No. 785,411. PATENTED MAR. 21, 1905.

W. H. DOBLE.

MACHINE FOR CLOSING AND SEALING THE ENDS OF CARTONS.

APPLICATION FILED NOV. 6, 1903.

5 SHEETS—SHEET 1.

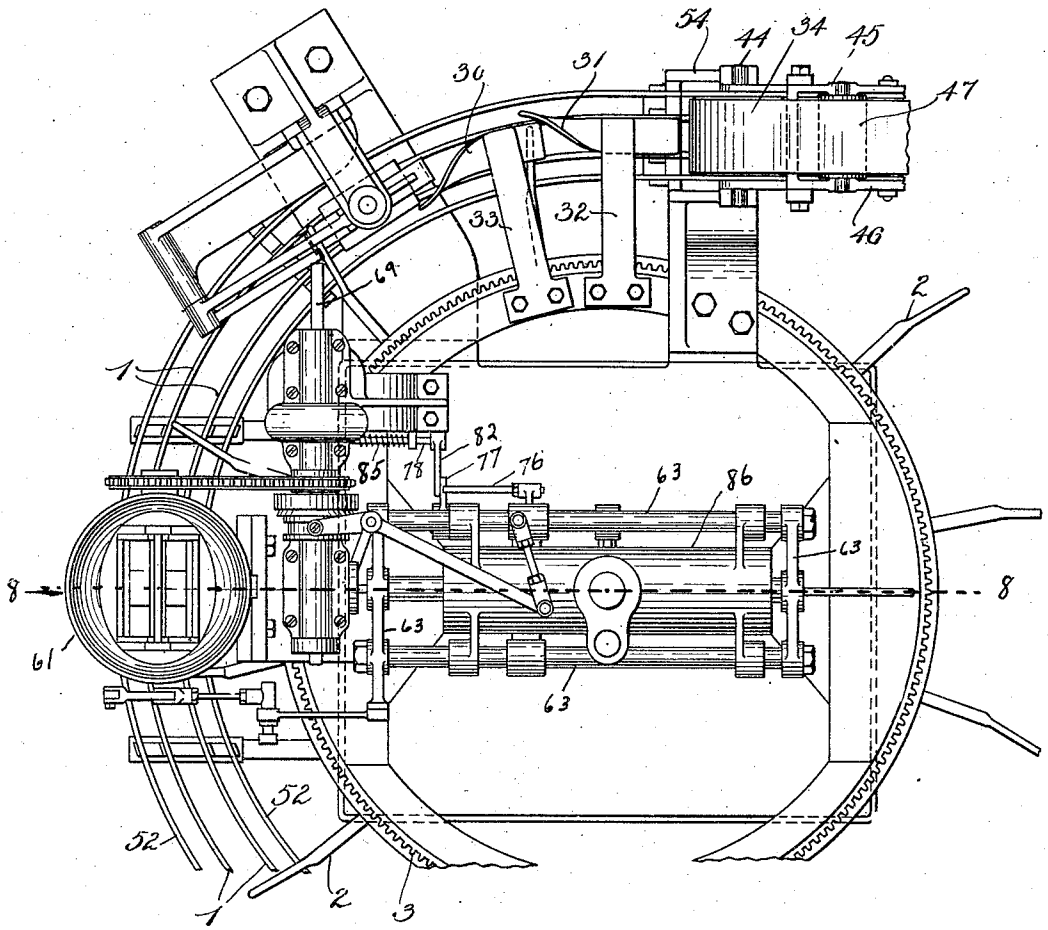


FIG. 1

WITNESSES:
Franklin E. Low.
Sydney E. Taft.

INVENTOR:
William H. Doble
by Wm A. Copeland
attorney

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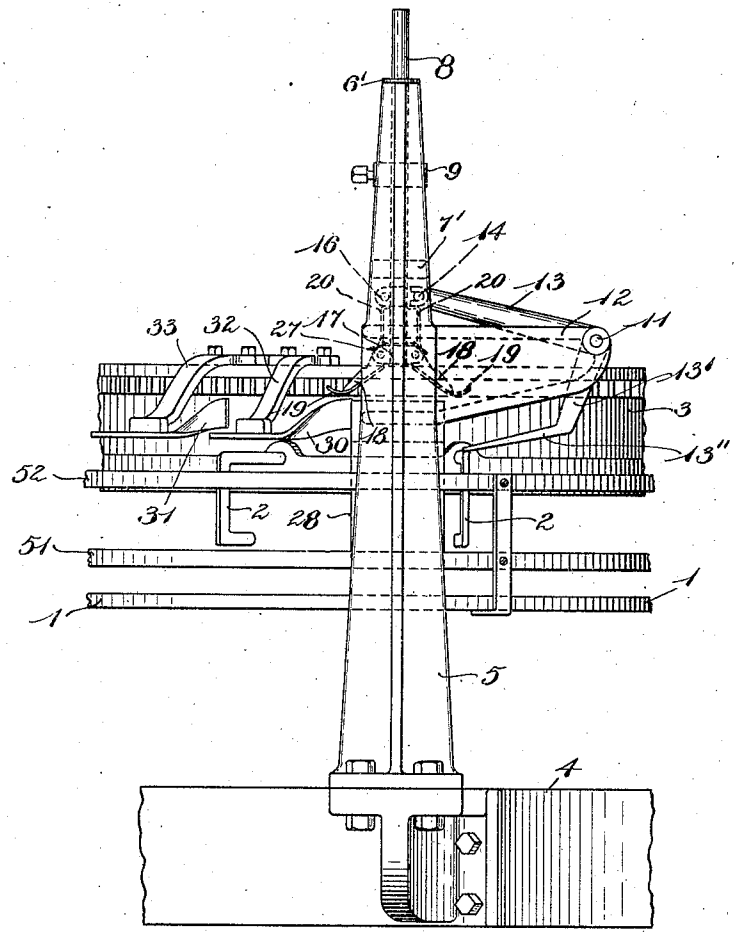


Fig. 2.

