July 27, 1926. 1,593,827

S. R. HOWARD

PACKAGING MACHINE

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Fig. 1.

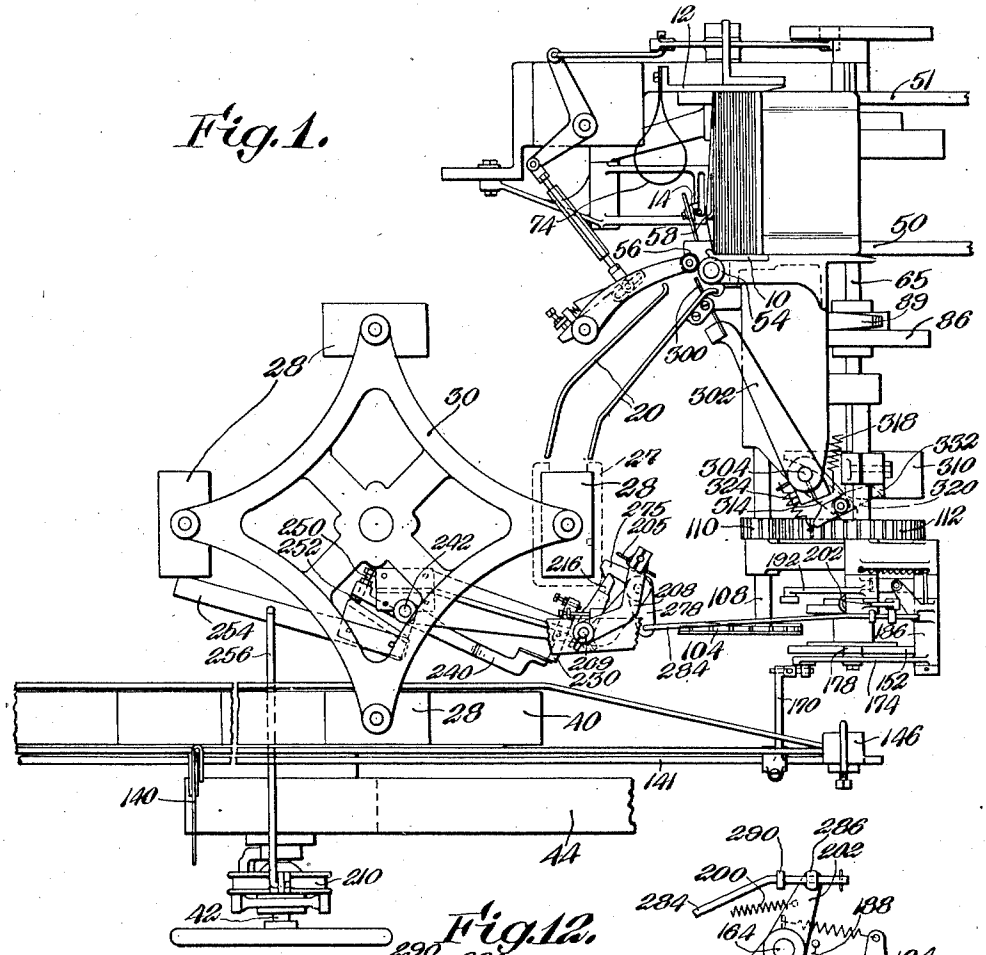


Fig. 11.

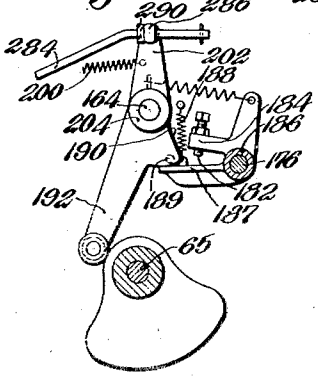
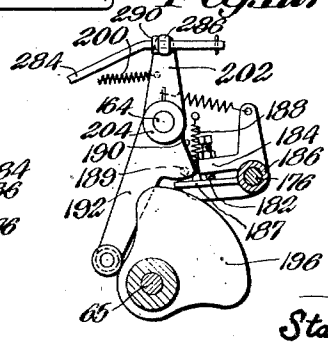


Fig. 12.



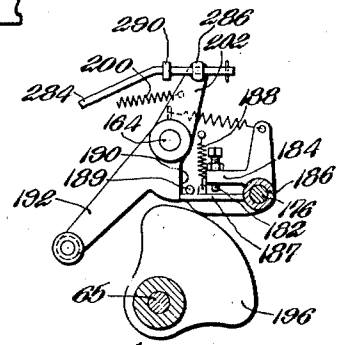


Fig. 13.

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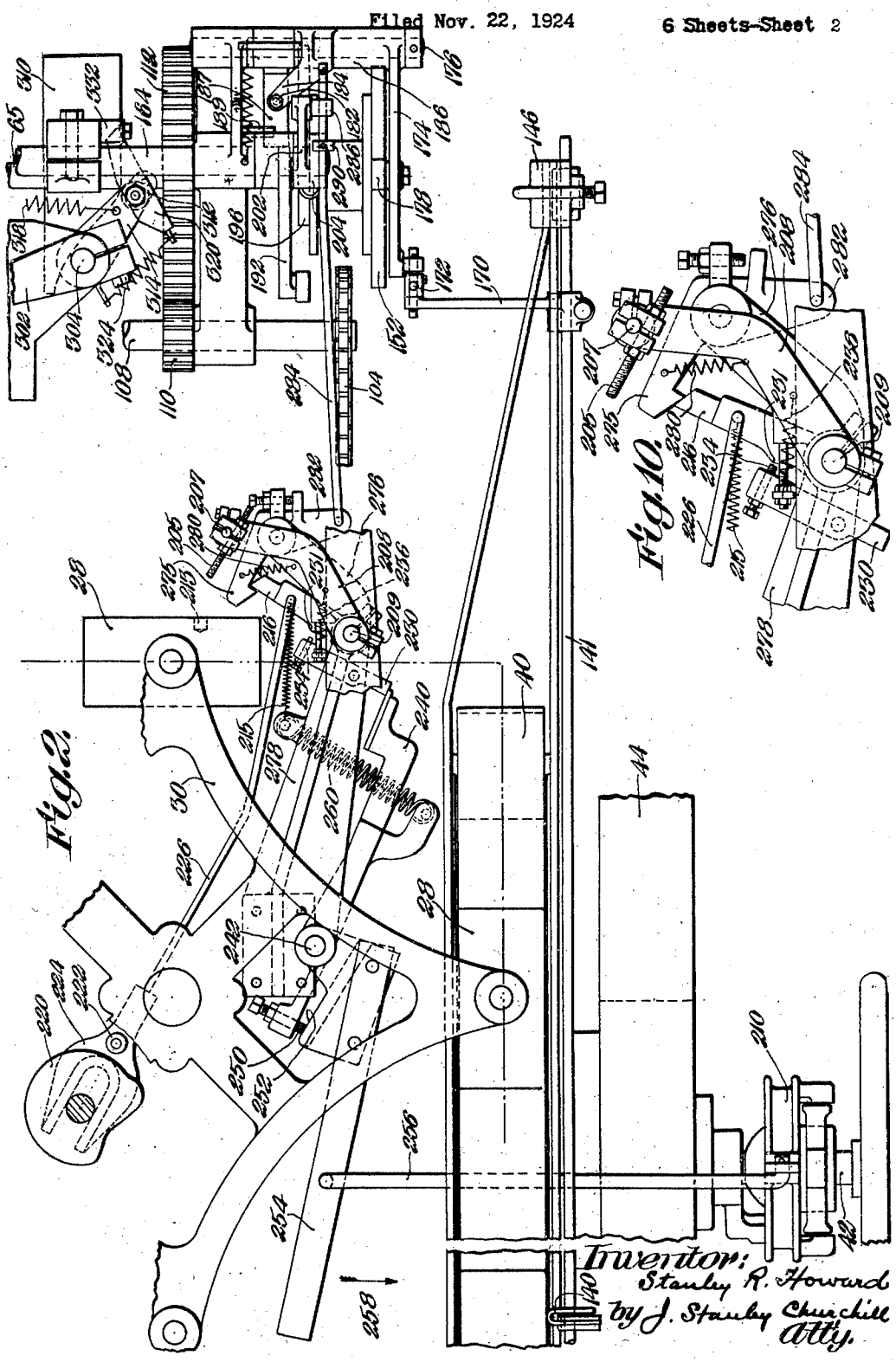


Fig. 10.

