

July 15, 1969

R. J. BROERSMA ETAL

3,455,084

NURSERY STOCK PACKING DEVICE

Filed Nov. 3, 1966

2 Sheets-Sheet 1

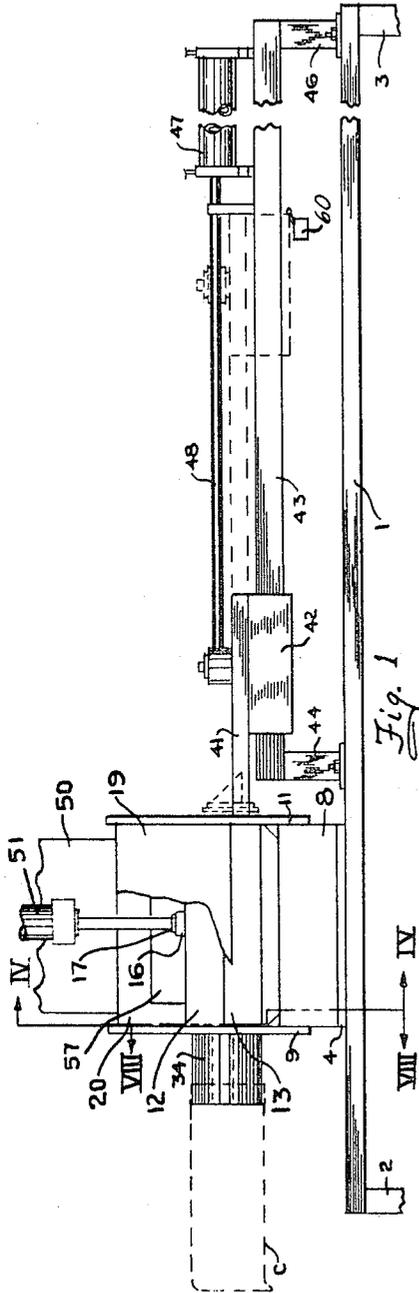


Fig. 1

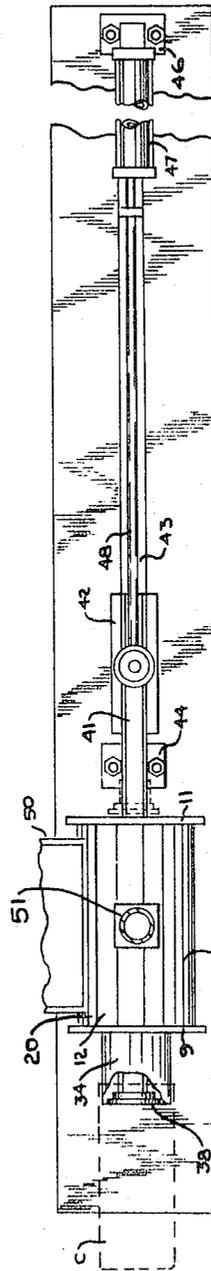


Fig. 2

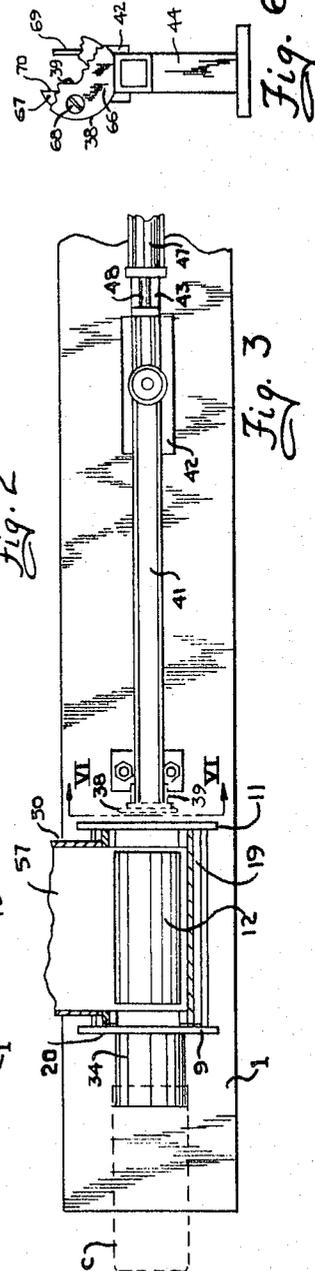