WITNESSES:
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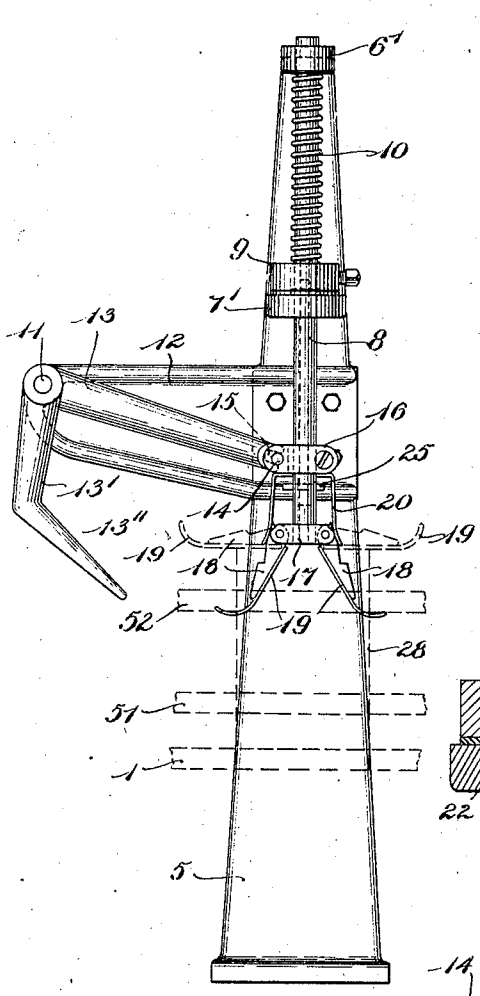


FIG. 3.

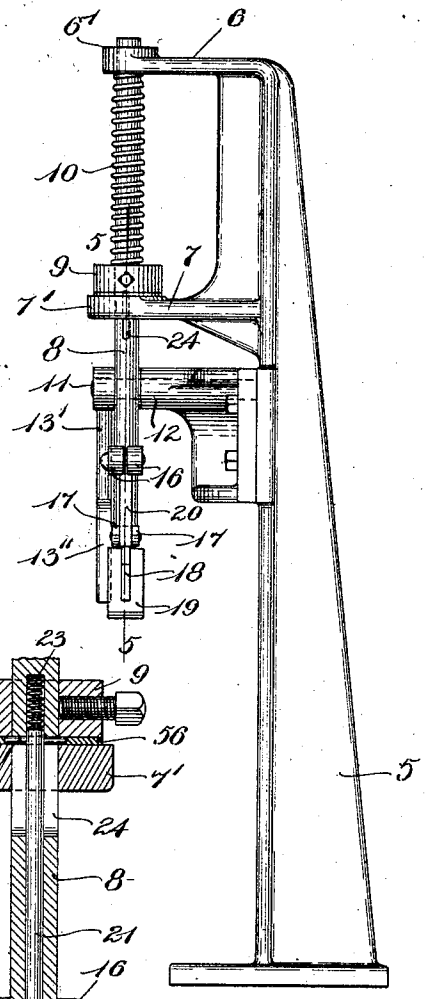


FIG. 4.

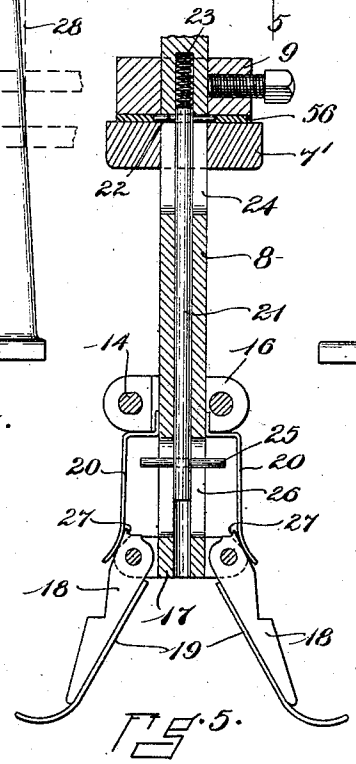


FIG. 5.

