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Agricultural Experiment Station

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THE WAR GARDEN HOTBED

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THE WAR GARDEN HOTBED

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In order to grow some vegetables successfully in our climate, the plants must be started under glass. Head lettuce, early cabbage, and cauliflower, for instance, require such a long season of cool weather that they could seldom be matured properly in this section if we waited to plant the seeds in the open. In other words, we must furnish them a longer period of cool weather than our climate ordinarily affords, by planting the seeds under glass. On the other hand, sweet potatoes and eggplants require such a long season of warm weather to complete their growth that we could not grow these crops in Illinois at all if we did not give them a good start under protection. Again, the earlier we bring tomatoes into bearing, the larger crops we secure, for on good soil and with a suitable variety, fruit is borne continuously after bearing begins until the plants are destroyed by frost. Even if none of the above circumstances applied to our climate, the starting of many vegetables under glass would be justified by the greater earliness of the products thus obtained.

The best conditions for growing plants are furnished by greenhouses, but these are expensive to build and to operate, and most home gardeners will find it preferable to use a hotbed. The expense of a small hotbed, distributed over its lifetime, will probably not exceed one dollar per season. If the initial cost is too great for one family, two or more may cooperate in the expense and management.

LOCATION

A hotbed should be located in a well-drained spot protected on the north by a building or a tight fence. On level land, the desired drainage and exposure may usually be obtained by plowing or digging so as to leave a good slope to the south, and by opening a furrow or trench to lead surplus water away.

KINDS OF HOTBEDS

Hotbeds are always provided with some form of artificial heat. There are three kinds, depending on how the heat is furnished. The fire hotbed¹ is heated from an open fire pit at one end, the smoke and gases being led thru flues extending beneath. The pipe-heated hotbed is heated by hot-water or steam pipes placed under, or around the edges, of the bed. The manure hotbed is heated by fermenting horse manure placed beneath the surface.

¹Directions for building a fire hotbed are given in Bulletin 144 of this station.

The manure hotbed is the most practicable for home gardens, and is the only type which will be discussed here. There are two kinds, the surface and the pit hotbed. The pit hotbed is sunk partly below the surface, while the surface hotbed is built entirely above the ground.

HOW TO CONSTRUCT A PIT HOTBED

Unless the location is poorly drained, the pit hotbed will be found most satisfactory. It is harder to make than a surface bed, but it is warmer, it requires less manure, and it is adapted for much colder weather.

Thawing Out the Soil.—The site for a pit hotbed should be covered with 18 to 24 inches of fresh horse manure some time during January in order to thaw out the ground in time for digging. There should be no snow or ice on the surface when this is applied, otherwise thawing may be greatly delayed. The same manure may be used for this purpose that will later be placed in the pit.

Type of Construction.—The war garden hotbed, in order to be in keeping with the national policy of conservation, should be economical of constructional materials. Fig. 1 shows a cross-section of a hotbed that not only meets these requirements but is of the greatest efficiency as well. Instead of having plank, brick, or concrete walls that extend all the way to the bottom of the pit, this bed has a frame at the top only, which is supported on bricks or stakes. This plan of construction not only economizes material to the utmost, but permits a pit that extends out 5 or 6 inches farther on all sides than the frame; thus the edges of the bed are kept practically as warm as the center. Furthermore, this kind of frame can be raised without difficulty when the plants become large. It can be taken apart at the close of the season and the lumber stored in a dry place; thus it will last longer than the permanent frame of lumber. With the frame removed, the site can be readily dug up and used for summer crops, whereas a permanent frame would be an obstacle to the preparation and use of the area and might offer a lodging place for insects, plant diseases, and vermin. A temporary frame permits changing the location of the hotbed from year to year if desired. A wood frame radiates less heat than one of brick or concrete.

