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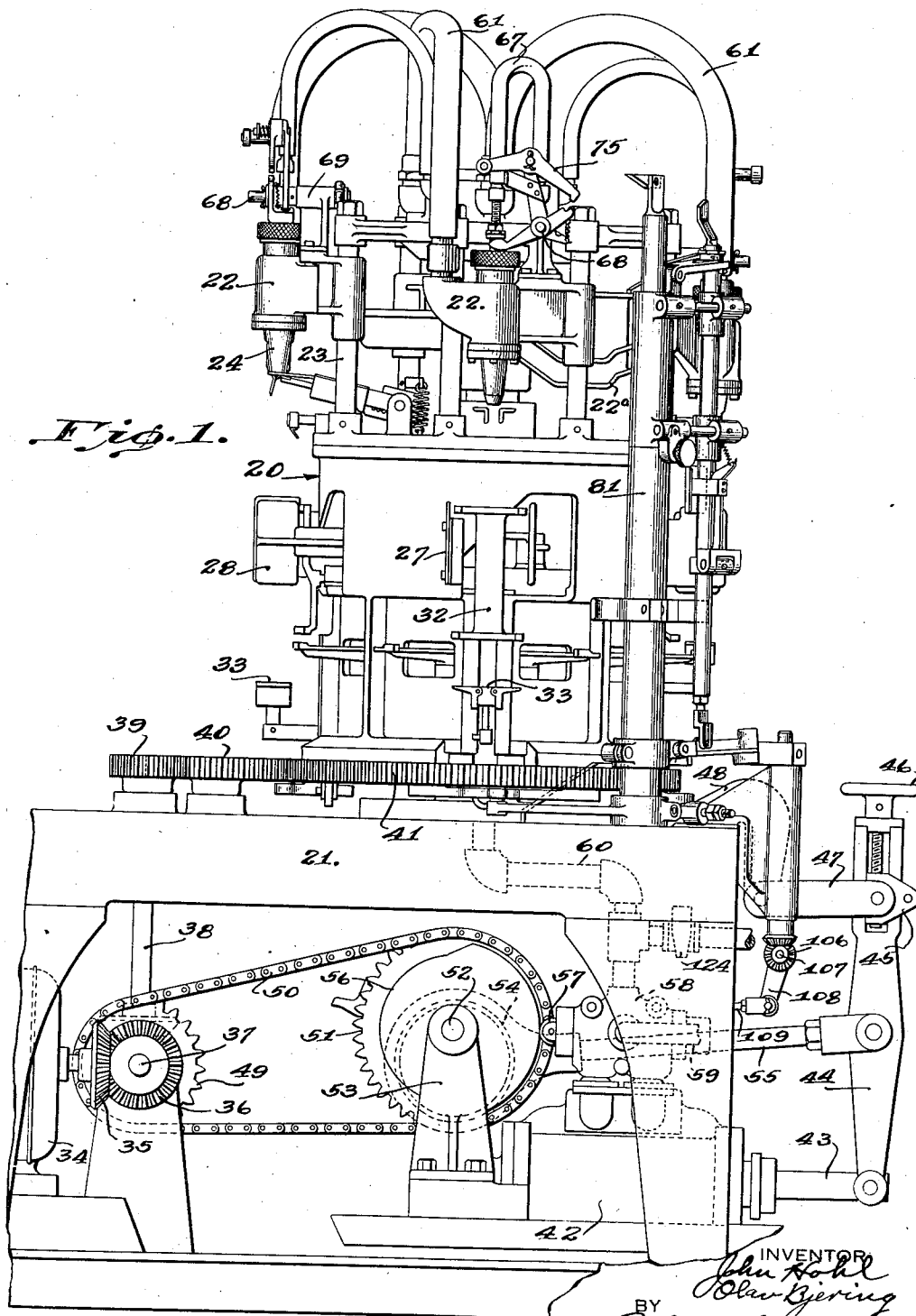
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2,290,103

SAFETY MECHANISM FOR PACKAGING MACHINES

Filed Sept. 5, 1940

5 Sheets-Sheet 1



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SAFETY MECHANISM FOR PACKAGING MACHINES

