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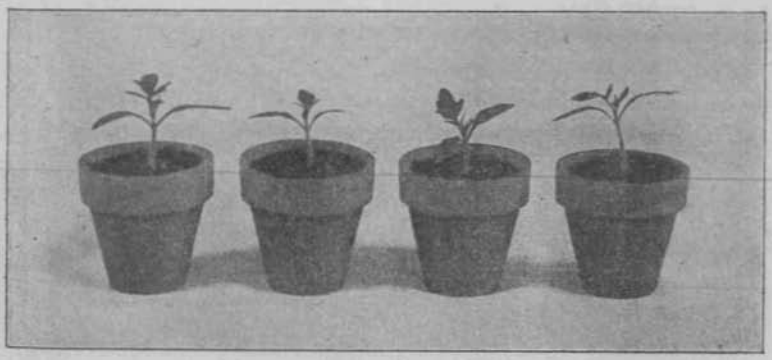

CONSTRUCTION AND MANAGEMENT OF HOTBEDS

BY F. A. HUNTLEY.

DEMOCRATIC-TIMES' JOB ROOM,
Moscow, Idaho
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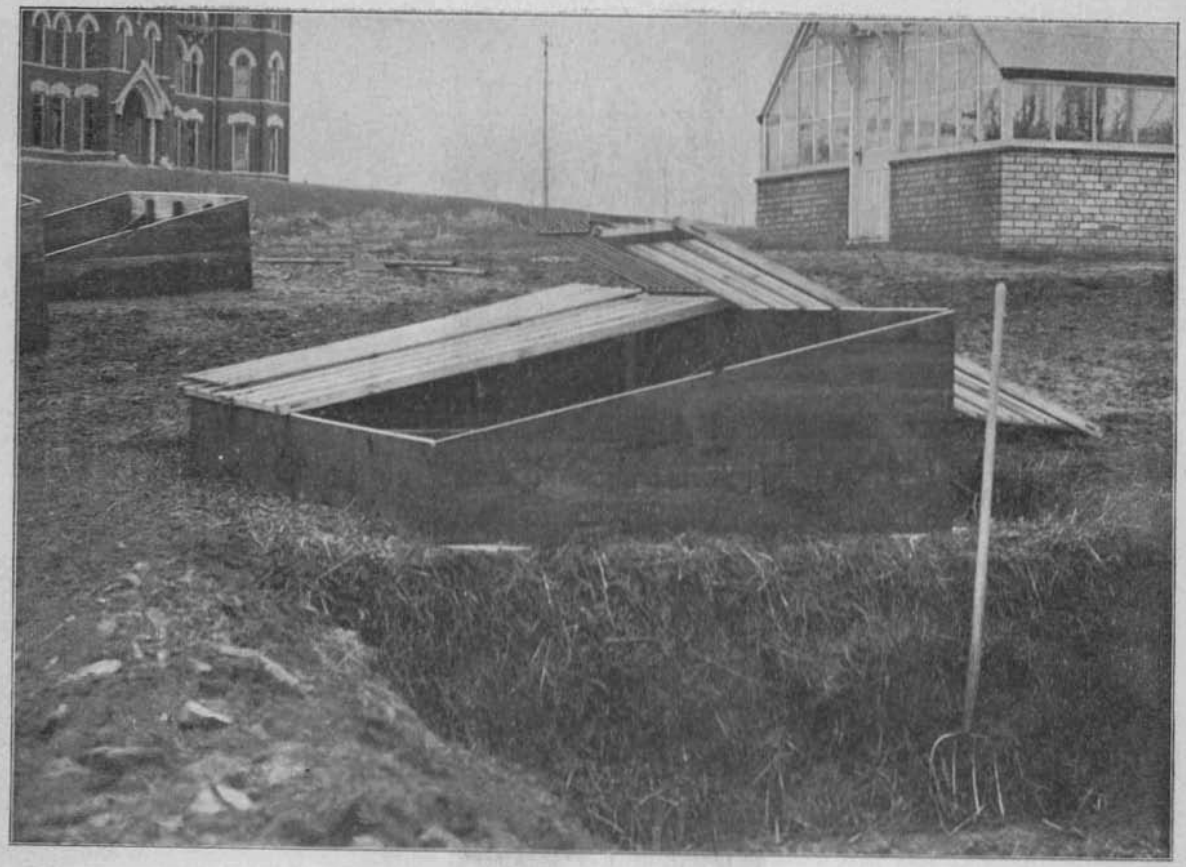
Frame.—Sufficient protection must be afforded to keep out cold and prevent influences of weather changes. For this purpose a frame built of inch lumber will answer the requirements. A hotbed of sufficient capacity for the use of a family of ordinary size should contain at least 45 square feet of ground surface, say five feet wide by nine feet long. The sash or top covering should slope toward the south to admit the sun's rays and to allow the water from snows and rains to drain away readily. The frame should be made of a size to accomodate the sash or the sash can be made to any size desired and adapted to a frame of certain dimensions. At any rate the edges of the sash should just overlap the frame all around to secure closed joints. The slope of the sash should be made to drop about two inches in every foot. Sometimes posts are driven in the ground at the four corners and boards nailed to them, but this is not the best means of construction. Posts are not needed. Corner blocks are better, and they should not project below nor above the edges of the boards, but flush with the edges. Pieces of 2 by 4 scantling make good corner blocks. The front board of the frame should be 12 inches wide, the height of the frame in front when finished, and if the frame is to be five feet wide the back should be 22 inches high and the ends sloped to meet the top edges of both front and back. Braces will be needed clear across the frame on the inside. Two or three will answer, but they must be provided and properly distributed to prevent crowding the frame out of alignment when the banking of earth is thrown up on the outside, a protection necessary to early planted beds.