When to Make the Hotbed.—The hotbed should be made early in February. In our climate, the pit should be dug deep enough to hold 12 to 15 inches of manure. Fairly fresh horse manure is the only kind adapted for hotbeds. It should contain only enough bedding to make it fork well. Better results are secured if the manure is piled up two or three weeks in advance and turned occasionally to insure uniform fermentation thruout the pile. Water should be used if necessary to prevent fire-fanging.

Size and Shape.—The hotbed should be of a size and shape that will fit the kind of sash at hand. Any odd window sash may be

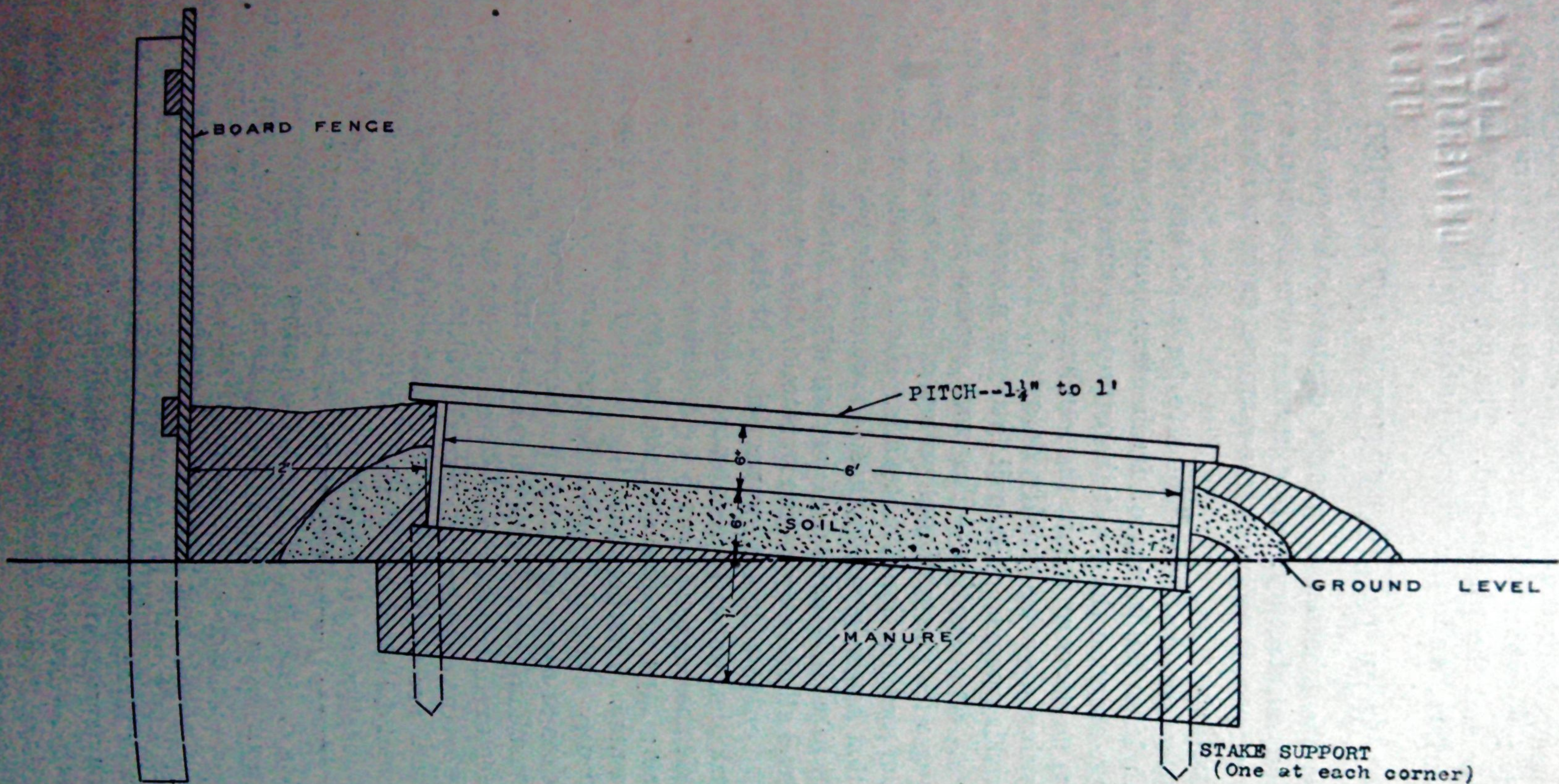
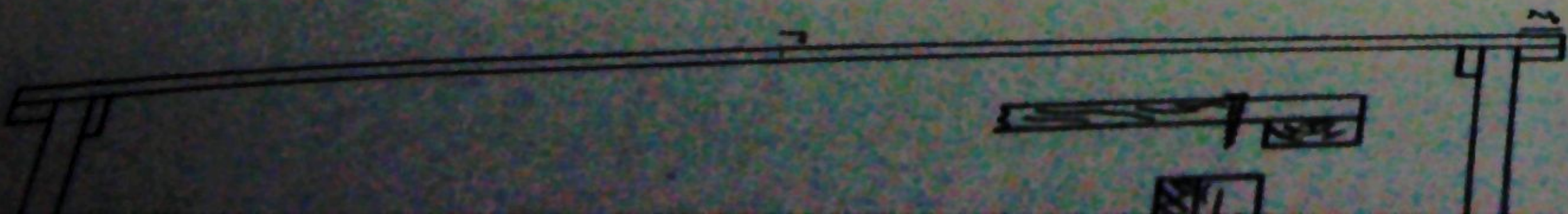