Witnesses.
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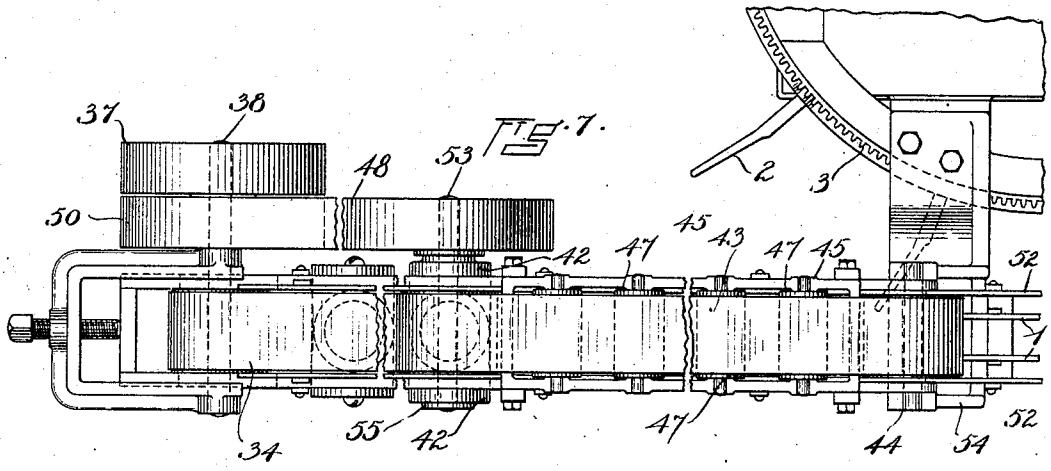


FIG. 7.

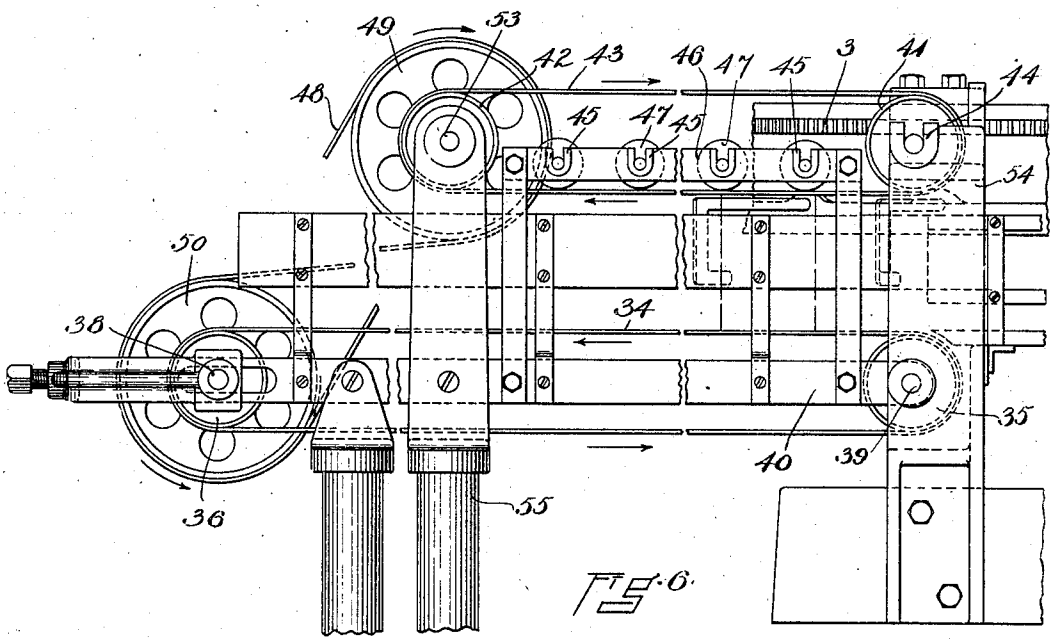


FIG. 6.

WITNESSES:
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MACHINE FOR CLOSING AND SEALING THE ENDS OF CARTONS.

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5 SHEETS—SHEET 5.

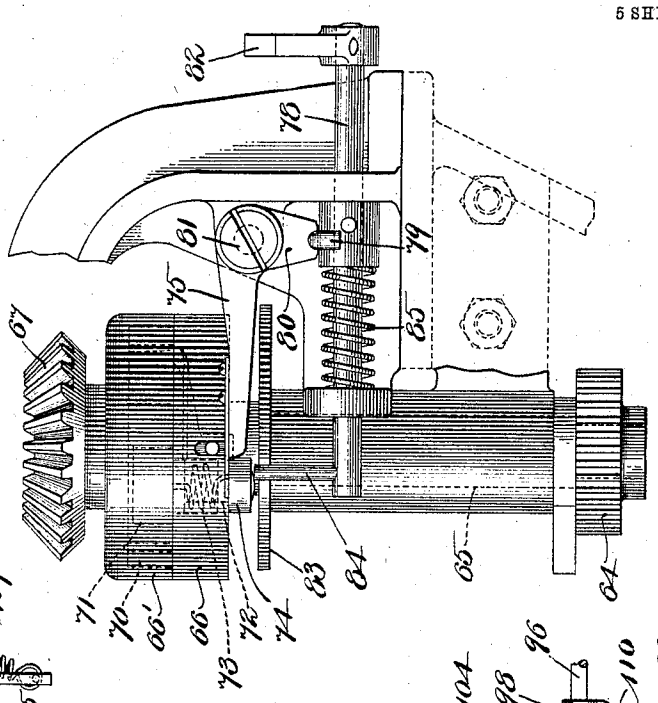


FIG. 11.

