Sept. 26, 1961 Z. C. ZELLER 3,001,345

BUSH PACKING MACHINE

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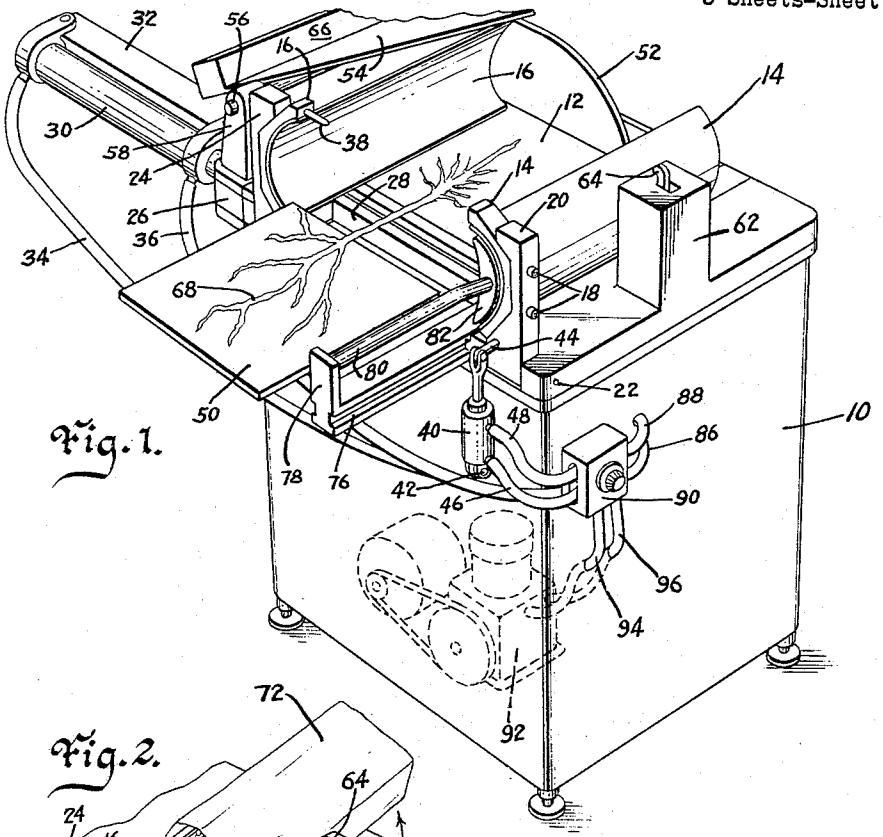


Fig. 1.

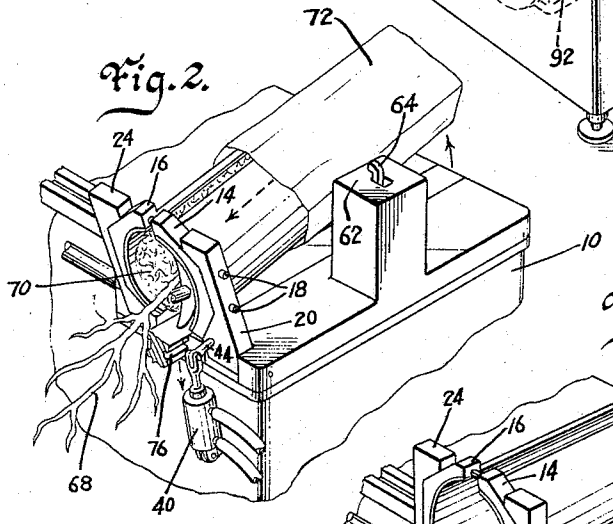


Fig. 2.

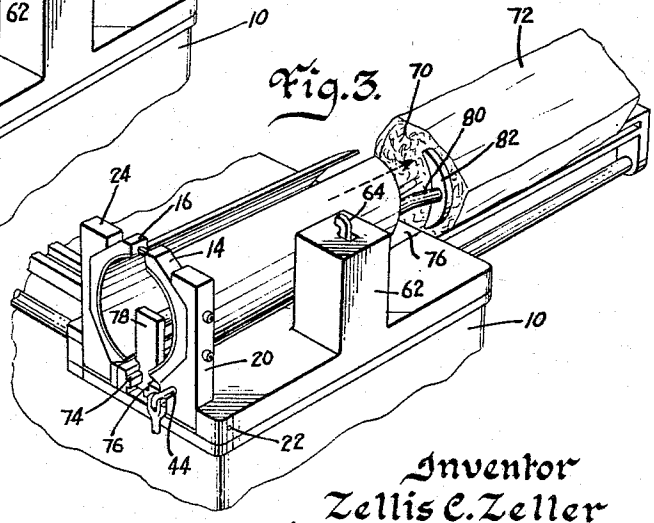


Fig. 3.