FIG. 1.—CROSS-SECTION OF A PIT HOTBED

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used. Standard hotbed sash, as used by gardeners, are 6x3 feet or 6x3 feet, 2 inches, and if the sash are to be purchased, this kind should be selected. Double-strength glass is preferable to the single strength. Four of these sashes make a hotbed of very satisfactory size for a large garden and two of them will serve for a small garden.

The Frame.—The frame for a hotbed like that illustrated is made of 12-inch boards. However, narrower boards will give satisfactory results. When the bed is longer than 6 feet, the boards on those sides should be 2 inches thick; otherwise 1-inch lumber will suffice. The parts of the frame may simply be nailed together, but in this case the boards are certain to split at the ends sooner or later. By using cleats across the ends of the boards as shown in Fig. 2, much tighter joints are secured and the frame will last several years longer. An inside support should be placed across the middle of the frame to prevent the sides from bending inward (see Fig. 2).

Digging the Pit.—After the frame is made, it should be placed over the hotbed site, and the outline of the pit marked around it with a spade, allowing 5 or 6 inches on all sides. The frame should then be set aside and the pit dug. This should be of such a depth that, when the bed is finished, the surface of the soil inside the bed

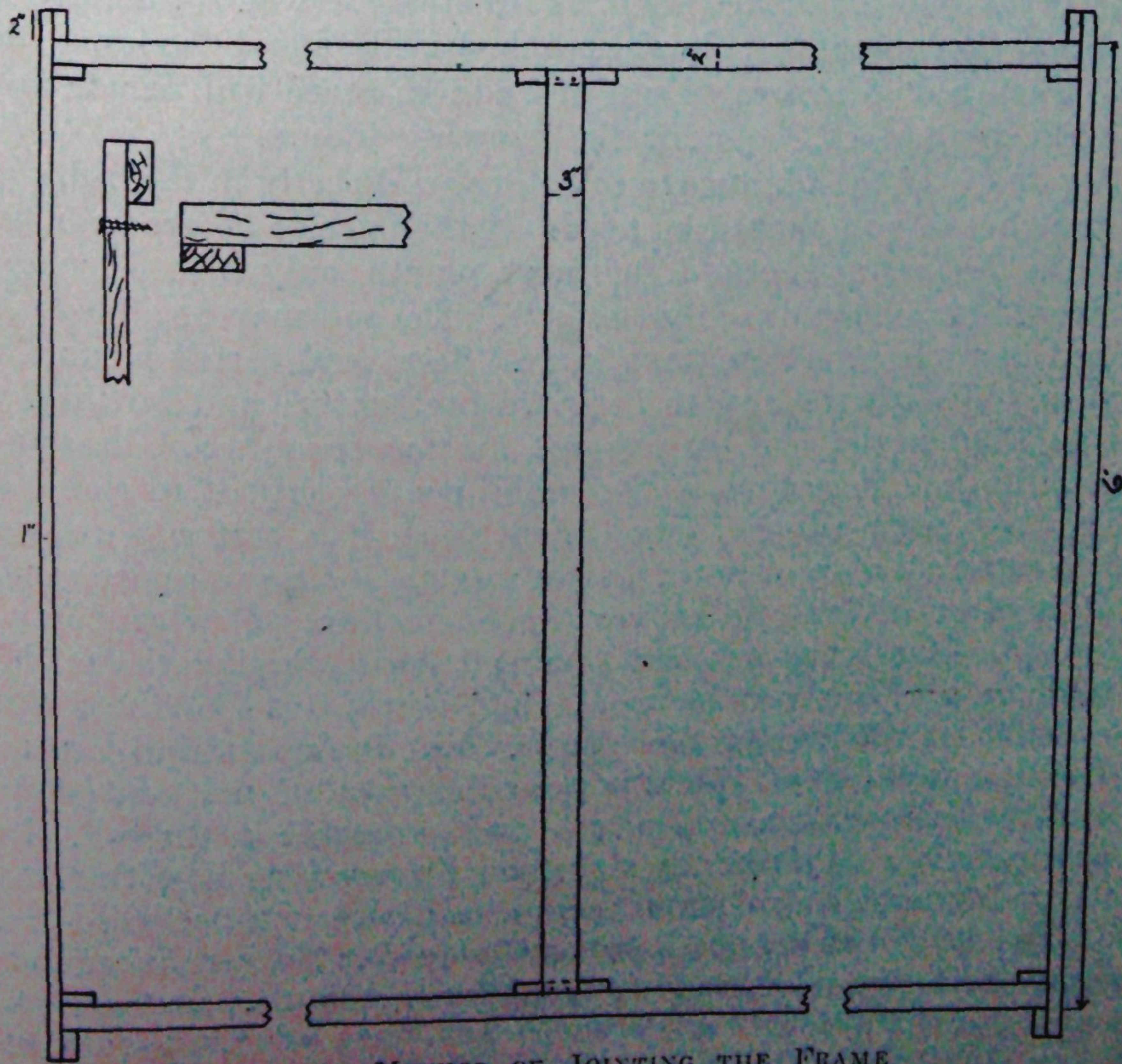


FIG. 2.—METHOD OF JOINTING THE FRAME

will be slightly higher than the ground level on the outside; this precaution may prevent flooding of the bed with water from melting snows or heavy rains. For Illinois conditions, a pit 12 to 15 inches deep will hold enough manure to provide the necessary warmth.

Setting the Frame.—After the pit is dug the next operation is to set the frame. Some persons first place the manure in the pit and simply set the frame on top of it, but it is far better to support it on stakes or temporary brick piers to prevent it from settling out of place. One support should be placed near each corner. The frame should be set at a pitch to the south of about $1\frac{1}{4}$ inches to the foot.

It is important to set the frame squarely so that the sash will fit snugly. To accomplish this in the easiest way, compare the diagonals. When these are of equal lengths, the frame will be exactly square, that is, if the opposite sides of the frame are of equal lengths.

Placing Manure in the Pit.—After the frame is set, the manure should be placed in it. Spread about 6 inches over the bottom, shaking to pieces any hard lumps, and tramp it well. Then add another layer, and so on, until the proper height is reached. If the manure promises not to heat readily, moisten it with hot water occasionally when placing it in the pit.