Fig. 2.

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PACKAGING MACHINE

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Fig. 3.

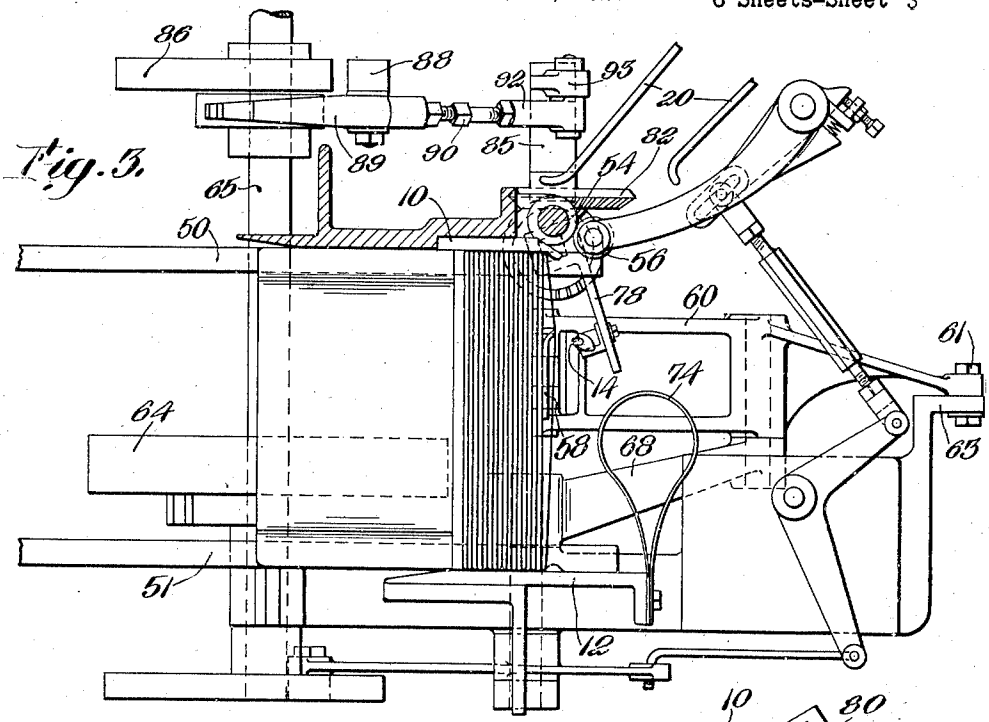


Fig. 5.

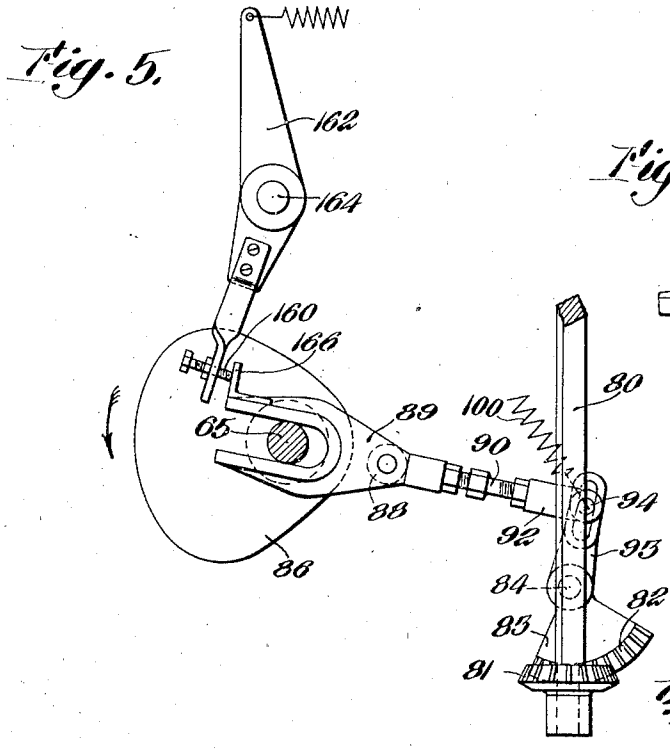
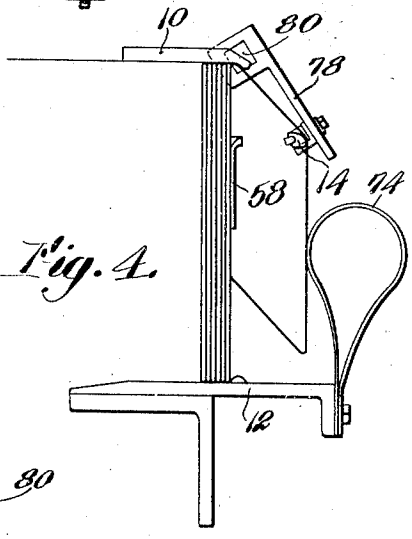


Fig. 4.



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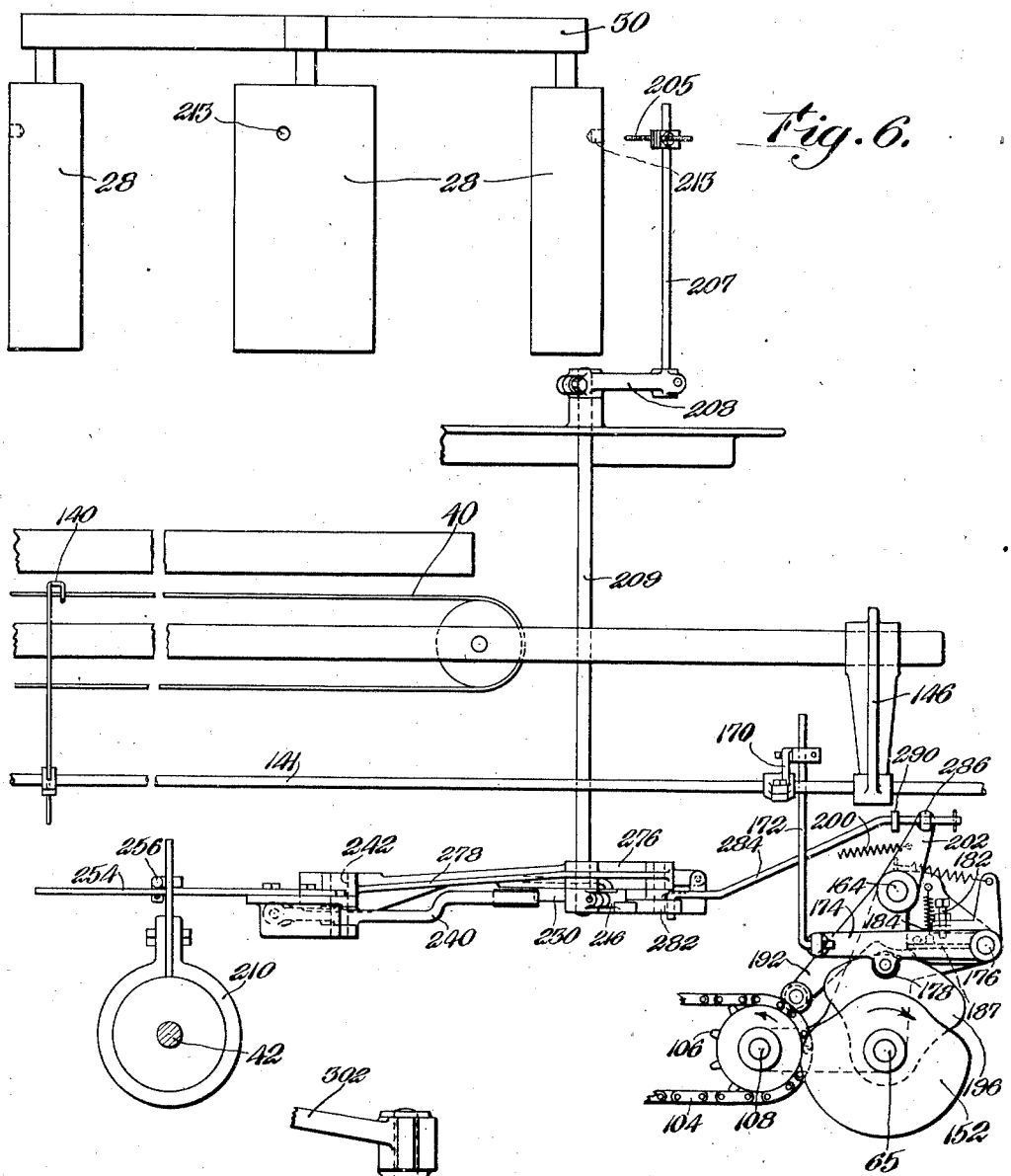


Fig. 6.