Fig. 3

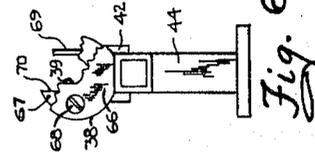


Fig. 6

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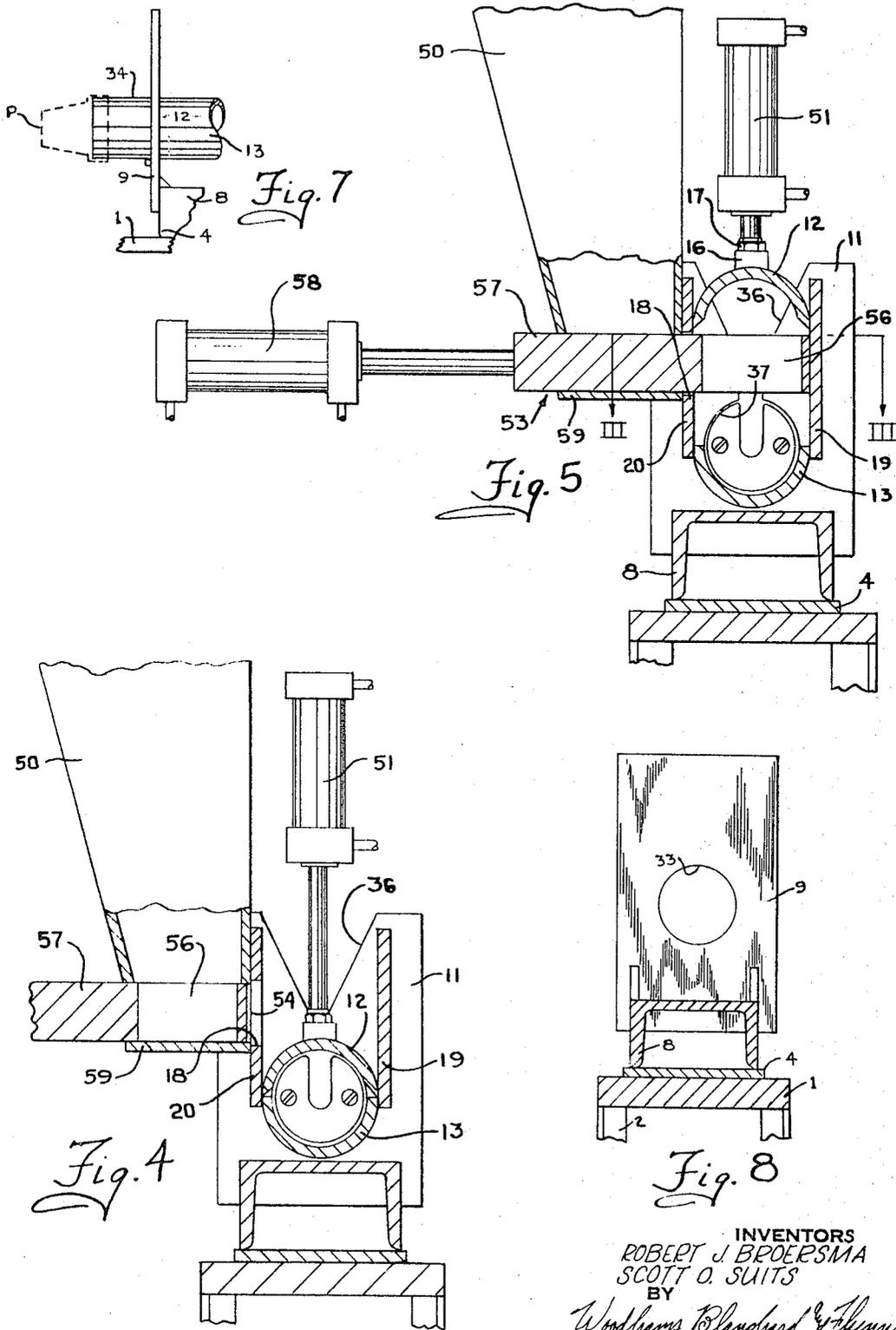
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NURSERY STOCK PACKING DEVICE

