

musculature which is responsible for lateral and longitudinal movement of the setae-covered tergal and sternal plates over the granular surface of the abdominal receptacle. The abdominal receptacle is a cone of fine-grade sandpaper connected by a needle to a piezo electric element which directs its output signal to the high impedance biological signal amplifier—and is instantly transcribed by the servo-chart recorder (see diagram).

An untreated abdomen alone is capable of generating a strong signal, but injection of *any* neuro-active substance causes it to become hyperactive, resulting in specific characteristic frequency and amplitude variations from the normal rhythmic wave form.

Testing

Testing excised honeybee abdomens with the Biosonic Analyzer System made it possible to determine the degree of histamine irritation as well as the degree of *counter* irritation caused by compound X when it was combined with the same amount of histamine *causing* irritation. With this dual technique it has been learned that 0.006 per cent compound X physiochemically inactivates 0.008 per cent histamine when both are administered simultaneously into living honeybee abdomens, and that this inactivation is comparable to what occurs at the site of histamine liberation. Evidence of this is illustrated in the graph. It is also interesting to note that these data corroborate results observed in the field where histaminergic skin conditions on higher animals have been corrected by topical applications of experimental compound X.

Research is still in progress and additional drugs and pesticides are currently being evaluated. Investigations are also underway to relate the physiological and pharmacological similarities in mechanisms of drug action at the mammalian level. The Biosonic Analyzer System, utilizing insect bio-assays, appears to be a potentially significant contribution to rapid screening and evaluation of pharmacological and toxicological substances of agonist, antagonist and depressant nature.

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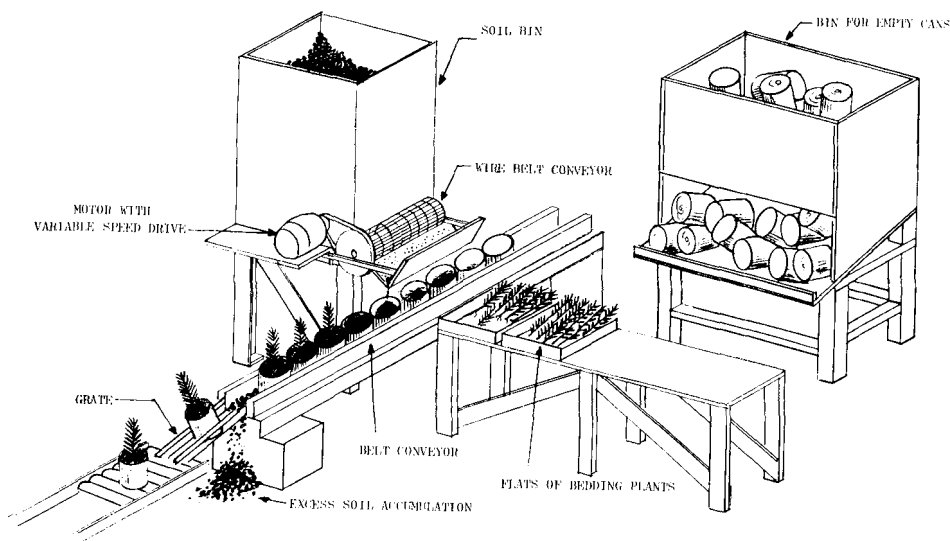
Through cooperation with Physionics Corporation, Southern Pines, North Carolina, an updated unit (photo) of greater capability than the apparatus herein described, is currently available for laboratory and teaching purposes.

MECHANIZED POT GALLON CON speeds nursery of ornamentals

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CONTAINER PLANT CANNING MACHINE SKETCH

THE PRODUCTION OF ORNAMENTAL PLANTS in gallon-size containers is a major enterprise in California. An estimated 350 nurseries in the state produced over 80 million dollars worth of container grown plants in 1967 (not including cut flowers). The potting of plants in gallon containers is one of the principal operations in most nurseries and at the same time a major labor requirement. Potting in gallon cans is still largely a hand operation although in a few cases it has been partially mechanized. The project described here attempts to better mechanize

this operation and to thus minimize cost and labor requirements.

To be successful, a canning machine must: (1) handle the soil mix and meter it into the cans; (2) feed the can into the machine; (3) handle the plants and plant them in the containers; and (4) remove and handle the final product.

In 1964 a simple, low-cost system was devised for metering soil mix into gallon cans. The machine was developed in cooperation with Select Nurseries at Brea, California. The schematic diagram shows the basic parts of the system: a conveyor

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bottom bin, and a rubber belt conveyor. The bin is approximately 3 ft wide by 4 ft long by 6 ft deep with a flexible flat wire conveyor belt running the full length of its base. The front of the bin has an adjustable opening through which the soil mix is discharged. This particular bin was originally built for metering grain into a livestock ration.

The conveyor is powered by a $\frac{3}{4}$ hp electric motor with a variable speed drive, and an additional five to one reduction through sprockets driving the conveyor. The rate of soil discharge is controlled primarily by varying the speed of the conveyor. The soil mix is dumped in a pile near the bin, and the bin is filled with a tractor scoop.

Can filling

Empty cans are piled near the can filling operation. A tractor scoop loads the cans into a sloping bottom bin. A worker transfers the cans onto a 9-inch-wide rubber conveyor belt which moves the cans, single file, past the discharge opening of the bin. Belt speed is controlled by an electric motor with variable speed drive. The cans are slightly overfilled and the excess soil is struck off by a rubber arm. The excess soil falls onto the belt, then falls through the openings in a short grate as the cans pass from the belt conveyor onto a roller conveyor. The excess soil accumulates in a pile and is returned to the bin by the tractor scoop. Now that plastic cans are increasingly being used it may be possible to mechanize the feed-

ing of empty cans onto the conveyor belt.

A crew of three workers transfers plants from bedding flats to the gallon cans as the filled cans move past on the conveyor belt (photo below). A metal shaft is used by one of the workers to form a hole in the soil of each can prior to planting. The canned plants move onto a large roller conveyor (photo above) and are transferred by hand to flat-bed trailers for removal to a place in the nursery where they will be grown. The plants are watered immediately after being moved to their growing sites.

This system has partially mechanized the can filling operation and has resulted in a significant saving of labor. Prior to the use of the machine, a hand crew of twelve workers canned approximately 1,000 containers per hour or 85 cans per man-hour. Canning rate with the machine has been increased to 2,200 cans per hour, and the crew reduced to eight (for an output of 275 cans per man-hour). The machine represents a saving in labor of approximately eight man-hours per 1,000 cans based on the above output rates.

Belt damage

The machine has been used for a period of four years at Select Nurseries with good results. The only mechanical problem has been periodic damage to the flat wire belt used in the bottom of the soil bin. The damage is generally caused by foreign material such as rocks, sticks, cans, etc., wedging between the belt and the end of the bin at the discharge point.

A slip clutch installed on the drive shaft has reduced belt damage considerably.

Estimated cost of the conveyor bottom bin and the belt conveyor complete with variable speed electric motor drives is \$3,000. This canning system could be further mechanized by adding a mechanical can feeder, and by mechanically punching the holes in the soil prior to planting.

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