April 23, 1940. W. H. NEWEY 2,198,225

CLOSURE APPLYING MACHINE

Filed May 13, 1938 2 Sheets-Sheet 1

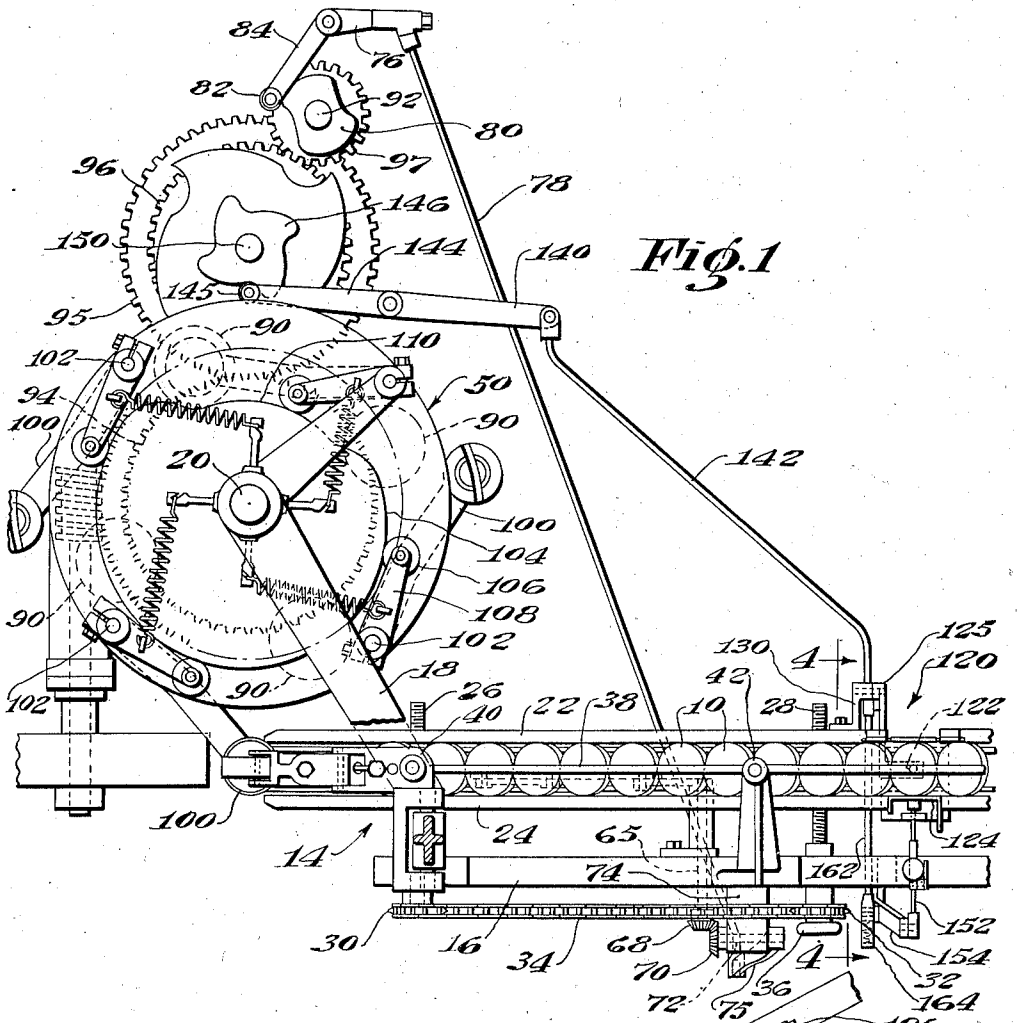


Fig. 1

Fig. 2

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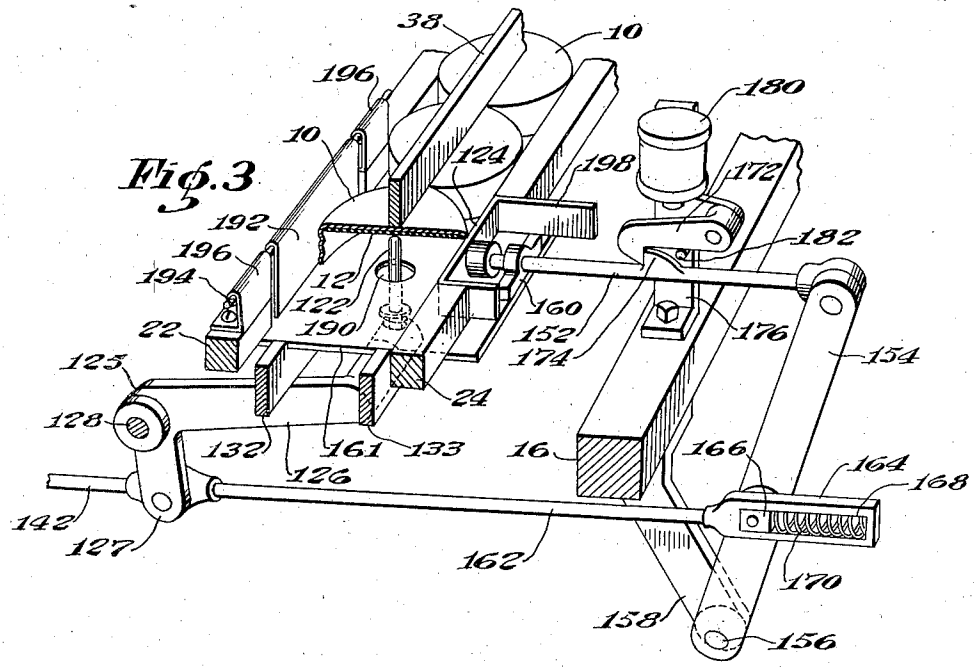


Fig. 3