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Fig. 4.

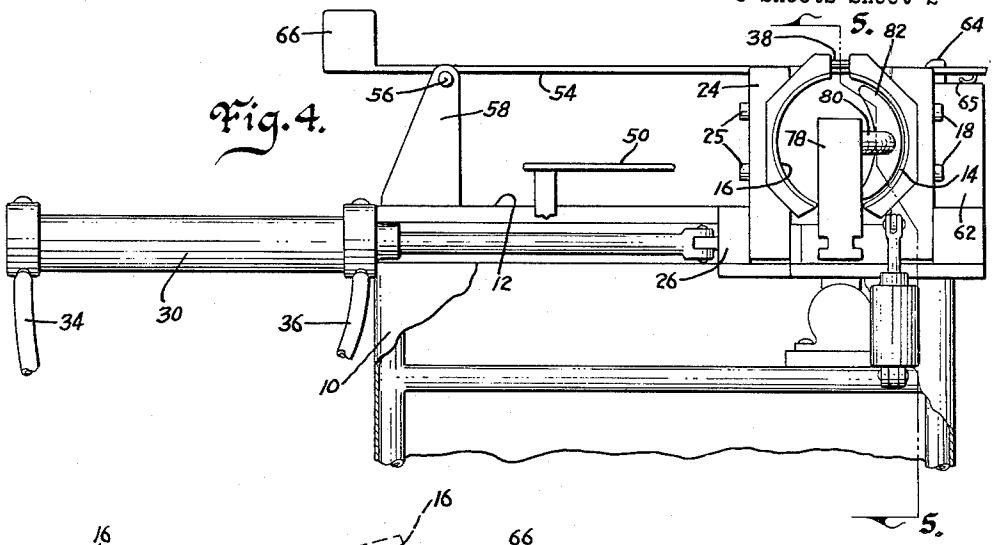


Fig. 5.

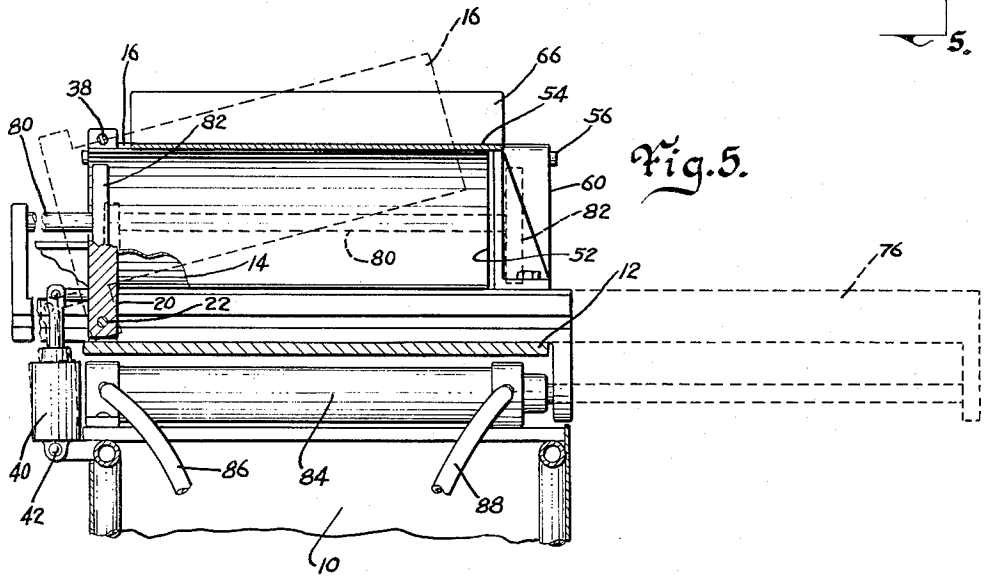


Fig. 6.