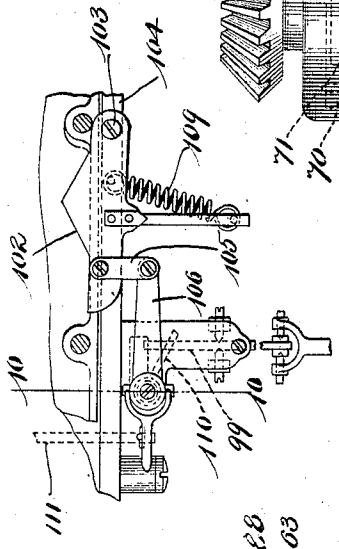


FIG. 9.

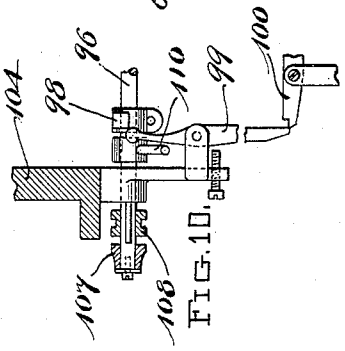


FIG. 10.

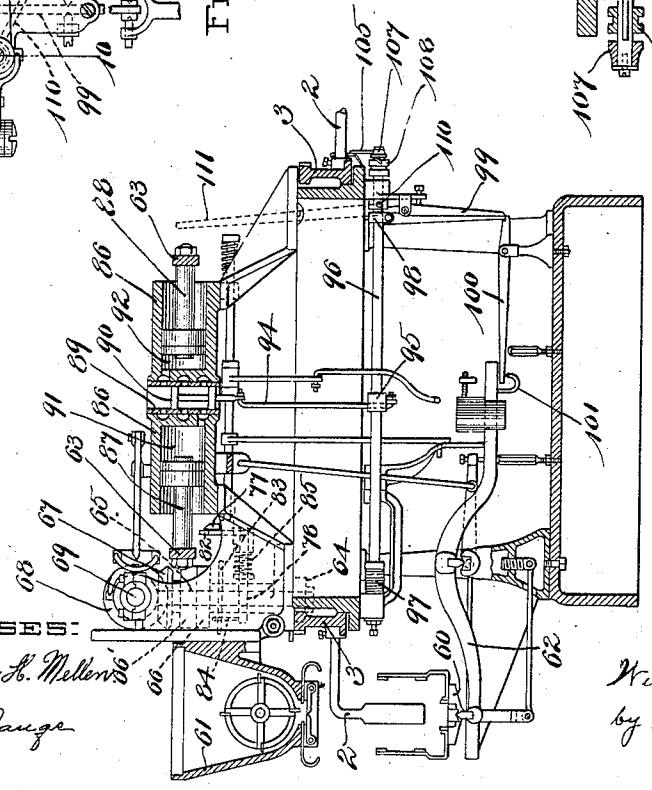


FIG. 8.

WITNESSES:

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Harold S. Bangs

INVENTOR

William H. Doble

by Wm A. Copeland

Attorney.

No. 785,411. Patented March 21, 1905.

UNITED STATES PATENT OFFICE.

WILLIAM H. DOBLE, OF QUINCY, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PNEUMATIC SCALE CORPORATION, LIMITED, A CORPORATION OF MAINE.

MACHINE FOR CLOSING AND SEALING THE ENDS OF CARTONS.

SPECIFICATION forming part of Letters Patent No. 785,411, dated March 21, 1905.

Application filed November 6, 1903. Serial No. 180,003.

To all whom it may concern:

Be it known that I, WILLIAM H. DOBLE, of Quincy, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Closing and Sealing the Ends of Cartons, of which the following is a specification.

The object of the present invention is to provide a machine to automatically close and seal the flaps at the top end of a carton after the carton is filled.

The invention is specially intended to be employed in combination with a machine for filling the cartons.

The invention will now be fully described by reference to the accompanying drawings, and the novel features will be particularly pointed out in the claims at the close of the specification.

In the drawings, Figure 1 is a plan of a weighing and package-filling machine having combined therewith mechanism embodying the present invention. Fig. 2 is a partial elevation viewed from the left upper corner of Fig. 1, the flap-sealing fingers being in their uppermost position. Fig. 3 is a partial elevation viewed from the opposite side from Fig. 2 and with the flap-sealing fingers in their lowermost position, the dotted lines showing the position assumed by them when a package is in place. Fig. 4 is an elevation viewed from the right-hand side of Fig. 3. Fig. 5 is a sectional view on line 5 5 of Fig. 4. Fig. 6 is an elevation viewed from the right hand of the top of Fig. 1 and showing parts which are broken away on the right-hand side of Fig. 1. Fig. 7 is a plan of Fig. 6. Fig. 8 is a vertical section on line 8 8 of Fig. 1. Fig. 9 is a detail elevation at the rear of the machine, showing the cam-lever which is engaged by one of the package-moving fingers and the connections for actuating the rock-shaft to open the scale-hopper valve. Fig. 10 is a detail, partly in section, on line 10 10 of Fig. 9. Fig. 11 is an enlarged detail elevation showing the clutch and some of the connections for driving and stopping the package-moving ring.

