side supports for the back of chair.
- Sandpaper

Tools:

- |               |               |
|---------------|---------------|
| Hammer        | Marking Gauge |
| Chisel        | Mallet        |
| Plane         | Brace and bit |
| Cross cut saw | Square        |
| Coping saw    |               |

Directions:

The Seat

1. On the top and bottom of the box mark points A and B, 1" from side edges. Diagram 15(a).
2. Draw lines AC and BD. Diagram 15(a).
3. Remove sides from box by carefully removing the nails.
4. Cut through the lines AC and BD. Remove extra pieces.
5. Nail sides back in place. The seat has now a more attractive shape.

The legs

1. Cut the back legs  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 19".
2. Hold the legs at an angle 2" from the edge of the seat, mark a line x-y at the same distance from the upper end of the legs as the inside depth of the box. Diagram 15(b).
3. Divide the board in half from line x-y to upper end as in Diagram 15(c).
4. Mark at the bottom of seat, 2" from back edge, two rectangles  $3/4$ " x  $1\frac{1}{2}$ " and at the front corners two rectangles  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ ". Cut with a coping saw or, if not available, use chisel and mallet.
5. Insert the backlegs at a slight angle and nail or screw to the seat.
6. Cut the front legs  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " x 17".
7. Hold the front legs in an upright position inside the front corners and nail or screw them to the seat.

The back of the chair

1. Use 2 pieces of board  $3/4$ " x  $1\frac{1}{2}$ " x 17" to serve as side supports to the back of the chair.
2. For comfort the supports should slope backwards. Draw a slightly sloping line OP at 4 or 5" from the end of the board (the distance to be the same as the outside depth of the box). Diagram 15(d).
3. Divide the board into half from line OP to lower end.
4. Nail or screw the supports to the outside of the seat.
5. Prepare a board  $3/4$ " x  $2\frac{1}{2}$ " x 13". Round the corners and nail or screw the board to the top of the back supports.
6. Sandpaper all parts of the chair.
7. Paint.

15. Chair with backrest.

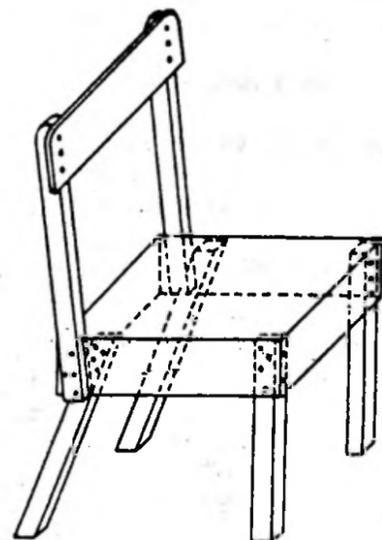


Diagram 15

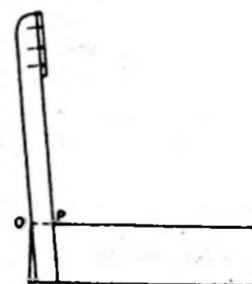


Diagram 15 (d)

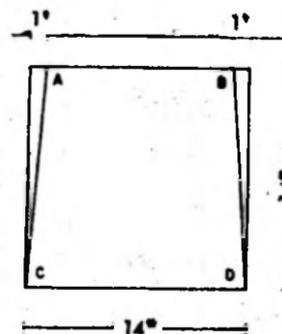


Diagram 15 (a)

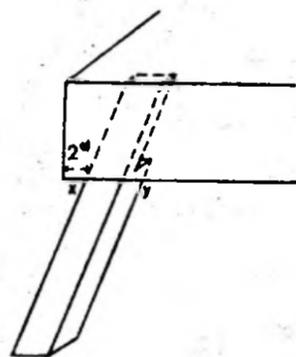


Diagram 15 (b)



Diagram 15 (c)

16. Folding Chairs

Material:

Wood:

- 2 pieces  $3/4" \times 1\frac{1}{2}" \times 3'$  (a)
- 2 pieces  $3/4" \times 1\frac{1}{2}" \times 1'10"$  (b)
- 2 pieces  $3/4" \times 1\frac{1}{2}" \times 1'3"$  (c)
- 2 pieces  $\frac{1}{2}" \times 1\frac{1}{4}" \times 1'2"$  (d)
- 1 piece  $\frac{1}{2}" \times 2\frac{1}{2}" \times 1'2"$  (e)
- 1 piece  $\frac{1}{2}" \times 1\frac{1}{2}" \times 1'2"$  (f)
- 1 round pole  $9\frac{13}{16}"$  in diameter  $3/4"$  (g)
- 8 slats (7 slats  $\frac{1}{2}" \times 1\frac{1}{2}" \times 1'2"$  (h)  
(1 slat  $6" \times 1\frac{1}{2}" \times 11\frac{1}{2}"$  (i))

Screw and bolts

Tools:

- |               |             |
|---------------|-------------|
| Tape          | Square      |
| Ripsaw        | Tenon Saw   |
| Plane         | Gauge       |
| Brace and bit | Screwdriver |
| 1" Chisel     |             |

Directions:

1. On the 2 pieces  $3/4" \times 1\frac{1}{2}" \times 3'$  (a), mark off a point  $10\frac{1}{2}"$  from one end and drill a hole through the broadest side ( $1\frac{1}{2}"$  side). Curve and smooth the other end.
2. On the 2 pieces  $3/4" \times 1\frac{1}{2}" \times 1'10"$  (b), mark off and drill 2 similar holes  $11\frac{7}{8}"$  from one end and 2 other holes  $9\frac{1}{4}"$  above these. Curve and smooth top end.
3. Curve one end of the two  $3/4" \times 1\frac{1}{2}" \times 1'3"$  pieces (c) (this is the back of the slat supports), then drill 2 holes on the slat supports; again on the broad side 2" from the curved end.
4. Cross the  $3/4" \times 1\frac{1}{2}" \times 3'$  (a) and the  $3/4" \times 1\frac{1}{2}" \times 1'10"$  (b) so that the bottom holes coincide - bolt and screw the same.
5. Fix slat support (c) on the inside of this so that the drilled holes coincide with the top holes of back leg. Screw and bolt.
6. Slope one edge along the length of the wood of the 2 pieces  $\frac{1}{2}" \times 1\frac{1}{4}" \times 1'2"$  (d) so that one broad side of the wood now measures  $1\frac{1}{4}"$  while the other measures 1".
7. Attach 1 piece to bottom of slat support so that sloped edge faces upwards and inwards and so that this piece is  $\frac{1}{2}"$  from curved edge of back.

8. Attach other piece  $\frac{1}{2}$ " x  $1\frac{1}{4}$ " x  $1'2"$ (d) to back of  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " x  $3'$ (a) pieces so that sloped edge faces upwards and inwards and so that this piece of wood lies  $16\frac{1}{2}$ " from bottom edge.
  9. Attach one piece  $\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $1'2"$ (e) to top front of 2 pieces  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " x  $3'$ (a) so that the one piece lies  $\frac{3}{4}$ " from top curved edge, and the 2 longer pieces lie  $11\frac{5}{8}$ " apart.
- N.B. To secure, drill 2 parallel holes on each side, countersink, and insert screws.
10. Fix  $11\frac{1}{2}$ " slat so that it lies at back of seat support and directly between 2 back rails of chair.
  11. Curve outside corner of the slat (h) to be used at the front of the seat. Drill 2 holes in it, the same distance apart as the seat support and equal distance from the edges. Countersink and insert screws.
  12. Arrange other six slats (h) so that they fit evenly in the remaining space and attach as above.
  13. Attach piece  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " x  $1'2"$  (f) to bottom of 2 long rails (front legs) so that it lies  $21\frac{1}{8}$ " from bottom edge.
  14. Drill 2 holes where required and screw this bit of board to the legs of the chair.
  15. Glue edges of round pole (g) and fasten between back legs of chair. Secure with wooden pegs.

Ref: From W.I. Home Economics Training Course.