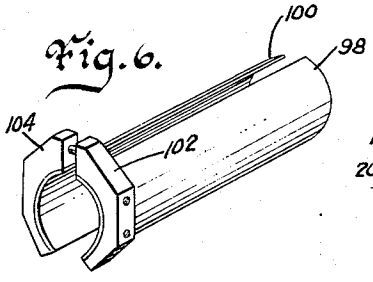
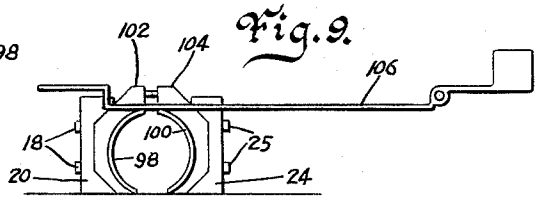


Fig. 9.



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Fig. 7.

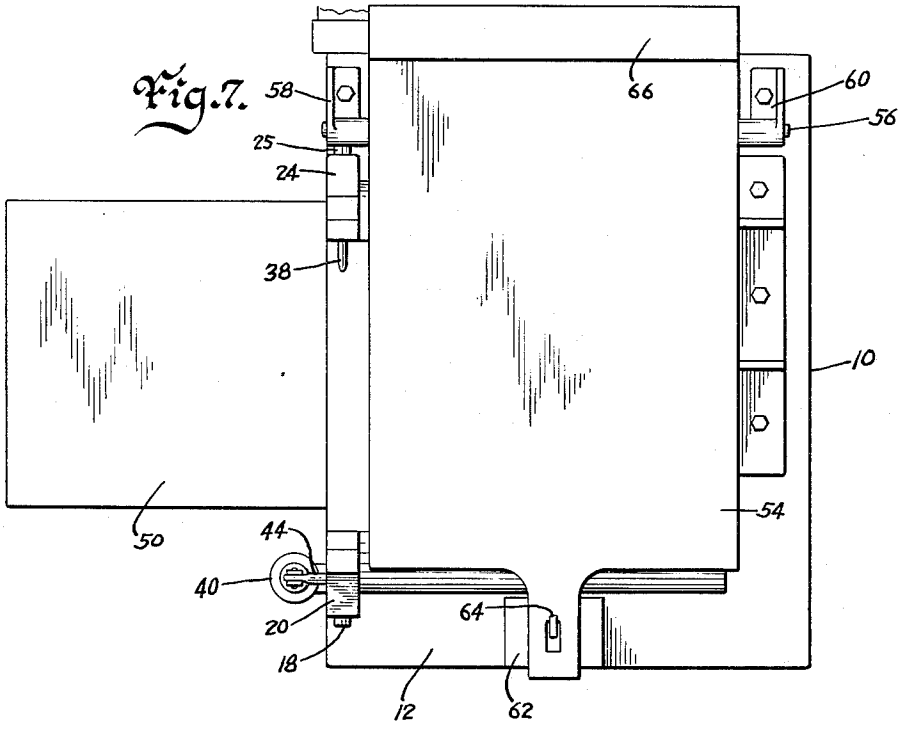
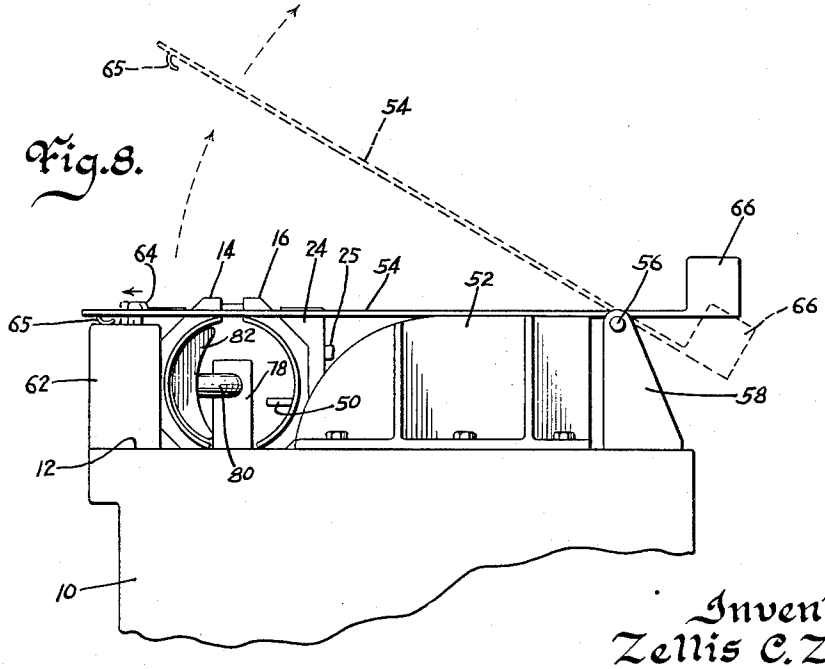


Fig. 8.