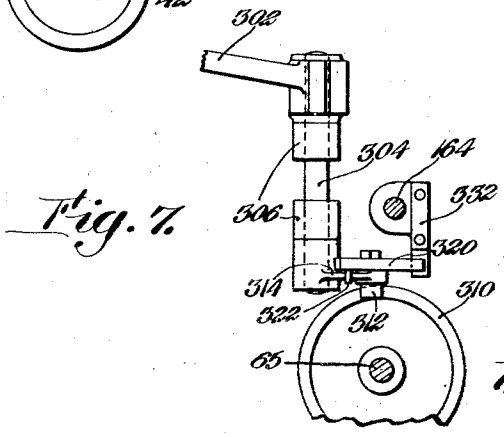


Fig. 7.

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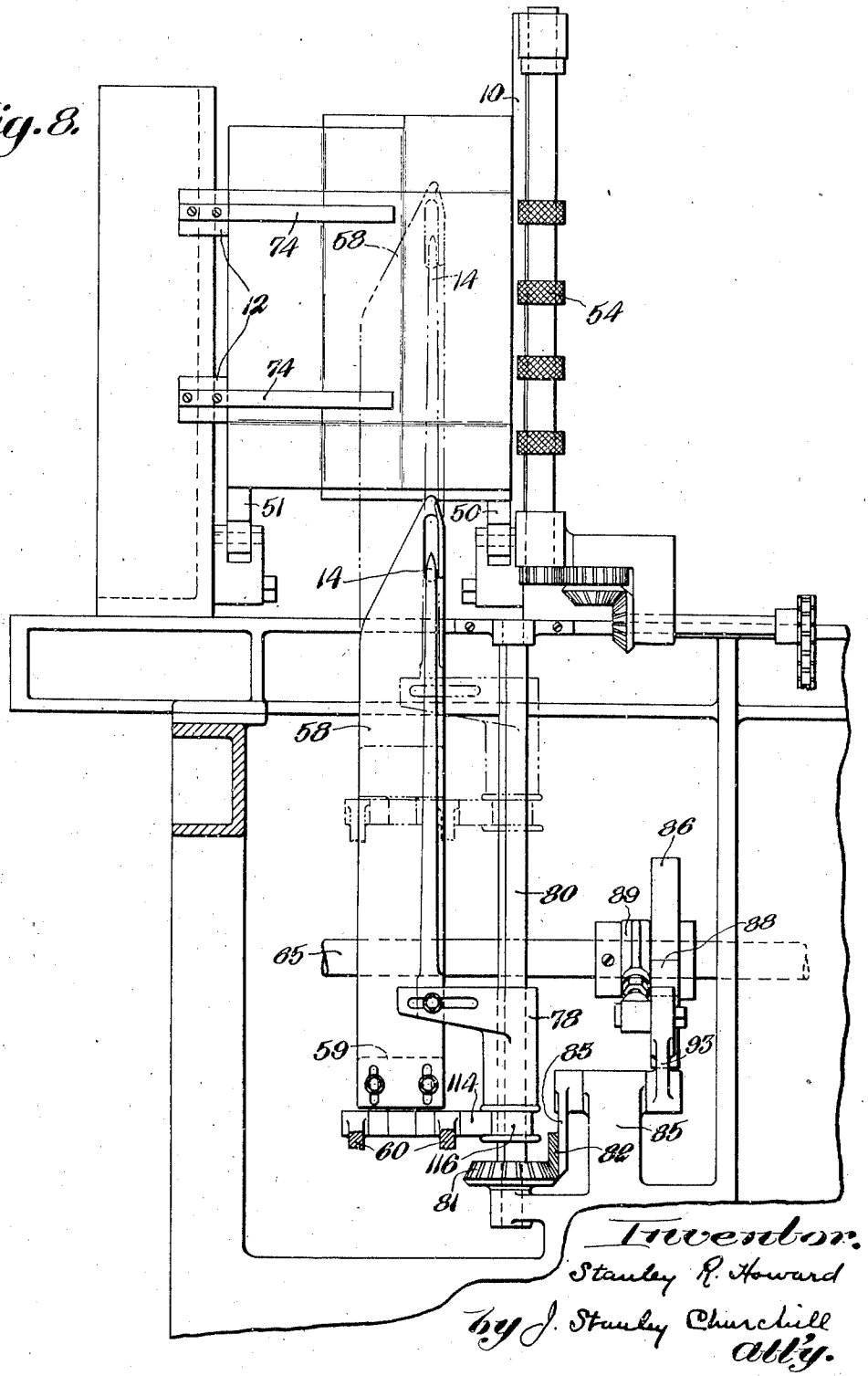
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PACKAGING MACHINE

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Fig. 8.



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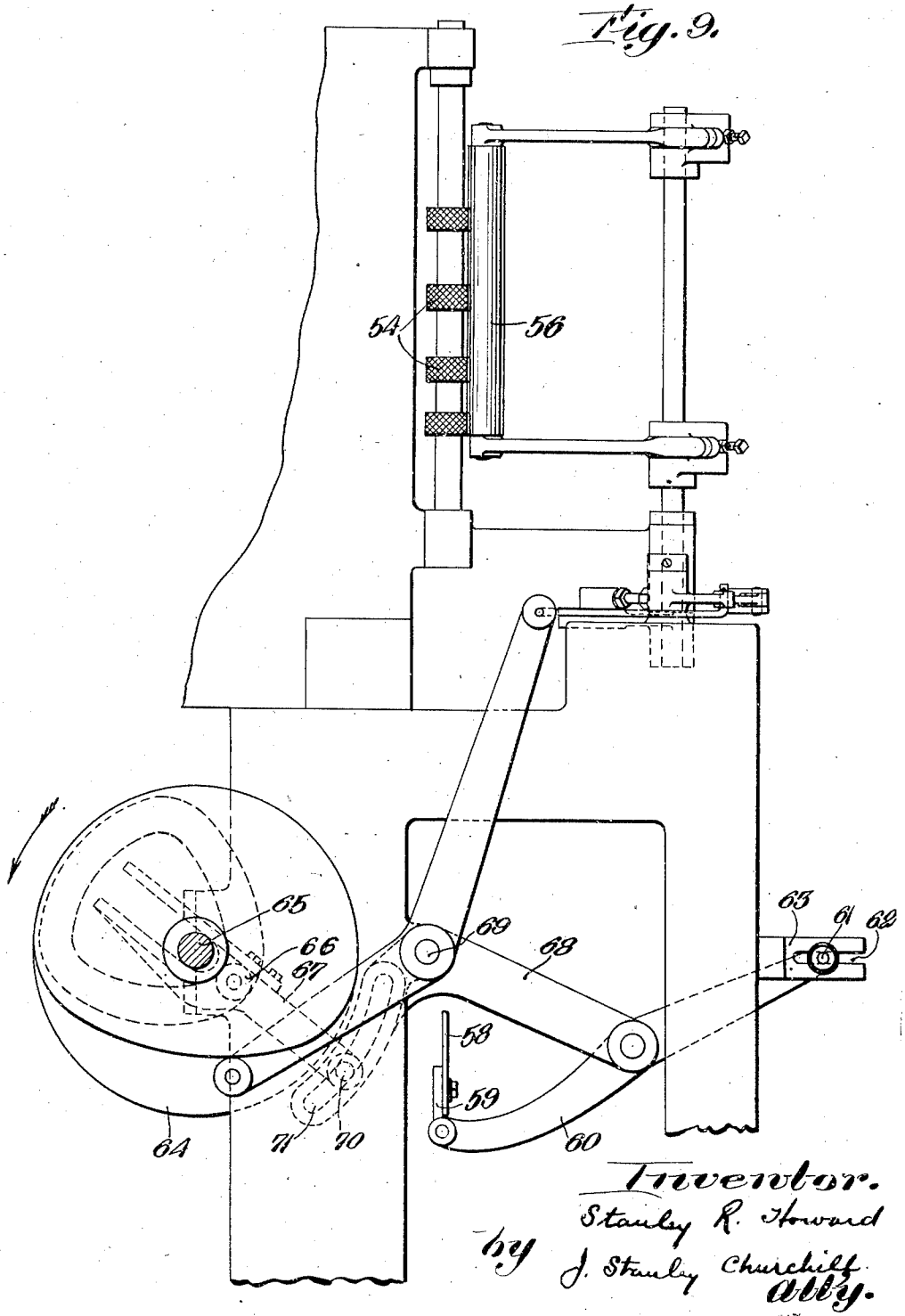
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Fig. 9.