16. Folding Chair.

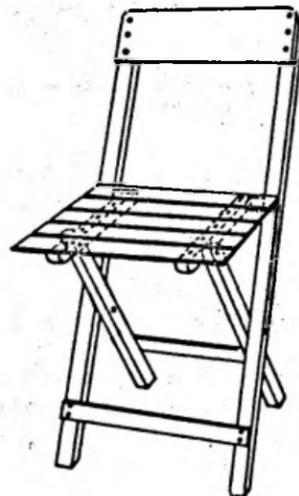


Diagram 16

17. Barrel Seat

Materials:

Barrel  
Screws  
Nails  
Sandpaper

Scraps of wood  
Hinges - 1 pr.  $1\frac{1}{2}$ "  
Oilcloth or cretonne  
Paint

Tools:

Saw  
Spoke shave  
Hand drill and bit

Turning saw  
Hack saw  
Hammer and screw driver

Directions:

1. Select a barrel of convenient size.
2. Mark seat by drawing a line all around the barrel  $16"$  from the floor.
3. Saw a line from A to B, that is, half the circumference of the barrel. Remove the top part of the sawn staves. Diagram 17(a).
4. Make a paper pattern of the sides, arm and back of the seat. The shape and size of the pattern will vary according to the shape and size desired.
5. Fit the pattern to the barrel using AB as the base of the fitting line. Diagram 17(a).
6. Mark the shape on the barrel.



Diagram 17

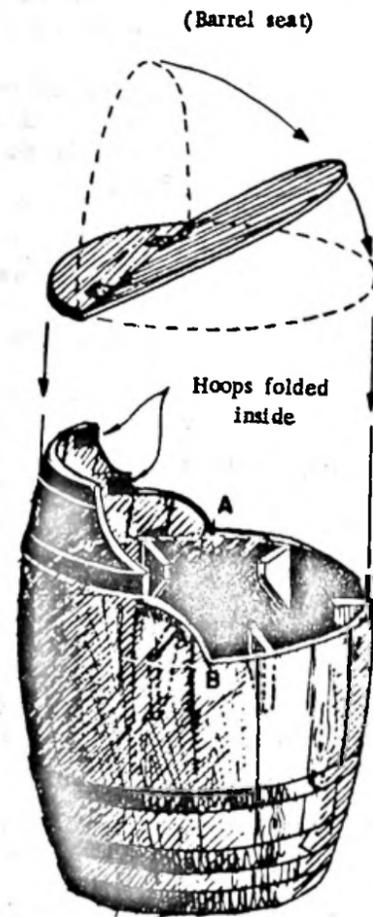


Diagram 17(a)

7. Before cutting the shape, rivet the top hoop. This is done to avoid splitting of the staves. Using a hack-saw or cold chisel, cut the hoop allowing 4" to fold inside to finish the top end neatly. Diagram 17(a).
8. Cut sides following the shape of the pattern already marked on the barrel. A turning or coping saw may be used for this. Remove all parts of the staves not needed.
9. To build the seat, first screw six supports (Diagram 17(a)) on the inside of the barrel at equal distances apart and at a height of 16" from the floor.

10. Prepare a board that fits the size of the seat opening. 1/4" or 1/2" may have to be taken off all around the board in order to make it fit the barrel and to give ease in opening.
11. The bottom of the chair may be used for storage. To do this, divide the board already prepared into two parts. The smaller part to be 1/3 of the board and the other to be 2/3. Connect these two parts with a pair of 1 1/2" hinges. Screw the smaller part to the inside support attached to the back of the barrel. This will set the seat in place.
12. Clean the iron hoops as described on page 164. Coat them with aluminum paint to avoid corrosion. Sand-paper the barrel, then paint it.
13. To cushion the seat, cut two circles of calico or flour bag 1/2" wider than the seat. Cut a straight strip 4" wide to form sides of the cushions. Stitch the sides of the cushion leaving an opening for filling.
14. Fill the cushion with cotton or straw. Stitch the opening.
15. Make a cover of cretonne or oil cloth to cover the cushion.
16. Upholster the back of the barrel.
  - a) Cut a piece of calico and a piece of cretonne or oilcloth same shape as the back of the barrel but about 5" wider. Stitch them together leaving the bottom open.
  - b) Fill in with cotton or other soft padding.
  - c) Stitch cretonne to calico in vertical lines 2" apart.
  - d) Nail upholstering to the back of the barrel.
  - e) Finish edge with gimp or bias material.

From "Simple Home Mechanics", University of Puerto Rico, 1953.

18. Movable Screen - Cheap wall

Materials:

6 pieces of board 1" x 2" x 72"  
6 pieces of board 1" x 2" x 30"  
7 pairs hinges 1½" long - may  
be improvised  
Paint

Tacks  
Sacks  
Screws for hinges - 1 doz.  
Cement - glue mixture

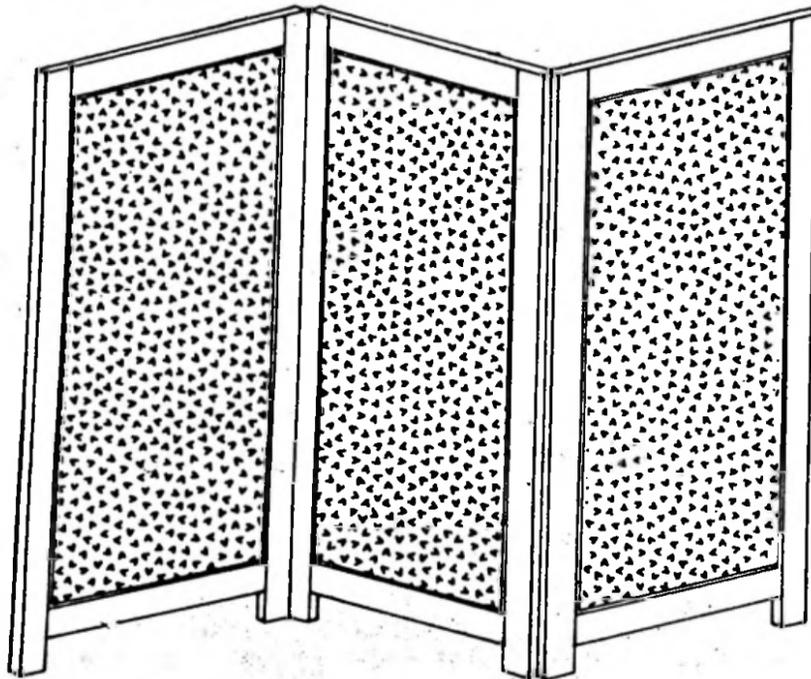
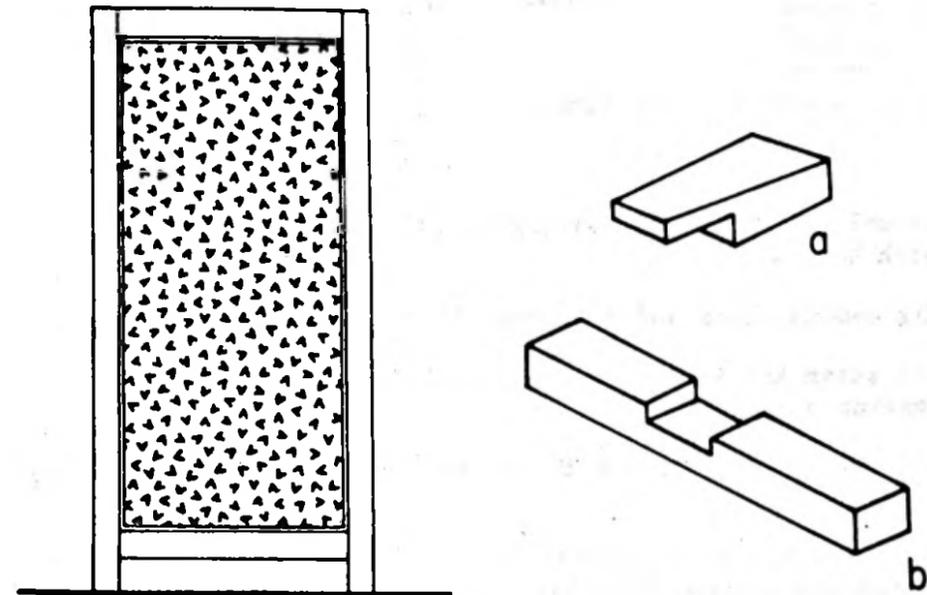


Diagram 18

Drawing from "Simple Home Mechanics", University of Puerto Rico, 1953.