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3,001,345

BUSH PACKING MACHINE

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Filed June 17, 1959, Ser. No. 820,922
16 Claims. (Cl. 53—124)

This invention is a bush packing machine. It consists generally of a pair of spaced shoes that are more or less semicylindrical in shape which makes it possible, when they are moved close together, to slip a bag or sack over the roots of a bush or shrub, along with the packing material used around the roots in shipping, confined between them. The device also provides structure for modifying the machine to adapt it to a variety of different sized bushes and shrubs. Once the bag or the like to cover the roots of a bush is embracing the outside of the shoes, an ejecting mechanism forces the bush along with the bag surrounding the roots off the shoes. As soon as the bush has been removed from the shoes, the shoes open up again to permit insertion of a fresh bush along with the packing material to go around its roots. A safety structure is included to prevent the shoes from coming together accidentally.

Until recently, most shrubs and bushes were packaged by hand. This practice consisted generally of either wiring the roots into a close bundle for insertion into a bag followed by placing packaging material in around the roots or by wrapping the roots along with the packaging material with a flat wrapper after which the package was sealed by means of tape or the like.

Recently machines have become available which package bushes by forcing the roots and packaging material around the roots through a funnel, thus compressing them so that they will fit in a bag which is then tied to hold it securely on the bush. These devices that force the bush roots and packing material through a funnel are inherently dangerous. In order to force material through the funnel, considerable inertia is developed and the machine acts rather suddenly when it starts compressing material by forcing it through the funnel. This sudden action of the machine makes possible injury to an operator who inadvertently gets in the way of it at the time that it is actuated for its packing thrust.

Furthermore, observation of these prior art bush packing machines tends to suggest that they are very little, if any, faster in operation than manual packing. They do have one great advantage over manual packing, however, which is the possibility of relatively expert packing by comparatively inexpert personnel. With the funnel packing device, it is possible for people who know little about bush packing to make packages that will survive shipment and protect well the bush roots being shipped.

The present invention retains the advantages of the prior art machine while avoiding substantially all of its difficulties. By use of the present invention, substantially all hazard to the operator is avoided. Furthermore, the present invention is capable of considerably faster packing than is possible by hand. In addition, the present device makes as acceptable and as strong packages as any previous packing methods known. Finally, the present bush packing machine of this invention occupies a relatively small space as compared to previous devices that are intended to accomplish bush packing.

Accordingly, it is the principal object of this invention to provide a novel shrub and bush packing machine; one that:

(1) Requires very little of the operator in the way of care and physical effort.

(2) Is adaptable easily to a wide variety of shrubs and bushes.

(3) Is safe to use.

While the foregoing specifically listed objects are the main ones of this invention, it is my intention to include as objects hereof any that may be clear to one familiar with this art after he has read this specification and examined the accompanying drawings that are briefly described as follows:

FIGURE 1 is a perspective view of my bush packing machine with portions of the device broken away to save space and hidden parts shown in broken lines;

FIGURE 2 is a fragmentary, perspective view of the machine in a different position;

FIGURE 3 is a perspective view of the same fragment of the machine shown in FIGURE 2 in a still different position;

FIGURE 4 is an enlarged fragmentary side elevational view of my bush packing machine;

FIGURE 5 is a longitudinal sectional view of my bush packing machine taken on the line 5—5 of FIGURE 4; portions of the machine are omitted to save space and adjusted positions of parts are shown in broken lines;

FIGURE 6 is a reduced perspective view of an alternate pair of compressing shoes for the machine;

FIGURE 7 is a plan view of the machine with a portion omitted to save space;

FIGURE 8 is a fragmentary side elevational view of the machine viewed from the opposite side from that shown in FIGURE 4; the top plate is shown in a raised position with broken lines; and

FIGURE 9 is a reduced side elevational view of a modified form of the cover plate.