With a frame 12 inches deep, as illustrated (Fig. 1), the manure, when thoroly compacted, should reach slightly above the lower edge. Thus, when 5 or 6 inches of soil are added, there will remain about the right amount of room for the growing plants.

The Soil.—If the plants are to be grown directly in the bed, about 5 to 6 inches of soil should be used. If they are to be grown in flats, which is the better method for most plants, only 2 to 3 inches of soil should be placed over the manure. The soil may be added when the bed is made or a few days later. Sand and rotted manure are often mixed with the soil to improve the texture and fertility.

Soil that is too rich in organic matter encourages diseases of the seedlings. Therefore, if the seedlings are shifted to richer soil before they begin to need much plant food, it is better to use a soil that is rather low in organic matter; some florists use pure sand.

It is often difficult to secure a good mellow soil when the beds are made. If the surface soil removed when digging the pit is of suitable nature, this may be used. Sufficient soil is sometimes stored in a cellar or pit during the winter. But it is better to expose it to freezing weather as much as possible. One of the best methods is to place the soil in a conical pile on the outside in the fall. Here it will remain comparatively dry, and by covering it with manure early in January, it will be in good condition when needed.

After the soil or the plant flats are placed in the bed, there should remain 5 or 6 inches of growing space for the plants. As the manure decays, the surface will settle somewhat, thus allowing more room for the plants as they become larger.

