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LABOUR REDUCTION TECHNIQUES FOR PROPAGATING AZALEAS AND MAGNOLIAS BY CUTTINGS

JON. T. SLYKERMAN

Slykerman's Nurseries

5 Leah Avenue, Upwey, Victoria

Preparation and Pasteurization of Medium. One part German peat and three parts coarse river sand are mixed in a 6 cu.yd. concrete mixer. This is driven by a 3 h.p. electric motor. The drum revolves at 3/4 rpm.

Heat pasteurisation of the medium is performed in the revolving drum by a diesel oil burner. (Fig 1.) This is best described as a "conduction heater" or an "indirect flame heater."

A vented mild steel pipe, approximately 6 ft. long, is attached to the burner and carries the heat inside the drum. When mixing, the drum revolves in a counter-clockwise direction, pulling the soil to the right hand side of the drum. The heat is directed into the air space on the left hand side of the drum. The hot air then warms the steel drum. The medium is warmed by contact with the hot air and heated metal surface inside the steel drum. Hence the reason for the above names.

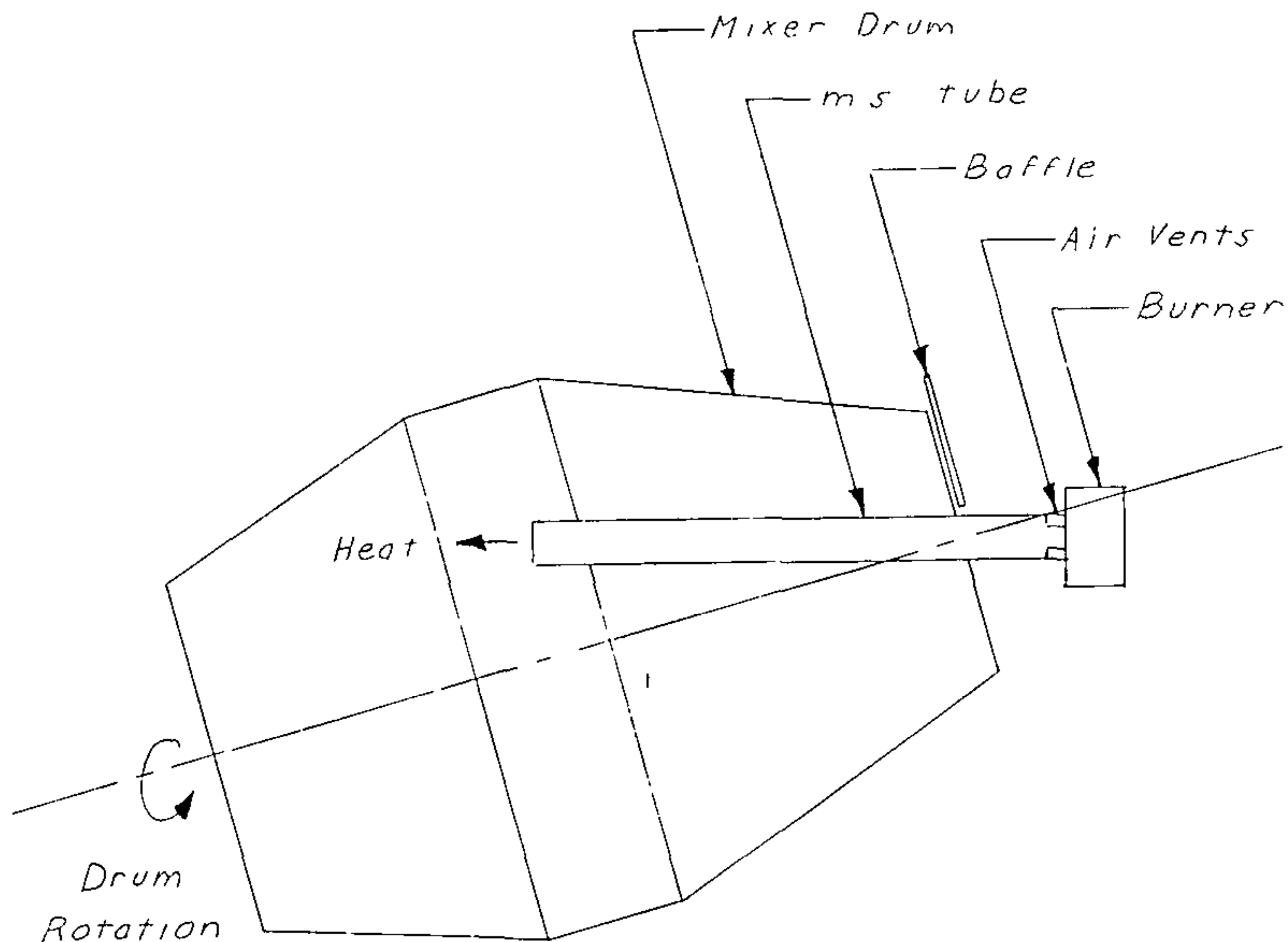


Figure 1. Burner and drum layout for mixing and pasteurizing medium.