Diagrams 18 (a) and (b)

Tools:

Plane  
Square  
Hammer  
Sandpaper

Saw  
Marking gauge  
Paint brush  
Coconut brush

Method of making:

1. Cut and plane 6 pieces of board 1" x 2" x 72"
2. Cut and plane 6 pieces of board 1" x 2" x 30"
3. With these boards prepare the frame by joining the top ends of two long boards with a short board using end lap joints. Diagram 18(a).
4. Join lower ends of long boards at 6" from the bottom with a short board using cross lap joints. Diagram 18(b).
5. Fit cross pieces and nail firmly.
6. Join the three frames using hinges 1½" long. Otherwise improvise them.
7. Sandpaper the frame.
8. Cover each of the sections of the frame with burlap or sacks tightly stretched and nailed to the frame.
9. Paint with cement-glue mixture.
10. Paint the woodwork.

Cement-Glue Mixture

4½ pints lime	4½ pints water
3 pints cement (4 lb.)	1½ pints glue (pearl glue) =
2 ¼ pints distemper or lime	21 oz.

Method:

1. Dissolve the glue by putting it into a can placed in a saucepan with boiling water.
2. Mix cement, lime and distemper thoroughly.
3. Add water and the dissolved glue gradually stirring continuously.
4. Cover both sides of the burlap wall with the mixture, using a coconut brush.

Work quickly, and do not mix more than can be used immediately as the mixture hardens quickly.

Note: When distemper is expensive, it can be substituted by using lime.

19. Water Container

Materials:

1 wooden nail keg  
 Nails ½" - ¾" - 1/4 lb.  
 Sand - 24 lbs.  
 Faucet

Fine meshed chicken wire  
 ½ yard  
 Cement - 8 lbs.  
 Paint

Tools:

Hammer  
 Sandpaper

Spatula  
 Paint brush

Instructions:

1. Soak the nail keg with water overnight.
2. Cover the inside with chicken wire. Nail to the sides and the bottom of the keg.
3. Mix cement and sand thoroughly. Add water gradually while stirring until mixture becomes like a thick batter.
4. Plaster inside of nail keg with the mixture.
5. Smoothen the surface with the spatula dipped in water.
6. Sprinkle some cement on surface to make it hard and smooth.
7. Let nail keg dry.
8. Sandpaper the wooden part.
9. Paint the keg and the iron bands in contrasting colours for attractiveness.
10. Attach a handle to the cover and paint.
11. To make the water container more practical, a tap can be inserted 2" above the bottom of the keg before it is lined with wire and cement.

19. Water Container.

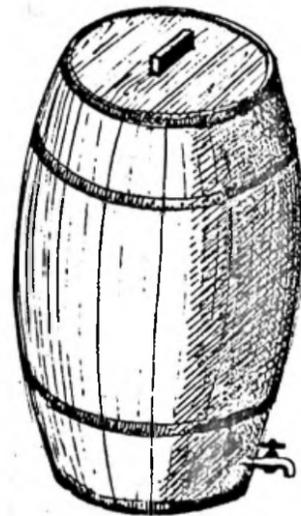


Diagram 19

20. Improvised bathroom

Materials:

2 pieces of wood or bamboo 6'6" long	Nails
2 pieces of wood or bamboo 7'6" long	Thatch
6 pieces of wood or bamboo 6'3" long	Stones
6 pieces of wood or bamboo 4'3" long	Gravel
Sacks or burlap	Sand
Cement-lime-glue mixture	

If required: Extra board for making the table, platform, towel rod and chair.

Tools:

Plane	Saw
Square	Marking gauge
Hammer	Coconut brush

Directions:

1. An improvised bathroom or washroom can be built in the yard by erecting a frame of bamboo or wooden strips.
2. Walls can be made by nailing sacks or burlap to the frame.
3. The sacks can be made stiff and waterproof by painting them with a cement-lime-glue mixture. (See page 198).
4. To provide privacy, a sloping roof of bamboo strips or thatch could be made.
5. The floor of the washroom should be at least 4' x 6' and should have a pit about 3' deep.
6. The pit should be filled with large stones to about 4" from the floor level, and with a layer of smaller stones and a layer of gravel up to the floor level. The used water which falls on the floor will sink among the stones and dry up.
7. There should be a simple table or box on which to rest a wash basin, a soap dish and a jug for pouring water and a rod on which to hang towels.
8. A wooden platform to stand on and a simple seat will provide added comfort.
9. If the frame is strong enough, arrangements could be made for an improvised shower. This shower could be made from a kerosene oil tin and could be placed at the level of the roof.

20. Improved Bathroom.

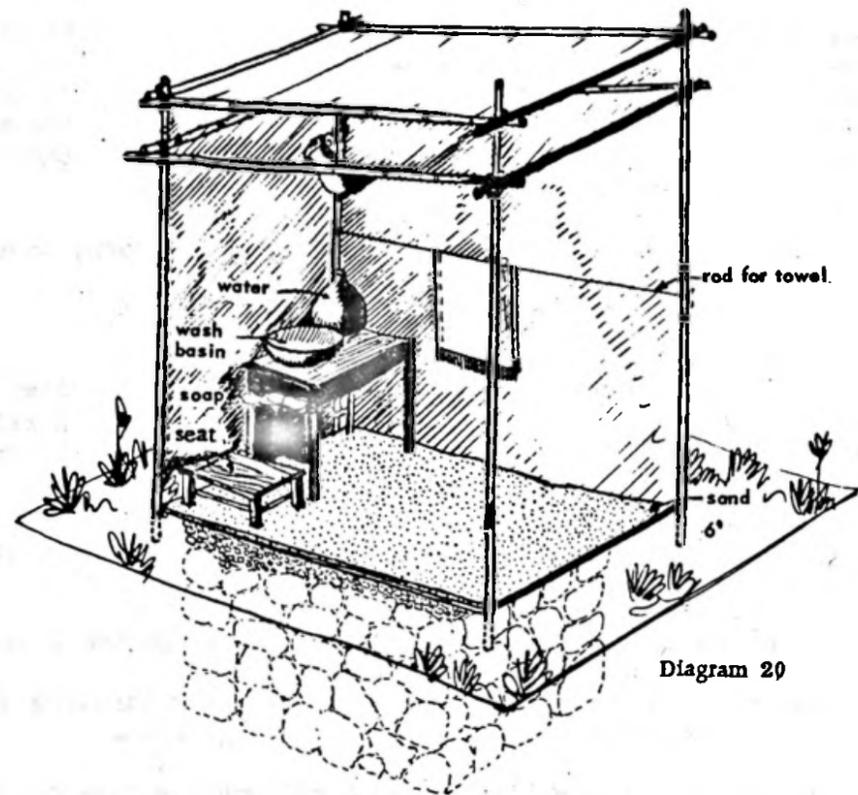


Diagram 20

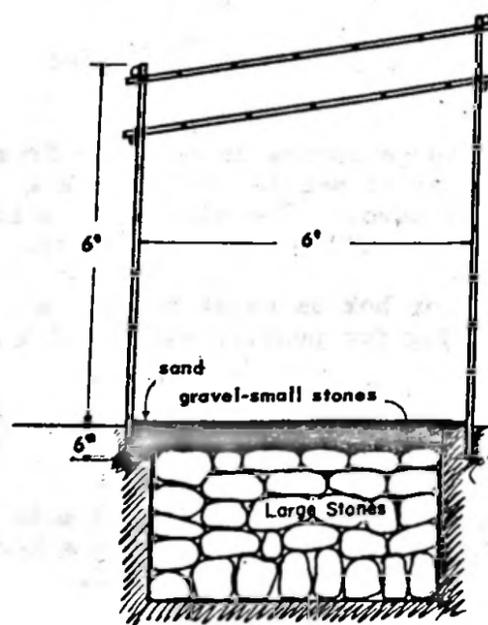


Diagram 20 (a)

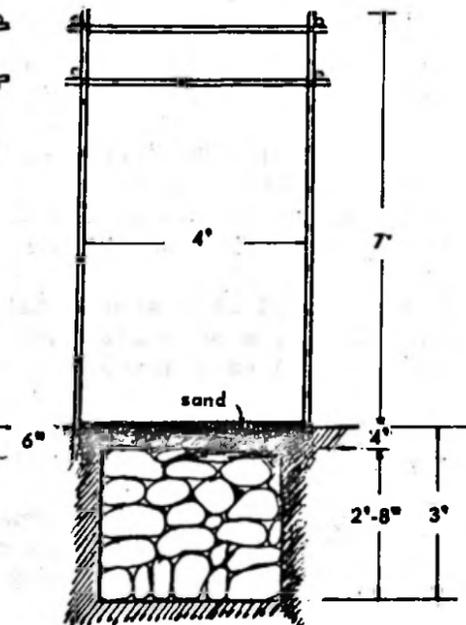


Diagram 20 (b)

21. Improved Shower

Materials:

- Kerosene tin
- Rose
- Paint
- A piece of board the length of the width of the can x 2"

- Faucet
- Solder
- Wire or cord for hanging

Tools:

- Cold chisel
- Soldering bolt

- Mallet
- Paint brush

Instructions:

1. Attach a handle to the top of the kerosene tin.
2. Solder a stopcock in the bottom of the tin.
3. Attach the faucet and rose.
4. Paint the kerosene tin.