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9 Claims

ABSTRACT OF THE DISCLOSURE

A packing machine having a casing formed of at least two arcuate sections, one of the sections being fixed and the other being mounted above the fixed section for pivotal movement. The casing sections can be brought together whereby the packing material placed in the casing is shaped into a generally cylindrical form. A pusher element pushes the packing material and the nursery object packed therein out of the casing. A hopper for supplying the packing material is disposed above the casing. Intermittent feed means, such as a reciprocable shuttle is provided for transporting a measured charge of packing material from the hopper to the casing. Guide means is provided adjacent the movable casing section to guide same into mating relationship with the fixed section.

This application is an improvement in the machine disclosed in my copending applications Ser. No. 243,044, filed Dec. 7, 1962, now Patent No. 3,284,981, and Ser. No. 576,807, filed Aug. 31, 1966, now Patent No. 3,426,359.

This invention relates to a packing machine and, more particularly, relates to a machine for packing items of nursery stock into packages for storage, handling and merchandising.

In a machine intended for the same general purposes as herein contemplated, which machine is disclosed in my copending application Ser. No. 243,044, there is provided means for supplying dirt or other packing material to a shuttle, the shuttle then places a measured amount of the packing material into a plurality of open clamshell-like casing sections, a plant is arranged thereon, the casing sections are closed to form the packing material around the plant roots, and then a ram moves the packing material and plant together out of the closed casing and into a container, such as a pot or a bag.

This machine works very successfully but, in a continuing effort to improve the same, certain additional features have been developed which provide substantially improved operation under certain operating conditions.

Particularly, in the earlier machine, the casing sections are of generally arcuate shape which are fastened by continuous hinge members at the lower edges thereof. When the casing sections are opened outwardly to receive a measured amount of the packing material, the hinge is exposed to the packing material as it is deposited into the casing section. Generally, the packing material causes no clogging of the hinge structure. However, certain types of packing material have a tendency to become trapped in the hinge structure, thus requiring a greater amount of power to open and close the casing sections. Furthermore, such a collection of packing material in the hinge requires that the casing sections and the associated hinge structure be periodically cleaned to insure proper machine performance. Accordingly, in the present development there is provided a pair of casing sections which cooperate in a manner so as to require no hinge interconnections between the casing sections or any other related structure.

A further problem encountered with the previous machine was that some or all of the casing parts upon which the packing media rested were moved when the casing was closed and this sometimes shifted the quantity of packing media and the plant more than was entirely desirable. Accordingly, in the present development there is provided a lower semicircular casing section in which the packing media can be deposited by the shuttle but which does not move during the closing of the casing and hence the undesired movement of the central portion of the packing material does not occur.

A still further problem encountered with the previous machine was that the casing sections were actuated by a power means located beneath the sections, the power means generally consisting of a pneumatic or hydraulic cylinder being coupled to the casing sections by means of a yoke or a linkage. Furthermore, the power means, being located beneath the casing sections, was exposed to a considerable amount of contamination due to packing media either falling through or spilling over the casing sections. The power cylinder thus had to be periodically cleaned and the seals periodically replaced due to the large amount of packing material which collected in this area. Accordingly, in the present development, there is provided a power cylinder which is directly coupled to one of the casing sections, thus eliminating the need for any yokes or linkages therebetween and thus simplifying the construction and maintenance of the machine. Furthermore, the power cylinder is located above the casing sections and is therefore not exposed to the packing material which spills out of the casing sections. The power cylinder is thus in a much cleaner environment and requires much less maintenance than in the previous machine.