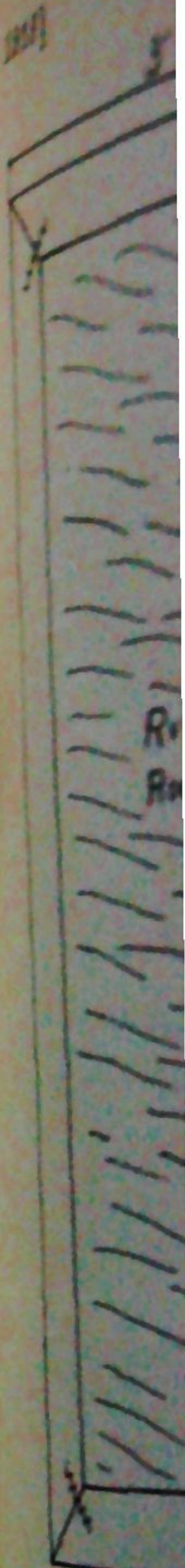


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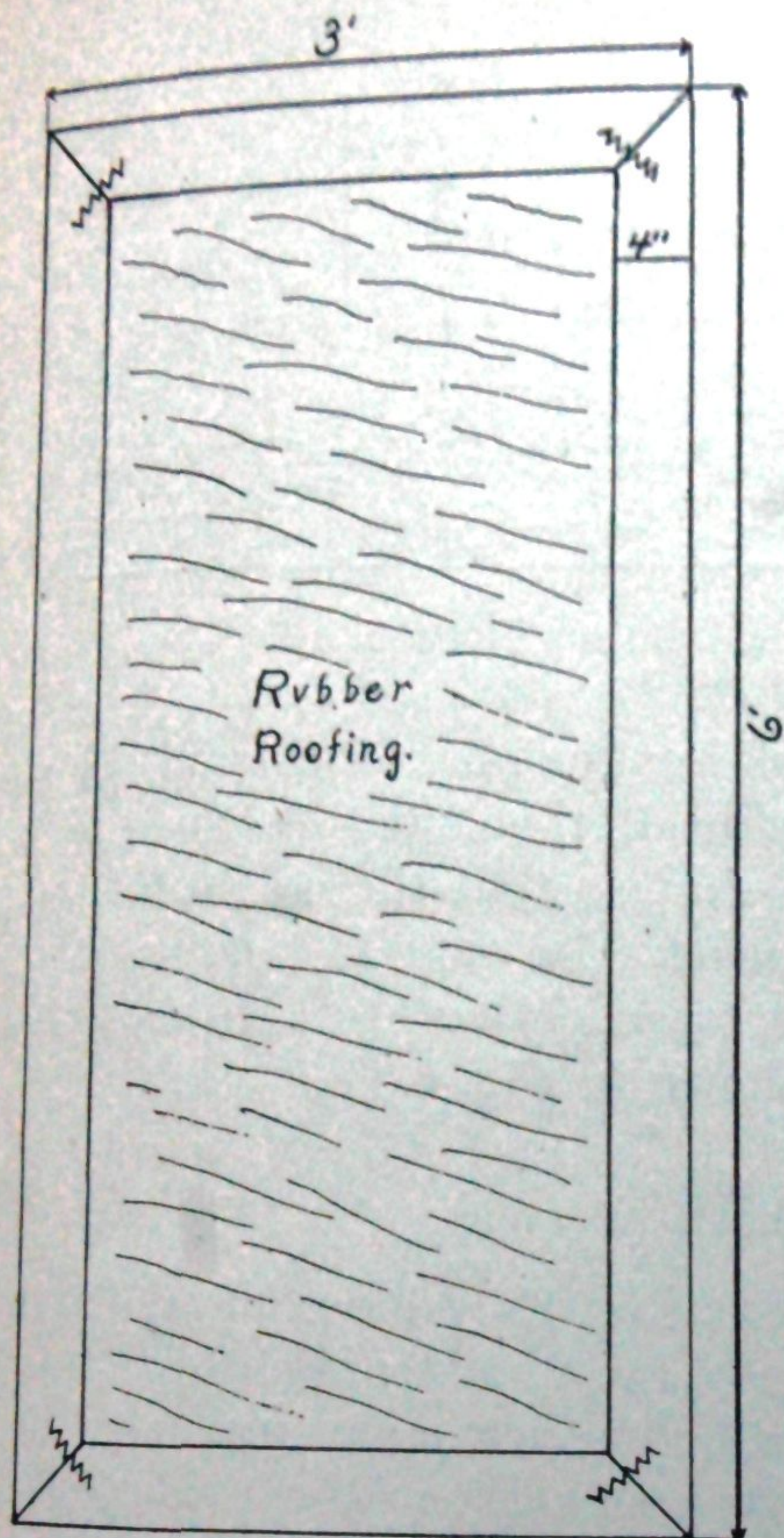


FIG. 3.—HOTBED COVER MADE OF 1x4-INCH STRIPS AND BUILDING PAPER

After the bed is made, the sash should be placed on top, and a layer of soil and manure should be banked around the outside to retain the heat, and to protect the bed from driving winds. All soil and manure not needed should be carted away; if left near the hotbed they may interfere with surface drainage.

Protection in Cold Weather.—For protection in cold weather, extra covers in the form of mats, boards, shutters, burlap, or old carpets, should be placed over the sash. Very satisfactory covers can be made of building paper¹ nailed to frames constructed of 1x4-inch strips. The best method of making the frame is to saw the pieces at a 45° angle and connect them by means of corrugated joints, as shown in Fig. 3. Enough straw or manure should be kept at hand to cover over the edges of the frame at night during early spring. In

severe weather, the entire bed may need covering to keep the plants from freezing.

Time to Plant the Seeds.—If a good grade of manure is used, the bed will heat violently for a week or ten days. The temperature may rise as high as 125° F. During this time the bed should be aired every day and covered at night. *Do not plant the seeds until the bed has gone thru this period of heating and the temperature has dropped to about 75° or 80° F.*

HOW TO MAKE A SURFACE HOTBED

Surface hotbeds are well adapted for poorly drained locations and for use late in the season. As already stated, they are difficult to keep warm in cold weather, and require more manure than pit hotbeds. They are easier to make, however, for digging is unnecessary and frozen ground is no hindrance. The manure is simply spread out over the ground and packed well, and the frame and sash are placed on top. More manure is then banked around the outside.