Note: Place on a ledge at least 6'6" from the floor. Fasten with wire or cord.



21. Improved Shower.

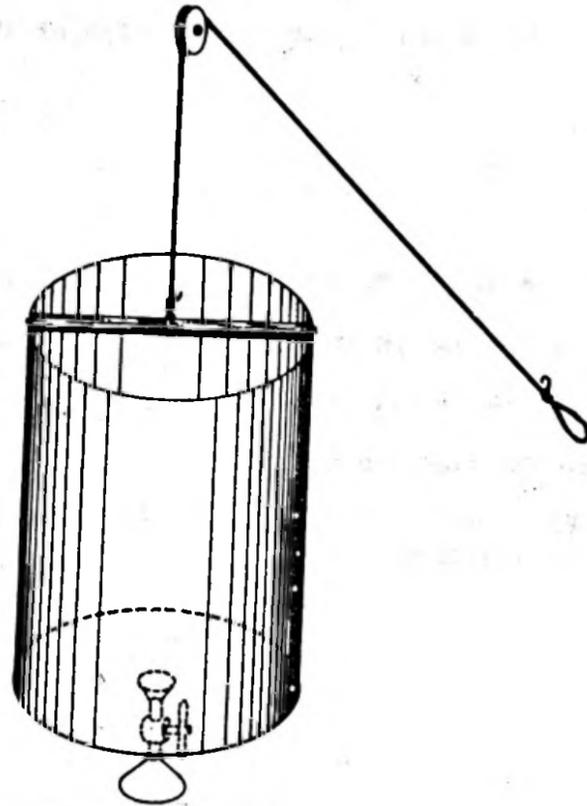


Diagram 21

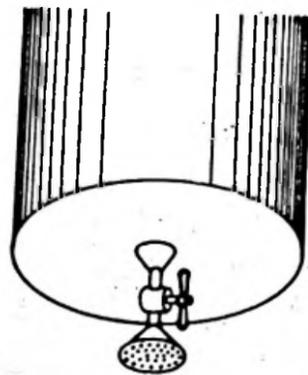


Diagram 21 (a)

22. Another Type of Improved Shower

A simple shower can be made from an ordinary can.

Remove half of the top of the can, cut a hole on the side, a little below the top. Diagram 22.

Make a funnel with a perforated bottom from a piece of tin. Solder it to the side of the can where the hole is as shown in Diagram 22(a).

Attach a wire at the top and a hook at the bottom (on opposite side of funnel). Diagram 22(b).

Fasten a strong cord to the handle.

When using shower, lift can to a suitable height by tying cord around a strong tree branch or bar. Diagram 22(c).

Let cord run through the hook.

Pull end of cord enough so that the water may pour through the funnel, as shown in Diagram 22(d).

22. Another type of Improved Shower.

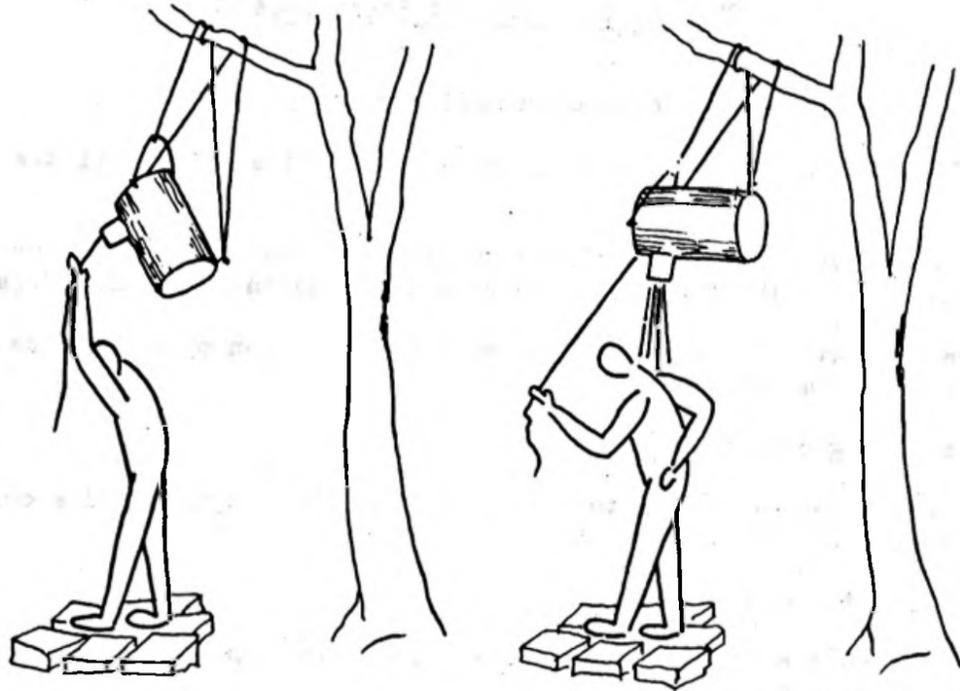


Diagram 22(c).

Diagram 22(d)

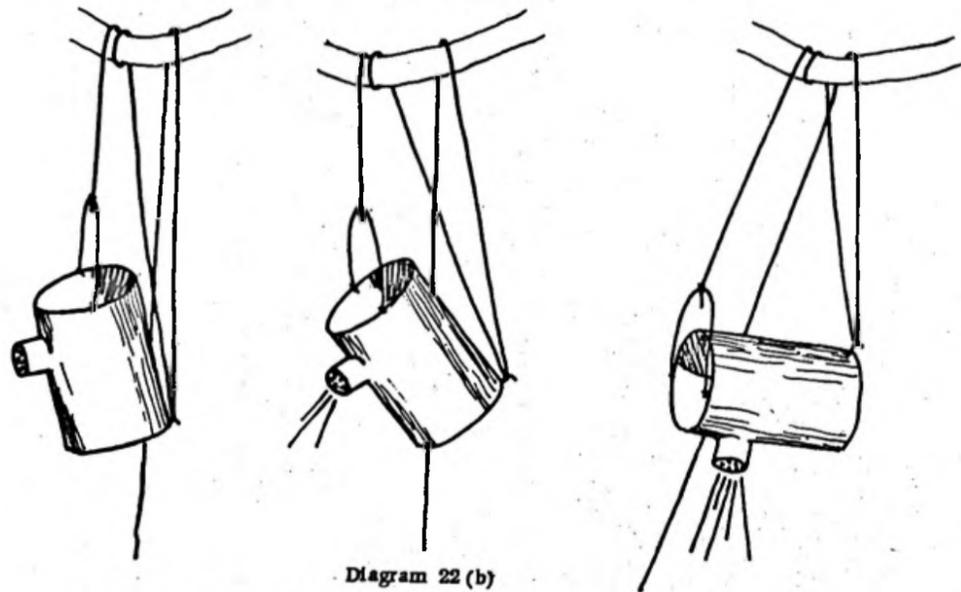


Diagram 22(b)

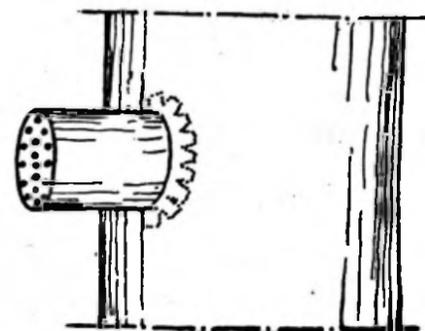


Diagram 22(a)

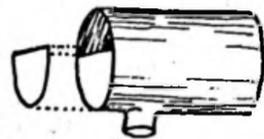


Diagram 22

23. Improved Oven

Materials:

- Big cracker can or other suitable can with cover.
- Wire or bailing
- Piece of metal for handle

Tools:

- Cold chisel
- Mallet

Directions:

1. Using a cold chisel make cuts around the can about 3" from the bottom. These cuts should be about 1" apart and wide enough to let pieces of wire or bailing pass through from one side to the other.
  2. Weave wire or bailing in the inside of the can.
  3. When cutting wire leave about 1" at each end. Pull the wire before bending down the ends to make sure that the weave is firm and kept in place.
  4. Bore holes 1" apart and  $\frac{1}{2}$ " in circumference around the can about  $1\frac{1}{2}$ " from the bottom.
  5. Prepare the lid so that it fits the top of the can tightly.
  6. With a piece of sturdy metal fit a handle to the cover.
- The oven can be used directly over the fire.

