A PRACTICAL DRIER FOR BOTANICAL SPECIMENS

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Several kinds of drying apparatus for botanical specimens have ben described at various times. The one concerned in this account has been in use in the botanical laboratories of the University of Arkansas since 1921. It was designed by the writer for the purpose of affording a drying apparatus with a circulation of warm air passed through a plant press employing corrugated paper separators. This form of drier was developed after considerable experimentation with various designs, is free from fire hazard, and is easily adjusted for use, whether a large bundle of plants is to be dried or only a few specimens.

The apparatus as described here is of duplex form, having two complete units built into a single piece of equipment. Air, warmed with mazda lamps which are placed at some distance from the specimens, may be distributed uniformly to all parts of the plant press. An important feature is a safety gauze of ¼ inch galvanized wire, which serves to protect the lamps should the bundle become untied and the specimens or other inflammable material fall down on the lamps.

The receiver shown for holding the press full of specimens has many advantages. It has sloping sides (figure 1, upper left) in the form of a hopper with one end fixed and the other adjustable. When only a few specimens are to be dried, the press is placed edgewise directly on the gauze, and the loss of warmed air passing outside of the corrugated driers may be checked by the use of rolls of paper or towels. If the plant press contains several dozen specimens, it will automatically fit somewhere into a higher position in the hopper. The sloping sides tend to hold the bundle tightly enough to compensate for shrinkage of the press as the specimens dry. If a similar pressure is desired on the upper edge of the plant press, this may be obtained by suspending two moderate weights from cords fastened by means of hooks, with the cords crossing over the top to the weights on opposite sides. The adjustable end assists in the insertion and removal of the press and is pushed in during the operation to prevent leakage of warm air around the end. This arrangement will receive a bundle of plant specimens which stacks 16 inches thick when tied. By placing

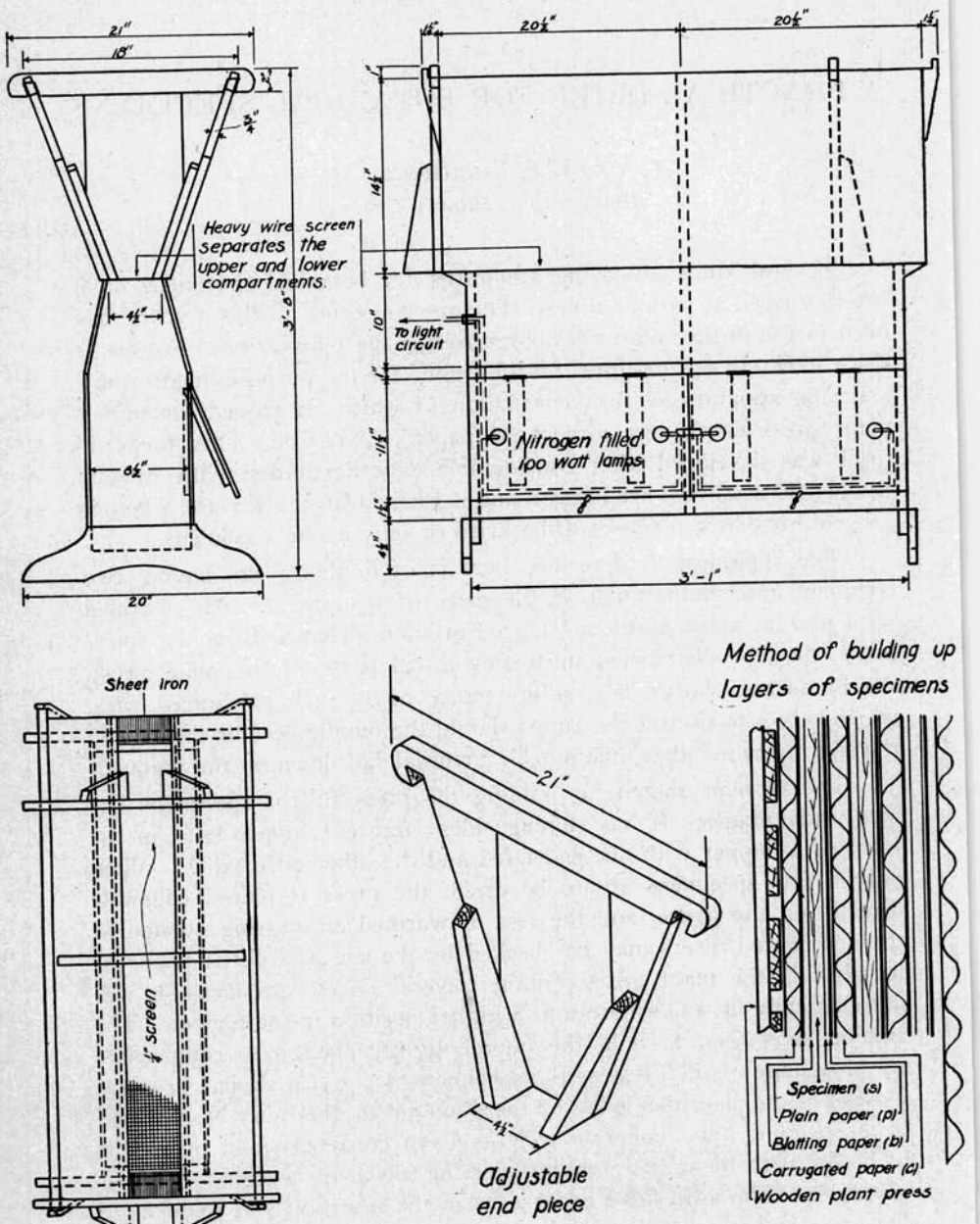

FIG. 1. *Above*—Design of plant drier, end and side views; dimensions are given in inches. *Below*—Top view of hopper showing ¼-inch screen gauze, adjustable end piece, and the proper method of building up a press using corrugated separators.

the press or several plant presses across the top of the hopper, 20 inches of the thickness may be accommodated in each unit, and with the duplex arrangement shown in the accompanying plan of construction, one has available a capacity for drying more than 100 plants as rapidly as only a few.