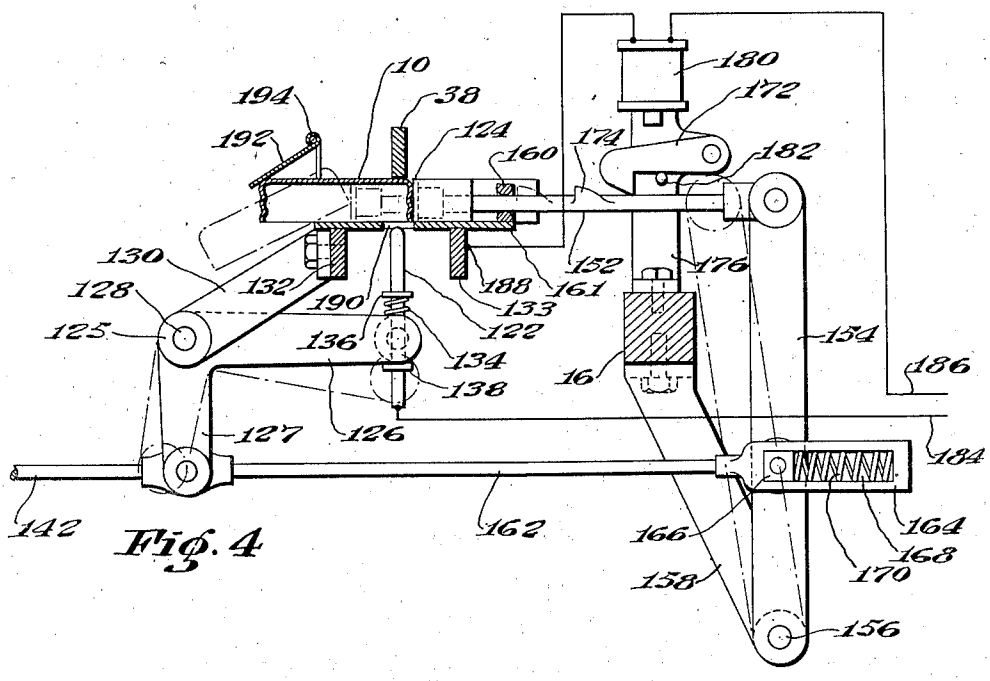


Fig. 4

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CLOSURE APPLYING MACHINE

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7 Claims. (Cl. 226—88.1)

This invention relates to a closure applying machine.