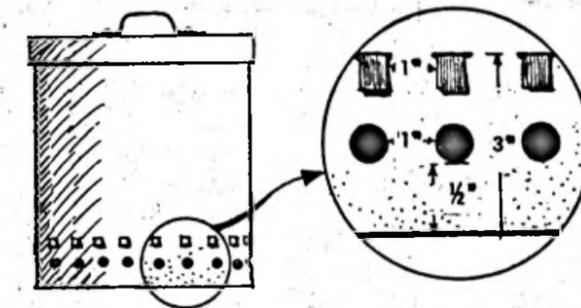


Diagram 23

### 24. Improved Dust Pan

#### Materials:

Oblong tin pan with flat sides  
2 1" bolts

A long stick

#### Tools:

Cold chisel  
Shears or tin cutter  
Brace and bit

Mallet  
Saw

#### Directions:

1. Lay pan flat with broad side up and bottom towards you.
2. Measure a width of  $1\frac{1}{2}$ " on the right and left ends of pan. Mark points A and B, then draw a line to join them.
3. Mark C and D on the bottom ends of the pan, farther away from you.
4. Turn pan placing narrow side up. Join A to C. Diagram 24.
5. Do the same with the opposite narrow side. Join B and D.
6. Using the cold chisel and mallet make a hole large enough to insert the shears.
7. Using the shears cut along the marked lines. Turn edges.
8. Make a hole at centre top of pan to accommodate the stick, and two holes  $2\frac{1}{2}$ " apart for the bolts.

#### How to attach the stick:

1. Mark off depth of pan on one end of stick.
2. Find the centre and saw from the end of the stick to the mark.
3. Fit the stick to the pan, hair pin style, then mark holes to correspond to those on the pan.
4. Remove stick and bore the holes.
5. Replace the stick and fit in the bolts. Diagram 24(a).

From "Simple Home Mechanics", University of Puerto Rico, 1953.

### 24. Improved Dust Pan.

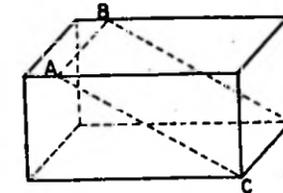


Diagram 24

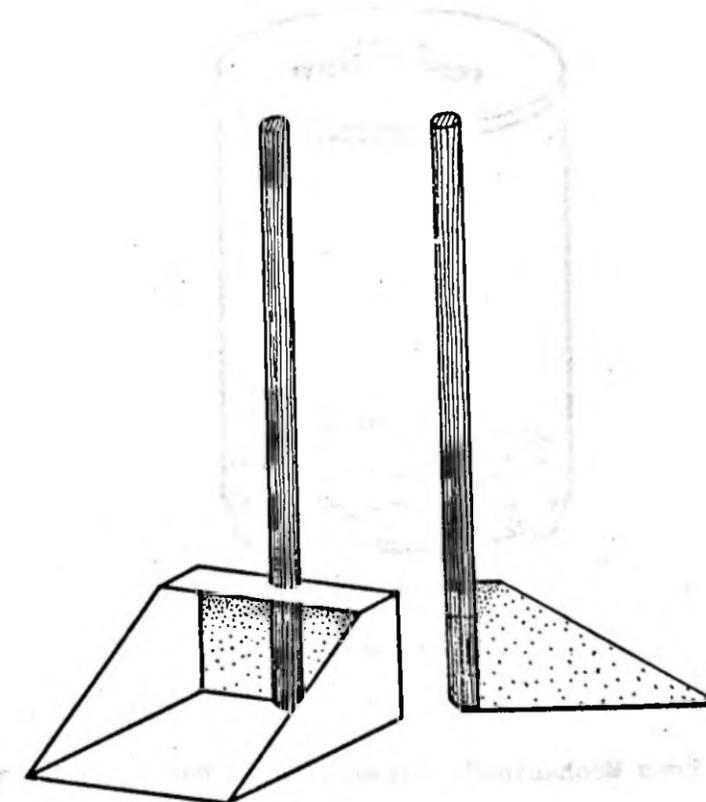


Diagram 24 (a)

From "Simple Home Mechanics", University of Puerto Rico, 1953.

25. Garbage Can

Materials:

Tin or drum of convenient size  
Piece of sturdy metal for a handle  
3 or 4 wooden blocks 2" x 4" x 8"  
Solder  
Paint

Tools:

Saw  
Pliers  
Soldering Bolt

Hammer  
Cold chisel  
Paint brush

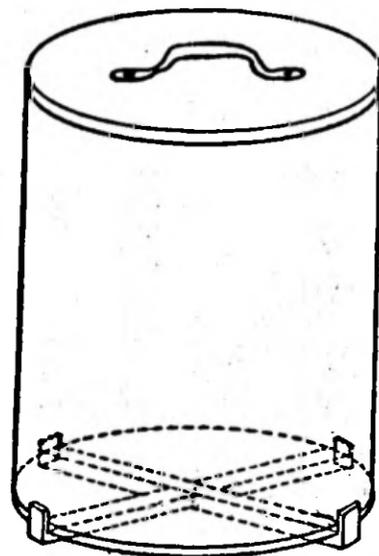


Diagram 25

From "Simple Home Mechanics", University of Puerto Rico, 1953.

Method of making:

1. Select an empty tin or drum with a tight-fitting lid and a ridge at the bottom of the tin.
2. Cut a handle of the sturdy metal and attach it to the cover by soldering or bolting.
3. Saw slits in the blocks 1" - 2" down the centre.
4. Paint the tin and the cover inside and outside.
5. Allow the cover to dry thoroughly before replacing it on the tin.
6. Place the tin on the blocks, fitting the ridge of the tin into the slits of the blocks or use a wooden stand as shown in Diagram 25.
7. Place the garbage can in a convenient spot. Always replace cover after use.

## 26. Improvised Incinerator

### Method of making:

1. Use an empty drum with a cover.
2. Punch holes  $\frac{1}{8}$ " in diameter in the bottom as well as on the sides of the drum.
3. Place the drum on stones or bricks so that air can also pass through the holes in the bottom.
4. The garbage should be lighted from the top and the cover replaced to prevent any burning paper from spreading out.
5. When everything is burnt up, the ashes should be removed and used in the garden.