Sash.—These can be purchased ready made, or any person handy with tools can make them and in this way often save expense and usually secure better construction. At least I have found the ordinary ready made hotbed sash a flimsy article. The usual length of ready made sash is six feet, which necessitates the construction of beds about six feet wide. This width I have found very inconvenient for planting, weeding, thinning, watering, and finally in taking up the plants for transplanting. Access to the bed is almost always difficult excepting at the front or lower side, and a reach of over five feet is too great for convenience. A good



HOTBED DURING THE PROCESS OF CONSTRUCTION.

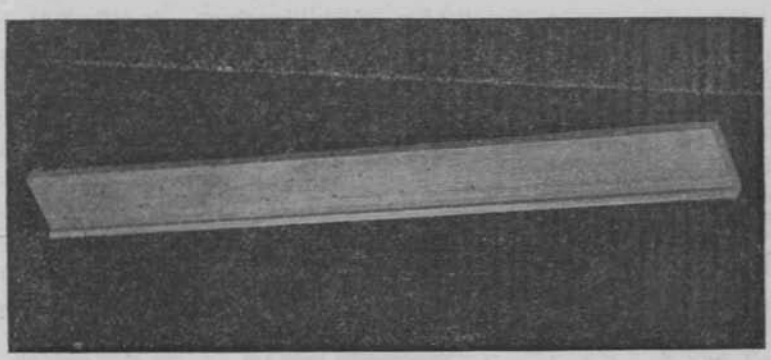
sash can be made as follows: For convenience in figuring let me assume the size of glass used to be 10 by 12 inches, although other sizes are admissable. There will be three rows lengthwise of the slope, and each row will contain five lights. The long way of the glass shall be in the direction of the slope when in use. Two end pieces of wood, two side pieces, and two sash bars intermediate, running lengthwise, will be required. The intermediate bars must support the center row of glass and the two inner edges of the two outer rows of glass. To do this the corner edges of the upper side of the sash bars must be rabbeted or cut out a quarter of an inch wide and a quarter of an inch deep. The inside edges of the side bars must be accordingly rabbeted to receive the glass and form their support. The side bars like the others should be an inch and a half in thickness, but about two and one-half inches wide. Thus we have grooves for three rows of glass The end pieces should be of inch and a quarter material and have the ends of the sash bars joined to them by means of mortise or groove connections. In setting the glass a quarter inch lap should be made over each other as in laying shingles, but a lap of at least a half an inch should be made over each end connection with the wood. Before setting the glass it is best to apply two coats of lead paint to the sash. If zinc points are used instead of nails in setting the glass, breakage will be best avoided. Putty can be used or not, but by its use greater strength and durability are secured.

The Pit.—The depth to make the pit for the heating material, the manure, will depend upon how long a period it is desirable to have the heat maintained. Hotbeds constructed late in February or early in March will need to have heat kept up for several weeks, or until the warmth of the spring season has tempered the surrounding soil. In this case a depth of four feet will maintain proper conditions. Ordinarily about April 1st is the best time to start hotbeds to raise plants for the garden. At this time two feet in depth of manure will secure all the heat necessary. Good drainage must be secured at the bottom surrounding the pit. If water from snows, rains or springs, is allowed to enter the manure the heat will soon be destroyed. Last year while

sides and ends should be well banked with the soil previously taken from the pit, and in doing this the main idea is to secure good surface drainage. The sash should be put on as soon as the seed bed has been prepared, and planting can be done any time thereafter. A few inches of settling always takes place as the manure becomes compacted, but if the whole mass has been evenly built up no irregularity of surface will result as would in the case of a frame built stationary and filled in the old style manner of constructing hotbeds.

Planting.

The soil of the seed bed should be quite moist but not wet, to be in the best condition for planting. Six inches between rows



MARKING BOARD.