The object of the invention is to provide a novel and improved closure applying machine in which provision is made for detecting imperfect closures to prevent the application thereof to containers.

A further and more specific object of the invention is to provide a novel and improved closure applying machine in which provision is made for detecting the absence of the insulating sealing disks within the closures and for preventing the application of such defective closures to the containers during the operation of the machine.

With these objects in view and such others as may hereinafter appear, the invention consists in the closure applying machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a plan view of a closure applying machine embodying the present invention; Fig. 2 is a longitudinal cross sectional view of a portion of the cap feeding chute shown in Fig. 1; Fig. 3 is a perspective view of the closure detecting and rejecting mechanism, partly in cross-section, and Fig. 4 is a cross-sectional view of the mechanism shown in Fig. 3, the section being taken on the line 4—4 of Fig. 1.

In general, the present invention aims to produce a novel and improved closure applying machine in which provision is made for detecting defective closures and for preventing their application to containers by the machine. In its preferred form the invention is designed for operation upon metal closures of the type provided with insulating sealing disks of paper, cork and the like, and which disks are used to form the seal on the top or mouth of the container when the closure is applied thereto.

Referring now to the drawings, the different features of the invention are illustrated as embodied in a closure applying machine having provision for automatically feeding the closures to be applied and except as to such details as are hereinafter pointed out, the illustrated closure handling apparatus and closure applying machine may comprise any of the usual forms of such apparatus and machines now upon the market. Reference is made to the patent to Arthur Clarence Everett, No. 2,082,048, dated June 1, 1937, as disclosing the details of construction and mode of operation of such prior art closure handling and applying machines.

In the operation of the prior art closure handling and applying machines, as illustrated in the Everett patent above referred to, a bulk supply of the closures are stored in a hopper from which they are individually withdrawn and deposited right side up in a guide chute. As is generally known, such guide chutes are provided with mechanism for releasing one closure at a time, in timed relation to the operation of the closure applying mechanism, and mechanism is provided for transferring each closure from the end of the chute to a position to be received by a revoluble closure applying chuck. Inasmuch as many portions of the closure handling and applying machine of themselves constitute no part of the present invention, it has been deemed sufficient to illustrate only such portions of the closure applying machine as will enable the present invention to be understood.

As herein illustrated, the closures comprising metal caps 10 provided with sealing inserts 12 are deposited in a guide chute indicated generally at 14. The guide chute is mounted upon a supporting member 16 one end of which is attached to the frame of the closure feeding hopper, not shown. The lower end of the supporting member 16 is suspended from an arm 18 secured to the top of a vertical shaft 20 forming part of the closure applying mechanism. The closures are guided in their movement down the chute 14 between rails 22, 24 and provision is made for adjusting the rails to suit the diameter of the closures by mechanism including threaded rods 26, 28 having left and right hand threads. The rods 26, 28 are provided with sprockets 30, 32 connected by a chain 34 and adjustment of the rails is effected by turning a hand wheel 36 fixed upon the outer end of the rod 28.

The chute is also provided with a top guide rail 38 positioned centrally over the top of the closures. The rail 38 is supported by brackets 40, 42 mounted upon the member 16 and as herein shown, the top rail is capable of vertical adjustment for different heights of closures by raising or lowering the pins 44, 46 and by tightening the set screws 45 at the preferred position of adjustment.