A further problem in at least one previous machine has been that of loading a plant with a large root structure. While means have been provided for this purpose, they have in some cases been inadequate and in other cases potentially dangerous, this latter being due to their providing slot means for the root into which slot means a user's finger could enter and be struck by the moving parts of such machine.

Accordingly, the major objects of the present invention include:

(1) To provide an improved machine for packing material around the roots of a plant and then further packing same into a container, such as a pot.

(2) To provide a machine, as aforesaid, which is similar in purpose to the machine shown in my applications Ser. No. 243,044 and Ser. No. 576,807, but which is easier to construct and easier to maintain.

(3) To provide an improved packing machine, as aforesaid, in which the casing for holding the item to be packed and for shaping the packing material around the item is comprised of at least two separate sections, one of which is fixed, forming an upwardly opening receptacle for receiving the packing material and the item to be packed, the second being movable vertically into engagement with the first section so as to form substantially a cylinder and in so moving to the second position to force the packing material around the item and shape the packing material into a substantially cylindrical shape.

(4) To provide an improved packing machine, as aforesaid, in which the lower casing section remains stationary while the upper casing section is moved from a first position out of engagement to a second position into engagement with the first casing section.

(5) To provide an improved packing machine, as aforesaid, in which the movable casing section is positively moved to and from a closed position by power operated means.

(6) To provide an improved packing machine, as aforesaid, in which the upper casing section is positively movable in a vertical direction by means of a power source which is mounted above the machine.

(7) To provide an improved packing machine, as aforesaid, in which the upper movable casing section is connected directly to the power cylinder, thus eliminating the need for any movable linkage means therebetween.

(8) To provide an improved packing machine, as aforesaid, in which the casing sections are moved together in face-to-face abutting relationship during the closing operation, thus eliminating the need for any hinges or equivalent structure therebetween.

(9) To provide an improved packing machine, as aforesaid, which retains the advantages of the machines described in my applications Ser. No. 243,044 and Ser. No. 576,807, and which has additional operational advantages.

(10) To provide an improved packing machine, as aforesaid, which is of sufficiently simple construction as to be economical to build, simple to operate and easy to keep in good operating condition.

(11) To provide an improved packing machine, as aforesaid, which has simple effective and safe means for receiving and packing plants having a large root structure.

Other objects and purposes of this invention will be apparent to persons acquainted with machines of this type upon reading the following specification and inspecting the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevational view of an improved packing machine according to the present invention.

FIGURE 2 is a top view of the apparatus embodying the invention with the upper power cylinder removed for purposes of clarification, the apparatus being shown in a position after the container C has been filled.

FIGURE 3 is a sectional view taken along the line III—III of FIGURE 5 showing the casing in an open position.

FIGURE 4 is a section taken along the line IV—IV of FIGURE 1 showing the casing sections in a closed position with the shuttle retracted into the hopper.

FIGURE 5 is a sectional view similar to FIGURE 4 showing the casing sections in an open position with the shuttle extended between the casing sections for depositing packing material therein.

FIGURE 6 is a partially broken section taken on the line VI—VI of FIGURE 3.

FIGURE 7 is a fragmentary view showing placement of a pot on the apparatus embodying the invention.

FIGURE 8 is a sectional view taken on the line VIII—VIII of FIGURE 1.

General description

The packing machine according to the present invention comprises a casing formed of at least two arcuate sections, one of the sections being fixedly mounted to the machine and the other section being mounted above the fixed section for vertical movement toward and away from the fixed section. The casing sections can be brought together to form substantially a cylinder whereby the item of nursery stock and the packing material placed in the casing are shaped into a generally cylindrical form. A pusher element is provided to push the packing material and the object packed therein out of the casing and thence out of the machine. The hopper for supplying the packing material is disposed above the casing. Intermittent feed means, such as a reciprocal shuttle or feed drawer, is provided for transporting a measured charge of packing material from the hopper to the casing. A suitable funnel and guide structure is provided between the feed drawer and the casing in order to guide the packing material into the fixed casing section. Guide means is also provided adjacent the upper movable casing section to guide the movable section into proper mating relationship with the fixed section.