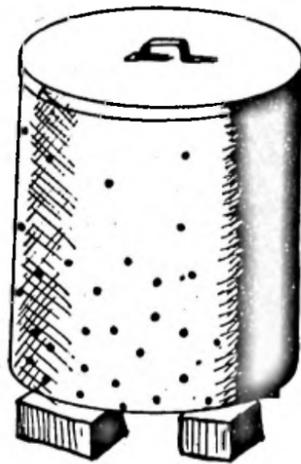


Diagram 26

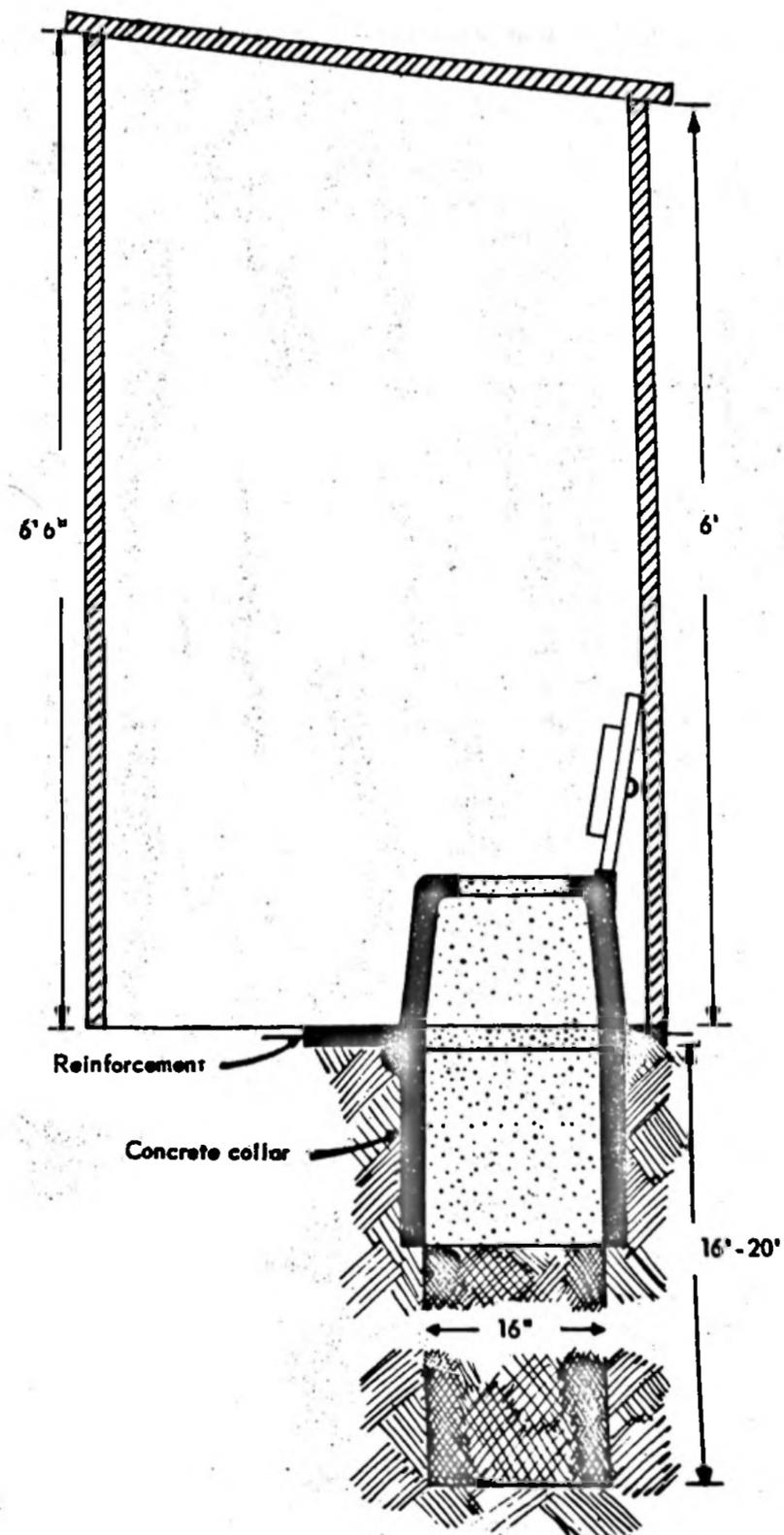
## 27. A Pit Latrine

The pit latrine consists of the following parts:

1. The pit or bored hole
  2. The concrete slab or floor base
  3. The box seat or riser
  4. The wooden cover
  5. The superstructure
1. The pit should be at least 8 feet and not more than 14 feet deep. The size of the hole should be about 3 x 2 feet. Where the possibility exists to bore a hole with an Auger, the depth of the pit is increased to 16 - 20 feet, and a concrete collar of about one foot in height is fitted into the bored hole just below the ground level. The diameter of the hole bored should be about 16 inches or correspond to the diameter of the concrete collar. See Diagram 27(d).
  2. The concrete slab or floorbase should be reinforced with some steel rods, and made in the size of 3 feet square and about  $1\frac{1}{2}$ " thick, with a hole in the middle with diameter of  $1\frac{1}{2}$  feet. Diagram 27(d).
  3. The box seat or riser can be made of wood or better still of concrete. Diagram 27(d). First make a mould of wooden boards in the desired shape and size of the riser, approximately 14 inches high, 15 inches wide and 18 inches deep. Make an outer case about  $1\frac{1}{2}$ " larger. Mix sand and cement in the proportion 4:1 and add water while stirring well. The mixture should be rather thick. Pour the mixture into the mould, making the top of the riser first, leaving an open space in the middle, then pour concrete into the mould for the four sides. Let stand to harden, then remove the mould and let the concrete dry. To avoid cracking, wet the concrete now and then during the drying process.
  4. Make a wooden cover that fits the hole at the top of the riser. Attach a good sized handle to the cover. Diagram 27(a). If the top of the riser is made of wood the cover can be hinged to the top. Diagram 27(b). A special type of cover can be affixed to the riser to ensure that the cover is always replaced after use. An open slot is made on one side of the riser, just below the top. A concrete wedge is provided on the other sides. A wooden board in the size of the top of the riser is inserted through the slot and allowed to slide on the concrete wedges. A strip of wood is attached to the bottom end of the board, to prevent the same from being pulled out entirely. The seat is so constructed that in order to use the latrine the board must be pulled out first. After use of the latrine the board must be pushed back covering the hole before it is possible for the person to get out of the place as the board bars the passage as long as it is not pushed back in place. Diagram 27(c) and 27(d).

5. The superstructure of the latrine can be made of bamboo sticks or wooden strips possibly plastered with mud or cement mixture to afford privacy. A sloping thatched or galvanised roof will complete the structure, as shown in drawing on page 204.

27. A Pit Latrine.



A pit latrine

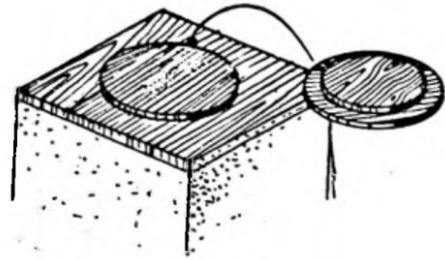


Diagram 27 (a)

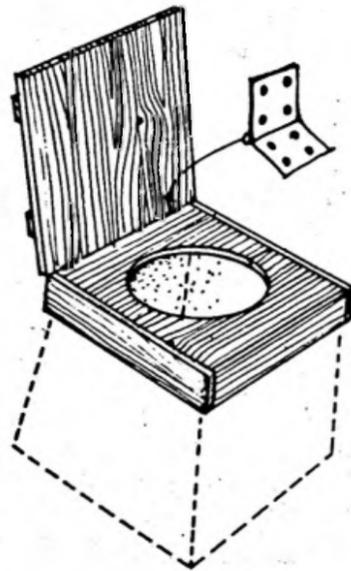


Diagram 27 (b)

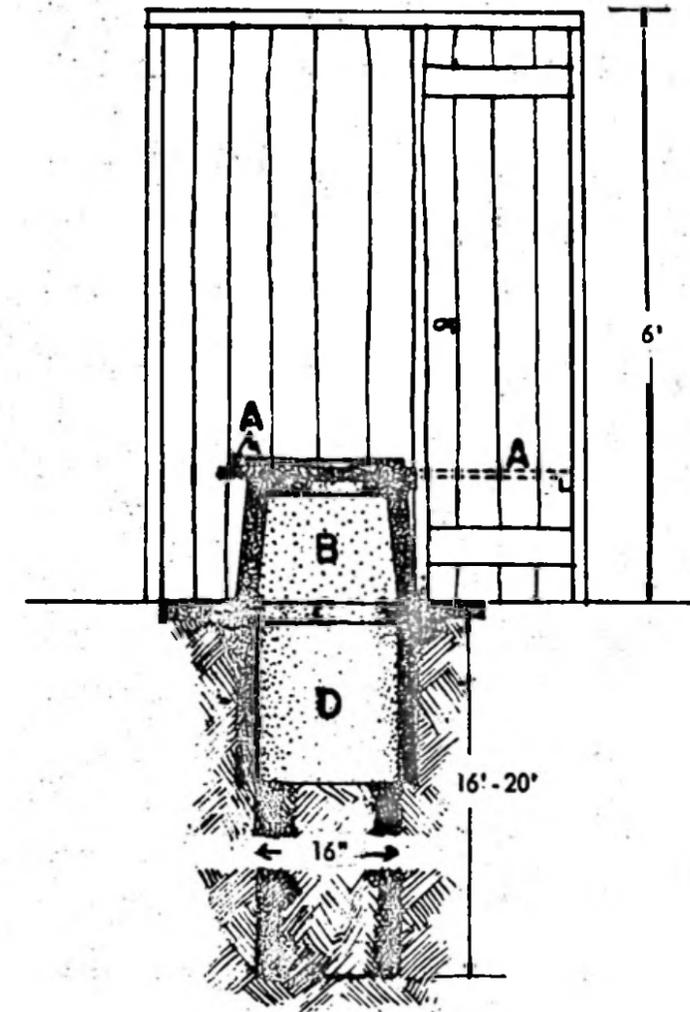


Diagram 27 (c)