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5 Sheets-Sheet 2

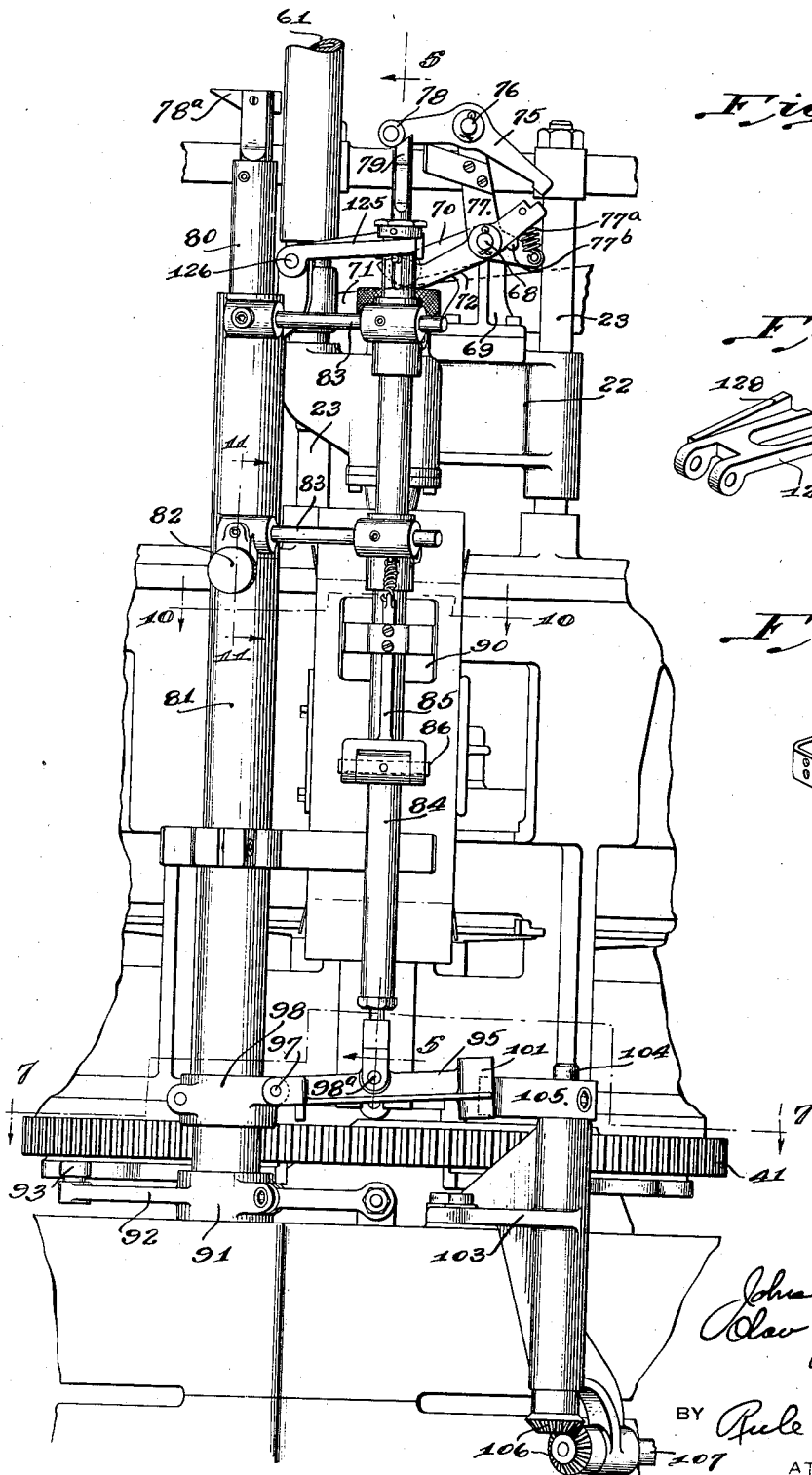


Fig. 2.

Fig. 3.

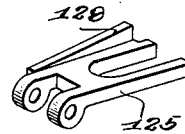
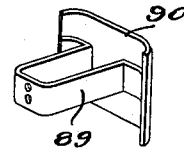


Fig. 4.



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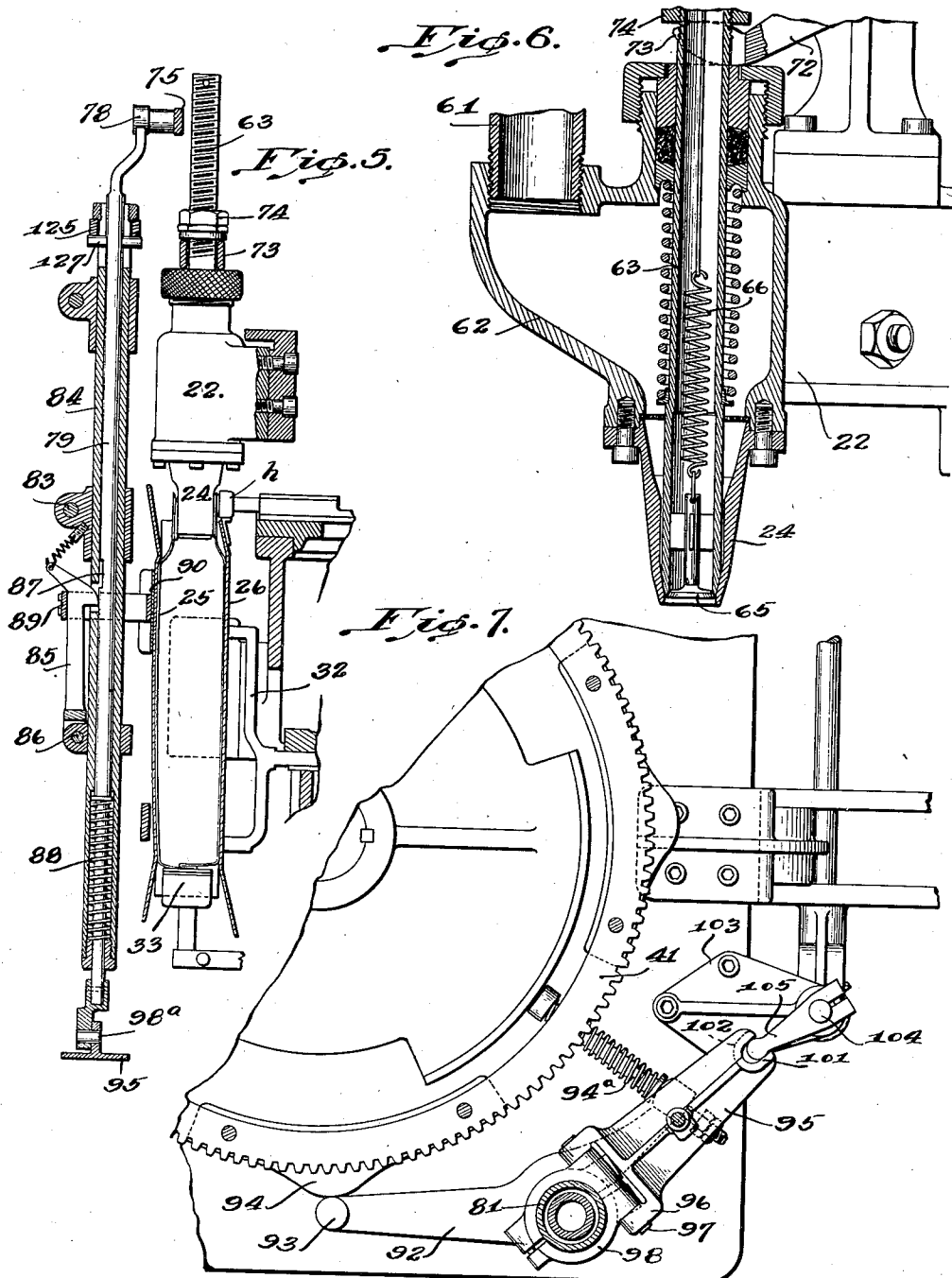
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SAFETY MECHANISM FOR PACKAGING MACHINES