Detailed description

In the following description, certain terminology will be used for convenience and reference which will be recognized for convenience only and as not limiting. For example, the terms "rightward" and "leftward" will refer to directions to the right or left as appearing in the drawings in connection with which said terminology is used. The terms "upward" and "downward" will refer to directions with respect to the apparatus in its normal position and use. The terms "inward" and "outward" will refer to directions toward and away from the geometric center of the apparatus. Such terminology will also include derivatives of said words above mentioned as well as words of similar import.

Referring first to the drawings, there is provided a table 1 supported on any convenient frame indicated only schematically at 2 and 3, the same being arranged to stand upon the floor or any convenient support. Supported upon such table is a plate 4 which in turn supports an inverted channel member 8 whose flanges are affixed to the plate 4, such as by welding. A pair of end plates 9 and 11 are affixed to the opposite ends of said channel 8 and extend upwardly therefrom.

A pair of substantially hemispherical casing members, shown as halves 12 and 13, are arranged between the end plates 9 and 11 for relative movement therebetween. The lower casing section 13 is generally fixed relative to the machine, hereby being connected to a pair of guide plates 19 and 20 by any suitable means, such as by welding. The guide plates 19 and 20 are preferably affixed to the end plates 9 and 11 at the opposite ends thereof. The upper casing section 12 is mounted for movement in a vertical direction between the guide plates 19 and 20. Movement of the upper casing section to a closed position causes the upper section 12 to be brought into abutting relationship with the lower fixed casing section 13. The casing sections 12 and 13 are shown in an open position in FIGURE 5, while FIGURE 4 shows the casing sections in a closed position.

Any convenient means may be provided for moving the casing sections between the open and closed positions. As shown in FIGURE 5, a pneumatic or hydraulic power cylinder 51 is mounted above the movable casing section 12 for controlling the vertical reciprocable movement thereof. The movable casing section 12 has in this embodiment a block 16 welded to the exterior surface thereof, the block being provided with a suitable threaded aperture therein. The piston rod of the power cylinder 51 is threadedly connected to the block 16, thus permitting the power cylinder 51 to control the reciprocable movement of the casing section 12. A lock nut 17 is provided adjacent the block 16 to lock the casing section 12 and the piston rod in a selected relative relationship. Suitable limit switches (not shown) can be mounted on the fixed guide plate structure to coast or cooperate with the piston rod to control the stroke extremities of the movable casing section if desired. The edges 14 of the movable casing section 12 are preferably beveled whereby lowering of the casing section causes the dirt to be forced away from the sides of the guide plates 19 and 20 into the central portion of the casing sections.

Any convenient means for urging the casing sections 12 and 13 into the open position may be provided. As shown, the power cylinder 51 is a double-acting cylinder and is thus energized in the reverse direction to drive the piston rod upwardly to open the casing sections. However, any other suitable means, such as springs or the like, could be utilized for opening the casing sections since the only load encountered during the opening operation is the weight of the piston rod and the associated casing section.

An opening 33 (FIGURE 8) is provided through the end plate 9 of approximately the same size and coaxial with the interior diameter of the cylinder formed by the casing sections 12 and 13 when the same are closed with respect to each other. A guide cylinder 34 is affixed rigidly

to the end member 9 coaxial with said opening 33, the leftward or discharge end of said guide member 34 being shaped in any of many ways for facilitating the discharge of packed material from said guide member to a bag or other container indicated in broken lines at C.