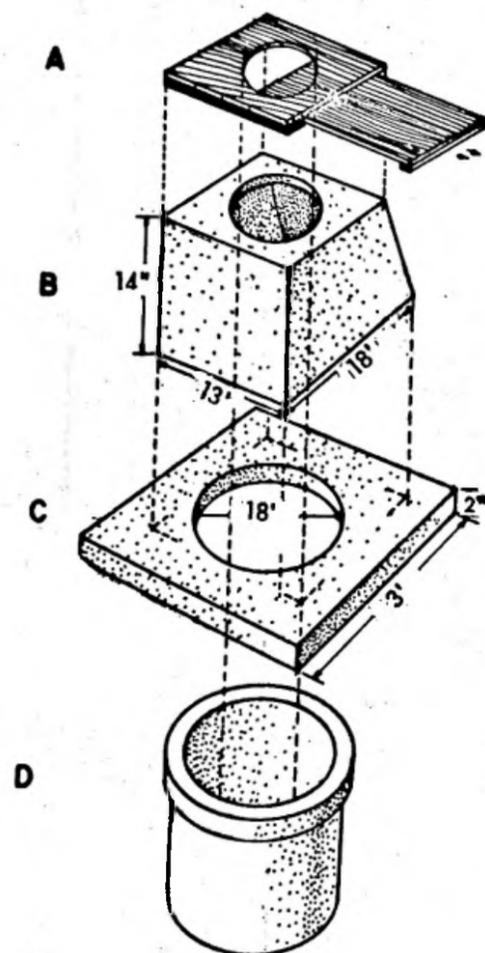


Diagram 27 (d)

### 28. A Compost Pit

#### Method of Making:

1. Dig a pit 6 feet by 3 feet and 2 feet deep.
2. Leave a space of about 1 foot at the end of the pit so that the compost can be easily turned.
3. Fill the rest of the pit with waste matter - leaves, peelings, etc. - for 1 foot in depth.
4. Cover the waste matter with 2 inches of manure.
5. Over this put a layer of wood ash 1 inch deep.
6. Next put a layer of soil 1 inch deep.
7. Repeat the process by filling the pit with another layer of waste matter, manure, ash and soil.

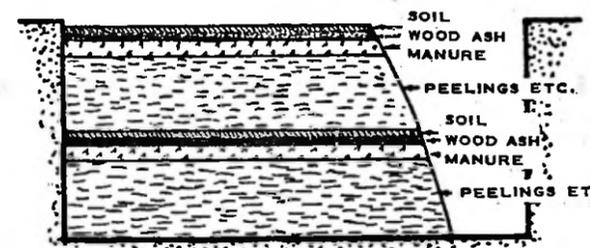


Diagram 28

The bacteria in the manure help to rot the peelings, etc. Turn over the compost once a month and it will be ready for use in five or six months time. A well kept compost is hot, owing to the decomposition, and will not breed flies. The compost pit should not be in the immediate vicinity of the house.\*

\* Kaeune, Esther. The African housewife and her home. Kampala, Uganda 1952. The Eagle Press.

29. A Simple Blockmaking Machine\*

To assemble

1. Place outer box on level ground and fasten hasp and staple.
2. Assemble inner box inside outer box.
3. Insert centre bar and hole inserts.

To make block

1. Mix dry ingredients thoroughly: sand, small stones, marl and cement in proper proportions.
2. Add very little water. The mixture should be moist but not wet.
3. Place in assembled mould and ram down hard. Add more mixture and ram until mould is filled. Level off top.

To remove mould

1. Withdraw centre bar and attached hole inserts.
2. Loosen hasp and staple, open hinges of outer box and remove.
3. Remove end pieces of inner box by upward and outward motion.
4. In same manner remove sides of inner box.

Caution:

Keep blocks moist for several days.

\* Ref. Rev. E. Cheney, S.J. Above Rocks, Jamaica.

29. A simple blockmaking machine.

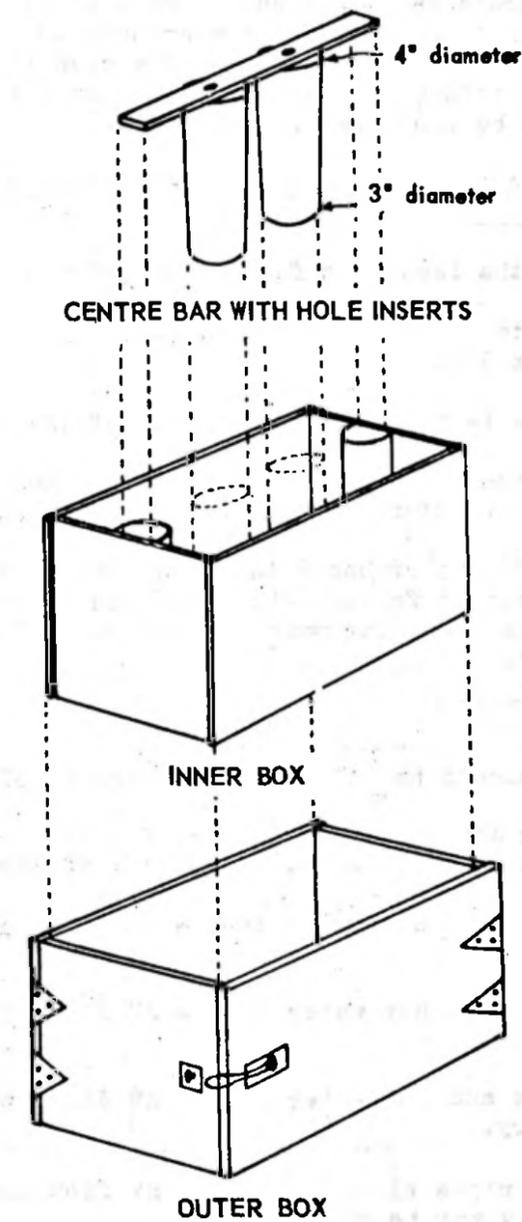


Diagram 29

### 30. Construction of a Smokeless Fireplace

(Extract from material prepared by Dr. S.P. Raju, India)

#### I. Preparation before starting construction

##### A. Platform or Stand:

The stove should be placed on top of a platform or table at a proper height to make work comfortable to the housewife. An existing stone structure used for the open fireplace may be used. A concrete platform can also be made. An existing sturdy table may prove to be convenient.

If you are to construct a stand the following directions may prove practical

- Prepare the legs from four pieces of wood 2" x 4" x 24½".
- Prepare two long rails 1" x 4" x 50" and two short rails 1" x 4" x 30".
- Screw the legs to the extremities of the short rails.
- Connect these two structures with the long rails. This will form the structure for the stand. Diagram 30(a).
- Prepare pieces of board to fit dimension of table top. Nail them firmly to frame. This platform or stand may be covered with a tin sheet for more protection against the heat of the stove.

##### B. Chimney:

The chimney should be well built for escape of smoke.