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5 Sheets-Sheet 3



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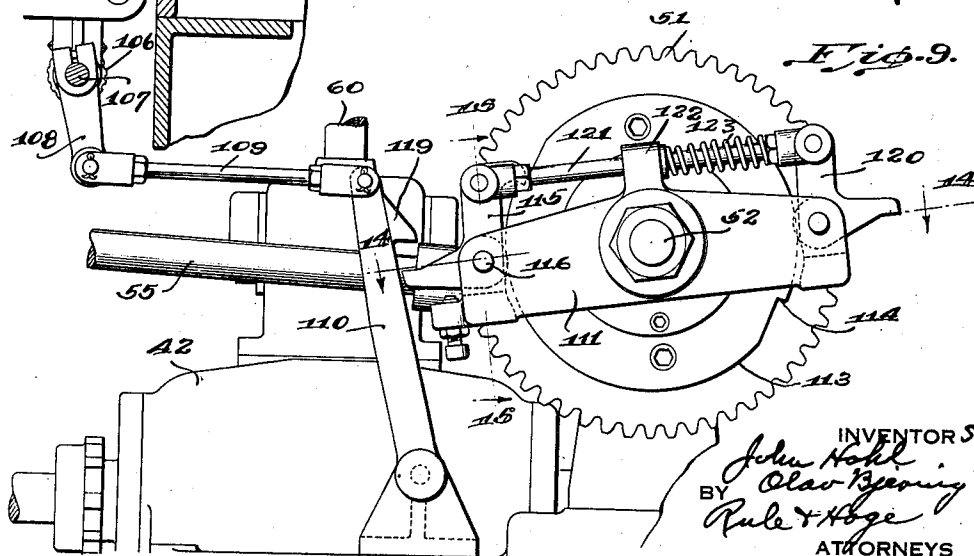
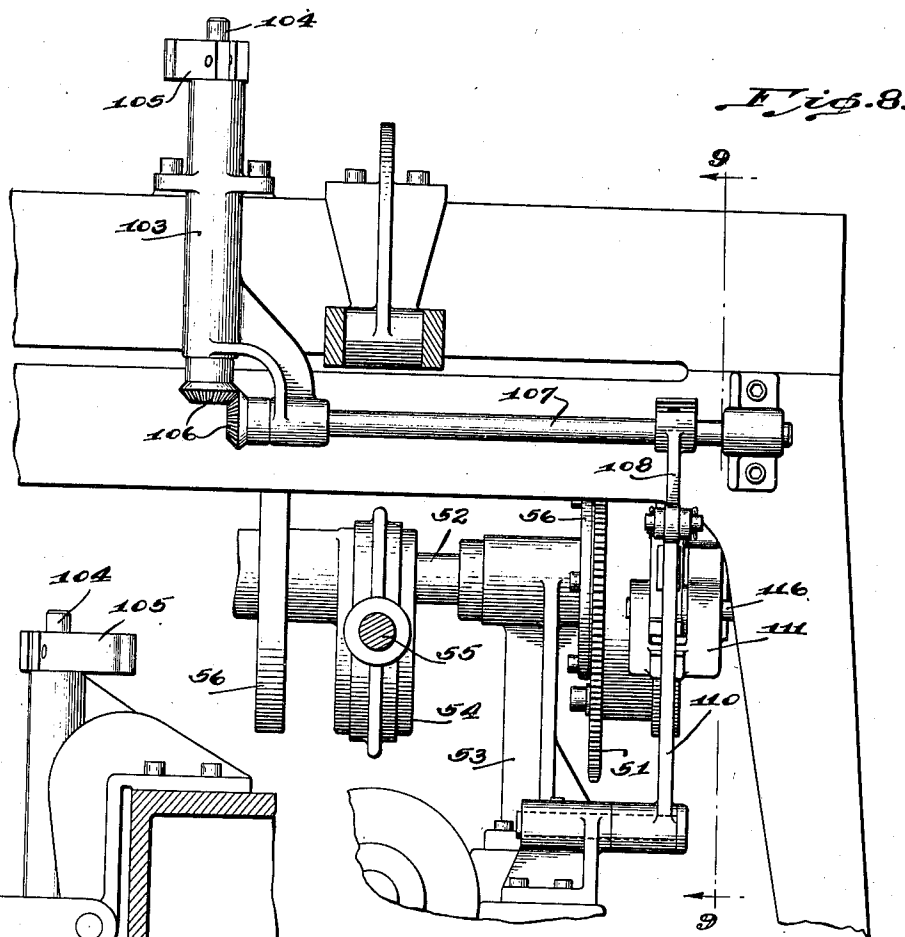
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SAFETY MECHANISM FOR PACKAGING MACHINES

