Feb. 19, 1935. H. A. CAMPBELL 1,991,656

BOX FILLING AND PACKING MACHINE

Filed Sept. 21, 1931 4 Sheets-Sheet 1

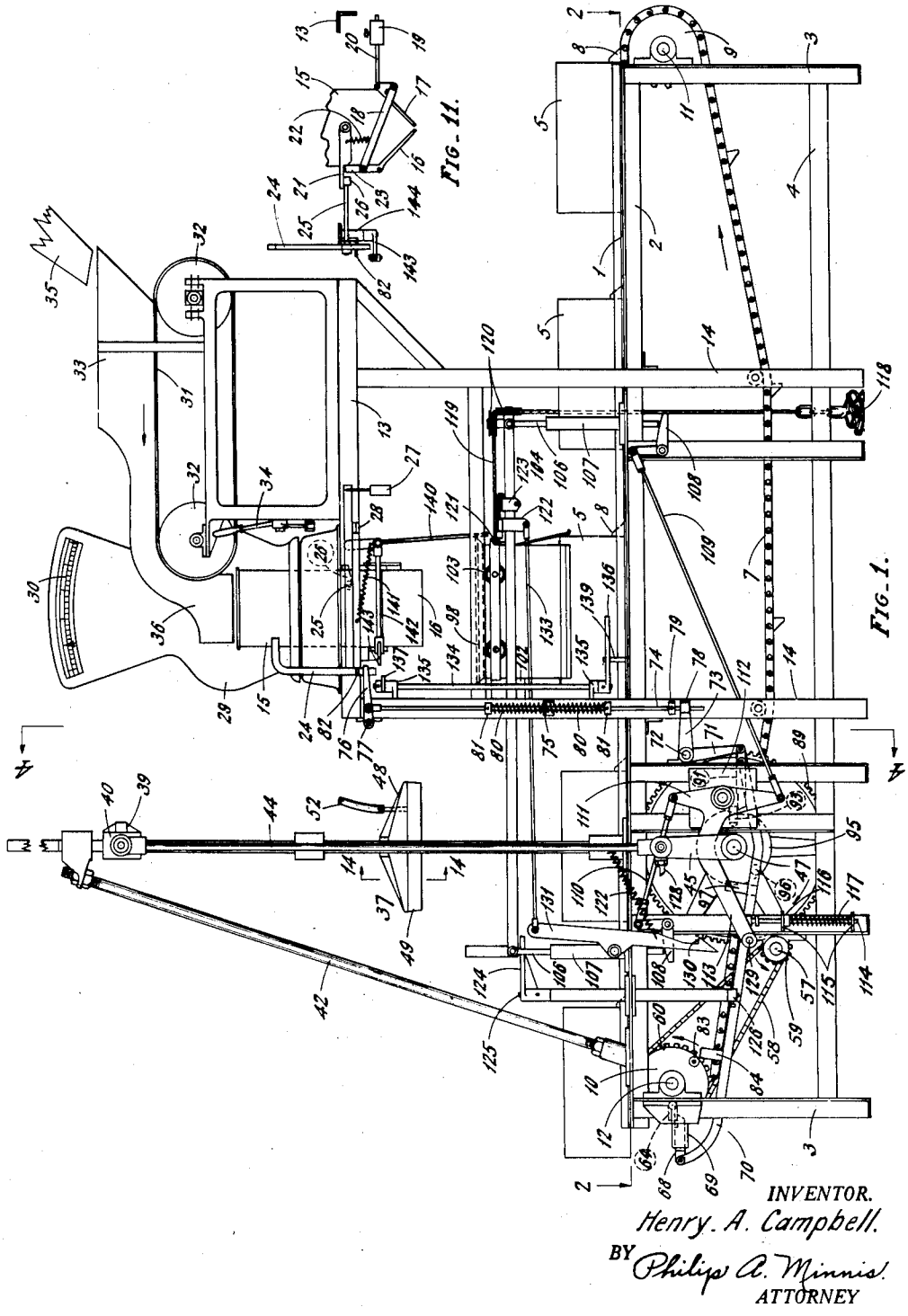


FIG. 1.

INVENTOR.
Henry A. Campbell.
BY Philip A. Minnis.
ATTORNEY

Feb. 19, 1935. H. A. CAMPBELL 1,991,656

BOX FILLING AND PACKING MACHINE

Filed Sept. 21, 1931 4 Sheets-Sheet 2

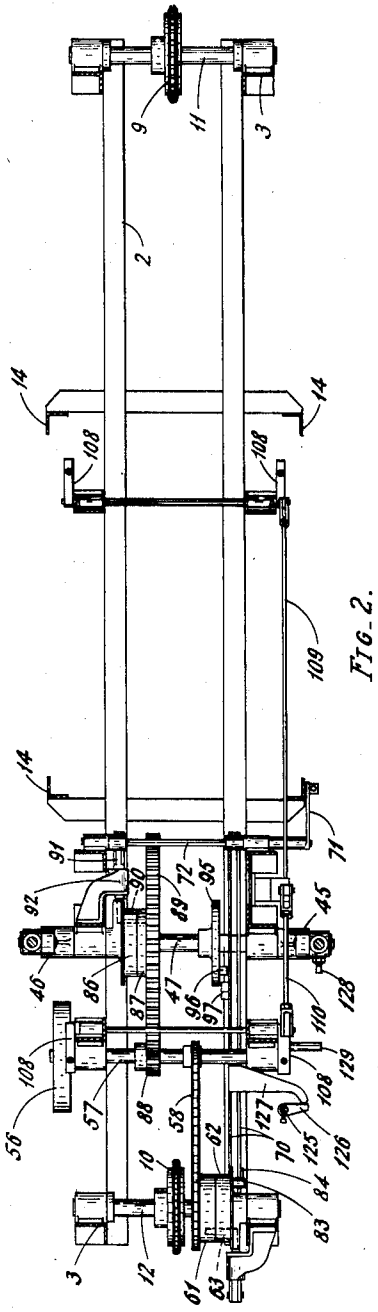


FIG. 2.

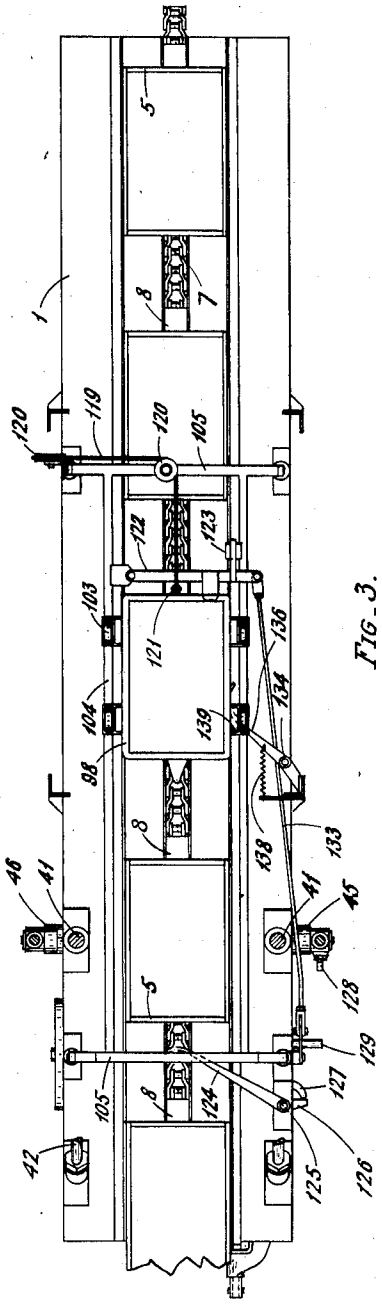


FIG. 3.