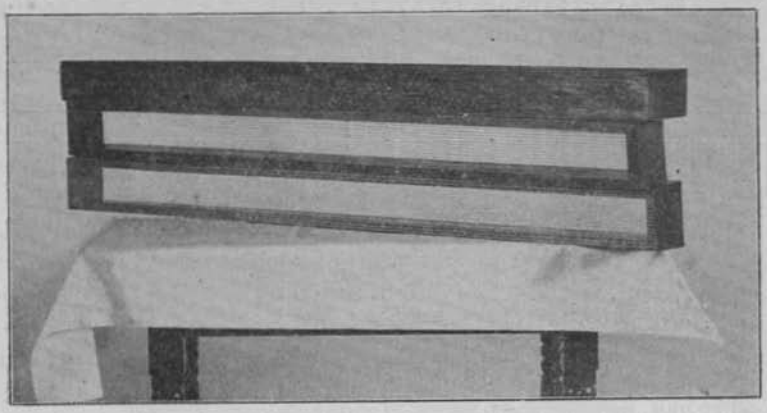
is about right for distance. Closer than this will cause slender growth in most plants, and a greater distance than six inches would ordinarily prove a waste of space. In marking the rows for planting the old method of scratching the soil with a stick drawn along the edge of a board is usually unsatisfactory as it is impossible in this manner to get the seeds covered to a uniform depth. The marks should be made by pressure instead. A good marker for a hotbed is made by taking a board six inches wide and of a length the rows are to be made. Along one edge of the board a strip is nailed projecting below the edge about a quarter of an inch as the board lies flat upon the soil, and should form a

V-shape projection which is imprinted in the soil by walking on the board. Each time a row is planted a mark is made for the next, and so on until the planting has been finished. The seed is covered by sifting the grooves full of fine soil, after which a thorough sprinkling with water settles the particles of soil about the seed and insures uniform conditions. For some seeds such as celery and those of a light nature, a quarter-inch groove in the soil would be too deep, in which case a gauge of proper depth can be easily provided.

Moisture.—While seeds are germinating, the soil should never be allowed to become dry even for a brief period. If the growing germ or even the seed leaves ever become dried out, recovery can hardly be expected of most plants. It is, therefore, of the utmost importance to afford protection to seeds and young tender plants during the first stages of growth, especially in respect to furnishing a constant supply of moisture. Evaporation of moisture is usually very rapid at the surface of the soil when unprotected by some kind of mulch. A thin layer of moss is sometimes used to arrest evaporation until the plants become well rooted. A very practical substitute for moss I have found in the use of a single thickness of cheap muslin spread, in contact with the soil, over the seed bed immediately after planting. Watering can be done without removing the cloth which can be left on until the plants by their own force of growth lift it in well defined ridges, and become safely established by their roots penetrating well into the soil. There is not as much danger of drying out after plants become deeply rooted. The appearance of the foliage will always indicate the supply of moisture present. It is a fact, however, that very many persons fail in their judgement in regard to irrigating hotbeds. Water should be furnished most liberally when it is applied. The soil should always be saturated to a depth below the limits of root growth, and then the water withheld until the foliage clearly indicates the need of more moisture. Frequent light surface waterings hinder root development and plants so managed are sure to become dwarfed and show lack of vitality.

Heat—Bottom heat favors root development. Excessive top heat,

that is, confined atmospheric heat, with too low temperature at the roots favors excessive top growth. Plants raised under the last named conditions have not their vital forces well enough balanced to transplant well and sustain themselves through the changes, without suffering deterioration from which they never fully recover. Too much top heat from the sun's rays is often the cause of plants becoming languid before transplanting from the hotbed. During warm sunny days the glass should be removed or tilted back, and during very warm days when the atmosphere is at a high temperature, shade should be provided. Lath screens made the size and to take the place of each sash, render very good shade protection. The spaces should alternate with each lath, and be of the same width. During warm nights, say at a minimum temperature of 45 degrees, it is best to leave off the sash, as such exposure tends to make the plants hardier.



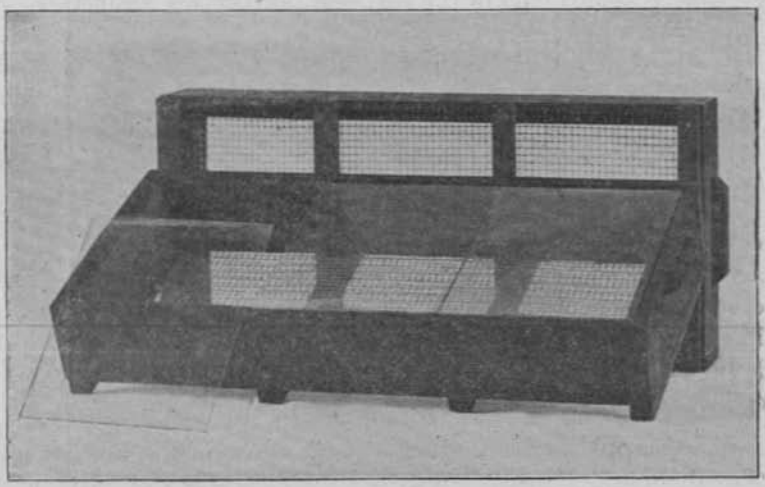
HOTBED TRAYS.