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5 Sheets-Sheet 4



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SAFETY MECHANISM FOR PACKAGING MACHINES

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5 Sheets-Sheet 5

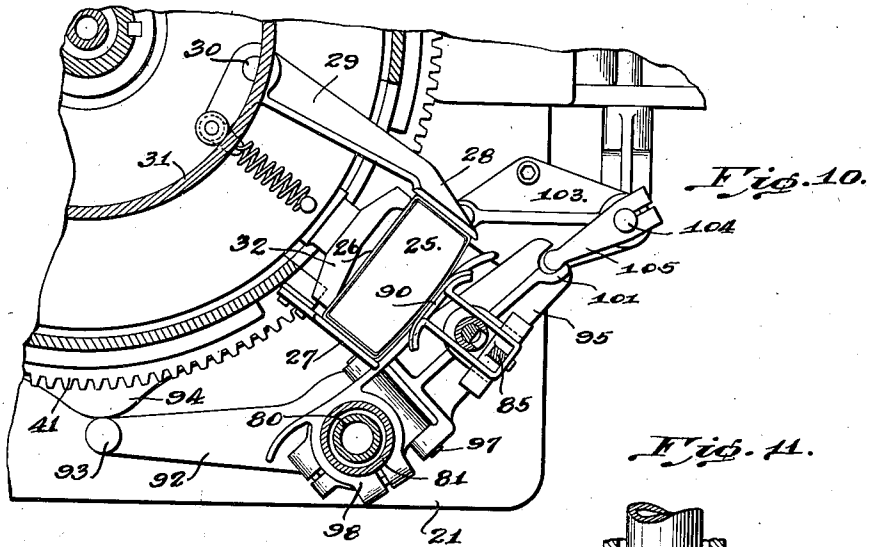


Fig. 10.

Fig. 11.

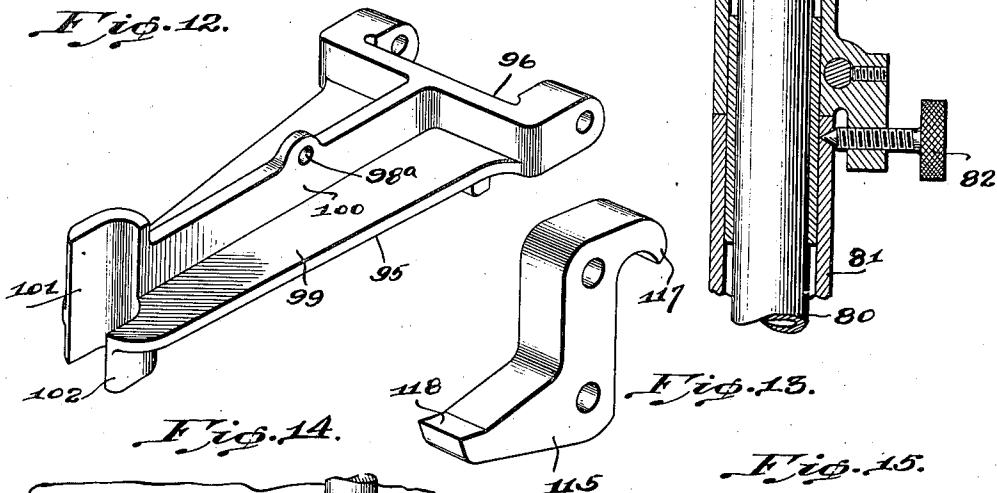
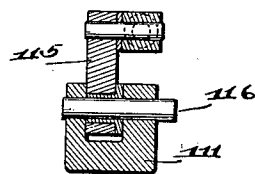
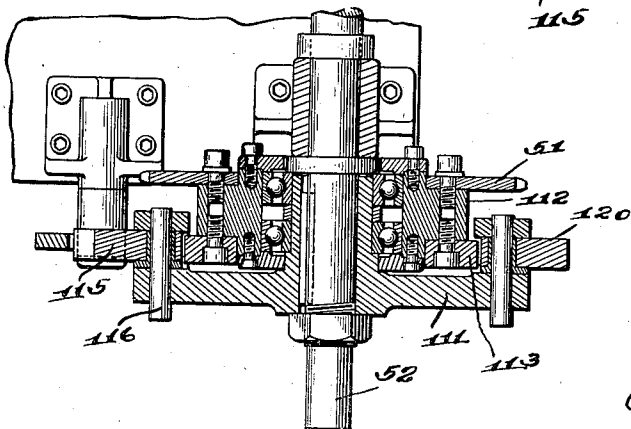


Fig. 12.