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Patented July 27, 1926. 1,593,827

UNITED STATES PATENT OFFICE.

STANLEY R. HOWARD, OF EAST MILTON, MASSACHUSETTS, ASSIGNOR TO PNEUMATIC SCALE CORPORATION, LIMITED, OF QUINCY, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PACKAGING MACHINE.

Application filed November 22, 1924. Serial No. 751,524.

This invention relates to an automatic packaging machine and the different features thereof are herein illustrated as embodied in a carton forming machine.

One object of the invention is to provide a novel and improved construction of machine of the character specfied in which provision is made for controlling the operation of the machine in a novel manner.

Further and more specific objects of the invention are to provide a novel and improved construction of carton forming machine.

To these ends the invention consists in the machine, and in the constructions, combinations, and arrangements 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, Figure 1 is a plan of a sufficient portion of a carton forming machine embodying the different features of the present invention to enable them to be understood; Fig. 2 is an enlarged plan of a portion of the machine shown in Fig. 1, illustrating the details of control mechanism to be referred to; Fig. 3 is an enlarged plan of the mechanism for feeding the collapsed cartons; Fig. 4 is a plan of a portion of the mechanism illustrated in Fig. 3, showing the operation of the parts in opening a carton; Fig. 5 is a detail of a portion of the mechanism employed for controlling the operation of the carton feeding mechanism; Fig. 6 is a side elevation illustrating a portion of the control mechanism to be referred to; Fig. 7 is a detail illustrating a portion of the carton supply control mechanism; Figs. 8 and 9 are front and side elevations, respectively, of a portion of the carton feeding mechanism; Fig. 10 is an enlarged detail of a portion of the control mechanism illustrated in Fig. 2; and Figs. 11, 12, and 13 are sectional details illustrating the operation of another portion of the control mechanism for controlling the operation of the machine, and which will be hereinafter referred to.

The various automatic packaging machines at present used for packaging goods include automatic weighing machines and automatic package forming machines, the latter being used to form the packages and to automatically present them to the weighing machine. In the commercial package forming machines the cartons or packages are formed from blanks into tubular form provided with top and bottom flaps projecting from opposite ends of the tubular body portion of the carton. In some instances the cartons are formed into this tubular form directly from flat blanks but in most instances the cartons are supplied by the manufacturer in a partially completed form, that is in a tubular form which is knocked down or collapsed. Such collapsed or knocked down cartons are automatically fed from a magazine holding a bulk supply thereof and are automatically opened into tubular form. After the cartons have been formed into tubular form, the bottom flaps are folded and glued to seal or close the bottom of the package or carton. The cartons thus formed are automatically delivered to the weighing machine. In practice the bottom flaps of the cartons are folded and glued or sealed in a machine known in the trade as a bottom sealing machine, and the collapsed or knocked down cartons are usually opened and fed to the bottom sealing machine by a carton feeding machine operatively connected to the bottom sealing machine to comprise in effect a unitary carton forming machine in which the carton feeding operations are performed in definite timed relation to the sealing and folding operations of the bottom sealing machine.

In the operation of automatic packaging machines for performing the various operations incident to packaging goods, it is desirable to employ a plurality of control mechanisms to control the operation of the machine in accordance with operating conditions in different parts of the machine, and which are of such a nature that the operation of one of the mechanisms causes a condition to arise in the operation of the machine such that the second control mechanism would, unless prevented, be caused to operate. For example, in the illustrated machine provision is made for stopping the machine by one control mechanism, when the supply of articles is cut off, and in addition provision is made for cutting off the supply of articles under a different operating condition, at which time it is undesirable

that the machine be stopped by the first mechanism. In accordance with the present invention, provision is made for rendering one of such control mechanisms inoperative when the second becomes operative, to thereby permit certain operations in the machine to continue to be performed upon those articles in process in the machine. As herein illustrated this feature of the invention is embodied in a carton forming machine.

As herein shown, provision is made for rendering the carton feeding mechanism inoperative when an abnormal condition arises in the discharge of the packages or cartons from the machine, and provision is also made for stopping the carton forming machine in the event that the supply of cartons becomes interrupted or that a defective carton is fed to the sealing and folding instrumentalities. Provision is made for rendering the second control mechanism inoperative in the event that the first control mechanism functions to render the carton feeding mechanism inoperative when an abnormal condition arises in the discharge of packages from the machine to thereby permit the sealing and folding operations to continue to be performed upon those cartons in process in the machine, thereby eliminating the liability of the flaps adhering to the sealing instrumentalities or of the adhesive material from drying upon the flaps which would be the case were the second control mechanism to operate to stop the machine upon the next cycle of operations after the carton feeding mechanism had been rendered inoperative by the first control mechanism.

Referring to the drawings, the carton forming machine illustrated therein and embodying the different features of the present invention may and preferably will comprise a machine for feeding collapsed cartons, opening successive collapsed cartons, feeding the opened cartons to folding and sealing instrumentalities for closing the flaps of the cartons and preferably the bottom flaps thereof, and from which the successively formed cartons are conveyed away and may be filled by a weighing machine. The present carton forming machine may and preferably will comprise the carton feeding and sealing machine illustrated in the patent to S. R. Howard, No. 1,342,047, June 1, 1920, with respect to its major details of construction and operation. The folding and sealing instrumentalities employed, while not illustrated in the drawings of said Howard patent, may comprise the usual folding and sealing mechanisms employed in machines of this character, such for example as those illustrated in the patent to W. S. Scales, Aug. 16, 1904, for machine for setting up cartons. Referring to the drawings and to the Howard Patent, No. 1,342,047, in general, the illustrated carton feeding and sealing machine comprises a carton feeding unit including guide rails 10, 12, which constitute a magazine or stack support and feed for the collapsed cartons, the latter being assembled in the magazine vertically with the bottom forming flaps at the bottom. The collapsed cartons may and preferably will be withdrawn from the stack between the guide rails 10 and 12 by novel mechanism including the revoluble knife 14, as will be presently described, and conveyed thereby through the usual pair of guides 20 into the usual pocket 27 illustrated diagrammatically in Fig. 1 of the drawings and shown in detail in Fig. 2 of the Howard patent above referred to. The collapsed carton is squared up in the pocket 27 and is lifted by the pocket onto the forming block 28 with the bottom flaps projecting below the bottom of the block. A plurality of forming blocks 28, herein shown as four in number, are mounted upon the usual spider 30 arranged at the top of the machine, and the spider 30 is intermittently rotated by usual mechanism to present the cartons to different stations. The mechanism for operating the pocket 27 for rotating the spider 30 may comprise that shown in the Howard patent above referred to. Provision is made for folding and sealing the bottom flaps of the carton as the latter are rotated into successive stations, and for this purpose the folding and sealing instrumentalities illustrated in the patent to Scales, No. 767,445, of August 16, 1904, may be employed. Inasmuch as the construction and operation of the features of the bottom sealing machine of themselves constitute no part of the present invention, to facilitate a clearer understanding of the present features of the invention, the details thereof have been omitted from the present drawings, and for further detailed description of the construction and operation of these parts, reference is made to the above mentioned Howard and Scales patents. After the bottom flaps have been folded and sealed to constitute a closure for the bottom of the carton, the latter is ejected from the forming block 28 when the latter has arrived at the fourth station, and the carton in this form is deposited upon a discharge conveyer 40, which is driven by the usual connections, not shown, from the main driving shaft 42 of the bottom sealing machine, the latter being driven by the belt 44 from any convenient source of power, such as a motor, not shown.