Air.—Plenty of fresh air is needed by plants at all times, and especially while a high temperature prevails, and plants are in the activity of growing. Good judgment may determine when and how much to ventilate, and a thermometer hanging in the frame will afford something of a guide. About seventy to seventy-five degrees is a good day temperature and 45 to 55 degrees for night.

Transplanting.

A common error is in allowing plants to remain too long in the hotbed before transplanting. They are usually allowed to grow without thinning, as it seems to most persons a sacrifice to destroy the things that have cost labor and painstaking care. Left in this way slender growth will always be the result, and much time is sacrificed in nursing the plants back to the vigor they once possessed before they became too cramped in growth. Again I want to say, do not plant hotbeds too early, as young thrifty plants set in the open ground have a decided advantage over those left too long in the seed bed and become weakened by spindling growth. If plants are inclined to grow tall and crowd each other before the season will justify transplanting to the open garden, it will prove wise economy to thin them enough to insure good healthy and stocky vigor. If it is desirable to save the plants removed by thinning they can be transplanted to other beds with perfect success. A hotbed is not necessary to receive them, but what gardeners call a cold frame can be provided This is in every sense a hotbed prepared without the heating material, but otherwise constructed the same. Some plants of which the egg plant is a good example, are somewhat difficult to transplant excepting while very young. It will pay to provide small pots, or something of the kind, while the plants are very small and can be taken up with soil adhering. Started in this way they can at any time be shifted to larger receptacles and given more room as increased growth demands, and the soil need not be disturbed from the roots. A good substitute for pots is old one-quart tin fruit or tomato cans. They can be unsoldered, the bottoms removed, and the circular shape preserved by wrapping and tying with stout string. When shifting these bottomless cans a trowel can be run under them and they are lifted without the contents falling out at the bottom. The strings can be removed in transplanting and the ball of earth preserved intact. Another device which I have used with success is herein described and illustrated: Instead of planting seeds in the seed bed as previously described, long narrow trough-like boxes or trays can be sunk in the earth side by side and each be made to

contain one row. Correct spacing of rows can be had by their use. To have these serve the intended purpose plants must be thinned to spaces of about two and one half to three inches in the row. When the time comes for transplanting, the troughs can be carried to the garden and the use of a sharp garden trowel will enable one to take up each plant without breaking the soil about the roots, and shift to the open garden with almost the advantage secured by the use of pots. I recommend that troughs be made three and one-half inches deep, three inches wide inside at the top, and a little less at the bottom to make them flare.



FLATS.

The bottoms should be covered with stiff galvanzied wire netting of quarter inch mesh. The use of three quarter inch lumber serves the purpose well for sides and ends. The illustration shows three of these trays piled to display bottom, top, side and ends, and the manner of their construction.

A good serviceable covering for late-prepared hotbeds is heavy muslin to take the place of sash. To render the cloth impervious to water, and durable, it should be coated with boiled linseed oil, applied with a paint brush. Narrow strips of boards to which are tacked the long margins of the cloth, serve to stretch

the cloth over the frames and render handling a convenient operation. During cold days and nights beds with cloth coverings need the additional protection of board shutters made solid and in sections to lay over the cloth. Such shutters are very practicable also for use over glazed sash where beds are planted very early and severe cold weather follows.

A good substitute for early hotbeds is the use of shallow boxes, called "flats," in which seeds are planted, and afterwards the young plants may be shifted to late prepared hotbeds. Flats can be handled with good success in an ordinary room with a night temperature maintained at not below fifty degrees. They should be prepared with good soil and be kept reasonably moist and never be allowed to dry out. Good means of drainage at the bottom is important unless great care is observed in watering. The picture illustrates a good construction for flats. Before the soil is put in, a cloth is laid over the bottom to prevent leakage. The open bottom as shown insures perfect drainage and admits the air to keep the soil pure and free of fungus diseases. Provision is made for glass over the top to save the rapid evaporation of moisture over the germinating seeds, which will occur in a dry room if the top is left open. About two inches of soil is sufficient for the germinating process, although a little deeper soil will hold moisture to better advantage.

Plants should never be allowed to suffer a check in their development from the time they appear until they become well established in the garden. The time of maturity may be hindered several weeks by a single period of neglect. Keep plants growing thriftily at all times is the best safeguard to success.