In the drawings, the invention is seen to be constructed on and around a basic frame or cabinet **10** having a loading table top portion **12**. A pair of compressing shoes **14—16** are located on either side of the table **12**. One of these shoes **14** is rigidly but removably secured by suitable means such as screws **18** to the arm **20**. Arm **20** is pivoted to table **12** suitably as by the pin **22**. The only movement of shoe **14** is the pivoting illustrated in FIGURE 2. Shoe **16** is secured rigidly and removably to arm **24** in a suitable manner as by screws **25**. Arm **24** is pivoted to block **26** and in alignment with arm **20**. Block **26** is slidably secured to table **12** by suitable means such as track **28**. A suitable means for forcibly sliding the block **26**, such as fluid cylinder **30**, is mounted on cylinder support **32** that is rigidly secured to the frame **10**. Usual air hoses **34—36** conduct fluid under pressure to the cylinder for extension and retraction, respectively. Shoe **16** has a boss or pin **38** associated with it that engages a hole in shoe **14** to lock the shoes together for pivoting movement, as shown in FIGURES 2 and 5. While the pin is desirable to assure simultaneous movement of the shoes, material compressed between the shoes has been found to function to keep the shoes together during the pivoting step. The small fluid cylinder **40** that is pivoted to frame **10** as at **42** is also pivotally secured to the finger **44** which is rigidly secured to arm **20**. Hoses **46** and **48** conduct fluid under pressure to the cylinder **40** to extend and retract, respectively. A branch supporting platform **50** is secured to the frame in a manner that prevents it from inhibiting the movement of block **26**. End barrier **52**, past which shoe **16** slides, aids in containing the packing materials until they are rather well compressed near the end of the extension stroke of air cylinder **30**. The barrier stops short of the final position of the compression shoe **16** as shown clearly in FIGURE 8 to permit freedom of operation of the ejecting mechanism. The compression assembly is completed by the cover plate **54** that is movably secured to the frame in a suitable manner as by pivoting on pin **56** which is supported by the legs **58**

and 60. A suitable latch mechanism 62 is provided with a catch 64 that is spring loaded to the cover holding position. A conventional electromagnetic device (not shown) releases the catch 64 when the shoe 16 operates a limit switch as it reaches the end of its compression stroke. Instantly as the catch 64 is released by the electromagnetic device, spring 65 raises the cover plate 54 free of the catch to insure that it will be free to move up when the shoes 14 and 16 are tipped to permit installing the bag 72 on the compressed bush and packing. As the shoes begin to tip up under the influence of fluid cylinder 40, cover plate 54 swings up and is held in an elevated position by a suitable counterbalancing means such as weight 66. After a bush such as the one 68 in FIGURE 1 has been placed on table 12, surrounded with packing material 70 in FIGURE 2 and compressed so that a sack or bag 72 can be slipped over the shoes, it is necessary to push the packing material, bush, and bag off the shoes so that they will be freed for the next bush to be packed. This is done with an ejecting mechanism.

The ejecting mechanism consists of a fluid operated pushing device. Secured to the table 12 is a suitable track 74 in which a slide 76 operates. Slide 76 is twice as long as the track 74 and thus the track is in total engagement with the slide at all times. The complete support of the slide while it is ejecting is valuable, because of the great loads placed on the ejector in forcing the bush and its packing material out of the shoes when they are compressing tightly the bush roots and packing material. A support 78 at the end of the slide 76 supports the leg 80 which carries pushing foot 82 at its extremity. Below the table 12 and secured to frame 10 in alignment with slide 76 is the fluid cylinder 84 which is an extending contracting means used for powering the slide 76. Any suitable timing or limit switch structure may be used to trigger the extension of the cylinder 84 to discharge the compressed bush roots and packing material from between the shoes and into the bag 72. The fluid hoses 86 and 88 serve to conduct air under pressure for the extension and retraction, respectively, of the piston rod of air cylinder 84.