A generally V-shaped opening 36 (FIGURE 5) is provided in the end plate 11 extending through the upper edge thereof with the apex of the opening 36 joined to a circular opening 37 therebeneath, the opening 37 having a diameter substantially equal to and coaxial with the internal diameter of the lower casing section 13 affixed to the plate 11. A pusher 38 is provided with a radius slightly smaller than that of the opening 37 but nevertheless capable of clearing same only slightly as it reciprocates and thereby passes through the end plate 11. Said pusher 38 may, if desired, be of a multipart construction, wherein a face plate 66 (FIGURE 6) is removably secured to a coaxial backing plate 67 by any convenient means such as screws 68. The backing plate 67 is secured by brackets 69 to a rod 41. The face plate 66 is provided with an upwardly opening slot 39 the lower edge of which defines an arc of radius slightly larger than the radius of the stem of the plant to be packed and substantially coaxial with the face plate 66 itself and extending through the upper edge thereof. The backing plate 67 is provided with a similar but larger slot 70. Rod 41 is mounted on a slide 42 and said slide 42 reciprocates on a guide member 43 which is supported by brackets 44 and 46 rigidly on the table 1. The rod 41 is reciprocated by any convenient means, such as a plunger 48 of a suitable power cylinder 47. Preferably, said power cylinder 47 will be pneumatically operated but this is a matter of choice.

Any convenient hopper means 50 (FIGURES 4 and 5) may be provided above the lower casing section 13 and may be operated either manually or automatically for dispensing packing material into said lower casing section 13 when desired. In the embodiment illustrated, the hopper is stationarily supported on the frame, being vertically and sidewardly offset from the end plates 9 and 11, but being located in lateral alignment therewith. The hopper is provided with an opening 54 through which a reciprocating trap device 53 is extendable. A similar opening 18 is provided in the guide plate 20 for permitting the trap device to extend therethrough. Said trap 53 is provided with an open portion 56 for defining a measured quantity and a solid shuttle 57 for closing the opening 54 when the same extends therethrough. If desired, plate-like spacers may be secured in the feed drawer 53 to adjust the volumetric capacity of the opening 56 therein. The lower side of the feed drawer 53 is closed by a wall 59 when the drawer is directly underneath the hopper 50. A power cylinder, such as an air cylinder 58, is provided for reciprocating said trap. While any convenient responsive means may be used, a fluid pressure switch 60 is here provided to be actuated by the slide 42 when same is in its retracted position (rightward in FIGURE 1) whereby to energize the cylinder 58 for conveying packing material from the hopper 50 into the casing half 13 when the casing sections are in their open position. A second pressure fluid switch (not shown) may be provided for operation when the casing sections are in their closed position so as to energize the cylinder 47 and cause plunger 48 to move leftwardly (as seen in FIGURE 1) for purposes as set out further hereinafter.

The power cylinders 47, 51 and 58 may be operated either manually or automatically in a predetermined sequence with the minimum effort on the part of the operator by means of a pneumatic or hydraulic control system. Such control systems are well known in the art and thus could obviously be incorporated into the present apparatus for control thereof. Furthermore, such a control system is shown in my copending application Ser. No. 243,044.

Operation

Assuming for purposes of illustration that the device thus far described is to be used for packing small and flexible plants such as carnations into peat moss and then into a receptacle such as a paper bag, the hopper 50 will be appropriately supplied with peat moss, a supply of such plants will be placed on the table 1 adjacent the end plate 11 and a supply of receptacles is placed on said table adjacent the other end plate 9. The trap 53 will be in its retracted position in the hopper as shown in FIGURE 4, while the casing sections will be in an open position as shown in FIGURE 5. The operator will, in starting the machine, actuate cylinder 58 which causes the shuttle 57 to extend outwardly from the hopper (rightwardly as shown in FIGURE 4) over the lower casing section 13. The opening 56 carries a predetermined amount of peat moss which is thus deposited into the lower casing section 13. The opening 56 is sized so as to deposit enough packing material to completely fill the lower casing section when in a compressed condition. The shuttle 57 is then retracted into the hopper wherein the opening 56 is again filled with peat moss.