The carton filling and weighing mechanism shown is similar to that shown in Patent No. 716,007, dated December 16, 1902. It may be either a single-hopper machine or a double-hopper machine. The carton-moving ring is controlled by the tipping of the scale. The packages to be filled are given a step-by-step movement along the track 1 by means of fingers 2, projecting from the intermittently-rotating ring 3 to a position on the scale 60. If the package has been partially filled through a preliminary feed, it will receive the remainder of its load through the hopper 61 while on the scale. If a single-hopper machine is used, the package may receive its entire load while on the scale. The tipping of the scale-beam 62 under weight of the filled package actuates mechanism which shuts off the feed and also causes the carrier-ring 3 to start. The filled package is engaged by one of the fingers 2 and removed from the scale and carried to the mechanism which folds two opposite flaps of the upper end of the carton, thence to mechanism which folds the other two upper end flaps, and thence to mechanism which presses down the flaps and retains them under pressure for a short time to insure the setting of the glue. When the scale tips, a reciprocating member 63 is caused to move in a direction to close the scale-hopper feed.

The carrier-ring 3 is driven by a pinion 64 on shaft 65, and shaft 65 is connected by a clutch 66 66′ and bevel-gears 67 and 68 with a shaft 69. The driving member 66 of the clutch is fast to shaft 65, and the upper member of shell 66′ is fast to the hub of bevel-gear 67, but loose on shaft 65. In the inner periphery of shell 66′ are a series of scalloped recesses 70, adapted to be engaged by a pawl 71 on the upper end of shaft 72 to lock the two members of the clutch together, and when so locked the shaft 65 will revolve and move the carrier-ring 3. A spring 73 tends to hold the pawl 71 thus engaged. On the lower end of shaft 72 is a dog 74, which when the reciprocating frame 63 is in its rearward position and the hopper-valve is open is engaged by a stop-lever 75 in a manner to hold the pawl-shaft

72 turned, so that the pawl 71 will be out of engagement with any of the recesses 70 and the shaft 65 will not turn. When the reciprocating frame 63 moves forward to close the scale-hopper valve, the projection 76 on the side of the frame will by its engagement with wedge-arm 77 and engagement of wedge-arm 77 with arm 82 push the sliding pin 78 to the left, as viewed in Fig. 11, thereby causing the boss 79, which is carried by the sliding pin 78 and is engagement with arm 80 of stop-lever 75, to turn stop-lever 75 on its pivot 81 and disengage the stop-lever from the dog 74, thereby allowing spring 73 to throw pawl 71 into engagement with one of the recesses in shell 66', and the pinion 64 is caused to revolve and move the carrier-ring 3.

Carried on shaft 65 is an eccentric cam 83, which when said shaft has partially completed a revolution will by its engagement with arm 84, projecting from sliding pin 78, turn said sliding pin 78 on its axis far enough to turn said arm 82 down out of engagement with wedge-arm 77, and spring 85, which was compressed when the sliding pin 78 was pushed by the sliding frame 63, will expand and push said sliding pin in the reverse direction back into the position shown in Fig. 11, bringing the stop-lever 75 down into position to again intercept the dog 74 at the end of the revolution of shaft 65. When the dog 74 is thus intercepted, the two members of the clutch will be disengaged and the rotation of pinion 64 and of the carrier-ring 3 will be stopped, the pinion 64 having made one complete revolution. After the eccentric cam 83 has moved around far enough for the stop-lever 75 to drop down into its intercepting position the said cam will before the end of its revolution permit spring 85 to turn sliding pin 78 on its axis, so as to bring arm 82 back into the position shown in Fig. 11 ready to be engaged by wedge-arm 77 at the next feed-valve-closing movement of the reciprocating frame 63, the wedge-arm 77 having been turned down out of its engaging position, as will be hereinafter described, so that arm 82 may be brought up into position.

There are various forms of mechanism by which the scale-hopper valve may be closed and the carrier-ring actuated by the tipping of the scale-beam and the valve opened again when a package is brought to the scale. The mechanism shown in the drawings is operated by compressed air and is as follows: In one end of a double cylinder 86 is a piston whose stem 87 is connected with the forward cross-head of the reciprocating frame 63, and in the other end of said cylinder is a piston whose stem 88 is connected with the rear cross-head of the reciprocating frame 63. The two cross-heads are connected together by side rods, which, together with the cross-heads, constitute what is called the "reciprocating frame." The double cylinder 86 consists of two cylinders placed end to end, their outer ends being open. Between the two pistons is an air-chest 89, connected with a compressed-air chamber and having ducts which lead into the two members of the double cylinder 86. Moving in the air-chest 89 is a piston-valve 90, which as it rises and falls admits air-pressure alternately to the opposite chambers 91 and 92 of the cylinder 86, and thereby drives the pistons 87 and 88 and moves the reciprocating frame 63 to open and close the scale-hopper valve. Piston-valve 90 is connected by a rod 94 and crank 95 with a rocker-shaft 96, which actuates the said piston. A torsion-spring 97 tends to rock said shaft 96 in a direction to pull down the piston-valve 90, and thereby apply the air-pressure to drive the reciprocating frame 63 in a direction to close the scale-hopper valve. This tendency is resisted by the engagement of a stop-lever 98, fixed to the rock-shaft, with the head of the pivoted vertical tripping-lever 99, whose lower end strikes against the end of the short arm of the horizontal lever 100. When the scale-beam tips under weight of a load, the hook 101 on the scale-beam engages the long arm of lever 100 and tips it up, releasing the lower end of vertical lever 99, so that the rock-shaft 96 is allowed to turn under pressure of spring 97. The stop-lever 98 rides down along the side of the curved head of lever 99 and throws forward the lower end of lever 99, so that it stands above the reduced rear portion of lever 100. The mechanism for rocking the shaft 96 in a direction to lift the piston-valve 90 and apply the pressure to move the reciprocating frame rearwardly and open the scale-hopper valve is actuated by the moving carrier-ring 3 and is as follows: A cam-lever 102 is pivoted at 103 to the fixed ring 104. When the carrier-ring 3 moves, one of the fingers 2 rides over the cam-lever and turns it down. The movable end of said cam-lever is connected by a link 105 with the lever 106, which is fast to clutch-disk 107 on rocker-shaft 96. Disk 107 forms the driving member of a clutch and engages with disk 108, which is slidable on shaft 96, but rotates with it. A spring 109 tends to lift cam-lever 102 and hold it in contact with carrier-finger 2, and when the clutch-disks 107 and 108 are in engagement with each other it turns the rock-shaft 96 in a direction to lift the piston-valve 90 and cause the reciprocating frame to move rearwardly and open the scale-hopper valve. When the rock-shaft 96 has partially turned under the influence of spring 109, the pin 110 rides up along the head of lever 99, on the opposite side from stop-lever 98, and turns lever 99 far enough to disengage it from the upper side of lever 100. The forward end of lever 100 will then drop and raise the rear end high enough to prevent the lever 99 from again moving forward under the action of lever 98 farther than to engage the rear end of lever