Fig. 13.

Fig. 14.



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SAFETY MECHANISM FOR PACKAGING MACHINES

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Application September 5, 1940, Serial No. 355,478

10 Claims. (Cl. 226—58)

Our invention relates to machines for packaging commodities including liquids, comminuted materials and other substances. In packaging machines of the type to which the present invention applies the empty packages or containers are brought in succession into operative relation to filling devices by which measured quantities of the material are introduced through a filling nozzle into the package. It some times occurs that a container is missing at the normal time for supplying a charge of the material through the filling nozzle. The present invention provides automatic means for preventing the discharge of the filling material when there is no package or container in position to receive it.

The invention in the form herein illustrated relates to a machine designed for packaging oil or other liquids in packages each comprising an impervious flexible bag within an outer protecting carton. A measured quantity of the liquid is introduced into the empty package comprising a bag which has been placed within the carton, the bag being then sealed and the carton thereafter closed and sealed to complete the package. The filling mechanism comprises a nozzle which is introduced into the open mouth of the empty bag within the carton. Air may be introduced through the nozzle to inflate the bag. A pump then operates to inject a measured quantity of the liquid. A valve in the nozzle, which controls the flow of liquid therethrough, is closed after each filling operation.

An object of our invention is to provide automatic safety mechanism for preventing opening of the valve in the nozzle in the event that there is no empty package in proper position thereon, thus preventing discharge of the filling material. It has been found in practice that although such safety mechanism serves the intended purpose, it also causes a change in the pressure characteristics of the filling system, back pressure being built up in the line through which the liquid is conveyed to the nozzle. This results in a variation in the amount of liquid discharged. To overcome this difficulty a further object of the invention is to provide automatic means by which operation of the pump is prevented when there is no empty package in position to receive the charge of liquid. Such means for preventing operation of the pump may operate either in conjunction with the valve for cutting off the flow through the nozzle or independently of such a valve.

A further object of the invention is to provide means by which the empty package when in posi-

tion to receive a charge of liquid, operates automatically to cause a normal operation of the filling mechanism, means being provided to render the filling mechanism inoperative in the absence of a carton or empty package.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is an elevation view of a filling turret forming part of the packaging machine to which our invention is applied, said view also showing the pumping mechanism;

Fig. 2 is a fragmentary elevation view on a larger scale of part of the mechanism shown in Fig. 1, showing particularly the trip mechanism controlling the valve in the filling nozzle and also controlling the operation of the pump.

Fig. 3 is a perspective view of a device for resetting the trip mechanism.

Fig. 4 is a perspective view of a plate actuated by the package at the filling position for operating the trip mechanism.

Fig. 5 is a sectional elevation at the line 5—5 on Fig. 2 illustrating the trip mechanism and a package by which it is operated.

Fig. 6 is an enlarged sectional elevation of a filling nozzle and its appurtenances.

Fig. 7 is a section at the line 7—7 on Fig. 2.

Fig. 8 is a fragmentary sectional elevation showing the clutch mechanism and associated parts.

Fig. 9 is a sectional elevation at the line 9—9 on Fig. 8.

Fig. 10 is a section at the line 10—10 on Fig. 2.

Fig. 11 is a section at the line 11—11 on Fig. 2.

Fig. 12 is a perspective view of a rock arm.

Fig. 13 is a perspective view of a locking dog for the clutch.

Fig. 14 is a sectional view of the clutch mechanism, the section being taken at the line 14—14 on Fig. 9.

Fig. 15 is a sectional detail at the line 15—15 on Fig. 9.

The machine herein illustrated is particularly designed for packaging oil or other liquids and is herein described as used for packaging oil. This machine embodies modifications of the oil packaging machine disclosed in the copending application, Serial Number 337,262, filed May 25, 1940, and may be considered an improvement on said machine.

Referring particularly to Fig. 1 the machine comprises a turret 20 mounted on a frame 21 for continuous rotation about a vertical axis. The turret carries a series of filling units, the

particular design herein shown comprising four such units. Each said unit includes a head 22 mounted for up and down movement on a pair of vertical rods 23 having a fixed mounting on the turret, such up and down movement being controlled by a stationary cam 22^a. Each head 22 includes a depending nozzle 24 adapted to be projected downward into the open mouth of an empty package when the head 22 is lowered.

Each package comprises a bag 25 (Figs. 5 and 10) of "Pliofilm" or other impervious material and a carton 26 in which the bag is placed. The carton is held between a pair of vertically disposed gripping plates 27 and 28, the latter being formed on a rock arm 29 pivoted at 30 and actuated by a cam 31 for gripping the carton. The carton is further supported by an upright support 32 (Figs. 5 and 1) and a bottom support 33. The empty packages may be placed in position on the turret by hand or automatically by mechanism such as fully disclosed in said copending application, Serial Number 337,262.