The operator, by means of the slot 36, will then lay a plant on the upper surface of the peat moss which has been deposited in the lower casing section with the roots of the plant to the left of the end plate 11 and the upper part of the plant extending through the slot 39 and lying to the right of the end plate 11. The operator then places the mouth of the receptacle over the guide cylinder 34. The shuttle 57 with its opening 56 filled with packing material is again moved by the cylinder 58 from under the hopper 50 toward and over the open casing section 13. This deposits a measured amount of packing material over the casing section 13, the plant, and the previously deposited packing material therein. Cylinder 58 is immediately energized in a reverse direction to retract the trap into the position shown in FIGURE 4. The cylinder 51 is now actuated and moves the upper casing section 12 downwardly between the guide plates 19 and 20. The upper casing section 12 is moved downwardly until it comes into abutting relationship with the lower fixed casing section 13. The closure of the casing sections forms the packing material therein around the plant with the plant substantially centered in the packing material, centering being assured due to the fact that the packing material was deposited into the lower casing section in two equal quantities. The cylinder 47 is now energized to urge the pusher 38 forwardly (leftwardly as appearing in FIGURE 1) by which the body of the packing material with the plant therein is urged axially of the closed casing sections 12 and 13 outwardly therefrom through the guide cylinder 34 and into the receptacle C. The receptacle C with the packing material and plant therein may now be drawn off from the guide cylinder 34 and the packing cycle is completed. Simultaneously therewith, or immediately thereafter, cylinder 51 is de-energized in the downward direction and energized in the upward direction to permit the piston to return to its upward position and thereby retract the upper casing section 12 into its original open position (FIGURE 5). Cylinder 47 is likewise energized in a reverse direction to retract the pusher 38 into the starting position (shown in FIGURE 3) and the machine is ready for the energizing of cylinder 58 and the commencement of another cycle.

Where the device is intended to fill relatively small pots P in place of the sack-type containers C, a pot P may be placed over the end of the guide cylinder 34 and held in place, usually by hand, as indicated in broken lines in FIGURE 7. The apparatus and the rest of the operation of the device remain the same as above described.

It will be recognized that by this mechanism a single operator can pack a large number of items of nursery stock in a relatively short time but that the device may be changed readily with respect to the type of plant being packed, the type of packing material being used, and the

type of container into which the packing is placed all without modification of the apparatus. Hence, this machine is particularly suited for handling relatively small quantities of a diversity of products and packing situations and will accomplish such packing both accurately and efficiently.

Further, the machine described is of low cost both to build and to maintain. The machine requires no complicated linkages of the operation of the casing sections and therefore dependability of operation is insured. Furthermore, all power mechanisms and moving parts are located in a region which is remote from the packing material, thus eliminating contamination and clogging of the moving parts. Thus, very little cleaning and maintenance of the machine is required, time spent for repair thus being held to a minimum resulting in the most efficient utilization of the machine.

The machine described is furthermore well adapted for varying degrees of automation which may be applied thereto. For example, any or all of the air cylinders 47, 51 and 58 may be eliminated and the operations performed thereby may be readily carried out by hand upon the application of suitable handles to the rod 41, shuttle 57, and casing section 12, respectively. Suitable conveyors may be provided both for supplying plants and containers to the machine and for removing packed containers away from the machine. Hence, the machine, though simple, is extremely versatile and the single basic machine may be widely adapted to many specific packing conditions and requirements.

Although particular preferred embodiments have been described above for illustrative purposes, it will be recognized that variations or modifications of such disclosure which lie within the scope of the appended claims are fully contemplated.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A packing device, primarily for nursery stock, comprising in combination:

a frame;

a pair of substantially horizontal arcuate casing sections comprising an upper and lower section, said sections forming a substantially cylindrical casing member when in abutting relationship;

means fixedly mounting the lower casing section relative to said frame whereby the inner arcuate surface thereof opens upwardly in a vertical direction;

closure control means for effecting reciprocable movement of said upper casing section between an open position in which said upper casing section is spaced upwardly from the lower casing section and a closed position in which said casing sections face and abut each other and define a generally cylindrical packing space;

reciprocable ram means positioned adjacent one longitudinal end of said casing section and aligned with the packing space defined by said casing sections when they are in said closed position, and means for effecting reciprocation of said ram means into and out of said packing space so that when the casing sections are in their open position packing material can be deposited in the lower casing section and then the upper casing section can be moved to its closed position in order to shape said packing material into a generally cylindrical shape, following which said ram means may be moved lengthwise through said packing space to discharge the packing material therefrom; and

vertical guide means adjacent the longitudinal edges of said upper casing section for guiding said upper casing section during its vertical travel between the open and closed positions.