100 until said lever 100 is tipped by the scale-beam 62 under a load. When the reciprocating frame moves rearward, it engages upright lever 111 and turns it up far enough to disengage the clutch-disks 107 and 108 from each other, thus releasing the rock-shaft 96 from torsion of the spring 109 and allowing it to respond to the spring 97. The stop-lever 98, which engages lever 99, prevents the rock-shaft 96 from turning far enough to shift valve 90 until the lever 99 is disengaged from the end of lever 100 by the tipping of the scale-beam. When the scale-beam is tipped by a load, the lever 99 will be disengaged from the end of lever 100, and the lever 99 being free to turn the torsion of spring 97 will turn rock-shaft 96 and cause piston 90 to move down and admit pressure to close the scale-hopper valve.

The end-closing flaps are supposed to be freshly gummed before the cartons are filled. Mechansm for doing this is not shown because not forming a part of the present invention. Suitable means for doing this are shown in Patent No. 633,953 to Doble and Scales, dated September 26, 1899; but it may be done in any other suitable way, either by hand or by machine, and at any stage of the movement of the carton previous to being sealed. The mechanism for folding the first pair of opposite flaps—that is, the forward and rear flaps as the package stands in the advance position—consists of spring-controlled fingers fulcrumed in a vertically-sliding carrier which is raised by the movement of the package-carrier and which is released when the package-carrier comes to a rest with the package beneath the flap-folding fingers and means for causing the sharp descent of the vertically-moving carrier, so that the fingers will engage and fold two opposite flaps. This mechanism will now be described.

Secured to the support 4, which may be a part of the frame of the machine, is a standard 5, having bracket-arms 6 7, one above the other, which project over the rails 1, which form the track on which the cartons are moved. The guard-rails 51 52 are to prevent the carton from sliding off the track. Slidably mounted in the bosses 6′ 7′, formed on said arms, is a slide rod or plunger 8, to which is clamped a collar 9, which serves as a stop to limit the downward stroke of the said plunger. Surrounding said plunger is a tension-spring 10, which tends to hold the said plunger in its lowermost position and which forces the plunger quickly down when it is released after being raised.

Fulcrumed at 11 to a bracket-arm 12, which projects from the standard 5, is a bell-crank lever, one arm of which, 13, has a slot 15 in the end which engages with a stud 14 in the check pieces or blocks 16, clamped to the plunger 8. Arm 13′ of the bell-crank lever is bent to form a finger 13″, which projects into the path of the package-moving fingers 2 at an angle to the plane of movement of the said fingers 2 in such manner that the movement of the package-moving finger will engage the said finger 13 and turn the bell-crank lever on its fulcrum, thereby raising the plunger. The slot 15 allows sufficient play of the lever on the stud 14 to permit the rocking of the bell-crank while the plunger moves in a straight line. The bell-crank is so positioned that the package-moving finger 2 will pass from engagement with finger 13″ of said bell-crank in time for the plunger to drop just as the package comes to a rest.

It is obvious that instead of having the bell-crank engaged by the package-moving finger it might be actuated by some other projection from the carrier-ring 3 suitably positioned relative to the bell-crank lever to raise and release it at the proper time.

Fast to the lower end of the plunger 8 is a block 17, to which levers 18 18 are fulcrumed in slots on opposite sides of the block, said levers having secured thereto shoes or folding-plates 19, which engage two opposite flaps of the carton when the plunger descends. Said shoes are preferably curved outward toward the outer ends to avoid catching the ends in the flaps. Tension-springs 20, secured to the plunger, press on the backs of the levers 18 and normally hold them in a slightly-flaring position with relation to each other, as shown in Figs. 3 and 4, but allowing them to be spread under pressure.