INVENTOR.
Henry A. Campbell.
BY Philip A. Minnis.
ATTORNEY

Feb. 19, 1935. H. A. CAMPBELL 1,991,656

BOX FILLING AND PACKING MACHINE

Filed Sept. 21, 1931 4 Sheets-Sheet 3

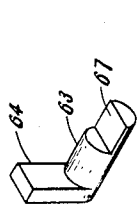


FIG. 8.

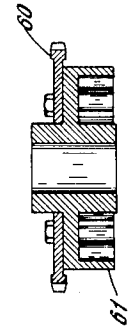


FIG. 9.

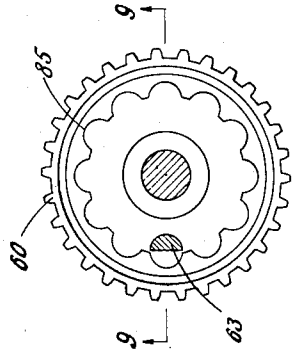


FIG. 10.

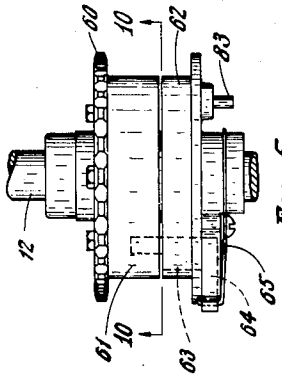


FIG. 5.

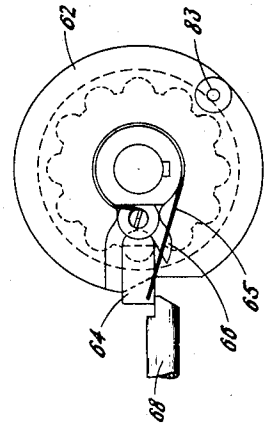


FIG. 6.

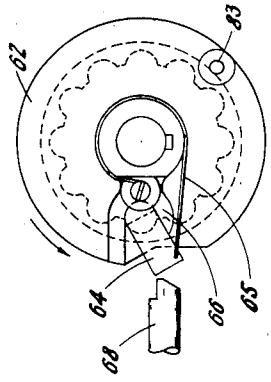


FIG. 7.

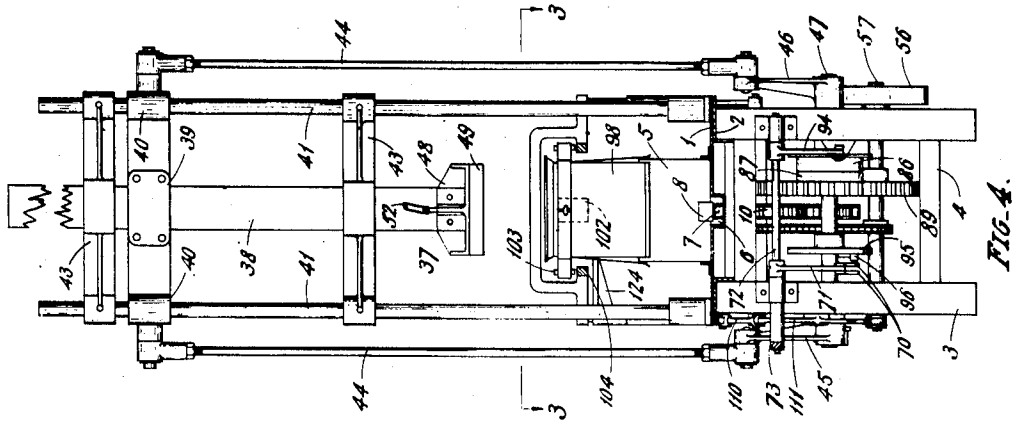


FIG. 4.

INVENTOR.
Henry A. Campbell.
BY Philip A. Minnis
ATTORNEY.

Feb. 19, 1935. H. A. CAMPBELL 1,991,656

BOX FILLING AND PACKING MACHINE

Filed Sept. 21, 1931 4 Sheets-Sheet 4

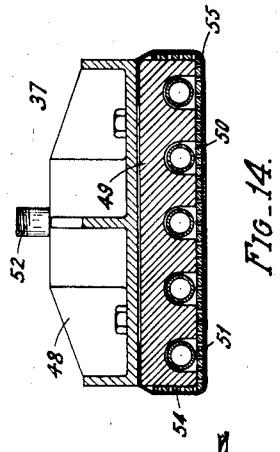


FIG. 14.

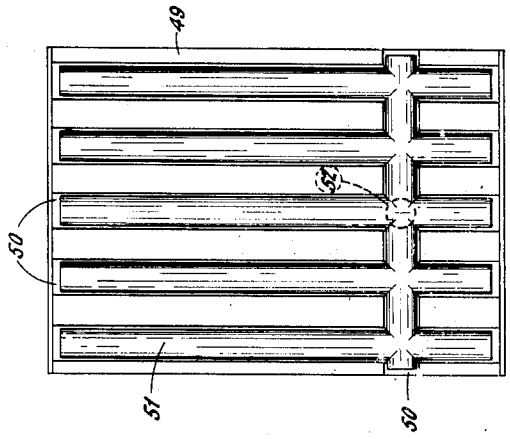


FIG. 15.

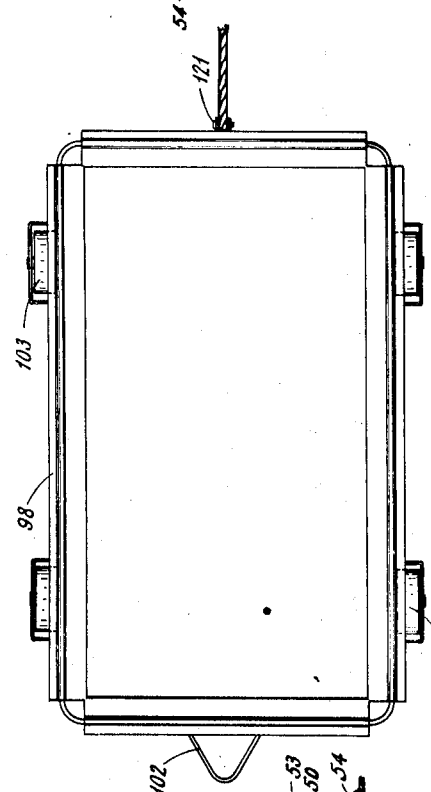


FIG. 12.

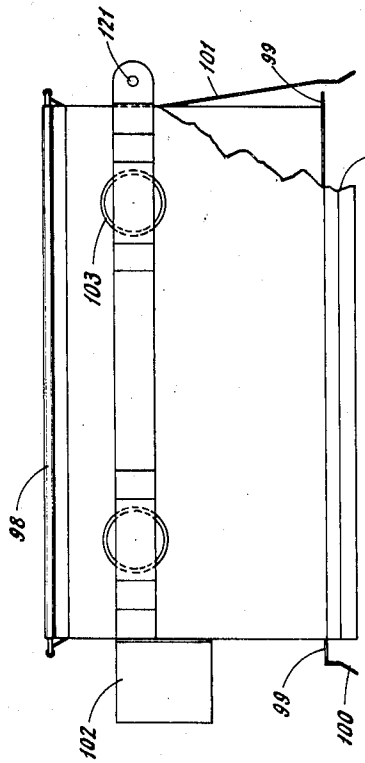


FIG. 13.

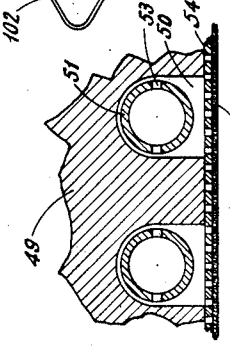


FIG. 16.