Provision is made in the illustrated machine for releasing one closure at a time from the end of the chute in timed relation to the operation of the applying mechanism, indicated generally at 50 in Fig. 1. As herein shown, the releasing

mechanism comprises a hooked finger 52 arranged to be extended upwardly within the endmost cap of the line to hold the closures from sliding out of the chute and provision is made for lowering the finger in order to release the endmost closure. The finger 52 is adjustably secured to a link 54 which is mounted for movement such that the finger will move with substantially a straight line motion. As herein illustrated the link is pivotally supported at its ends by arms 56, 58 of bell crank levers 60, 62. The second arms of levers 60, 62 are pivotally connected together by a connecting rod 64. In order to rock the mechanism the shaft 65 upon which the bell crank 62 is secured, is provided with a bevel gear 68 which meshes with a bevel gear 70 fast on one end of a rocker shaft 72 mounted in a bracket 74 supported by the member 16. The other end of the rocker shaft 72 is provided with a lever 75 which is connected to a lever 76 of the closure applying mechanism by a connecting rod 78. The lever 76 is arranged to be rocked by a cam 80 cooperating with a roller 82 carried by a lever 84.

In the illustrated embodiment of the invention, the closure applying machine is provided with four applying heads or chucks indicated generally at 90 so that for each revolution of the continuously revoluble mechanism of the closure applying machine about the vertical shaft 20 it is necessary to provide four closures. As herein shown, the vertical cam shaft 92, upon which the cam 80 is mounted, is arranged to be driven from the closure applying mechanism at a ratio of 2 to 1 through a train of gears including cooperating gears 94, 95 and cooperating gears 96, 97. The cam 80, being provided with two lobes, thus causes four closures to be released at each revolution of the closure applying mechanism.

The mechanism for transferring the closures from the end of the feeding chute to the jaws of the closure applying chucks while the latter are revolving is fully illustrated and described in the Everett Patent No. 2,082,048, above referred to and is herein indicated generally by transferring arms 100 mounted upon vertical rods 102 carried by a revoluble portion of the closure applying mechanism. The arms 100 are arranged to be rocked outwardly to remove a closure from the end of the chute by a stationary cam 104 with which the rollers 106, carried by the arms 108, cooperate during the revoluble movement of the latter. The low portion 110 of the cam 104 permits the transferring arms to swing inwardly into alignment with the closure applying chucks to permit the latter to receive the closures.

In accordance with the present invention, provision is made for detecting the closures from which the sealing disks 12 are missing and for rejecting such closures from the feeding chute in order to prevent a defective closure from being applied to a container. As herein illustrated the detecting and rejecting device indicated generally at 120 includes a contact finger 122 arranged to be inserted within the closure 10 in order to detect the presence or absence of a sealing disk in the closure, and, a pusher plate 124, which is rendered operative to reject the closure in the event that the sealing disk is missing therefrom. The contact finger 122 comprises part of an electrical circuit which is closed when the contact finger touches the metal closure 10 thus releasing the mechanism for rejecting the closure. Normally, when the contact finger 122 engages the insulating cork or paper insert 12, the circuit remains open and the closure is permitted to pass.

Referring now to Figs. 3 and 4, the contact finger 122 is yieldably mounted in an insulating member 123 which is secured to one arm 126 of a bell crank 125. The bell crank 125 is pivotally mounted upon a stud 128 fast in a bracket 130 extending from one of the closure supporting rails 132. In order to permit the contact finger to yield when it engages the inside of the closure, a coiled spring 134 is disposed between a shoulder 136 and the insulating member 123 which normally tends to urge the contact finger upwardly. The contact finger is limited in its upward movement by a collar 138 which bears against the member 123 as illustrated.

Provision is made for rocking the bell crank 125 in timed relation to the closure applying mechanism in order that the contact finger will be inserted within each closure as it is advanced along the feed chute. As herein shown the second arm 127 of the bell crank is connected to one arm 140 of a two armed lever by a connecting rod 142. The second arm 144 carries a roller 145 which cooperates with a four lobed cam 146 fast upon the top of a vertical shaft 150 forming part of the driving mechanism of the closure applying machine. It will be observed that the shaft 150 is driven through the cooperating gears 94, 95 at a ratio of 1 to 1 so that the four lobes provided upon the cam 146 operate to rock the contact finger 122 in timed relation to the removal of the closures from the end of the feeding chute.