Referring now particularly to Figs. 1, 3, 4, 5, 8 and 9, the improved mechanism therein illustrated for withdrawing the successive collapsed cartons from the stack or magazine is described as follows: The stack of collapsed cartons is supported be-

tween the guide rails 10, 12, upon two supporting members 50, 51, with the cartons arranged vertically as illustrated. The cartons are withdrawn in succession from the stack by a knife 14 having a relatively narrow blade, which is adapted to be raised from the full to the dotted line position illustrated in Fig. 8 to cause it to enter the carton, and which is thereafter swung through an arc of substantially 180 degrees to open the carton and to deliver one corner thereof between gripping rolls 54, 56, by which the carton is fed between the usual guides to be conveyed into the pocket 27. The knife 14 cooperates with a relatively flat knife blade 58, the latter being secured by a bracket 59 upon one end of a lever 60 pivoted at 61 in an open slot 62 in a bracket 63 projecting from the frame of the machine, see Fig. 9, and the knife blade is actuated to be raised from the full to the dotted line position, Fig. 8, by a cam 64 upon the main cam shaft 65, the movements of the cam being transmitted through a cam roller 66 upon a forked cam arm 67, through a bell crank 68 pivoted upon a stud 69 supported upon the machine frame. A pin and slot connection 70, 71, serves to time the movements of the knife to cause the latter to withdraw from within the carton during the early portion of the movements of the revoluble knife 14, as will be described. The function of the relatively flat knife is to engage the interior of the rear side of the carton, as illustrated in Fig. 4, to hold it firmly against the stack while the revoluble knife operates to open the carton. A light spring 74 is provided for engaging the forward side of the carton to cause the carton to be directed to the gripping rolls by the movements of the knife. The revoluble knife 14 is mounted upon a bracket 78 slidably mounted upon a square shaft 80 journaled in suitable bearings in the machine frame and capable of being rotated through a beveled gear 81 upon the lower end thereof and a beveled segment 82 formed on an arm 83 mounted upon a stud 84 supported by a bracket 85, constituting one part of the machine frame, as is shown in Figs. 5 and 8. The stud 84 has fast thereon a second arm 93. The lever 93 is rocked by a cam 86 upon the cam shaft 65 through the cooperation with the cam 86 of a cam roll 88 upon a forked member 89, the latter being adjustably connected by a threaded rod 90 to a hub 92 having a pin 94 received within a slot in the lever 93. The cam 86 operates to cause the revoluble knife 14 to swing through an arc of substantially 180 degrees from its carton entering position to its carton opening position, and the knife 14 is returned during the normal operation of the machine, by a spring 100 attached to the pin 94 and having the other end thereof attached to a part of the machine frame. The cam shaft 65 extends transversely of the carton feeding mechanism and is driven in the usual manner from the main driving shaft 42 of the bottom sealing machine through a sprocket, not shown, upon the main driving shaft, through the sprocket chain 104 and through the sprocket 106 on a countershaft 108, and through cooperating gears 110, 112 on the countershaft and main cam shaft respectively. Provision is made for raising both the flat knife 58 and knife 14 from the full to the dotted line positions illustrated in Fig. 8, in order to introduce them into the collapsed carton, and for this purpose the lever 60 is provided with a forked extension 114 which is received within a yoke 116 forming a part of the hub of the knife carrying bracket 78, and which is slidably mounted upon the square shaft 80, so that both knives are raised by the cam 64 through the linkage described.

In practice, machines of the character illustrated and comprising in effect combined carton feeding and bottom sealing machines, are employed in connection with automatic weighing machines, and when so used the collapsed cartons are opened and their bottoms sealed and the sealed cartons automatically conveyed in succession upon the discharge conveyer to the weighing machine. It so happens that in practice, the operation of the weighing machine varies for various reasons, chiefly because of the irregularities in the supply to the weighing machine of the material to be weighed. When the weighing machine slows down the empty cartons gradually accumulate in the conveyer between the bottom sealer and the weighing machine, and in order to control the operation of the carton feeding and the folding and sealing instrumentalities of the sealing machine in accordance with an abnormal condition in the number of cartons upon the discharge conveyer leading from the sealing machine, provision is made in accordance with the present invention for rendering the carton feeding mechanism inoperative, and at the same time for permitting those cartons in the process of being sealed in the bottom sealing machine to be run out and completely sealed to prevent the glue hardening upon the flaps, and the flaps from adhering to the glue rolls, as would be the case were the carton feeding and sealing machine to be entirely stopped at this time. Provision is also made for controlling the operation of the carton feeding and sealing machines in accordance with the supply of cartons to the folding instrumentalities of the sealing machine. In practice it often happens that a defective carton or no carton at all is fed by the carton feeding mechanism to the folding instrumentalities of the sealing machine, and in such an

instance it is desirable that the operator be obliged to direct his attention to clearing the machine of such condition. This is conveniently accomplished by stopping both the bottom sealing and carton feeding mechanism at this time. As herein shown, the present carton feeding and sealing machine is provided with two sets of control mechanisms, one which includes a feeler member adapted to feel for the packages being conveyed away from the sealing machine upon the discharge conveyer, and the other control mechanism one which includes a feeling member adapted to feel for the absence or for a defective carton in the course of its transfer from the carton feeding mechanism to the folding instrumentalities of the sealing machine. In order that the two control mechanisms may not interfere with one another in their operation, as would be the case were the two mechanisms to be used independently of one another, provision is made for rendering one of the control mechanisms inoperative when and so long as the other control mechanism remains operative. For example, assuming a condition to exist in the operation of the illustrated machine wherein the weighing machine being fed by the illustrated machine had stopped, thus causing a large number of cartons to accumulate upon the discharge conveyer of the illustrated machine, the control mechanism operating from the discharge conveyer would operate to cut off the supply of cartons being supplied to the folding instrumentalities of the present machine, and upon the next cycle of operations because of the fact that no carton would be presented by the carton feeding mechanism to the folding instrumentalities, then the second control mechanism would operate to stop the entire machine, thus bringing about a condition in which the partially sealed cartons would remain in the sealing machine and the flaps would adhere to the gluing devices and the glue itself would dry upon the flaps. This undesirable condition is eliminated in accordance with the present invention by rendering the second control mechanism inoperative when and so long as the first control mechanism operates.

Referring particularly to Figs. 2 and 6, the first control mechanism, and which will be, for convenience of description, hereinafter referred to as the discharge control mechanism, includes a feeler member 140 comprising a bent rod secured on a rock shaft 141 arranged to be reciprocated across and transversely of the discharge conveyer 40. The rock shaft 141 extends along the machine and is journaled in a suitable bearing 146. The feeler member 140 is reciprocated, as will be described, by an actuating cam 152 upon the cam shaft 65, and in the normal operation of the feeler member 140, the latter reciprocates across the discharge conveyer in the spaces between succeeding cartons or packages being conveyed away by the discharge conveyer 40 without coming in contact with such cartons. When an abnormal condition arises in the discharge of the cartons or packages from the sealing machine because of an accumulation of an excessive number of cartons upon the discharge conveyer 40, the feeler member 140 will, in its reciprocation, engage one of the cartons detecting this condition, and provision is made for rendering the carton feeding mechanism inoperative when the feeler member makes this detection. As herein shown, this is accomplished by preventing the carton feeding knife 14 from returning to its operating position so that it is prevented from entering the endmost carton in the stack in the magazine and subsequently withdrawing it from the magazine. As herein shown, the mechanism actuated by the restriction in the forward movement of the feeler 140 when it engages a carton, and which operates to prevent the carton feeding knife from returning to an operative position in which it may withdraw the cartons from the stack, includes a stop comprising a set screw 160 carried in one arm of a bell crank 162 mounted upon and secured to a rock shaft 164 and which set screw 160 is positioned by the restriction in the forward movement of the feeler member 140 by the carton, so that it will engage a lug 166, (see Fig. 5), upon a yoke 89 carrying the cam roller 88, and is arranged to operate to hold the cam roller 88 from following the cam 86 which, as above described, controls the swinging of the carton feeding knife. In this manner the carton feeding knife 14 is prevented from completely returning to its carton entering position and consequently the entire carton feeding mechanism is rendered inoperative, and the supply of additional cartons to the folding instrumentalities of the sealing machine is cut off. In the illustrated machine the rock shaft 164 upon which the bell crank 162 is mounted, is normally rocked to actuate the carton feeding knife, and the connections between the feeler member 140 and the rock shaft 164 include a lever arm 170, link 172 and cam arm 174 mounted upon a countershaft 176, and which cam arm 174 is provided with a cam roll 178 adapted to be rocked by the positively driven cam 152 upon the cam shaft 65 actuated in timed relation to the movements of both the carton feeding mechanism and the folding and sealing means. During the normal operation of the parts, the actuating cam 152 through the cam roller 178, cam arm 174, link 172, lever 170, operates to cause the feeler 140 to reciprocate across the discharge conveyer.