INVENTOR.
Henry. A. Campbell.
BY Philip A. Minnis
ATTORNEY

Patented Feb. 19, 1935 1,991,656

UNITED STATES PATENT OFFICE

1,991,656

BOX FILLING AND PACKING MACHINE

Henry A. Campbell, San Jose, Calif.

Application September 21, 1931, Serial No. 564,049

41 Claims. (Cl. 226—71)

This invention relates to the art of filling and packing boxes or other containers with loose material such as dried fruit or the like, and provides a mechanism adapted to perform the filling and packing operations rapidly and effectively without requiring the manual labor heretofore necessary for carrying out these steps.

It is the customary practice in packing dried fruit into boxes for shipment to temporarily provide each box, prior to filling, with a collar adapted to fit over the top of the box and project upwardly therefrom, whereby the volumetric capacity of the box is increased according to the volume of the collar. By the application of such a collar to the box a larger amount of material can be deposited in the box without overflowing than can be done without the use of the collar, so that when the material is pressed or tamped into the box, a full box of tightly compressed material is assured.

According to one of the more common methods of packing dried fruit which is used in the dried fruit industry, the empty boxes which are to be filled with fruit are passed in succession before an operator who is provided with a supply of collars and whose duty it is to place a collar over each box as it passes before him. The box and its associated collar is then conveyed into registry beneath a filling mechanism, which another operator manipulates to deposit a measured charge of fruit into the box. In order that a full box may be assured after the material is tightly pressed therein, a larger charge of fruit is deposited in the box than could be done without overflowing were it not for the collar.

After the material is deposited in the box and its associated collar, it is conveyed past another operator who places a wooden block or shoe within the collar so as to rest upon the fruit, this shoe being of such size as to substantially fill the collar, and of a thickness so that it projects several inches above the upper periphery of the collar.

The loosely filled box carrying its associated collar with the shoe therein is thereafter placed on a conveyor which conveys it through a pressing mechanism, which mechanism takes the form of a second conveyor arranged lengthwise above the box conveyor and inclined so as to be convergent therewith. The box is conveyed beneath the higher end of the upper conveyor and as it continues to travel therebeneath the shoe which projects above the box collar is engaged by the upper conveyor, due to its inclination, and is depressed, whereby the fruit is compressed into the box. The box of tightly packed fruit is then conveyed to another operator who removes the shoe and collar from the box, whereupon the box passes on to the lidding machines and the shoe and collar are returned to the operators who initially placed them in position.

As might be expected, this method of packing fruit into boxes is not a particularly rapid one and is comparatively expensive, due to the number of operators required. Moreover, a considerable amount of space is required for the equipment.

Another weakness of this type of apparatus lies in the unsatisfactory operation of the aforementioned shoes. During their use they often become sticky from the fruit, so that when the operator removes them they sometimes remove a part of the fruit from the box which is adhering to the shoe. This is a source of considerable annoyance and necessitates the frequent washing of the shoes.

The use of this type of shoe also has been found to result in contaminating the fruit with mold spores so as to cause spoilage of the fruit. For example, if one box of fruit happens to be infected, the shoe which is used with that box also becomes infected so that its continued use spreads the infection to other fruit which may otherwise be uncontaminated. The accumulation of mold spores on the shoes is also apt to occur during periods of idleness.

It is, therefore, the prime object of this invention to overcome these difficulties insofar as possible by providing a box packing apparatus in which the box collar is mechanically actuated, thus reducing the number of operators heretofore required, so that the packing is accomplished with less labor and, consequently, less expense, and carried out more rapidly than heretofore.

It is also an object to provide a box packing machine with a reciprocable box collar and operating means therefor which serves to place the collar in position over an empty box, removes it after the pressing operation, and repositions it over a succeeding empty box.

Another object is to provide a box packing apparatus in which the pressing mechanism is of such a character as to do away with the use of the wooden shoes heretofore referred to.

Another object is to construct a box packing apparatus in which is incorporated a filling station, a pressing station, a conveyor for conveying a file of boxes into successive registry with the stations, and a box collar reciprocable above the

conveying means so that it may register with a box at the filling station and move in unison therewith into registry with the pressing station.

Another object is to provide a box packing apparatus having a reciprocable box collar in which automatically operated means are provided for removing the collar from a box at the pressing station and returning it into operative relation with a succeeding box at the filling station.

Another object is to provide a pressing mechanism and means to cause the operation of such mechanism when a box collar registers therewith.

Another object is to provide a pressing mechanism and means to prevent the operation of such mechanism when no box collar is therebeneath.

Another object is to provide a box packing machine which, after being set in operation, will automatically stop after completing one cycle of operations.

Another object is to provide an apparatus for the purpose described having a box collar movable over a track between the filling mechanism and the pressing mechanism.

Another object is to provide a track for the box collar having means for raising and lowering the track in timed relation to the operation of the filling and pressing mechanism.

Another object is to provide a box collar track with operating means having a buffer associated therewith.

Another object is to provide a box packing machine having filling and pressing stations with a box collar reciprocating between the stations, and means for transferring the collar from the pressing station to the filling station which exerts a gradually diminishing force on the collar as it approaches the filling station.

Another object is to provide a filling mechanism with a safety device which prevents its operation when no box is in registry therewith.

Another object is to provide a filling mechanism with a safety device which prevents its operation when the box collar is out of registry therewith.

Another object is to provide a box packing machine having an operative mechanism arranged to perform a complete cycle of operations when the filling mechanism is actuated.

Another object is to provide a pressing mechanism including a heated presser shoe, whereby the shoe is self-sterilizing.

Another object is to provide a pressing mechanism including a steam heated presser shoe having a perforated bottom for the partial escape of steam, whereby to moisten the bottom of the shoe and prevent the accumulation thereon of sticky material.

Another object is to provide a box collar of suitable construction to fit boxes of various sizes and to enable it to be operated over a trackway.

That the invention has numerous objects and advantages other than those above recited will become apparent as the description proceeds in connection with the accompanying drawings, it being understood that various changes and modifications may be resorted to without departing from the spirit of the invention, and I deem myself entitled to all such changes and modifications as fall within the scope of the claims hereto appended. Moreover, although the invention is described in connection with the filling and packing of boxes with dried fruit, it is contemplated that the same may be used to fill other types of containers than boxes with other materials than dried fruit, the invention not being limited to the particular use described, which is illustrative only.

In the drawings:

Figure 1 is a side elevation of a completely assembled filling and packing apparatus embodying the features of the invention.

Figure 2 is a sectional view, taken along the lines 2—2 of Figure 1, illustrating in plan view the conveyor and presser operating mechanism.

Figure 3 is a sectional view, taken along the line 3—3 of Figure 4, illustrating in plan view a portion of the actuating mechanism for operating the track raising and lowering device, as well as a portion of the safety mechanism which prevents operation of the filling mechanism when no box is therebeneath.

Figure 4 is a sectional view taken along the line 4—4 of Figure 1.

Figure 5 is a plan view of one of the single revolution clutches provided to drive the conveyor and the pressing mechanism, the clutch being shown in assembled form.

Figure 6 is a side elevation of the clutch shown in Figure 5, illustrating the position of the parts when the clutch is disengaged.

Figure 7 is also a side elevation of the clutch shown in Figure 5, but illustrating the positions of the parts when the clutch is engaged.

Figure 8 is a perspective view of the clutch pin which serves to engage and disengage the clutch.

Figure 9 is a sectional view taken along the line 9—9 of Figure 10.

Figure 10 is a sectional view taken along the line 10—10 of Figure 5, and illustrates to better advantage the configuration of the inner periphery of one of the clutch members.