The turret is rotated continuously by an electric motor 34 (Fig. 1) having driving connection therewith through a train of gearing including bevel gears 35 and 36, the latter keyed to a drive shaft 37 geared to a vertical shaft 38 to which is keyed a spur gear 39 operating through an intermediate gear 40 to drive a ring gear 41 on the turret.

The motor 34 also operates to drive an oil pump 42 which supplies measured quantities of oil to the packages. The pump as shown is a double acting pump comprising a cylinder and reciprocating piston, the piston rod 43 being connected to the lower end of a lever 44, the upper end of which carries a head 45 adjustable up and down by means of a hand wheel 46 for adjustably regulating the volume of oil supplied at each piston stroke. A link 47 is pivoted at one end to the lever 44 and at its other end to a stationary bracket 48 on the machine frame. The driving connection between the motor 34 and the pump includes a sprocket wheel 49 keyed to the shaft 37, a sprocket chain 50 trained over the wheel 49 and a sprocket wheel 51 (Figs. 1, 9 and 14). The wheel 51 has a driving connection through clutch mechanism hereinafter described with a shaft 52 journaled in a standard 53. An eccentric 54 fixed to the shaft 52 operates a pitman 55 connected to the lever 44 for reciprocating the pump piston.

A cam 56 on the shaft 52 engages a cam roll 57 on the valve stem of the pump valve 58, said valve being of conventional construction and operable to connect the opposite ends of the pump cylinder alternately with an intake pipe 59 through which oil is drawn into the pump cylinder. When either end of said cylinder is open to the intake pipe, the other end is in communication with the oil line 60 through which oil is transmitted to the filling nozzles. The line 60 extends through a distributing head on the turret which operates as the latter is rotated to connect the filling nozzles in succession to the oil line through flexible pipes 61 individual to the filling heads. Each pipe 61 (Figs. 1 and 6) opens into a chamber 62 in the filling head.

Each filling head is provided with a tubular plunger 63 which extends downward through the chamber 62 into the nozzle and serves as a valve for closing the nozzle. It also serves as

an air line through which air under pressure is supplied for inflating the bags preliminary to the oil filling operation. Each plunger is provided with a valve 65 which seats on the lower end thereof and is held closed by a light tension spring 66. The valves 65 are opened by the pressure of the air which is supplied to the plungers through pipes 67 individual to the plungers. Each pipe 67 is periodically connected to a source of air pressure supply under the control of a distributing head on the turret.

When an empty package (Fig. 5), comprising a carton 26 and bag 25, enters the filling zone, the filling head 22 is lowered by means of the cam 22^a so that the nozzle 24 enters the mouth of the bag which has been previously opened by means including a suction head *h*. Air under pressure is then admitted to inflate the bag. The plunger 63 is then lifted by mechanism presently to be described, thereby opening the nozzle and permitting a charge of oil to be introduced into the carton. The mechanism for lifting the plunger (see Figs. 1, 2) includes a rock shaft 68 journaled in a bracket 69 mounted on the filling head 62. A rock arm 70 fixed to the shaft 68 carries a cam roll running on a stationary cam 71. A lever 72, mounted to rock on the shaft 68, is formed with a bifurcated end 73 (Figs. 5 and 6) which engages beneath an adjustable stop nut 74 threaded on the plunger rod 63. The opposite end of the lever 72 is adapted to be engaged by a latching lever 75 pivoted at 76 on an arm 77 fixed to the rock shaft 68. A light tension spring 77^a connected between the lever 72 and an extension of the arm 77 holds the lever against a stop lug 77^b on said extension.

The latch 75 carries a roll 78. A trip rod 79, which projects into the path of the roll 78, serves during the normal operation of the machine to swing the latch lever 75 into engagement with the lever 72 so that when the rock arm 70 is lifted by the cam 71 to rock the shaft 68, the arm 77 operates through the latch 75 to rock the lever 72, thereby lifting the valve plunger 63, permitting a charge of oil to enter the package. After the filling operation, the rock arm 70 is released from its cam, the plunger lowered and the latch 75 released. In the event that the latch does not swing free of the lever 72 of its own accord, it is released by positive means comprising a stationary cam 78^a on the upper end of the post 80, under which cam the roll 78 rides.

The safety mechanism for preventing the valve plunger from being lifted and also preventing the operation of the pump except when an empty carton is in proper position at the filling station, and the bag therein properly placed on the filling nozzle, will now be described. A tubular post 80 (Figs. 1, 2, 10 and 11) has a fixed mounting on the machine frame 21. A tubular rock shaft 81 surrounds the post 80 and as shown is made in sections detachably connected by a thumb screw 82 (Figs. 2 and 11) for convenience in assembling and disassembling the parts. Rock arms 83 secured to the rock shaft 81 carry a vertical tubular shaft 84 in which the trip rod 79 is mounted for up and down movement.

A latch 85 (Figs. 2 and 5) having a pivotal connection 86 with the shaft 84 is adapted to engage a notch 87 in the trip rod and hold the latter in its lowered position. When the latch is released, as presently described, the rod is moved upward by a coil compression spring 88 mounted thereon within the tubular shaft 84. Attached

to the latch 85 by means of a strap 89 is a plate 90 (Figs. 4, 5, 10) positioned to bear against the side of the carton while the latter is supported on the turret.