The accompanying drawings of the plan will serve as a sufficient guide so that a mechanic of average intelligence may construct this apparatus. The correct dimensions are given on all parts, as the drawing was not made and reproduced strictly to scale. The essentials include two flues, one for each unit, 24 inches high and 8½x18 inches in section, in which lamps are installed. The upper ends of the flues narrow down to 4½ inches at the place where the ¼-inch galvanized safety gauze is inserted and the hopper begins. This narrowed throat serves to deflect a part of the air current and tends to spread it slightly within the hopper. The hopper is 4½ inches wide below, widens to 16 inches at the top (inside dimensions), and is 20½ inches long, projecting slightly beyond the flue in order to give space for the adjustable end piece. The piece of sheet iron (fig. 1, lower left) is a stop for stray air currents beyond the end piece when pushed in, but this part may be attached to the bottom of the adjustable end piece or it may be replaced by a small block of wood. Hinged doors permit easy access to the electric lamps which may be turned on and off as occasion requires. In dry weather a single lamp is usually sufficient to dry the plants; in damp, rainy weather both lamps should be used. Various other forms of electric heaters have been suggested, but I have preferred lamps since it was found that the 100-watt, nitrogen-filled mazda bulbs develop about the proper amount of heat to give satisfactory circulation of the air, and when lamps are used there is never any question as to whether the apparatus was left turned on or off.

The height or length of the flue here given was found after several trials to be most desirable. Earlier, in 1919, a low form of this type of apparatus was constructed in which the plants were brought down close (within 5 inches) of the electric bulbs, when the plant bundle rested on the gauze. This form of apparatus, although it dried the plants fairly well, did not give the even distribution of heat and heated air which was found in the apparatus made two years later with a 24-inch flue. Apparently it depended too much upon a smaller volume of heated air, rather than a larger volume of well circulated warm air. After the form described here was found to be an improvement over the low form, a tall form with a flue 3½ feet high was constructed. This apparatus was also somewhat less satisfactory, but is still in use. Altogether, the form with dimensions and proportions as described here

was found to be the favorite drier and was somewhat more practicable than the other two types. Plants may be dried between morning and evening, or over night. As a piece of laboratory equipment, this drier is ideal. It is not a portable drier, but it would seem that anyone with a little mechanical ingenuity might take the dimensions here given as a guide in the construction of a lighter piece of similar apparatus, perhaps making it out of wall board, which could be quickly set up or knocked down and packed into a trunk.

This piece of apparatus which can be constructed from stock lumber by an ordinary mechanic, is relatively cheap, and very simple in operation. The greatest item of expense is the corrugated separators. We found it economical to purchase the corrugated paper in 250-foot rolls 1 yard wide. A common brand called Ridgeway corrugated paper comes in several grades of which the single faced "straw back" weighing 70 pounds per roll is desirable. Any printer or paper dealer will know where to place such an order. The cost per roll need not exceed $4.00 to $4.50 at current prices, and may be cut into about 560 separate pieces 16 inches long and 11½-12 inches wide. The single-faced corrugated paper is as satisfactory as the double-faced but should be used in conjunction with blotters. The lower right-hand diagram shows how they may be stacked in filling the press. A plant specimen is placed between single folds of newspaper, this between two blotters, each specimen being separated from its neighbor by a single corrugated sheet. When the corrugations become dented there is still air space between the blotter and the corrugated sheet.

The blotting paper (sheets 11x16) supplied by the paper dealer should be cut to desired dimensions by the printer. Blotters for drying plants need not be thicker than the ordinary office blotter stock.

A hint as to a simple and easy method of cutting the corrugated paper roll into sheets may be appropriate here. If some of the paper is unrolled and then rolled back into a small, more compact roll about 12-14 inches in diameter, tied with stout cords at the middle and toward the two ends, it may be cut into three small rolls 11½ or 12 inches wide with an ordinary cross-cut saw. If desired, a special miter box may be constructed for sawing the rolls with greater convenience and accuracy. The paper in small rolls may then be cut into 16-inch lengths with a large knife. This treatment does not crush or damage the corrugations at the edges of the sheets. The separators need not be more than 11-11½ inches wide so that one may cut the ends off the rolls if it seems desirable to discard the damaged edges of the original roll.

Several types of plant drier based upon the principle of utilizing artificial heat and corrugated separators between the blotters have been described. There is nothing new or novel in this general method which has been in use for twenty-five years at least. However, several of these types of driers embody a design which brings the specimens into very close contact with the source of the heat. The type here described utilizes convection currents of air only slightly warmed, has a range of adjustment to accommodate from a few to more than 100 plants, is economical of construction and operation, and is safe from fire. Its successful use for more than ten years has fully demonstrated its practicability.