The pusher or rejecting plate 124 is fixed upon the end of a rod 152 which is pivotally connected to a lever 154 loosely mounted upon a stud 156 carried in a bracket 158 supported from the member 16. The rod 152 is guided in a bearing member 160 mounted upon a bridge plate 161 extending across the lower closure chute rails 132, 133. The rejecting plate 124 is arranged to be reciprocated through connections from the arm 127 of the bell crank 125 including a connecting rod 162. As herein shown a yieldable connection 164 is provided upon one end of the rod 162 which is adapted to receive a swiveled member 166 secured to the lever 154. The swiveled member 166 is slidingly received in an opening 168 in the yieldable connection and the member 166 is urged forwardly in the opening by a spring 170.

Provision is made for locking the pusher plate in its outward or inoperative position during the normal operation of the machine and for releasing the pusher plate when a defective closure is detected. As herein shown, the rejecting plate is locked in its outward position by a latch 172 which is arranged to engage a hook 174 extending from the pusher rod 152. The latch member 172 is pivotally supported in a bracket 176 extending from the member 16 and is arranged to act as an armature for an electro-magnet 180 supported on the bracket 176 directly above the latch. The electro-magnet 180 is adapted to be energized when a closure without an insert is detected which operates to raise the latch member 172 and permit the pusher plate to reject the defective closure. A stop pin 182 extending from the bracket 176 serves to maintain the latch in position to be raised by the hook 174 and to be engaged thereby when the pusher plate is rocked outwardly.

The electrical circuit for energizing the electromagnet 180, as shown in Fig. 4 includes the leads 184, 186 one of which 184 is connected directly to the contact finger 122. The other lead is con-

nected to the electro-magnet 180 and from the electro-magnet to a part of the machine frame as at 188. The circuit is closed when the contact finger engages the metallic portion of the closure. Should the contact finger strike the insulating material comprising the insert 12, the electro-magnet will not be energized and the pusher remains in its locked position.

From the description thus far it will be observed that the closures ride down the chute on the rails 132, 133 by gravity and are advanced each time a closure is released from the end of the chute. The bridge plate 161 extending across the rails 132, 133 is set flush with the top of the rails and serves to form a greater conducting area than would normally be obtained if the closure were supported upon the rails alone. An opening 190 is provided in the bridge plate to permit the contact finger to pass through. In the operation of the machine it will be observed that when the contact finger is rocked upwardly the connection 164 operates to positively rock the rejecting plate outwardly. However, when the contact finger is rocked downwardly, if the pusher plate is in its latched position, the spring 170 is contracted and the arm 154 remains in its locked position.

In the operation of the device, when the contact finger engages the metallic portion of the closure, the electro-magnet is energized and the latch member is raised. As the arm 126 is lowered, the spring 134 holds the contact member up against the inside of the closure in order to maintain the contact until the pusher has started to come forward so that the hook 174 may pass beyond the reach of the latch member 172 when the contact is broken. As illustrated in Figs. 3 and 4, the defective closures are pushed out of the chute through a gate 192 which is arranged to swing outwardly when engaged by a closure. The gate is hinged on a pin 194 extending between bearing members 196 mounted upon the side rail 22. As shown in Fig. 3, the guide rail 22 is cut out at the point where the gate is positioned. Normally the gate hangs downwardly and serves as a guide for the closures. Likewise, the guide rail 24 is cut out for the pusher plate 124 and the front edge of the pusher serves as a guide for the closures when the pusher is in its retracted position. The side edge 198 of the pusher serves to hold back the line of closures in the chute while one is being rejected. The yeldable connection 164 in addition to permitting the pusher to remain in its locked position when a normal closure is detected also serves as a safeguard against damaging the parts, should the pusher encounter any undue resistance during its forward motion.