When the bag is inflated the air pressure therein forces the side of the carton outwardly, thereby releasing the latch 85 and permitting the trip rod 79 to be moved upward into operative position (Figs. 2 and 5). This permits the valve plunger 63 to be lifted as above described for the filling operation.

The valve will not be lifted under any of the following conditions:

1. When there is no carton or package presented at the filling station.
2. When an empty carton without a bag therein is brought to the station.
3. When the carton contains a leaky or faulty bag.
4. When the carton containing the bag is not properly placed with the bag on the filling nozzle.

When any of the above conditions prevail, the latch 85 will not be operated and the trip rod 79 will remain in its lowered position. The latch 75 will therefore remain disconnected from the lever 72 so that when the shaft 68 is rocked by its cam the lever 72 will not operate to lift the plunger, the spring 77^a being too weak to lift the plunger. The nozzle therefore remains closed and no oil is discharged therethrough.

The safety mechanism for preventing operation of the pump, as when an empty carton is missing at the filling zone or other of the above mentioned conditions prevail, is as follows. Such mechanism includes means for releasing a clutch through which the shaft 52 (Fig. 1) for driving the pump, is connected to the driving gear 51. The operation of the clutch in turn is controlled by the trip rod 79. When a carton is in filling position and operates normally to actuate the trip lever 85 so that the rod 79 is lifted, the clutch remains operative for driving the pump. If the rod 79 is not lifted, the clutch is actuated through mechanism now to be described for disconnecting the pump from its driving means.

Clamped to the rock shaft 81 at the lower end thereof is a collar 91 (Fig. 2) carrying a rock arm 92 on which is a cam roll 93 which engages cam lobes 94 attached to the gear 41. A compression spring 94^a (Fig. 7) holds the rock arm 92 in engagement with the cams. A collar 98 (Figs. 2 and 7) is clamped to the rock shaft 81. A rock arm 95 is formed at one end with a yoke 96 having a pivotal connection 97 with the collar 98 permitting up and down rocking movement of the arm 95. The latter has a pivotal connection 98^a with the lower end of the trip rod 79. The arm 95 (see Fig. 12) comprises a horizontally disposed body portion in the form of a plate 99, and a web or flange 100 extending lengthwise of the arm. The web is formed at its outer end with a wing or bearing plate 101 which extends above and below the body 99. A second bearing plate or wing 102 opposite the wing 101 extends downwardly below the body plate 99.

A bearing bracket 103 (Figs. 2, 7, 10) mounted on the machine base, has journaled therein a vertical rock shaft 104 to the upper end of which is attached a rock arm 105, the free end of which extends between the wings 101 and 102. The shaft 104 has an operating connection through a pair of beveled gears 106 with a horizontal rock shaft 107. A rock arm 108 (Figs. 8, 9), fixed to and depending from the shaft 107, is

connected through a rod 109 to a trip lever 110 for tripping the clutch.

The clutch mechanism includes an arm 111 (Figs. 9 and 14) keyed to the shaft 52. An annular clutch member 112 journaled on the hub of the arm 111 provides a mounting for the sprocket wheel 51. An annular ratchet plate 113 is also mounted on the clutch member 112 and is formed with diametrically opposite ratchet teeth 114. A locking dog 115 (Figs. 9, 13 and 15) in the form of a bell crank has a pivotal connection 116 with the arm 111. The dog is formed with a nose 117 to engage the ratchet teeth 114, and a tail 118 adapted to be engaged by a lug 119 on the trip lever 110. A dog 120 is pivoted on the opposite end of the arm 111 and both said dogs are connected to a rod 121 mounted for lengthwise sliding movement in a bearing lug 122 on the arm 111. A compression spring 123 mounted on said rod holds the dog 115 in engagement with the ratchet.

Normally the trip lever 110 is swung out of the path of the clutch dogs each time either of said dogs as it rotates with the arm 111 is moved upward past the lug 119 so that a driving connection for the pump is maintained. This swinging movement of the trip lever is effected by the cams 94 (Fig. 7) operating through the mechanism above described, including the rock shaft 81 and arm 95 which rocks the arm 105. The operative connection between the rock arms 95 and 105 is dependent upon the position of the trip rod 79. When the pressure plate 90 (Fig. 5) is actuated during the normal operation of inflating the bag and releases the latch 85 so that the rod 79 is lifted by its spring, the rock arm 95 is swung upward about its pivot so that the wing 102 thereon engages behind the arm 105. The cam 94 then operates through the rock arms 92 and 95 to rock the arm 105, said motion being transmitted to the trip lever 110 (Fig. 9) and swinging it out of the path of the dogs 115, 120. As the cam 94 swings the arm 92 outward the wing 101 rocks the arm 105 inwardly and rocks the trip lever 110 to move the trip lug 119 into the path of the trip dogs 115, 120. But the inward movement of the rock arm 92 as the cam passes beyond it withdraws the trip lever 110 before it can trip the clutch dog 115. It will be noted that during this inward movement of the rock arm 92, the wing 102 is in its lifted position and operative to swing the rock arm 105.

In the absence of a bag or empty carton so that the rod 79 is not released, the rock arm 95 remains in its lowered position in which the wing 102 and plate 99 are below the arm 105. The cam 94 now operates as above described to swing the trip lever 110 to operative position (shown in Fig. 9), but the trip lever is not withdrawn as the wing 102 is in an inoperative position. As a result, the trip lever 110 remains in position to operate the clutch dog 115, thereby releasing the clutch and permitting the pump to remain idle so that no oil is fed through the nozzle.