The peat is first loaded into the mixer using a front end loader. Water is sprayed into the revolving mixer to thoroughly wet the peat. To save time the burner is then started, followed by loading of the sand. A sheet metal "baffle" is then placed over the top half of the mouth of the drum. This reduces the amount of heat escaping, and speeds up the heating time. Normally this is 1 to 2 hours, depending on volume, water content, and outside air temperature. The temperature of the medium is checked with an 18-inch stem thermometer inserted through a hole in the side of the drum. We currently heat the medium to 60°C and keep it there for ½ hr.

The cooling cycle is initiated by removing the "baffle", sprinkling water on the outside of the drum, and disconnecting the ignition of the oil burner, allowing it to blow outside air into the mixer. This normally takes 1 to 2 hours, depending upon volume and outside temperature.

When the medium has cooled to at least 30°C, we add 4 lb/cu.yd. of 8 to 9 month Osmocote, 1 lb/cu.yd. Micromax, and 1 lb/cu.yd. dolomite lime. After further mixing for approximately 1 hour, the medium is emptied onto a bench in front of the mixer, where it is placed in tubes or trays.

The filled trays or tubes are placed on a "handy angle" roller conveyor, where they are thoroughly watered. This is followed by punching holes in the medium, with a multi-hole

punch. (Fig. 2). This is a device with dowling pins or nails to form holes, which saves individual dibbling. The main feature of this is a stripper plate to hold down the tubes as the pins are withdrawn.