For convenience of description and as used throughout the claims hereof, the term "defective closure" is intended to define closures rendered defective by the absence of the insulating sealing disk 12.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A closure applying machine having, in combination, closure applying mechanism, closure feeding mechanism adapted to feed metal closures having non-conductible sealing inserts, means for detecting the presence or absence of a sealing insert, and means for rejecting such closures as are not provided with a sealing insert comprising a pusher plate operatively connected to said closure applying mechanism to operate in timed relation thereto, a latch for normally retaining said pusher plate in its inoperative position, and electrically operated means for raising said latch and permitting said pusher plate to operate when a closure without an insert is detected, said electrically operated means including an electro-magnet forming part of a circuit adapted to be closed in response to said detecting means, said detecting means including a movable contact finger insertible into said closures and adapted to close said circuit to said electro-magnet when the contact finger engages the metallic portion of the closure, said movable contact finger being operatively connected to said pusher plate and arranged so that the pusher plate will not operate until the contact finger has been withdrawn.

2. A closure applying machine having, in combination, closure applying mechanism, closure feeding mechanism adapted to feed metal closures having non-conductible sealing inserts, said closure feeding mechanism comprising an inclined guideway through which the closures are fed right side up and in succession, means for releasing successive closures from said guideway, a movable contact finger disposed beneath said guideway and insertible into said closures for detecting the presence or absence of said sealing inserts in the closures, and means responsive to said detecting means for ejecting from the guideway those closures from which a sealing insert is absent.

3. A closure applying machine, in combination, closure applying mechanism, closure feeding mechanism arranged to feed closures in an upright position and electrically operated means for detecting the absence of an insulating sealing disk from a closure fed by the closure feeding means including a contact member disposed beneath the closures being fed and insertible into the interior of said closure and adapted upon detection of the absence of a sealing disk therefrom to electrically contact the metallic closure, and means rendered operative by said electrically operated detecting means for preventing the application of such a defective closure to a container.

4. A closure applying machine, in combination, closure applying mechanism, closure feeding mechanism arranged to feed closures in an upright position and electrically operated means for detecting the absence of an insulating sealing disk from a closure fed by the closure feeding means, including a contact member disposed beneath the closures being fed and insertible into the interior of said closure and adapted upon detection of the absence of a sealing disk therefrom to electrically contact the metallic closure.

5. A closure applying machine having, in combination, closure applying mechanism, closure feeding mechanism adapted to feed metal closures having non-conductible sealing inserts, said closure feeding mechanism comprising an inclined guideway through which the closures are fed right side up and in succession, means for releasing successive closures from said guideway, a movable contact finger disposed beneath said guideway and insertible into said closures for detecting the presence or absence of said sealing inserts in the closures, and means responsive to said detecting means for ejecting from the guide-

way those closures from which a sealing insert is absent, said guideway including a movable portion disposed adjacent said detecting means and adapted to be moved outwardly when engaged by a closure being ejected from said guideway.

6. A closure applying machine having, in combination, closure applying mechanism, closure feeding mechanism adapted to feed metal closures having non-conductible sealing inserts, said closure feeding mechanism comprising an inclined guideway through which the closures are fed right side up and in succession, means for releasing successive closures from said guideway, a movable contact finger disposed beneath said guideway and insertible into said closures for detecting the presence or absence of said sealing inserts in the closures, and means responsive to said detecting means for ejecting from the guideway those closures from which a sealing insert is absent, said guideway including a movable portion disposed adjacent said detecting means and adapted to be moved outwardly when engaged by a closure being ejected from said guideway, said movable portion being normally disposed to guide said closures through said guideway.

7. A closure applying machine having, in combination, closure applying mechanism, closure feeding mechanism adapted to feed metal closures having non-conductible sealing inserts in an upright position, said closure feeding mechanism comprising a guideway including side rails between which said closures are fed in succession and in contiguous relation, means for detecting the presence or absence of a sealing insert, and means for rejecting such closures from the guideway as are not provided with a sealing insert comprising a pusher plate operatively connected to said detecting means, one of said side rails being provided with a hinged portion adapted to be swung outwardly when engaged by a closure being ejected, said hinged portion being normally disposed to guide said closures through said guideway.

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