A by-pass valve 124 (Fig. 1) may be provided for by-passing the oil in the event that the pump is operated while the nozzle 24 is closed. Means for resetting the trip rod 79 includes a bifurcated arm 125 (Figs. 2, 3 and 5) pivoted at 126 to a bracket on the rock shaft 81, said arm straddling the rod 79 and engaging a pin 127 on said rod. The arm 125 is formed with a cam 128 which, during the rotation of the turret, rides beneath the projecting end of the rock shaft 68, thereby

camming the rod 79 downward so that it is re-engaged by the latch 85.

Modifications may be resorted to within the spirit and scope of our invention.

We claim:

1. The combination of means for supporting an empty, collapsed container, means for expanding the container, a spout positioned and arranged to deliver a quantity of material to the container, a valve for closing the spout, and means actuated by the expansion of the container for effecting the opening of the valve.

2. Apparatus for packaging a liquid comprising in combination, means for supporting an empty bag in position to receive a supply of said liquid, means for inflating the bag, means for delivering a quantity of said liquid and flowing it into the inflated bag, a valve controlling the flow of the liquid into the bag, and means actuated by the expanding of the bag when inflated to effect an opening of said valve and thereby permitting said flow of the liquid into the bag.

3. Apparatus for packaging a material comprising a spout through which the material is delivered, means for supporting an empty bag in position to receive said material, means for conveying the material to said spout, a valve controlling the delivery of said material, means for inflating and expanding the bag, and automatic control mechanism actuated by the expansion of the bag for effecting an opening of said valve and permitting delivery of the material to the bag, said control mechanism operative to prevent opening of the valve in the absence of the bag at said position.

4. Packaging apparatus comprising in combination means for supporting a deflated bag, means for supplying a liquid to the bag comprising a passageway through which the material is conveyed, a valve in said passageway, means for inflating the bag, a trip device actuated by the expansion of the bag, and valve opening means controlled by said trip device and operable automatically to open the valve and permit the delivery of liquid to the inflated bag.

5. Packaging apparatus comprising in combination a rotatable turret, a motor geared to the turret for rotating it, filling heads carried on the turret and each comprising a spout, a stationary pump, means for conducting filling material from the pump and distributing it to the spouts, means providing driving connections between the motor and the pump and including a clutch, means for supporting containers on the turret in position to receive the filling material supplied through the spouts, a valve in each filling head controlling the discharge of said material through the spout, a trip device having a stationary mounting and actuated by said containers in succession, automatic means controlled by said trip device for opening the valves, and automatic means controlled by said trip device for actuating the clutch and disconnecting the pump from the motor upon failure of the trip device to effect a normal opening of said valve.

6. Packaging apparatus comprising in combination means for supporting an empty deflated bag, means for inflating the bag, a filling nozzle, means for delivering a liquid through said nozzle into the

bag, a valve controlling the flow of liquid to the bag, a trip device actuated by the bag as it is inflated, valve opening mechanism, and means controlled by said trip device for operating said valve opening mechanism.

7. Packaging apparatus comprising in combination means for supporting an empty deflated bag, means for inflating the bag, a pump, means for driving the pump, means for conveying liquid from the pump to said bag, means for stopping the pump, and means actuated by the expansion of the bag when inflated to render said stopping means ineffective.

8. Packaging apparatus comprising in combination means for supporting an empty deflated bag, means for inflating the bag, a pump, means for driving the pump, means for conveying liquid from the pump to said bag, a valve controlling the supply of liquid to the bag, means actuated by the expanding bag when it is inflated for opening said valve and permitting a flow of the liquid to the bag, means for stopping the pump in the absence of a bag at the filling position, and means actuated by the expansion of the bag to render said stopping means ineffective.

9. Packaging apparatus comprising in combination a pump, a motor, driving connections between the pump and motor including a clutch, a rotating turret, a filling nozzle on the turret, means for conveying liquid from the pump to the filling nozzle, means for supporting an empty container on the turret in position to receive the liquid supplied through said nozzle, automatic means controlled by the rotating turret and operable when a predetermined position of rotation is reached to operate said clutch and thereby disconnect the pump from the motor, and means actuated by the empty container while in said filling position to render said clutch operating means ineffective.

10. Packaging apparatus comprising in combination, a turret rotatable about a vertical axis, a motor geared to the turret for rotating it, filling heads carried on the turret and each comprising a spout, a pump, means for conducting a filling material from the pump and distributing it to the spouts, driving means including a clutch between the motor and the pump, means for supporting containers on the turret in position to receive filling material supplied through the spouts, valves individual to the filling heads and individually controlling the discharge of material through the spouts, a control device actuated by said containers in succession while the containers are in said receiving position, automatic means controlled by said control device for effecting the opening of the valves, a clutch trip device, means individual to said filling heads for actuating said clutch trip device and thereby disconnecting the pump from the motor, and means actuated by said control device to prevent the operation of the clutch trip device when said control device operates to effect an opening of a said valve, whereby the pump remains operative when the valves are normally opened and is stopped upon failure of a valve to open.

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