Figure 11 is a detail of a portion of the filling mechanism and its actuating members.

Figure 12 is an enlarged plan view of the box collar.

Figure 13 is a side view of the collar illustrated in Figure 12.

Figure 14 is an enlarged sectional view of the plunger shoe taken along the line 14—14 of Figure 1, illustrating in detail the construction of the pressure shoe.

Figure 15 is a bottom view of the presser shoe with the perforated plate removed.

Figure 16 is an enlarged detail of a portion of the presser shoe, better illustrating certain details of construction.

Like reference characters denote like parts throughout the several views.

Referring to Figures 1 to 4, inclusive, it will be seen that the apparatus includes a table 1, supported by a suitable frame work 2 having a plurality of supporting legs 3 and cross braces 4. The table 1 is adapted to support a file of boxes 5 and is provided with a central longitudinal groove 6 in which operates an endless conveyor chain 7 provided with a series of spaced flights 8 which engage the ends of boxes resting on the table 1 and propel them therealong. The chain 7 passes over sprockets 9 and 10 at opposite ends of the frame, which sprockets are supported by transverse shafts 11 and 12, respectively. The conveyor chain is caused to travel in the direction indicate by the arrow in Figure 1 by mechanism presently to be described, and it will be seen that as the conveyor chain so moves the flights 8 will engage the ends of the boxes 5 on the table 1 and propel them lengthwise of the table in uniformly spaced relation.

As best seen in Figures 1 and 11, the filling mechanism is supported upon an auxiliary frame work 13, supported by legs 14 and comprises a

hopper 15 having a bottom formed by the hinged gates 16 and 17, which are interconnected by the link 18, so that they move simultaneously. The gates are normally held in closed position by means of the adjustable weight 19, slidably mounted on a rod 20 projecting from the gate 17, and are locked in closed position by a catch 21 which is held by a spring 22 in engagement with the upper end of a projection 23 on the gate 16. The weight 19 is so adjusted that a given weight of material placed in the hopper 15 will readily overcome its influence and cause the gates to open and discharge the material whenever the catch 21 is lifted out of engagement with the projection 23.

The filling mechanism is operated by means of a handle 24 secured intermediate its ends to the outer end of a shaft 25, journaled in the frame 13. The free end of the shaft 25 is provided with a finger 26 adapted to cooperate with the catch 21 so as to lift the same clear of the projection 23 when the finger is lifted. A weight 27 is hung on one end of the handle 24 so as to hold it normally against the stop 28 whereby the finger 26 is held away from the catch 21.

In order that measured charges of fruit may be deposited in the boxes, the filling hopper 15 is preferably mounted upon the platform of a scale 29 so that the weight of fruit in the hopper is indicated at all times on the dial 30. A feed mechanism for supplying fruit to the hopper is provided and comprises an endless feed belt 31 passing over pulleys 32 and running in a trough 33. The belt 31 may be operated in the direction indicated by the arrow by any suitable clutch mechanism (not shown) and controlled by an operating handle 34. Fruit is delivered onto the belt 31 from a chute 35 and is delivered to the hopper through the spout 36.

The manner of operation of the filling mechanism is as follows: The operator manipulates the handle 34 to drive the belt 31 so as to deliver fruit through the spout 36 into the hopper 15 until the dial 30 shows the hopper to contain the desired quantity of fruit. The feed belt 31 is then stopped and the operator depresses the handle 24, whereupon the shaft 25 is rotated, causing the finger 26 to lift the catch 21 free of the projection 23 on the gate 16. As soon as the projection 23 is freed from the catch 21, the weight of fruit in the hopper opens the gates 16 and 17 against the action of the weight 19 and the fruit is discharged from the hopper, whereupon the weight 19 closes the gates, which are again latched shut by the catch 21 until such time as the handle 24 is again depressed.

After a box has received a charge of fruit from the hopper 15 it is moved by the conveyor chain beneath the reciprocable plunger, indicated generally at 37, which depresses the fruit into the box. The plunger is mounted upon the lower end of the column 38 and secured to a cross head 39. The cross head 39 is provided with bearings 40, slidably carried by the vertical shafts 41. Brace rods 42 hold the shafts 41, in place, and spacers 43 between the shafts also help hold them in position, and provide guides for the column 38. The cross head 39 is reciprocated by the connecting rods 44, which are actuated by cranks 45 and 46 secured to the outer ends of the shaft 47.

As may best be seen by reference to Figures 14 to 16, inclusive, the plunger 37 comprises a head 48 secured to the lower end of the column 38. Affixed to the underside of the head 48 is a presser shoe 49, provided on its underside with a plurality of channels 50 adapted to receive a series of perforated steam pipes 51. The steam pipes are interconnected, as shown, and steam is fed thereto through the pipe 52, which may be connected to any suitable source of steam supply.

The steam pipes 51 are provided with a series of perforations 53, all of which are horizontally arranged, and a perforated plate 54 is secured by any suitable means to the bottom of the shoe. The perforations in the steam pipes and the plate 54 are very small, so that when steam is admitted to the pipes a small quantity continuously escapes, thereby moistening the underneath side of the plate 54. The horizontal arrangement of the perforations 53 serves to protect them from becoming plugged up with particles of fruit which may accidentally be forced through the perforations in the plate 54 into the channels 50. The plate 54 is also preferably covered with some porous fabric, such as indicated at 55, in order to prevent the plate perforations from becoming clogged. When the fabric becomes fouled it is a simple matter to remove it for cleansing, or to replace it with a new fabric.

In the use of a presser shoe of the above described construction, it has been found that because of its continually moistened surface there is little or no tendency for pieces of fruit to adhere thereto, and the steam also continually sterilizes the shoe, so that there is no danger of spreading contamination.

It is necessary that the hopper 15, plunger 37, and conveyor 7 be operated in timed relation to each other, and the driving mechanism for these devices will now be described. Power is applied to the pulley 56, secured to the shaft 57, so that the shaft 57 rotates continuously in the direction indicated by the arrow in Figure 1. This shaft 57 drives the shaft 12 (which drives the conveyor chain 7) through the medium of the chain 58 passing around sprockets 59 and 60. The sprocket 60 is integral with the clutch member 61 which rotates freely on shaft 12. The cooperating clutch member 62 is keyed to the shaft 12.

As best seen in Figures 5 to 10, inclusive, a clutch engaging pin 63 projects inwardly through the side wall of the clutch member 62 so as to cooperate with a series of semi-circular grooves 85 formed on the inner periphery of the free clutch member 61. An arm 64 is carried on the outer end of the pin 63, and a wire spring 65 is secured thereto and to a portion of the hub of the clutch member 62, which tends to pull the arm downwardly against the stop 66, as shown in Figure 7. That portion of the pin 63 which projects into the clutch member 61 is flattened, as at 67, so as to be semi-cylindrical, and this flat surface is so disposed that when the arm 64 is horizontal, as shown in Figure 6, the flat surface is vertical.

The operating means for the clutch includes a finger 68, slidably mounted in a sleeve 69 secured to a supporting leg adjacent the clutch, and controlled by a double rod 70 which is pivotally secured to the outer end of the finger 68 and to the lower end of a crank arm 71 keyed to a rock shaft 72. The shaft 72 is actuated by a crank 73 secured to the outer end of the shaft and adapted to be actuated by a vertical rod 74 which passes through a guide 75 secured to one of the legs 14 and has its upper end pinned to an intermediate portion of a lever 76 pivoted to the leg 14 at 77. The crank 73 is provided with a bearing 78 in which the lower end of the rod 74 is slid-

ably mounted. A collar 79 secured to the rod 74, is adapted to engage the bearing 78 when the rod is depressed, whereby to actuate the crank 73. Coil springs 80 surround the rod 74 on either side of the guide 75 and are held in place by collars 81 keyed to the rod. These springs maintain the rod in neutral or middle position, so that the crank 73 is not obliged to carry the weight of the rod.