Plunger 8 is bored out lengthwise to receive a slidable rod 21, which is prevented from dropping out of the plunger by a pin 22, which is fast to the rod 21 and rests on the upper side of the boss 7′ when the plunger is in its lowermost position. Seated on the upper end of rod 21 is a compression-spring 23, which tends to press the said rod downward onto its rest. The plunger 8 is formed with a slot 24, through the sides of which the pin 22 extends and which permits movement of the plunger 8 and rod 21 relative to each other.

Fast to the rod 21 near its lower end is a stop-pin 25, the plunger 8 being formed with a slot 26, which limits the movement of the plunger 8 and rod 21 relative to each other by the engagement of the pin 25 with the upper ends of levers 18. Projecting from the upper end of each lever 18 at the outer side is a horn 27, between which horns the pin 25 fits when the rod 21 is in its lowermost position relative to the plunger 8. The engagement of the ends of the pin with the horns 27 will prevent spreading of the levers 18 until the levers are released from engagement with the pin.

Just before the package-moving finger 2 passes out from engagement with the finger 13″ the plunger 8 will be raised to its highest position, as shown in Fig. 2, carrying up with it the levers 18 and compressing spring 10. As plunger 8 rises the compression-spring 23

expands and pushes down the rod 21, or rather prevents the rod 21 from rising with it until the stop-pin 25 engages with the upper ends of levers 18 between the horns 27. The continued ascent of plunger 8 after the pin 25 is thus engaged will carry rod 21 also upward and all connected parts. As the bracket 7 is stationary and stop-pin 22 is fast to rod 21, the pin 22 will rise with the rod 21 away from its seat on boss 7′, but with the rod 21 pushed down by spring 23, and the pin 22 will be down some distance below the upper end of slot 24. When the package-moving finger 2 passes from the bell-crank finger 13″, the spring 10, which has been compressed, causes the quick descent of the plunger 8 and all connected parts. The curved faces of the folding-plates 19 will engage the outer faces of the front and rear flaps of the carton 28 and partially fold them in before the plunger has descended far enough for the stop-pin 22 to strike the top of boss 7′. When the stop-pin 22 comes into engagement with said boss 7′, the rod 21 will be prevented from farther descent, but plunger 8 will continue its descent until the stop-collar 9 comes into engagement with the washer 56, which rests on boss 7′ This extra descent of plunger 21 will carry the detached levers 18 down also and release the horns 27 of levers 18 from engagement with stop-pin 25. As the folding-plates 19 are engaged with the carton-flaps, the continued descent of plunger 8 will cause the levers 18 to spread out horizontally, as shown in dotted lines in Fig. 3, completely folding the flaps which are engaged thereby.

At some place beyond the point at which the first pair of flaps are folded are the means for folding the second pair of flaps—that is, the side flaps. The means shown are as follows: Secured to the fixed arms 32 and 33 are the curved and twisted folding-plates 30 and 31, which engage and fold the side flaps as the carton is moved along the track beneath them. The carton first passes under the folder 30, which folds the inner side flap, and then under the folder 31, which folds the second side flap, which is the fourth one of the upper end-closing flaps. The curved portions of the blades turn the flaps nearly down and the horizontal portions press them down flat; but it is desirable to have them pressed and held down firmly for a space of time to give opportunity for the glue to set sufficiently to insure the flaps against springing up after leaving the machine. As already stated, the carrier is actuated and controlled by the tipping of the scale, and, as already described, the moving carrier controls and actuates the mechanism which operates the device for closing the forward and rear flaps. It has also been described how the carrier after being set in motion by the tipping of the scale moves the carton between the guides to fold the second pair of end-closing flaps. Thus the tipping of the scale controls the folding of both pairs of end-closing flaps through the medium of the carrier. The mechanism for thus holding the flaps down under pressure is as follows: Leading from the end of the track 1 is a traveling endless belt 34, onto which the packages are pushed by the package-moving fingers 2. Said belt travels over pulleys 35 36, which may be driven in any suitable way, as by a driving-wheel 37 on the same shaft 38 as pulley 36, said shaft 38 and shaft 39, on which pulley 35 is mounted, being journaled in the frame 40. Traveling over pulleys 41 42 above the carrier-belt 34 is a second endless belt 43, which is placed at such an elevation that the belt when traveling on the under side of the pulleys will rest on the tops of the packages. The bearings 44 for the journals of the pulleys are slotted, so as to allow the pulleys to have a slight vertical movement to yield to upward pressure on the belt. Journaled in similar slotted bearings 45 in the frame 46 are a series of idle rollers 47, which bear on the upper side of the belt to produce a yielding downward pressure on the belt and press down on the folded end flaps of the carton as it is carried along on the lower belt 34. The upper belt 43 is driven by a belt 48, running from pulley 49 on the same shaft 53 as pulley 42 to pulley 50 on driving-shaft 38. It is obvious that the belts may be driven at any rate of speed desired; but preferably the speed should be such as to carry off the packages as fast as delivered from the track of the filling-machine. They would not, however, have to be speeded up the same as the carrier-ring 3, because the carrier-ring moves intermittently, being at rest while the packages are being filled. The belts may be made of any length of travel desired also in order to retain the sealed flaps under pressure as long as required. Preferably the carrier-belt 34 is longer than the pressure-belt, so as to carry the packages a short distance after they pass from under the pressure-belt. They may be removed from the carrier-belt in any way desired.

The operation of the machine will be obvious from the description already given.