When, however, the return or forward movement of the feeler member 140 is restricted by engagement with a carton, the cam arm 174 is prevented from following the cam 152 and is held up in the position illustrated in Fig. 6. In this position, a set screw 182 mounted in an arm 184 upon the hub 186 by which the cam arm 174 is mounted upon the countershaft 176, (see Fig. 2), is positioned so as to permit a latching member 187, loosely mounted on the countershaft 176, to be lifted by a coil spring 188 into a horizontal or latching position and against an abutment or stop pin 189, as shown in Figs. 2, 6 and 13. In this position, the latching member 187 is adapted to engage a shoulder 190 upon a cam arm 192 to be referred to and to thereby hold the rock shaft 164 from being rocked in a counterclock-wise direction, see Fig. 6. When the rock shaft 164 is thus held from movement by the latch 187, the carton feeding mechanism is rendered inoperative by the set screw 160 (see Fig. 5), the latter being positioned to prevent the cam roll 88 from following its actuating cam 86, and thus preventing the carton feeding knife 14 from completely returning to its carton entering position. As long as this condition remains, the knife 14 when raised vertically passes in front of the endmost carton in the magazine and does not enter the same.

Referring now more particularly to Figs. 11, 12 and 13, in the normal operation of the machine when the cartons are being discharged normally, the latch member 187 occupies a position such as is illustrated in Fig. 11 and in which the cam roll upon the end of the cam arm 192 is retained against the actuating cam 196 by the coil spring 200, having one end secured to an arm 202 upstanding from a hub 204 keyed to the rock shaft 164, and the second end of which is secured to a fixed part of the machine frame. As the actuating cam 196 revolves, the high part of the cam swings the cam arm 192 outwardly, causing the arm 202 to be rocked to the right, viewing Figs. 11 and 12, and when the cam arm 192 is forced into its extreme outward position, the latch member 187 is swung up into a position illustrated in Fig. 13 in the event that the feeler member 140 has detected an accumulation of cartons upon the discharge conveyer. The engagement of the latch member 187 with the shoulder 190 upon the cam arm 192 operates to hold the cam arm in the position illustrated in Fig. 13, preventing the cam roll on the end thereof from following the actuating cam 196 as the latter continues to revolve. With the parts in the position illustrated in Fig. 13, the rock shaft 164 is held in the position illustrated in Fig. 5 in which the set screw engages the lug on the end of the forked member 89 and operates, as has been described, to render the carton feeding knife 14 inoperative and to thereby cut off further supply of cartons into the machine.

When the abnormal condition of the packages or cartons upon the discharge conveyer is relieved, as for example when the weighing machine again speeds up, provision is made for automatically permitting the parts of the described control mechanism by which the carton feeding mechanism is rendered inoperative to resume their normal position, illustrated in Fig. 11, permitting the cam arm 192 to follow its cam 196 and consequently to permit the knife 14 to be returned to its carton entering position. This is accomplished as a result of the ability of the cam roller 178 to follow its cam 152. When the feeler 140 is permitted to again reciprocate through its complete stroke, thus causing the cam arm 174, see Fig. 6, to be rocked downwardly and the latch member 187 to be depressed by the set screw 182 in the arm 184 thus moving the latch 187 away from the shoulder 190 on the cam arm 192, and permitting the latter to be swung by the spring 200 to cause the cam roller upon the end of the cam arm 192 to follow the cam 196. The rock shaft 164 is consequently permitted to oscillate through its complete oscillations thus moving the abutment screw 160 out of the path of the lug upon the end of the forked cam arm 89, see Fig. 5, and permitting the knife 14 to be returned to its carton entering position.

The second control mechanism referred to above, and which is adapted to detect the absence of a carton being supplied to the folding and sealing instrumentalities, or to detect the presence of a defective carton such as one with a torn flap, is arranged to throw out the clutch 210 upon the main driving shaft 42 of the machine, and inasmuch as in the illustrated machine both the folding and sealing instrumentalities and the carton feeding mechanism are operatively connected together and both driven from the main driving shaft 42, it will be apparent that when the main clutch 210 is thrown out, that the entire machine is stopped. The illustrated machine is arranged whereby it is necessary for the operator, after the complete machine has been stopped by this second control mechanism, to again throw the clutch in by hand, the purpose being to require the operator to return to the machine and remove the cause for the interruption in the supply of cartons by the carton feeding mechanism or to remove the defective carton. For this purpose, as herein shown, the second control mechanism is provided with a feeler finger 205, herein shown as comprising a rod ad-

justably mounted upon the upper end portion of a vertical rod 207 carried at its lower end in an arm 208 mounted upon the upper end of a vertical operating shaft 209. Referring particularly to Figs. 2 and 6, the feeler member 205 is arranged to be swung from the position illustrated in Fig. 6 to a position in which the end of the feeler member enters a hole or socket 213 in the base of the forming block 28 above referred to. The feeler member 205 is actuated in its forward movement by a spring 215, one end of which is secured to a latch member 216 secured to the operating shaft 209, the other end of which is connected to a fixed part of the frame. The feeler member 205 is actuated in a return direction by an operating cam 220 driven in timed relation to the operation of the carton feeding and other mechanism of the machine by suitable gearing connections (not shown). A cam roller 222 is mounted upon a cam arm 224 connected by a link 226 directly to the latch member 216. In the operation of this control mechanism, whenever the hole or socket 213 in the forming block 28 is covered by a carton or by the flap of a carton as is the case in the normal operation of the machine, the feeler finger 205 engages the carton and is held from completing its movement into the hole or socket in the forming block, the spring 215 yielding at this time. When the hole or socket 213 in the forming block 28 is not covered by a carton or by a flap thereof at the same time when the feeler finger 205 is performing its detecting operation, as for example when no carton has been fed upon the forming block or when the top flap of the carton has been torn so that it does not cover the hole in the forming block, then the feeler finger 205 is permitted to complete its operation and move into the hole and provision is made for utilizing this completion of the movement of the feeler finger 205 for throwing out the main operating clutch 210 controlling the operation of the entire machine. For this purpose the latch member 216 is arranged to engage a second latch 230 pivoted upon the machine frame, and to rock it to the left, viewing Fig. 2. A contact member 231 formed upon the latch 216 is arranged to engage an adjustable screw 234 in the upper end of the second latch 230 during this operation. The lower end of the second latch is normally held in the position illustrated in Fig. 2 by a coil spring 236, and in which position the lower end of the latch rests upon the end of a lever 240 pivoted upon a stud 242 secured to the machine frame, the second end of which is provided with an adjustable contact screw 250, which engages a bearing surface 252 upon a shipper lever 254 also pivoted upon the stud 242. The shipper lever 254 is preferably connected by a link 256 to the main operating clutch 210, and the latter may be of any usual or preferred construction arranged to be thrown out when the shipper lever is thrown in the direction of the arrow 258. The lever 240 is normally urged in a counter-clock-wise direction by a strong operating spring 260 of sufficient strength so that when the second latch member 230 is rocked free of the contact surface upon the end of the lever 240, the strong spring 260 operates to rock the lever 240 in a counter-clock-wise direction, rocking it upon the stud 242 and causing the second end of the lever 240 through the engagement of the adjustable contact screw 250 with the bearing surface 252 upon the shipper 254, to throw the shipper lever in the direction of the arrow 258 to disengage the clutch. It will be observed that during the normal operation of the machine when the clutch is thrown in, the parts are retained in the position illustrated in Fig. 2 by the engagement of the second latch member 230 with the end of the contact surface on the end of the lever 240.

In order to permit the use of the two control mechanisms upon the illustrated machine and to avoid the condition which would necessarily occur were the two mechanisms to be employed without additional mechanism for controlling the operation thereof, provision is made for rendering one of the control mechanisms inoperative when and so long as the other mechanism remains operative. Such a condition would arise when the first control mechanism had cut off the supply of cartons, and upon the next or subsequent cycle of operations of the machine the second control mechanism would stop the entire machine due to the absence of a carton upon the forming block 28, (the supply having been previously cut off), thus causing those cartons in the process of being glued and sealed to remain in the sealing machine. In order to overcome this situation provision is made for rendering the second control mechanism inoperative so long as the abnormal condition continues upon the discharge conveyer and for again rendering the second control mechanism operative when this abnormal condition is removed.