The free end of the lever 76 is positioned directly beneath a lug 82 on the handle 24, so that when the handle is depressed the lug 82 engages the lever 76 so as to depress it also, which causes the rod 74 to be shifted downwardly. The downward movement of the rod 74 is transmitted through the crank 73 and rod 70 to withdraw the finger 68 from beneath the arm 64 of the clutch pin 63, whereupon the spring 65 pulls the arm downwardly against the stop 66 and rotates the clutch pin 63. This rotation of the pin 63 turns a portion of its periphery into engagement with one of the grooves 85 of the rotating clutch member 61, whereby the clutch members 61 and 62 are keyed together and the shaft 12 is thereupon rotated so as to cause the conveyor chain 7 to travel in the direction of the arrow.

The diameter of the sprocket wheel 60 is such that a single revolution thereof will cause the conveyor chain 7 to move a box exactly the distance between the filling hopper 15 and the plunger 37, and means is provided to disengage the clutch members 61 and 62 when they have made a single revolution. This means takes the form of a pin 83 projecting from the outer side of the clutch member 62 and is adapted to cooperate with a lug 84 projecting upwardly from the clutch actuating rod 70. When the finger 68 is withdrawn, causing engagement of the clutch, the pin 83 is carried around and strikes against the lug 84 and shifts the rod 70 to the right, as viewed in Figure 1, so that the finger 68 is returned into the path of the arm 64 of the clutch pin 63. When the arm 64 engages the finger 68 it is turned into a horizontal position, thereby moving the pin 63 out of engagement with the groove 85, and the clutch is thereupon disengaged. This construction insures that when the handle 24 is depressed so as to withdraw the finger 68, the clutch will make only a single revolution and then stop.

The plunger 37 is also operated by means of a single revolution clutch, similar to that described above, and comprising the clutch members 86 and 87, mounted on the shaft 47. The clutch member 87 rotates freely on the shaft 47 and is continually driven from the drive shaft 57 by means of pinion 88 and gear 89. The clutch member 86 is keyed to the shaft 47. The construction 86 and 87 is the same as that of the clutch members 61 and 62, and they are engaged by a pin 90 identical with the pin 63.

The operating means for the clutch members 86 and 87 includes a finger 91 slidably mounted in a sleeve 92 secured to a leg 3 adjacent the clutch, and adapted to be moved into and out of engagement with the arm 93 of the pin 90 by means of a crank 94 keyed to the shaft 72. A collar 95 is keyed to the shaft 47 adjacent the rod 70 and carries a pin 96 adapted to cooperate with a lug 97 on the rod 70 so that when the shaft 47 has made a single revolution, after clutch members 86 and 87 are engaged, the pin 96 engages the lug 97 and shifts the rod 70 to the left, as viewed in Figure 1, whereby the crank 71 rotates the shaft 72, causing the crank 94 to thrust the finger 91 into the path of the arm 93 of the pin 90 to cause disengagement of the clutch members 86 and 87. It will thus be seen that upon engagement of clutch members 86 and 87 the shaft 47 makes only a single revolution, whereby the plunger 37 is depressed and then withdrawn and stopped in its original position at the upper end of its stroke.

At this time it is to be noted that the relation of the fingers 68 and 91 and their connecting parts is such that they may both be in engagement with their respective pin arms 64 and 93 at the same time, whereby both clutches are disengaged. When this situation obtains, both the fingers 68 and 91 occupy positions relative to their respective clutch pin arms such as shown in Figure 6. If, therefore, the rod 70 is shifted so as to withdraw one of the fingers out of engagement with its clutch pin arm, the other finger is simply moved further into engagement with its clutch pin arm. It is, therefore, obvious that while both clutches may be disengaged at the same time, it is impossible for them both to be engaged at the same time.

In Figure 1 the parts are shown in normal or idle position. If the operator now depresses the operating handle 24, the rod 70 will be shifted to the left, whereby the clutch pin arm 64 is freed from the finger 68 and the clutch members 61 and 62 are engaged. Simultaneously the finger 91 is thrust further into engagement with the clutch pin arm 93, so that the clutch members 86 and 87 remain disengaged. As the pin 83 revolves into engagement with the lug 84, the rod 70 is shifted back to the right into its original position wherein the finger 68 engages the clutch pin arm 64 to disengage clutch members 61 and 62. The finger 91 remains in engagement with clutch pin arm 93 so that clutch members 86 and 87 are not affected. It may, therefore, be seen that the operation of the handle 24 does not directly affect the plunger operating clutch.

As has been heretofore explained, it is desirable to deposit a larger amount of fruit in the boxes than can be done without overflowing, in order that when the fruit is pressed into the boxes it will be full in spite of the diminished volume of fruit. For accomplishing this purpose, a box collar 98 is provided, which is a rectangular box having an open top and bottom. In the construction shown the bottom edges of the walls of the collar are bent outwardly so as to form flanges 99 adapted to rest on the rim of a box. A downwardly projecting lip 100 is formed on the flange at one end of the collar, and the other end and the sides of the collar are provided with flat springs 101 which project downwardly below the flanges 99 to engage the sides of the box. This construction insures that the collar will fit over the tops of boxes regardless of minor variations in size. A buffer 102 is secured to one end of the box collar and serves a purpose to be described later.

The collar 98 is provided on each side near its top with a pair of rollers 103 which are pinned to the walls of the collar whereby the box may move over the track rails 104, extending above and longitudinally of the table 1. Mechanism is provided for lifting and lowering the rails 104 so that the collar 98 may be lifted free of a box therebeneath, or let down into engagement therewith. To this end the rails 104 are secured at their ends to cross members 105 which are sup-

ported by the vertical shafts 106 passing through bearings 107 secured to the frame 2. The lower ends of the shafts 106 are supported by the projecting ends of the bell cranks 108, whose free ends are interconnected by means of the rods 109 and 110, and the double bell crank 111 is pivoted to a plate 112 secured to a portion of the frame work. The arm 113 of the double bell crank 111 is supported by a buffer rod 114 passing through bearings 115 and having a collar 116 between which and the lower bearing is a coil spring 117 which tends to urge the rod 114 upwardly.

In the position of the parts illustrated in Figure 1, the rails 104 are in their lower position, whereby the box collar 98 engages with a box resting on the table 1. The collar may be lifted clear of the box by a clockwise rotation of the double bell crank 111, in which case the collar would be held in position beneath the hopper 15 by means of a weight 118 hung on the end of a rope 119 passing over sheaves 120 and secured to the box collar at 121. A pivoted lever 122 disposed crosswise of the rails 104 abuts against a stop 123 so that the collar will not be pulled out from under the hopper.

When the collar 98 is in engagement with a box and the conveyor chain is operated so as to move the box beneath the plunger 37, the collar moves in unison with the box by reason of its engagement therewith. As the collar reaches a position of registry beneath the plunger 37, the buffer 102 engages an arm 124 secured to a vertical shaft 125 so as to rotate the shaft. Another arm 126, secured to the lower end of shaft 125, cooperates with a lug 127 on the rod 70 whereby movement of the arm 124 by the box collar causes rod 70 to be shifted to the right to remove the finger 91 from the clutch operating pin 90, whereby the clutch members 86 and 87 are engaged and the plunger is depressed into the collar and then withdrawn. Whereupon, the clutch, having made a single revolution, is disengaged in the manner heretofore described and the plunger stops.