To time the various operations that call for timed control, a suitable conventional device such as that shown at 90 is provided. Control valves operated by timer 90 direct flow of fluid under pressure from a suitable source such as the compressor 92 shown in broken lines in FIGURE 1 to the various cylinders. Compressor 92 is connected to the timer control 90 by the hoses 94—96. FIGURE 6 shows a pair of shoes for the machine that have compressing portions 98—100 that are smaller than those illustrated in the other figures. The blocks 102—104, however, will be seen to conform in shape to those on shoes 14—16, but are thicker to compensate for the smaller diameter of compressing portions 98—100. By means of this structure, the same stroke of cylinder 30 will place the smaller shoes adjacent each other in a position comparable to that of 14—16 in FIGURES 2, 3, and 4. Compressing portions 98—100 are set down in the blocks 102—104 so that they will be adjacent to the table 12, however, and will pack like shoes 14—16 when used with smaller bushes and shrubs. These smaller shoes may be substituted for 14—16 by simply removing the screws 18—25, taking off the larger shoes and replacing them with the smaller ones. Screws 18—25 are then used to secure these smaller shoes in place. With the smaller shoes in the machine, it is necessary to lower the operating surface of the cover plate. This may be accomplished in numerous ways, obviously, and I have illustrated a practical way of so doing in FIGURE 9. This figure shows a modified form of cover plate designated 106 to distinguish it from the cover plate 54 shown in the other figures. It will be seen that cover plate 106 has both its hinge end 108 and its latching end 110 offset to cause the effective position on the machine of its confining surface 112 to be lower than is true of the cover plate 54. This lower position places it down near to the top surface of the smaller shoes in a position relative to them comparable to that of cover plate 54 in relation to shoes 14—16. To exchange one of these cover plates for the other, one need only pull pin 56 and, after removing the cover plate in the machine, insert the desired one between legs 58—60. The pin is then reinserted and the machine is ready to have an appropriate set of shoes placed on it to perform a particular packing function. It would seem to be clear that this machine is very easily adapted to pack a wide range of bushes by the changing of only the shoes and the cover plate. Hence this machine is very versatile.

Operation

At the beginning of a cycle of operation of the machine, it is open as shown in FIGURE 1, which is to say with the cover plate 54 up and the shoes 14 and 16 spread apart. With the machine thus open, a bush 68 is placed in the machine with its roots between the shoes on table 12 and its branches supported on platform 50. Packing material 70 is then placed on table 12 in the general area of the roots, but no great skill need be exercised in placing it. The only care that need be used is in limiting the quantity of packing material to an amount that will not split bag 72 when it is released from the compression of the shoes when ejected into bag 72. Ascertaining the amount of packing best used is a matter of brief experience with the machine. Cover plate 54 is then lowered manually until catch 64 secures it down against the shoes. The packing material and the bush roots are now contained between the shoes. The closing of the cover plate 54 actuates a switch (not shown) that opens the extending valve for the fluid cylinder 30 which then extends under the influence of air pressure and moves shoe 16 toward shoe 14. As the shoe 16 moves along, it rolls the packing material 70 and bush 68 and also compresses them into a tight bundle. As shoe 16 reaches the end of its travel, it engages mechanically a conventional switch that causes the electromagnet of the latch mechanism 62 to withdraw catch 64 from engagement with the cover plate 54. The same switch actuated by shoe 16 also, through a time delay device of conventional type and hence not shown, opens the retracting valve for the fluid cylinder 40. With the catch 64 released and the fluid cylinder 40 shortening, shoes 14 and 16 are tipped up as shown in FIGURE 2. Although cylinder 40 is secured to arm 20 only, both shoes are tipped by reason of the material between them, together with pin 38 in the preferred structure shown. Initial tipping of the shoes also throws up cover plate 54 to the position shown in FIGURE 8 in broken lines as described above. As soon as the shoes are tipped up, the operator slips bag 72, which is larger than the closed diameter of the shoes, onto the shoes. Timer 90 lowers the shoes after a short interval by actuating a valve that vents retracting line 48 of cylinder 40 and applies air under pressure to the extending line 46. When the shoes reach the down position as shown in FIGURE 5, cylinder 84 extends under the influence of air pressure and causes foot 82 to push bag, bush, and packing off the shoes. It will be noticed that the bag 72 is loose on the shoes, as shown in FIGURE 2, because the shoes compress the packing material and roots more than is necessary to fit in the bag. It is easy, therefore, to place the bag over the shoes. As the bag with the bush and packing material inside of it is ejected off the shoes, the roots and packing expand to fill the bag snugly. At the end of its ejecting stroke, any suitable portion of the ejecting mechanism operates a switch (not shown) that actuates control 90 to vent the extension line 34 of cylinder 30 and open its retracting line 36 to air under pressure. As the foot 82 is only on one side of the branches of the bush 68, it may be removed from the machine readily once the bush and bag have been pushed off the shoes. The machine is then back to its

open position and ready to begin a new cycle of packing.