For this purpose a control latch 275 is pivotally mounted upon an arm 276 secured to a bracket 278 attached to the machine frame. The control latch 275 is constructed in the form of a bell crank and the latching portion thereof is arranged to hook over the end of the latching member 216 and to hold it from completing its movement to throw out the main clutch through the disengagement of the second latching member 230 with the end of the lever 240 as above described. The control latch 275 is nor-

mally urged into latching position by a light coil spring 280 connecting the latch with the arm 276. The second arm 282 of the bell crank forming the control latch, is connected by a link 284 to the upper end of the arm 202 upstanding from the hub 204 keyed to the rock shaft 164, as above described, and as herein shown, the free end of the link 284 is slidably extended through a hole in a pivoted pin 286 projecting from the arm 202. The link 284 is provided with a stop collar 290 secured thereto and with which the pin 286 engages to move the link 284 to the left, viewing Fig. 2, and to thereby rock the bell crank and to move the latching portion of the control latch 275 out of the path of movement of the end of the latching member 216 which controls the throwing of the main clutch as above described. By reference to Figs. 2, 6, 10, 11, 12 and 13, it will be observed that the position assumed by the operating parts of the mechanism, when the feeler member 140 has detected an excessive accumulation of cartons upon the discharge conveyer, is such that the arm 202 is prevented by the latch 187 from completing its movement to the left, the cam roll 178 being prevented from following its actuating cam 152 so that the pivoted pin 286 upon the arm 202 is held from engagement with the collar 290 upon the link 284, and thereby permits the light coil spring 280 to hold the latching portion of the control latch 275 in a position such that, when the actuating cam 220 arrives at its high point, the latch member 216 is swung to the right into a position in which it is latched by the latching portion of the control latch, and held, as shown in Fig. 2, from returning as the cam 220 recedes into a position into which it might throw out the main clutch to stop the machine. In other words, when the feeler member 140 has detected an accumulation of cartons upon the discharge conveyer, then when the carton feeding mechanism, namely the knife 14, is prevented from returning to its carton entering position, the rock shaft 164 will be in the position illustrated in detail in Figs. 6 and 13, and in such position the pin 286 will not have engaged the collar 290 upon the link 284 so that the hook of the control latch 275 is held by the spring 280 in its position in which, when the latching member 216 is forced into its extreme position to the right, viewing Fig. 2, it will be locked by the hook of the control latch 275. The second feeler member 205 which ordinarily operates to detect the presence of a carton upon the forming block 28 is in this manner rendered inoperative so that it will not enter the hole or socket 213 in the forming block 28 and stop the machine by throwing out the main clutch 210 upon the next cycle of operations after the carton feeding mechanism has been rendered inoperative through the medium of the feeler member 140 detecting an accumulation of cartons upon the discharge conveyer in the manner above described. During the normal operation of the parts of the two control mechanisms above described, the timing of the cam 220 and the cams 152 and 196 is such that the pin 286 upon the arm 202, whose movements synchronize with the rock shaft 164 and consequently with the movements of the knife 14 of the carton feeding mechanism, will engage the collar 290 upon the link 284 and rock the hook of the control latch 275 clear of the path of oscillation of the end of the latch member 216 before the high point of the cam 220 is reached, so that so long as the carton feeding mechanism is not rendered inoperative by the mechanism including the feeler member 140, then the second control mechanism which detects the supply of cartons to the forming block 28 is free to operate in a normal manner. As soon as the excessive accumulation of cartons upon the discharge conveyer is removed, the feeler 140 is permitted to swing again into the spaces between adjacent cartons upon the discharge conveyer, and then the latch member 187, see Figs. 6, 11, 12 and 13, is rocked downwardly, permitting the cam arm 192 to follow its cam 196 and consequently permitting the spring 200 to rock the arm 202 and the rock shaft 164 in a counterclock-wise direction, causing the pin 286 to engage the collar 290 and move the link 284 to rock the control latch 275, thus causing the hook of the latch to be disengaged from the point of the latch 216, thus returning the parts to normal operation and permitting, in the event that no carton is present upon the forming block 28 and the feeler 205 feels for a carton, the spring 215 to rock the latch 216 to swing the latch 230 to disengage the second end thereof from the lever arm 240, thus permitting the main actuating spring 260 to throw out the main clutch 210 in the manner above described in the event that no carton is present upon the forming block 28.

In the illustrated form of carton feeding mechanism, referring particularly to Fig. 1, after the collapsed carton has been withdrawn from the magazine and conveyed by the revoluble knife 14 between the gripping rolls 54, 56, the carton is then moved between the guides into the pocket 27 by the revoluble pusher member comprising a finger 300 mounted upon the end of an arm 302, the latter being secured upon the upper end of a vertical rock shaft 304 journaled in suitable bearings 306 attached to the machine frame. The arm 302 and pusher member 300 are rocked by an edge cam 310 through a cam roller 312 upon a cam arm 314 secured upon the lower end of the rock shaft

304. The cam roller is retained against the cam by a control spring 318, one end of which is attached to the cam arm and the second end of which is attached to a fixed portion of the frame of the machine. Provision is made for locking the arm 302 and consequently the pusher member 300 in its initial or starting position, such as is illustrated in Fig. 1, whenever the rock shaft 164, see Fig. 13, is locked in the position therein illustrated corresponding to a detection by the feeler 140 of an accumulation of cartons upon the discharge conveyer. As herein shown, this is accomplished by a latch 320 pivoted upon the cam arm 314 and which is normally held in a position with a stop pin 322 against the cam arm 314 by a spring 324. The rock shaft 164 has mounted thereon an abutment member 332 which is adapted, when rocked downwardly corresponding to a position occupied by the rock shaft 164 when the parts are in the position illustrated in Fig. 13, to engage the end of the latch and thereby lock the arm 302 and pusher member 300 in the position shown in Fig. 1. With this construction, therefore, when the carton feeding knife 14 is rendered inoperative the pusher member 300 is held from advancing, thereby preventing an additional carton which might be within the guide rails from being fed into the pocket 27. When the abnormal condition in the discharge of cartons from the machine is removed, then the abutment member 332 is swung with the rock shaft 164 out of the path of the latch 320, permitting the spring 318 to move the arm 302 and pusher member 300 to feed the cartons in the normal manner.

It will be observed that by rendering the second control mechanism inoperative when and so long as the first control mechanism operates to cut off the supply of cartons in the manner above described, the automatic restarting of the machine is rendered possible when the abnormal condition is removed, a result which in the illustrated machine would be impossible to attain were the second control mechanism permitted to operate.

While the different features of the present invention have been illustrated and described as embodied in a carton forming machine for feeding collapsed cartons and sealing the bottom flaps thereof, it will be understood that they may, if it is found desirable, be embodied in other forms and in other machines within the scope of the following claims.

Having thus described the invention, what is claimed is:—

1. A carton forming machine having, in combination, means for feeding successive cartons into the machine, flap folding means, means for discharging successive cartons from the machine, a control device for cutting off the supply of cartons into the machine under one condition of operation, a second control device for stopping the machine when the supply of cartons to the folding means is cut off, and means for rendering the second control device inoperative when the first control device becomes operative.

2. A carton forming machine having, in combination, means for feeding successive cartons into the machine, flap folding means, means for discharging successive cartons from the machine, a control device for cutting off the supply of cartons into the machine under one condition of operation, a second control device for stopping the machine when the supply of cartons to the folding means is cut off, and means for rendering the second control device inoperative as long as the first control device remains operative to cut off the supply of cartons.

3. In a carton forming machine, in combination, means for feeding successive cartons into the machine, flap folding means, means for conveying successive cartons from the machine, means for cutting off the supply of cartons into the machine, means for stopping the machine in the event of an abnormal condition in the supply of cartons to the folding means, and means for preventing the last mentioned means from operating to stop the machine when the aforesaid means operates to cut off the supply of cartons into the machine.

4. In a carton forming machine, in combination, means for feeding successive cartons into the machine, flap folding means, means for conveying successive cartons from the machine, and means for controlling the operation of the machine comprising two control mechanisms for controlling the operation of the machine in accordance with operating conditions in different parts of the machine, and means cooperating with said control mechanisms for rendering one of said control mechanisms inoperative when the other of said control mechanisms becomes operative.