As the plunger 37 is being withdrawn a pin 128, secured to the crank 45, comes into engagement with a roller 129 carried on the end of the arm 113 of the double bell crank 111 and lifts it above the catch 130 on the latch lever 131. As the pin 128 rises it pulls away from the roller 129 and releases it, whereupon it falls into engagement with the catch 130 which is held therebeneath by a spring 132. When the arm 113 is lifted into engagement with the catch 130, it will be noted that the box collar is lifted clear of the box, whereupon the weight 118 returns the collar over the rails 104 into registry with the hopper 15. As the collar comes into registry beneath the hopper it engages lever 122 which is connected with the latch lever 131 by a link 133, and the catch 130 is withdrawn from beneath the roller 129, permitting the arm 113 to fall against the buffer rod 114 and lower the track 104 so that the collar is let down into engagement with another box on the table 1.

The weight 118 preferably takes the form of a heavy chain so that as the collar is pulled away from the plunger 37 toward the hopper 15 the chain piles up on the floor and its effective weight decreases as it piles up. The force acting on the collar thus decreases as the collar approaches the filling station, so that the shock occasioned by the collar striking the lever 122 and stop 123 is much diminished.

It sometimes happens that the operating handle 24 is accidentally moved when either the collar is not beneath the hopper or there is no box in position to receive the contents of the hopper, and to prevent such a thing from occurring a double safety mechanism is provided. A vertical shaft 134, journaled in bearings 135, carries at its lower end an arm 136 which extends into the path of boxes moving over the table 1, and at its upper end a short plate 137 adapted to pass beneath the end of the operating handle 24. A spring 138 urges the arm 136 against a stop 139 and into the box path, so that as no box engages therewith the plate 137 is maintained beneath the operating handle 24 thus preventing its operation. When a box engages the arm 136 it is moved outwardly so as to remove the plate from beneath the operating handle into a non-interfering position.

A lever 140, pivoted at its upper end to the frame 13, is urged towards a vertical position by a spring 141. A rod 142, pivoted to a plate 143 is secured to the lever 140 and is adapted to swing the plate 143 beneath the lower end of the operating handle 24 when the lever is in vertical position, so that the handle cannot be depressed. The plate 143 is pivotally secured to a bearing 144 fastened to the frame 13. When the box collar comes beneath the hopper it moves the lever 140 so as to carry the plate 143 out from beneath the operating handle 24 where it no longer interferes with the operation of the handle.

It will thus be seen that the double safety mechanism prevents the operation of the handle 24 at all times unless both box and box collar are in proper position to receive the contents of the hopper.

As illustrative of the regular operation of the apparatus described, let it be assumed that the parts are in the position shown in Figure 1, which is the normal idle position assumed after the completion of each cycle of operations. The operator causes the delivery belt 31 to deliver fruit through the spout 36 until the dial 30 indicates that the hopper 15 contains the desired weight of fruit. Whereupon he manipulates the handle 34 to stop the delivery belt. The operator then depresses the operating handle 24 and releases it, whereby, through the action of shaft 25 and finger 26, the latch 21 is lifted and the weight of the fruit in the hopper opens the gates 16 and 17 and the fruit is discharged into the box and associated collar therebeneath. After the fruit is so discharged the weight 19 closes the hopper gates, which are again latched shut, and the hopper is ready to receive another charge of fruit.

The depression of the handle 24 also shifts the rod 74 downwardly so that the crank 73 is turned clockwise, whereby the shaft 72 is rotated and the rod 70 is shifted from neutral position to its extreme left hand position. The rotation of the shaft 72 causes the crank 94 to thrust the finger 91 a little farther into engagement with the clutch pin arm 93, but this does not change the position of clutch pin 90, so that the clutch members 86 and 87 are not affected. The movement of the rod 70 to its extreme left hand position, however, withdraws the finger 68 out of engagement with the clutch pin arm 64, so that the spring 65 turns pin 63 and clutch members 61 and 62 are engaged. This causes the shaft 12 to rotate and the conveyor chain 7 moves the box 5 away from the filling station and into registry beneath the plunger 37, carrying the box collar with it by reason of its engagement with the box. Simultaneously, an-

other box is moved into registry beneath the hopper 15.

When the box and collar are moved out from under the hopper, the springs 138 and 141 cause the safety plates 137 and 143 to be carried beneath the end of the operating handle 24 so that the handle cannot be depressed. The movement of the conveyor brings another box into registry with the hopper as the box ahead is moved into registry beneath the plunger, and the succeeding box displaces the lever 136 so as to remove the plate 137 from beneath the operating handle. Since the collar is not yet in position, however, beneath the hopper, the plate 143 remains in position so that it is still impossible to move the operating handle until the collar is returned.

As the box and its associated collar are brought into registry beneath the plunger 37, they are brought to rest by reason of the pin 83 coming into engagement with the lug 84 on the rod 70, whereby the rod 70 is returned to neutral position and the finger 68 is carried into the path of the clutch pin arm 64, causing the pin to be turned, thus disengaging the clutch members 61 and 62 and stopping the chain 7.

As the collar 98 is brought into registry with the plunger 37, the buffer 102 engages the arm 124 which rotates the vertical shaft 125 so that the arm 126 engages the lug 127 on rod 70 and shifts the rod to its extreme right hand position, which does not affect the clutch members 61 and 62 but does withdraw the finger 91 away from clutch pin arm 93, so that the clutch pin 90 is turned and the clutch members 86 and 87 are thereby engaged. The shaft 47 is thereupon rotated and the cranks 45 and 46 cause the plunger 37 to be depressed so as to compress the material into the box, and the plunger is then withdrawn. During the revolution of the cranks, and as they are withdrawing the plunger 37, the pin 128 on the crank 45 engages with the roller on the end of the arm 113 of the double bell crank 111 and lifts the roller so as to turn the bell crank 111 clockwise and lift the rails 104. As the pin 128 continues upwardly it releases the roller 129 which falls into engagement with the catch 130 on the latch lever 131 and holds the track in raised position. At about this time the plunger is nearing the end of its withdrawal stroke and the pin 96 on the collar engages the lug 97 on the rod 70 and moves it to the right into neutral position, whereby the finger 91 again engages with the clutch pin arm 93 and the clutch pin 90 is turned so as to disengage the clutch members 86 and 87, whereby the plunger comes to rest. Since the rod 70 is only shifted into neutral position, the clutch members 61 and 62 are unaffected.

The lifting of the track 104 frees the collar 98 from the box with which it has been associated, whereupon the weight 118 returns the collar over the rails 104 into registry beneath the hopper 15 and over the next box, which was brought under the hopper when the previous box was moved to the plunger. As the collar reaches the end of its path it strikes against the lever 122 which causes the latch 130 to release the roller 129, whereupon the arm 113 falls back upon the buffer 114 and the rails 104 are lowered, thus lowering the collar into engagement with the box therebeneath.

When the collar comes into registry beneath the hopper it also engages the lever 140, which withdraws the safety plate 143 out from under the end of the operating handle 24 so that the handle may now again be operated, whereupon the mechanism will pass through another cycle of operations such as just described.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. In a box packing machine, a filling mechanism, a pressing mechanism, intermittently actuated means for conveying boxes into successive registry with said filling and pressing mechanisms and momentarily stopping them in such positions, a box collar operable above the conveying means and movable into and out of registry with said filling and pressing mechanisms, means for lowering the collar into engagement with a box at the filling mechanism when said collar is in registry with said filling mechanism, means for actuating the pressing mechanism during stationary periods of said conveying mechanism when the collar registers therewith, and means for lifting said collar free of the box after actuation of the pressing mechanism when said collar is in registry with the pressing station.