What I claim is—

1. In combination with a package-filling machine, an intermittently-moving carrier which moves the packages to and from the place of filling, a vertically-slidable plunger mounted above one of the stopping-places of the filled packages, flap-folding fingers carried by said plunger, and mechanism actuated by said carrier to raise said plunger and release it before the carrier comes to a rest, the descent of the plunger carrying the flap-folding fingers into engagement with and folding two opposite flaps on the upper end of the package, substantially as described.

2. In combination with a package-filling ma-

chine, an intermittently-moving carrier which moves the packages to and from the place of filling, a vertically-slidable plunger mounted above one of the stopping-places of the filled packages, flap-folding fingers fulcrumed in said plunger, a bell-crank lever fulcrumed to a fixed support, one arm of said lever having a flexible connection with said plunger and the other arm projecting into the path of a projection on said carrier whereby the moving carrier engages the said lever and raises the plunger and releases it before the carrier comes to a rest, said flap-folding fingers engaging two opposite flaps on the upper end of the carton when the plunger descends, substantially as described.

3. In combination with a package-filling machine, an intermittently-moving carrier which moves the packages to and from the place of filling, a vertically-slidable plunger mounted above one of the stopping-places of the filled packages, flaring flap-folding fingers fulcrumed in said plunger, a lever fulcrumed to a fixed support, one arm of said lever having a flexible connection with said plunger and the other arm projecting into the path of a projection on said carrier, whereby the moving carrier engages the said lever and raises the plunger and releases it before the carrier comes to a rest, means for preventing said flap-folders from spreading until the flaps are partially folded and means for releasing the detent and allowing the folder to spread while completing the folding, substantially as described.

4. In a machine for closing the tops of filled cartons, a vertically-reciprocable plunger moving in a fixed support, flaring flap-folding fingers fulcrumed in said plunger to fold two opposite flaps on the upper end of the carton, mechanism which normally holds the said fingers in a flaring relation to each other, a carrier which moves the filled packages to a position beneath said plunger, a lever fulcrumed in a fixed support, one arm of said lever having a flexible connection with said plunger and the other arm projecting into the path of the carrier, said carrier engaging the said lever and thereby elevating the plunger and releasing it again before the carrier comes to a rest, and a tension-spring connected with said plunger, substantially as described.

5. In a machine for closing the tops of filled cartons, a vertically-reciprocable plunger moving in a fixed support, flaring flap-folding fingers fulcrumed in said plunger to fold two opposite flaps on the upper end of the carton, mechanism which normally holds the said fingers in a flaring relation to each other, a carrier which moves the filled packages to a position beneath said plunger, a lever fulcrumed in a fixed support, one arm of said lever having a flexible connection with said plunger and the other arm projecting into the path of the carrier, said carrier engaging the said lever and thereby elevating the plunger and releasing it again before the carrier comes to a rest, a rod carried by said plunger, said rod and plunger being also movable with relation to each other, a spring which when the plunger rises prevents said rod from rising with the plunger until the plunger has risen a portion of its distance of travel, a cross-pin carried by said rod which engages said flap-folding fingers and prevents them from spreading until the plunger has partially completed its descent and the flaps are partially folded, and a stop-pin which stops the descent of said rod before the plunger has completed its descent and disengages said cross-pin from said flap-folding fingers whereby the continued descent of the plunger while the said fingers engage the flaps causes the spreading of said fingers, substantially as described.

6. In a machine for folding the upper end-closing flaps of filled cartons, a vertically-reciprocable plunger moving in a fixed support, flap-folding fingers fulcrumed in said plunger an intermittently-moving carrier which moves the filled cartons to a position beneath said plunger, a lever fulcrumed in a fixed support, one arm of said lever having a flexible connection with said plunger and the other arm projecting into the path of the carrier, said carrier engaging the said lever and thereby elevating the plunger and releasing it again before the carrier comes to a rest, the said fingers engaging and folding the forward and rear flaps on the upper end of the carton during the descent of the plunger, and guide-plates between which the carrier moves the carton, thereby folding the side flaps, substantially as described.

7. In a machine for filling cartons and closing the end flaps, a scale, an intermittently-moving carrier which removes the filled cartons from the scale, carrier-starting mechanism actuated by the tipping of the scale, mechanism for folding end-closing flaps on the carton, and means whereby the moving carrier controls the flap-folding mechanism.

8. A machine for filling and weighing cartons and closing the ends thereof having a scale, end-flap-closing mechanism, and intermediate mechanism actuated by the tipping of the scale which controls the flap-closing mechanism.

9. In a machine for folding the flaps which close the ends of filled cartons, an intermittingly-moving carrier which gives the cartons a step-by-step movement, mechanism for folding two opposite flaps while the carton is at rest and intermediate mechanism actuated by the carrier near the end of its movement to actuate the folding mechanism.

10. In a machine for folding the flaps which

close the ends of filled cartons, an intermittingly-moving carrier which gives the cartons a step-by-step movement, mechanism to fold two opposite flaps after the carrier and carton have come to a rest, intermediate mechanism actuated by the carrier near the end of its movement to actuate the said flap-folding mechanism, and flap-folding guides between which the carrier moves the carton to fold the other pair of flaps, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM H. DOBLE.

Witnesses:

WILLIAM A. COPELAND,

ROBERT WALLACE.