From the foregoing it should be clear that the machine requires little of the operator either in the way of physical effort or care in placing the materials in the machine. Very little in the way of skill and training are necessary to the effective use of the device, therefore, and great consistency in packing of the bushes is attained. Since the cover plate triggers the operation of the shoes, there is no hazard to the operator in getting caught between them. The machine is very safe. It is also apparent that the machine can be adapted to a variety of sizes of bushes very easily which makes it very versatile as a nursery packing machine.

I have disclosed my invention by describing and showing the preferred though not exclusive practical embodiment of it. I now set out with the particularity required by statute those structures that I believe to be inventive in the following claims.

I claim:

1. In a bush packing machine, a loading table, a pair of shoes movably secured to said loading table, a cover plate movably secured to said loading table and selectively secured down against said shoes and releasable to move away from said shoes; means secured to said loading table and at least one of said shoes for spacing and placing said shoes adjacent to each other selectively; means secured to said loading table and one of said shoes for moving said shoes away from said loading table when they are adjacent to each other; an ejecting member movably secured to said loading table to move between said shoes when they are adjacent to each other; and means secured to said loading table and said ejecting member for moving said ejecting member.

2. The bush packing machine of claim 1 in which one of said shoes is slidably secured to said loading table, and said means for spacing and placing said shoes adjacent to each other is an extending and retracting means secured to said loading table and said slidable shoe.

3. The bush packing machine of claim 2 in which said extending and retracting means is a fluid cylinder and a source of fluid under pressure.

4. The bush packing machine of claim 1 in which said cover plate is secured down by means of a releasable catch; secured to said loading table, and a counterweight means secured to said cover plate, said shoes adapted to engage and impart motion to said cover plate.

5. A bush packing machine comprising a loading table, a shoe pivoted to said loading table and otherwise stationary, a shoe slidable and pivotally secured to said loading table, means for sliding said slidable shoe to and from said shoe that is pivoted only, a cover plate movably secured to said loading table for selective positioning adjacent said shoes and away therefrom, means secured to said pivoting only shoe and said loading table for pivoting said pivoting only shoe when said shoes are together, and ejecting means movably secured to said loading table to move between said shoes when they are down and together.

6. The bush packing machine of claim 5 in which said ejecting means is a track in said loading table, a slide working in said track, said slide being twice as long as said track; a leg secured to said slide, a pusher foot secured to said leg, and means secured to said loading table and said slide for reciprocating said slide.

7. The bush packing machine of claim 6 in which an end barrier is secured to said loading table at the opposite ends of said shoes from said pivoting means.

8. The bush packing machine of claim 7 in which a branch support is secured to said loading table at the same end of said shoe as said pivoting means.

9. The bush packing machine of claim 5 in which an end barrier is secured to said loading table at the opposite ends of said shoe from said pivoting means.

10. The bush packing machine of claim 5 in which a branch support is secured to said loading table at the same end of said shoe as said pivoting means.

11. A bush packing machine of claim 5 in which said cover plate is hinged to said loading table, a counterbalance secured to said cover plate, and a releasable catch for holding said cover plate adjacent to said shoe at times, said shoes when pivoted engage and impart motion to said cover plate.

12. In a bush packing machine, a loading table, an arm pivoted to said loading table, a shoe removably secured to said arm, a block slidably secured to said loading table, an arm pivoted to said block, a shoe removably secured to said arm secured to said block, means for sliding said block to place said shoes near and spaced from each other selectively, means for pivoting said arms when said shoes are near each other, a cover plate removably hinged to said loading table and selectively down against said shoes and away therefrom, an ejector movably secured to said loading table to clear the space between said shoes at times when they are adjacent each other, a second pair of shoes having arm fitting portions identical to said first mentioned shoes and other portions different from said first mentioned shoes, and a second cover plate having a hinge portion identical to said first mentioned cover plate and other portions different therefrom and adapted to cooperate with said second pair of shoes.

13. The bush packing machine of claim 12 in which said ejector means comprises a track in said loading table between said shoes, a slide movably mounted in said track, said slide being twice the length of said track, a leg secured to said slide, a foot secured to said leg, and means for reciprocating said slide in said track.

14. The bush packing machine of claim 13 in which an end barrier is secured to said loading table at the end of said shoes opposite from said pivoting means.

15. The bush packing machine of claim 14 in which a branch support is secured to said loading table at the same side of said loading table as said pivoting means.

16. The bush packing machine of claim 12 in which an end barrier is secured to said loading table at the end of said shoes opposite from said pivoting means.

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