¹Tar paper should not be used, as the fumes are injurious to plant life.

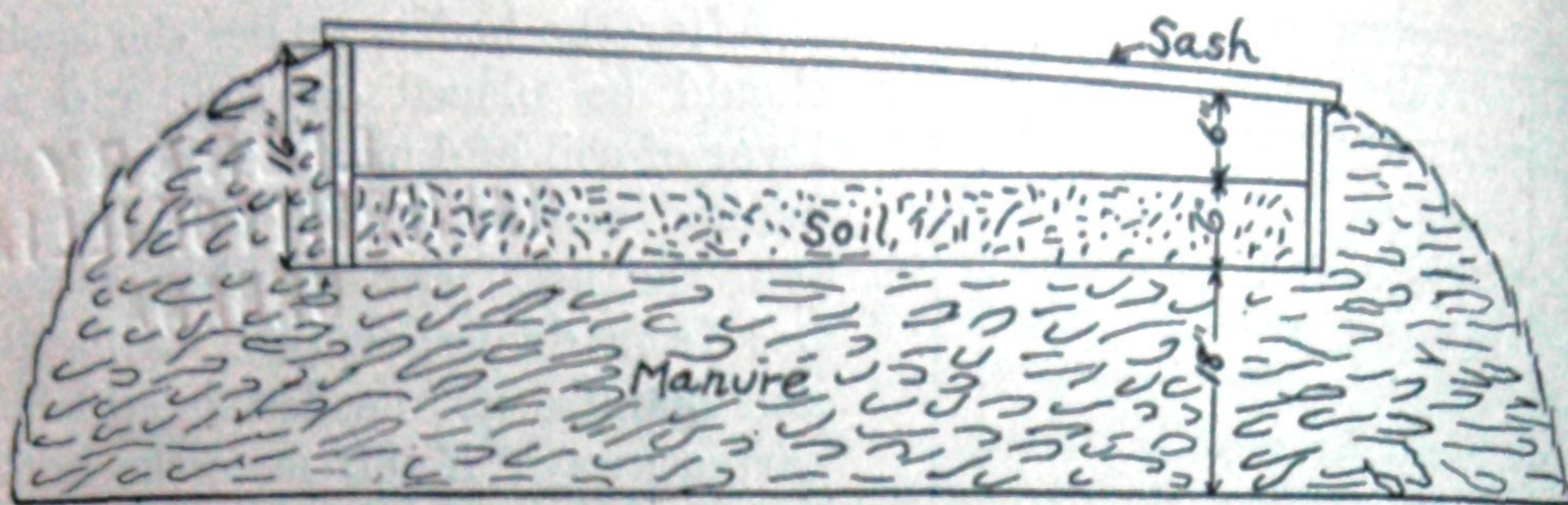


FIG. 4.—CROSS-SECTION OF A SURFACE HOTBED

The same kind of frame as described for the pit hotbed will serve also for a surface bed. The north side of the frame is sometimes made of wider boards than the south side, so that the bottom of the frame may be set practically on the level. In a surface hotbed the frame is scarcely ever placed on any supports other than the manure. A cross-section of a surface hotbed is shown in Fig. 4.

COLD FRAMES

Cold frames are like hotbeds except that they have no artificial heat of any kind. They are used chiefly for "hardening off" plants grown in the hotbeds or greenhouses before transplanting them to the open. They are covered with glass sash early in the season, but for use in the late spring, muslin or canvas covers fastened to rollers will be found convenient, cheap, and serviceable. A canvas-covered cold frame is shown in Fig. 5.



FIG. 5.—CLOTH-COVERED COLD FRAME

The growing of plants in hotbeds and cold frames is discussed in Circulars 198 and 216 of this station.