2. A packing device according to claim 1, in which said closure control means is disposed above said casing sections.

3. A packing device according to claim 2, in which

said closure control means includes a vertically reciprocable member and means for moving said member downwardly in order to move said upper casing section to said closed position and upwardly in order to effect movement of said upper casing section to said open position.

4. A packing device according to claim 3, in which said vertically reciprocable member is coupled directly to the upper casing section whereby said casing section is moved in a vertical direction.

5. A packing device according to claim 4, further including feed means for depositing packing material into the lower casing section when said casing sections are in their open position, said vertical guide means being adjacent to the longitudinal edges of said lower casing section and functioning to guide the packing material into the lower casing section during depositing and for confining the material therein when the upper casing section is moved to a closed position.

6. A packing device according to claim 1, in which said upper and lower casing sections are hemicylindrical members.

7. A packing device, primarily for nursery stock, comprising in combination:

a frame;

a pair of substantially horizontal casing sections comprising a lower arcuate casing section and an upper arcuate casing section, said casing sections when in abutting relationship defining a substantially cylindrical casing member;

means for fixedly mounting said lower casing section relative to the frame whereby the inner arcuate surface thereof opens upwardly in the vertical direction; closure control means for effecting pivotal movement of said upper casing section between an open position in which said upper casing section is outwardly spaced from the lower section and a closed position in which said casing sections face and abut each other and define a generally cylindrical packing space;

reciprocable ram means positioned adjacent one longitudinal end of said lower casing section and aligned with the packing space defined by said casing sections when they are in said closed position, and means for effecting reciprocation of said ram means into and out of said packing space so that when the casing sections are in their open position packing material may be deposited in the lower casing section and then said upper casing section can be moved to its closed position in order to shape said packing material into a generally cylindrical shape, following which said ram means may be moved lengthwise through said packing space to discharge the packing material therefrom; and

wall means at least partially closing those ends of said casing sections which are adjacent the retracted position of said ram means, said wall means including an open slot extending from the upper edge thereof at least to a point adjacent said ram means.

8. The device of claim 7 including a further slot in the upper portion of said ram means providing substantially a continuation of said slot when said ram means is in a retracted position.

9. A packing device, primarily for nursery stock, comprising in combination:

a frame;

a pair of substantially horizontal casing sections comprising a lower arcuate casing section and an upper arcuate casing section, said casing sections when in abutting relationship defining a substantially cylindrical casing member;

means for fixedly mounting said lower casing section relative to the frame whereby the inner arcuate surface thereof opens upwardly in the vertical direction; closure control means for effecting pivotal movement of said upper casing section between an open position in which said upper casing section is outwardly

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spaced from the lower section and a closed position in which said casing sections face and abut each other and define a generally cylindrical packing space, said closure control means including linear motor means disposed above and operatively interconnected to said upper casing section for linearly moving same from said open to said closed position; feed means for depositing a measured charge of packing media into the lower casing section when said casing sections are in their open position; and reciprocable ram means positioned adjacent one longitudinal end of said lower casing section and aligned with the packing space defined by said casing sections when they are in said closed position, and means for effecting reciprocation of said ram means into and out of said packing space so that when the casing sections are in their opened position packing material may be deposited in the lower casing section and

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then said upper casing section can be moved to its closed position in order to shape said packing material into a generally cylindrical shape, following which said ram means may be moved lengthwise through said packing space to discharge the packing material therefrom.

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TRAVIS S. McGEHEE, Primary Examiner

U.S. Cl. X.R.

100—232