The following dimensions of chimney for different types of stoves are recommended by Dr. Raju, originator of stove:

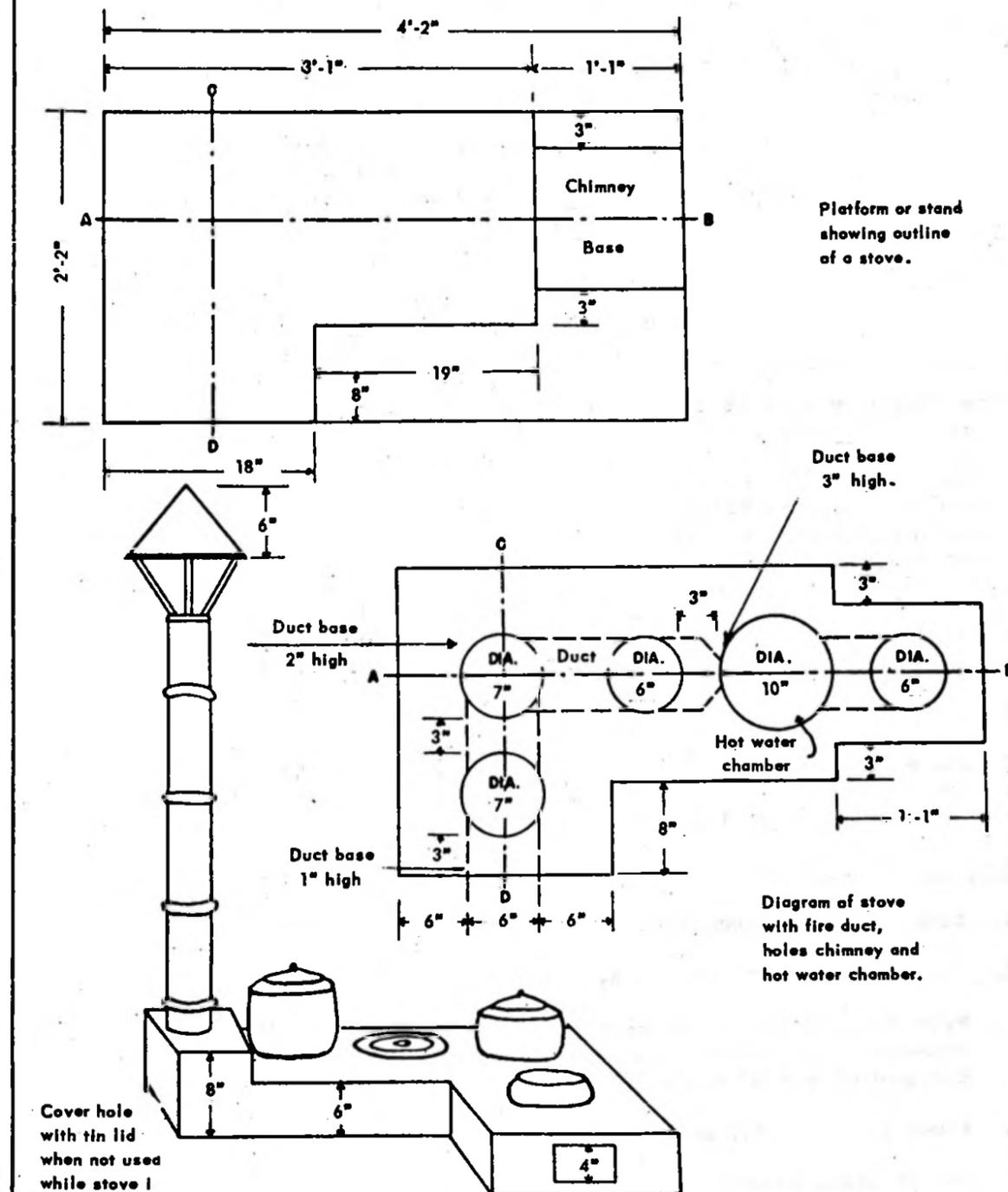
For 3-hole and hot water type - 6" diam. pipe or 6" square masonry.

For 2-hole and hot water type - 4" diam. pipe or 4" square masonry.

For 1-hole and hot water type - 4" diam. pipe or 4" square masonry.

If ready-made pipes slightly different from these dimensions are available, they may be used.

Diagram 30. Smokeless fireplace (by courtesy of Dr. S.P. RAJU)



DRAWN BY  
R. HERNANDEZ  
U. P. R.

C-371

Construction of a Smokeless Fireplace.

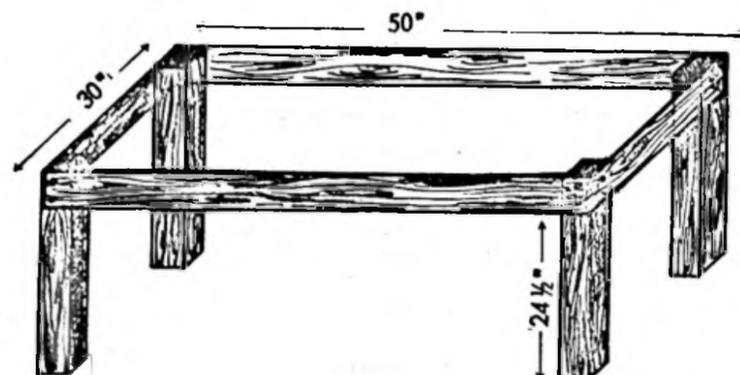


Diagram 30 (a)

The chimney should be ready before the stove is started. Round tin cans, 6" in diameter, can be fitted one on top of the other, or they may be soldered to form the chimney. Drain pipes or round roofing tiles, can also be used to form the chimney. In some places it may prove practical to pack prepared earth round a pipe of suitable diameter, which is withdrawn afterwards. Galvanised sheets, asbestos or cement pipes can also be used. A oowl on top of the chimney to prevent the entrance of rain water may be made of tin for pipe chimneys. A flat stone or a flat asbestos cap may be used for masonry chimneys. The oowl must be removable for cleaning the chimney.

C. Reinforcements for moulding holes:

Scraps of tin, bailing, or pieces of wire should be at hand to use as supports in various parts of the stove. Tops of cans with cut out circular centres may also be used to form the various holes.

D. Preparation of Clays:

1. Secure a large amount of clay, approximately 200 lb.
2. Soak it in water overnight.
3. Next day, take off the water and mix the clay well with sand, saw-dust or cow-dung. Three parts of clay to one part of sand has proved a good mixture.
4. Knead it very well and cover with moist sacks.
5. Let it stand overnight.
6. Bricks can be used in building the walls of the stove. In this case, less clay will be needed.

II. Directions for making the stove:

1. Draw a plan of the stove on the table. (Photograph 1).
2. Place a mould at the back and side of the stand to hold the clay.
3. Build up the fire duct base 1" thick, gradually increasing it to 2" at the L-shaped angle, and 3" high about 10" from beginning of chimney base.
4. Continue building the duct 1" thick to form base for hot water chamber and chimney. (Photograph 4).
5. Place a block of clay in the centre of the hot water chamber to serve as a seat to the water pot.
6. Build the walls around the duct 5" high. (Photographs 5, 6, 7 and 8).
7. Place tins for support and shaping of holes over the passage. Make roof of 1" thick layer of clay.
8. The finished walls should be 6" high. (Photograph 10).
9. Place the chimney in proper place and build up with clay around the base 8" high. (Photograph 11).
10. Measure carefully to assure accuracy.
11. Smooth with water. (Photographs 11 and 12).
12. Cover with damp sacks and leave to dry.
13. Mend cracks that have developed during drying process by moistening surface of cracks and fill in with clay mixture as used for stove.

III. Lighting the Stove:

Place fuel such as wood or other combustible material of the household in duct through front opening and light it. Do not choke the fire by feeding it with too much fuel at a time.

Cover all holes when stove is in use.

CONSTRUCTION D'UN FOURNEAU SANS FUMEE



Photograph 1

Draw a plan of the stove on a built-up stand.



Photograph 3

Measure the height of the duct base to get the correct slope from 1 inch to 2 inches to 3 inches.



Photograph 5

Build the walls around the duct 5 inches high and 6 inches wide.



Photograph 2

Build a fire-duct base sloping from 1 inch in front to 2 inches at the angle and 3 inches at 10 inches distance from the chimney base.



Photograph 4

Continue building the duct 1 inch thick to form the base for the hot water chamber and chimney.



Photograph 6

Start building the wall to hold the chimney at the end of the fireplace.

CONSTRUCTION D'UN FOURNEAU SANS FUMEE



Photograph 7

When the back wall is 5 inches in height start building the front wall.



Photograph 9

The chimney is put in its proper place, and tins placed in support of the top.



Photograph 11

Build the walls around the chimney 8 inches high.



Photograph 8

The walls are now all 5 inches high and ready for the construction of the top with its cooking holes.



Photograph 10

Make the roof 1 inch thick and shape the cooking holes to fit the pans.



Photograph 12

The fireplace is completed when the surface has been well smoothed with water.

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