2. In a box packing machine, a filling station, a pressing station, intermittently actuated means for conveying boxes into successive registry with said stations and momentarily stopping them in such positions, a box collar movable between said stations in unison with boxes on the conveying means, and means for transferring said collar from the pressing station to operative position at the filling station while said conveying means remain stationary.

3. In a box packing machine, a filling station, a pressing station, a freely movable box collar adapted to fit over a box and to be carried by engagement therewith from the filling station to the pressing station, means for lifting the collar from said box at the pressing station, means for returning the collar to the filling station, and means for lowering said collar into engagement with a box at said filling station.

4. In a box packing machine, a filling station, a pressing station, intermittently operated means for conveying a file of boxes into successive registry with said stations and momentarily holding them in such position, a box collar adapted to register with a box on said conveyor and movable in unison therewith from the filling station to the pressing station, and means for transferring the collar from said box after it reaches the pressing station to a position in registry with a succeeding box having registration with the filling station.

5. In a box packing machine, a filling station, a pressing station, a box collar movable between said stations, and means for transferring the collar from the pressing station to the filling station, and exerting a gradually diminishing force on said collar as it approaches the filling station.

6. In a box packing machine, a filling station, a pressing station, means for conveying boxes from the filling station to the pressing station, a track disposed above said conveying means, a box collar movable along said track between said stations, means for lifting and lowering said track, and a buffer associated with said lifting and lowering means.

7. In a box packing machine, a reciprocable plunger for pressing material into boxes, a box collar movable into and out of registry beneath the plunger, means for depressing and withdrawing the plunger when the collar registers therewith, and means for preventing the operation of the plunger depressing and withdrawing means when the collar is out of registry with the plunger.

8. In a box packing machine, means for filling boxes with material, a reciprocable plunger disposed at a fixed location for pressing the material into said boxes, intermittently actuated means for conveying boxes into successive registry beneath the filling means and the plunger and momentarily stopping them in such positions, a box collar disposed above the conveying means for registration with a box thereon and movable in unison therewith from beneath said filling means into registry beneath said plunger, means for depressing and withdrawing the plunger when the box and associated collar register therewith, and means for transferring the collar into registry with the filling means after the plunger is withdrawn.

9. In a box packing machine, a reciprocable plunger for pressing material into boxes, driving means therefor including a single revolution clutch, a box collar movable into and out of registry beneath the plunger, and means operable when said collar is in registration with the plunger to cause engagement of the clutch whereby said clutch makes a single revolution and causes the plunger to be depressed and withdrawn.

10. In a box packing machine, means for filling boxes with material, a plunger for pressing material into said boxes, driving means for the plunger including a single revolution clutch, an intermittently operated conveyor for conveying a file of boxes into successive registration beneath said filling means and plunger, driving means for said conveyor including a single revolution clutch, a box collar adapted to register with a box on said conveyor and movable in unison therewith from beneath the filling means into registration beneath the plunger, means for engaging the conveyor operating clutch whereby said clutch makes a single revolution and a box and the collar are moved from beneath the filling means into registration beneath the plunger, means operable when said collar comes into registration with the plunger to cause engagement of the plunger operating clutch whereby said clutch makes a single revolution and causes the plunger to be depressed and withdrawn, and means for moving the collar out of registration with the plunger during withdrawal thereof and returning said collar into registration with a succeeding box having registration with the filling means.

11. In a box packing machine, a filling mechanism, actuating means therefor, a box collar movable into registry beneath the filling mechanism, and safety means for preventing the operation of said actuating means when the collar is not beneath said filling means.

12. In a box packing machine, means for filling boxes with material, actuating means therefor, a plunger for pressing material into said boxes, driving means for the plunger, a conveyor for conveying a file of boxes into successive registration beneath said filling means and said plunger, operating means for said conveyor associated with the actuating means for the filling mechanism whereby when the filling mechanism is actuated the conveyor is likewise operated, a box collar adapted to register with a box on said conveyor and movable in unison therewith from beneath the filling means into registration beneath the plunger, means operable when said collar comes into registration with the plunger to disengage the conveyor operating means and engage the plunger driving means whereby the conveyor stops and the plunger is depressed and withdrawn, means for moving the collar out of registration with the plunger after withdrawal thereof and returning said collar into registration with a succeeding box having registration with the filling means, and means for disengaging the plunger driving means when the collar moves out of registry with the plunger, whereby said plunger is stopped at the upper end of its stroke.

13. In a box packing machine, a presser shoe for pressing material into boxes, said presser shoe having a perforated bottom, a chamber within the shoe above said bottom, a conduit leading from a source of steam supply and communicating with said chamber for introducing steam into said chamber, means for conveying a file of boxes into successive registry beneath said presser shoe, and means operated in timed relation to said conveying means for reciprocating said presser shoe to compress the contents of successive filled boxes conveyed therebeneath.

14. A presser shoe for box packing machines comprising a block having a channel in its under surface, a steam pipe in said channel having perforations directed against the walls of the channel, a perforated plate secured to the underside of the block over the channel, and means for introducing steam into said pipe.

15. In a box packing machine, a presser shoe adapted to press material into boxes comprising a block having a channel in its under surface, a steam pipe in said channel having perforations directed against the walls of the channel, a perforated plate secured to the underside of the block over the channel, and means for introducing steam into said pipe.

16. In a box packing machine, a box collar movable over a confined path, a filling station at one end of said path, a pressing station at the opposite end of said path, a stop at each end of said path, said box collar being adapted to register with one of said stations when it engages either of said stops and a conveyor extending beneath the path of travel of said box collar for conveying a file of boxes into successive registry with said filling and pressing stations.

17. In a box packing apparatus, means for filling boxes with material, means for pressing the material into said boxes, means for conveying boxes into successive registry with said filling and pressing means, a guideway extending beneath said filling and pressing means, a box collar movable along the guideway into registry with either of said filling or pressing means, and a stop at each end of said guideway, said stops being so located that when the box collar is held thereagainst it is in registry with the filling or pressing means.

18. In a box packing machine, a filling station, a pressing station, means for conveying boxes from the filling station to the pressing station, a track disposed above said conveying means, a box collar movable along said track between said stations, and means for raising and lowering said track.

19. In a box packing machine, a filling station, a pressing station, means for conveying boxes from the filling station to the pressing station, a track disposed above said conveying means, a box collar movable along said track, means operable by the collar at the filling station to cause the track to be lowered whereby the collar is lowered into engagement with a box at said station, and means operable by the collar at the pressing

station to cause the track to be lifted whereby the collar is lifted free of said box.

20. In a box packing machine, a filling mechanism, a presser mechanism, means for conveying boxes into successive registry with said filling and pressing mechanisms, a trackway extending above said conveying means between the filling and pressing mechanisms, and a box collar provided with rollers cooperating with said trackway whereby said box collar may be rolled over the trackway.

21. In a box packing machine, a filling mechanism, a pressing mechanism, means for conveying boxes into successive registry with said filling and pressing mechanisms, a box collar operable above the conveying means and movable into and out of registry with said filling and pressing mechanisms, actuating means for said collar normally holding it in registry with the filling mechanism, means for lowering the collar into engagement with a box at the filling station for transfer to the pressing station by engagement with the box, and means for lifting said collar free of the box at the pressing station whereby the collar is returned to the filling station by said collar actuating means.

22. In a box packing machine, a filling station, a pressing station, intermittently actuated means for conveying boxes into successive registry with said stations and momentarily holding them stationary in such positions, a box collar operable above the conveying means and movable into and out of registry with said stations, means for lowering the collar into engagement with a box at the filling station when said collar is in registry with said station and the conveying means is stationary, means for lifting said collar free of the box when said collar is in registry with the pressing station and the conveying means is stationary, and means for returning the collar into registry with the filling station when it is lifted free of said box.