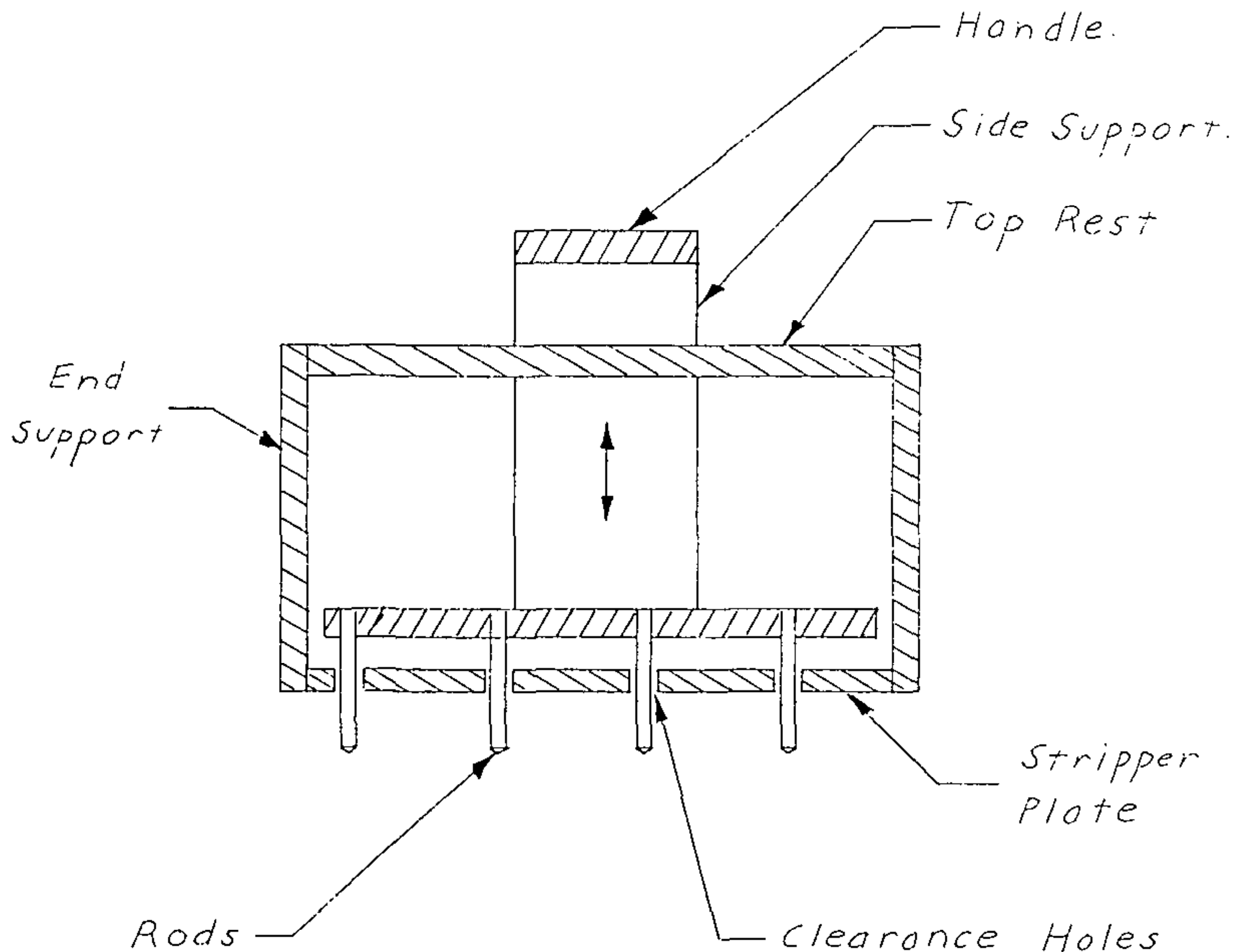


Figure 2. Cross section of multi-hole punch (not drawn to scale)

Magnolia Cuttings. Species and cultivars propagated are: *Magnolia heptapeta* (*M. denudata*); *M. × soulangeana*, 'San Jose', 'Purpleform', 'Picture', 'Lennei', 'Lennei Alba', 'Rubra'; *M. quinquepetala*, *M. q.* 'Nigra'; *M. kobus*, var., *stellata*; *M. salicifolia* (*M. × proctoriana*), *M.* 'King Rose'; and *M. kobus* var. *loebneri* 'Leonard Messel'.

The first crop of cuttings is taken in mid-summer (the week before Christmas in Australia). They are taken early in the morning, mainly from stock plants. Soft, juvenile shoots are cut off using secateurs; they are protected from direct sun till they arrive at the propagating shed. Normally 1 to 2 leaves are left on a cutting 6 to 9 in. long. Large shoots are cut into 2 or 3 cuttings with a node at the top and bottom. Leaves are not trimmed, with the exception of 'Lennei', which has extremely large leaves. The cuttings are then dipped in a solution of Rovral, Alliette, and Malathion. they are then side wounded, (approximately $\frac{3}{4}$ in.) and the bases are trimmed using a grafting knife.

A hormone powder of equal parts IBA powder and Captan is used. For the *M. kobus* var. *stellata* types, 2% IBA is used, with 1% IBA for the others. We have experimented with liquid hormones on *M. heptapeta* with little success.

Because magnolias have large fleshy root systems the cuttings are inserted in 6cm (2½ in.) tubes. They are then placed under mist with bottom heat of 20 to 25°C. After approximately 6 to 8 weeks they are moved to an unheated polyhouse. The mist house is then filled with a second crop of magnolia cuttings, during late summer (mid- to late February).

Azalea Cuttings. Approximately 70 species and cultivars of azaleas are propagated, mainly Indicas and Kurumes.

For the first time this year, the cuttings from the previous year, which had been stuck in plastic seedling trays, had their tops pruned off with an electric hedge trimmer. These were used for cuttings. Our procedure for this is to strip the cutting and pinch the top out, then dip it in the same fungicide solution as used for the magnolias. The person sticking them gathers a bunch of approximately 15 cuttings with the tops level. The bottoms are then cut off with secateurs, leaving cuttings approximately 2 in. long. These are then dipped as a bunch in 1% IBA powder with 10% Captan added. The trays of cuttings are then placed in a glasshouse which is heavily whitewashed and equipped with bottom heat and fine sprinklers. Depending upon weather conditions, the sprinklers are manually turned on for 10 to 20 seconds every 1 to 2 hours. This is gradually reduced to a daily watering after 2 months. At the age of 4 to 5 months, they are sprayed with 2.5% Atrinal to encourage branching.

The previous year's cuttings, which have been pruned, are moved to a shadehouse. They are potted directly into 5-in. pots from the seedling trays, eliminating the tube stage. Although this is a severe setback, they recover to grow into bushy, good commercial quality plants.

Summary. Labour reductions are achieved by the following:

a) Simultaneous mixing and pasteurising of the medium in large quantities.

b) Use of a multi-hole punch to eliminate dibbling.

c) Use of roller conveyors to reduce handling.

d) Use of an electric hedge trimmer to obtain cuttings.

e) Elimination of tubing.