23. In a box packing machine, means for conveying a file of boxes, a filling mechanism and a pressing mechanism disposed above said conveying means for simultaneous registration with adjacent boxes in said file as they pass therebeneath, means for intermittently driving said conveying means to advance said boxes from the filling mechanism to the pressing mechanism and momentarily stop them in such positions, a box collar adapted to register with a box on said conveying means, and movable in unison therewith from the filling mechanism to the pressing mechanism, means for actuating the pressing mechanism when the collar registers therewith, and means for moving the collar backwardly from each box beneath the pressing mechanism into registry with the next succeeding box beneath the filling mechanism while said conveyer remains stationary.

24. In a box packing machine, a filling mechanism, a pressing mechanism, intermittently actuated means for conveying boxes into successive registry beneath the filling and pressing mechaisms, a box collar operable above the conveying means and movable into and out of registry beneath the filling and pressing means, said collar being adapted to register with a box as it passes from the filling mechanism to the pressing mechanism, and means for returning the collar from the pressing mechanism to the filling mechanism in a direction counter to the path of travel of the boxes.

25. In a box packing machine, a filling station, a pressing station, means for conveying boxes from the filling station to the pressing station, a freely movable box collar movable from the filling station to the pressing station by engagement with a box on the conveying means, and means operable to transfer the collar from the pressing station to a box at the filling station when said collar is disengaged from the box.

26. In a box packing machine, a filling station, a pressing station, a track extending between said stations, a box collar movable along said track, means actuated by the collar at the pressing station to cause the track to be lifted whereby the collar is lifted free of a box, means for returning the collar along the track to the filling station, means actuated by the collar at the filling station to cause the track to be lowered whereby the collar is lowered into engagement with a box at said station, and means for conveying the box and collar from the filling station to the pressing station.

27. In a box packing machine, a reciprocable plunger for pressing material into boxes, means for conveying a box into registry beneath the plunger, a box collar operable above the conveying means and movable into and out of registry beneath the plunger, means for depressing and withdrawing the plunger, and means actuated by engagement with the collar when said collar is moved into registry beneath the plunger for operating the plunger depressing and withdrawing means.

28. In a box packing machine, means for filling boxes with material, a reciprocable plunger for pressing the material into said boxes, means for conveying boxes into successive registry beneath the filling means and the plunger, a box collar operable above the conveying means and movable into and out of registry beneath the filling means and the plunger, means for depressing and withdrawing the plunger, means actuated by engagement with the collar when the collar is moved into registry beneath the plunger for operating the plunger depressing and withdrawing means, and means for transferring the collar into registry with the filling means after the plunger is withdrawn.

29. In a box packing machine, means for filling boxes with material, a reciprocable plunger for pressing the material into said boxes, means for conveying boxes into successive registry beneath the filling means and the plunger, a box collar operable above the conveying means over a confined path, a stop at each end of said path, said collar being adapted to register with the filling means when it engages one of the stops and with the plunger when it engages the other stop, means for depressing and withdrawing the plunger when the collar registers therewith, and means for transferring the collar into registry with the filling means after the plunger is withdrawn.

30. In a box packing machine, means for filling boxes with material, a reciprocating plunger for pressing the material into said boxes, means for conveying boxes into successive registry beneath the filling means and the plunger, a box collar actuated independently of the conveyer and reciprocable between said filling means and plunger and movable into and out of registry therewith, means for guiding the collar into registration beneath the filling means and beneath the plunger, means for actuating the plunger when the collar registers therewith, and means for transferring the collar into registration with

the filling means after the plunger is actuated.

31. In a box packing machine, a filling mechanism, actuating means therefor, means for conveying boxes into registry beneath the filling mechanism, a box collar movable into registry beneath the filling mechanism, and safety means adapted to prevent the operation of said actuating means except when a box and the collar are both beneath the filling mechanism.

32. In a box packing machine, a filling mechanism, actuating means therefor, a box collar movable into and out of registry beneath the filling mechanism, a safety catch, means associated with said safety catch for normally holding it in operative position to prevent operation of said actuating means, and means controlled by said collar when moved beneath the filling mechanism to displace said safety catch into operative position.

33. In a box packing machine, a filling mechanism, actuating means therefor, means for conveying boxes into registry beneath the filling mechanism, a box collar movable into and out of registry beneath the filling mechanism, a pair of safety catches, means associated with each of said safety catches for normally holding them in operative position to prevent operation of said actuating means, means controlled by a box when conveyed beneath the filling mechanism to displace one of said safety catches into inoperative position, and means controlled by said collar when moved beneath the filling mechanism to displace the other safety catch into inoperative position.

34. In a box packing machine, a presser shoe for pressing material into boxes, means for heating the face of said shoe to sterilize the same, means for conveying a file of boxes into successive registry beneath said presser shoe, and means operated in timed relation to said conveying means for reciprocating said presser shoe to compress the contents of successive filled boxes conveyed therebeneath.

35. In a box packing machine, a presser shoe for pressing material into boxes, means for heating and moistening the face of said shoe to sterilize the same and minimize the adherence of sticky material thereto, means for conveying a file of boxes into successive registry beneath said presser shoe, and means operated in timed relation to said conveying means for reciprocating said presser shoe to compress the contents of successive filled boxes conveyed therebeneath.

36. In a box packing machine, a presser shoe for pressing material into boxes, said presser shoe having a perforated bottom, a chamber within the shoe above said bottom, a conduit connected with a source of steam supply and communicating with said chamber for introducing steam into said chamber, a porous fabric covering for said perforated bottom, means for conveying a file of boxes into successive registry beneath said presser shoe, and means operated in timed relation to said conveying means for reciprocating said presser shoe to compress the contents of successive filled boxes conveyed therebeneath.

37. A pressure shoe for box packing machines comprising a block having a channel in its under surface, a perforated steam pipe in said channel, a perforated plate secured to the underside of the block over the channel, and means for introducing steam into said pipe.

38. In a box packing machine, a box filling device, a pressing device for compressing the contents of filled boxes, a conveyer for conveying a file of boxes into successive registry beneath said filling and pressing devices, and a box collar adapted to register with a box on said conveyer and mounted for reciprocating movement forward and backward above the conveyer between a position beneath the filling device at one end of its travel, and a position beneath the pressing device at its opposite end of travel.

39. In a box packing machine, a box filling device, a pressing device for compressing the contents of filled boxes, a conveyer for conveying a file of boxes into successive registry beneath said filling and pressing devices, and a box collar adapted to register with a box on said conveyer and mounted for reciprocating movement forward and backward over a confined path above the conveyer between a position beneath the filling device at one end of its travel, and a position beneath the pressing device at its opposite end of travel.

40. In a box packing machine, a box filling device, a pressing device for compressing the contents of filled boxes, a conveyer for conveying a file of boxes into successive registry beneath said filling and pressing devices, a box collar adapted to register with a box on said conveyer and movable in unison therewith above said conveyer as the box passes from the filling device to the pressing device, and means for returning the collar backward from the pressing device in a direction counter to the travel of the boxes, and into registration with a succeeding box beneath the filling device.

41. In a box packing machine, a box filling device, a pressing device for compressing the contents of filled boxes, a conveyer for conveying a file of boxes into successive registry beneath said filling and pressing devices, a trackway disposed above and co-directional with said conveyer, and a box collar adapted to register with a box on said conveyer and mounted for reciprocating travel forward and backward along said track between a position beneath the filling device at one end of its travel, and a position beneath the pressing device at the opposite end of its travel.

HENRY A. CAMPBELL.