5. In a carton forming machine, in combination, means for feeding successive cartons into a machine, flap folding means, means for conveying successive cartons from the machine, and means for controlling the operation of the machine comprising two control mechanisms for controlling the operation of the machine in accordance with operating conditions in different parts of the machine, and means cooperating with said control mechanisms for rendering one of said control mechanisms inoperative so long as the other control mechanism remains operative to control the machine.

6. In a carton forming machine, in com-

bination, means for sealing the bottom flaps of successive cartons, means for feeding successive unsealed cartons to said sealing means, means for discharging successive cartons from the machine, and means for controlling the operation of the machine including means for cutting off the supply of cartons in the event of an abnormal condition in the discharge of cartons from the machine, means for stopping the machine in the event that an abnormal condition arises in the supply of cartons to said sealing means, and means for permitting the carton supply to be cut off by the first mentioned means while permitting the machine to continue in operation to seal the flaps of those cartons in the machine.

7. A carton forming machine having, in combination, carton feeding mechanism, flap folding mechanism, means for discharging successive cartons from the machine, a control mechanism including a feeler having provision for detecting an abnormal accumulation of the cartons being discharged from the machine, connections between the feeler and the carton feeding mechanism arranged to render the carton feeding mechanism inoperative upon detection of the abnormal condition by the feeler, said connections including a movable member, a second control mechanism including a feeler adapted to detect an abnormal condition in the supply of cartons to the folding mechanism, connected to said movable member of the first control mechanism, and means for rendering the second control mechanism inoperative as long as the first control mechanism remains operative to cut off the supply of cartons, including a latching device operatively connected with the first control mechanism to be actuated thereby.

8. In a machine of the character described, in combination, means for conveying successive articles into the machine, means for conveying successive articles from the machine, means for cutting off the supply of articles when an abnormal condition arises in the discharge of articles from the machine, including a feeler cooperating with the articles being discharged, a movable member operatively connected therewith, connections between the movable member and article feeding means adapted to render the article feeding means inoperative when said movable member is held from movement, a second control mechanism having provision for stopping the machine and including a feeler member adapted to feel for the presence of an article at a definite point in its travel through the machine, and a device actuated when the movable member of the first control mechanism is arrested from movement upon the detection of an abnormal condition in the discharge of articles from the machine, for preventing the feeler of the second control mechanism from operating.

9. In a machine of the character described, in combination, two separate control mechanisms for controlling the operation of the machine in accordance with operating conditions in different parts thereof, comprising independent feeler members, a movable member operatively connected with one feeler member to be arrested from movement when one control mechanism is rendered operative, and means rendered operative when said movable member is thus arrested from movement, for preventing the operation of the other control mechanism.

10. In a carton forming machine, in combination, carton feeding means, flap folding means, means for discharging successive cartons from the machine, a control mechanism for cutting off the supply of cartons when an abnormal condition arises in the discharge of cartons including a feeler member, a movable member connected thereto to be arrested from movement when the feeler member detects such abnormal condition, a second control mechanism including a feeler for detecting an abnormal condition in the supply of cartons to the flapfolding means, and means rendered operative when said movable member is arrested from movement, for preventing the operation of said second control mechanism.

11. In a carton forming machine, in combination, carton feeding mechanism including a revoluble carton feeding member, flap folding means, including a plurality of forming blocks, means for conveying successive cartons from the machine, a control mechanism including a feeler cooperating with the cartons being discharged, a normally reciprocating member, connections between the feeler member and said reciprocatory member for arresting the movement of the latter when the feeler detects an excessive accumulation of cartons being discharged from the machine, means actuated when said reciprocatory member is arrested from movement for preventing the return of said carton feeding member to operative position to thereby cut off the supply of cartons into the machine, a second control mechanism adapted to stop the operation of the machine and including a feeler for detecting the presence of a carton upon a forming block, and means actuated when said reciprocatory member of the first control mechanism is arrested from movement, for preventing the operation of the feeler of the second control mechanism and thereby preventing the latter from stopping the machine.

12. In a carton forming machine, in com-

bination, carton feeding means, flap folding means, means for discharging successive cartons from the machine, a control mechanism for cutting off the supply of cartons when an abnormal condition arises in the discharge of cartons including a feeler member, a rock shaft, connections between the rock shaft and feeler member including a latch adapted to arrest the rock shaft from movement upon detection of an abnormal condition by the feeler member, a second control mechanism including a feeler member for detecting an abnormal condition in the feeding of cartons through the machine, and means rendered operative when said rock shaft is arrested from movement, for preventing the operation of said second control mechanism including a latch and connections between the latch and the rock shaft.

13. A carton forming machine haivng, in combination, carton feeding mechanism, a control mechanism for rendering the carton feeding mechanism inoperative comprising a feeler member for detecting an abnormal condition in the operation of the machine, and connections between the feeler member and carton feeding mechanism including a movable member arranged to be arrested from movement when the feeler detects such abnormal condition, and means actuated when the movable member is thus arrested for rendering the carton feeding mechanism inoperative.

14. A carton forming machine having, in combination, mechanism for feeding knocked down or collapsed cartons, a control mechanism for rendering the carton feeding mechanism inoperative comprising a feeler member for detecting an abnormal condition in the operation of the machine, and connections between the feeler member and carton feeding mechanism including a movable member arranged to be arrested from movement when the feeler detects such abnormal condition, and means actuated when the movable member is thus arrested for rending the carton feeding mechanism inoperative.

15. A carton forming machine having, in combination, mechanism for feeding knocked down cartons including a movable member adapted to enter a collapsed carton and to open the same, a control mechanism comprising a feeler for detecting an abnormal condition in the operation of the machine, and connections between the feeler and said carton opening member having provision whereby the latter is prevented from entering a carton when the feeler detects such abnormal condition.

16. A carton forming machine having, in combination, mechanism for feeding knocked down cartons including a movable member adapted to enter a collapsed carton and to open the same, and a control mechanism for preventing the operation of said carton opening member comprising a feeler for detecting an abnormal condition in the discharge of cartons from the machine.

17. In a carton forming machine, in combination, flap folding means, means for opening successive collapsed cartons, means for moving the opened cartons to the folding means, and a control mechanism including a feeler for cooperating with the cartons arranged to render the carton opening means and the carton moving means inoperative while permitting the flap folding means to continue in operation.

18. In a carton forming machine, in combination, flap folding means, means for opening successive collapsed cartons, means for moving the opened cartons to the folding means, and a control mechanism including a feeler for rendering the carton opening means inoperative while permitting the flap folding means to continue in operation.

19. In a carton forming machine, in combination, flap folding means, means for opening successive collapsed cartons, means for moving the opened cartons to the folding means including a movable pusher member and a control mechanism for rendering both the carton feeding means and the carton moving means inoperative while permitting the flap folding means to continue in operation.

20. In a carton forming machine, in combination, flap folding means, means for opening successive collapsed cartons, means for moving the opened cartons to the folding means, and a control mechanism actuated in accordance with the condition of the cartons being discharged for rendering both the carton feeding means and the carton moving means inoperative while permitting the flap folding means to continue in operation.

21. In a carton forming machine, in combination, flap folding means, means for opening successive collapsed cartons, means for moving the opened cartons to the folding means, a control mechanism actuated in accordance with the condition of cartons being discharged for rendering the carton opening means and the carton moving means inoperative while permitting the folding means to continue in operation, and a second control mechanism for stopping under certain conditions of operation both the flap folding and carton opening and moving means, said second control mechanism being operatively connected to the first control mechanism to be rendered operative when the first control mechanism operates.

22. The combination with flap folding means, of means for feeding knocked down

cartons thereto, and means for conveying successive cartons from said flap folding means, and means cooperating with the cartons being discharged from the folding means for rendering the carton feeding means inoperative while permitting the folding means to continue in operation.

23. The combination with carton feeding means, of means for folding flaps of successive cartons, means for conveying successive cartons from the machine, and means for rendering said carton feeding means inoperative while permitting said folding means to continue in operation.

24. The combination with carton feeding means, of means for folding flaps of the cartons, means for conveying successive cartons from said sealing means, and means for rendering said carton feeding means inoperative while permitting said folding means to continue in operation.

25. The combination with carton feeding means, of means for closing the ends of successive cartons, means for conveying successive cartons from the machine, and means for cutting off the supply of cartons while permitting said carton closing means to continue in operation.

26. In a machine of the character described, in combination, means for feeding successive articles into the machine, means for operating upon the articles while in the machine, means for conveying successive articles from the machine, and means for controlling the operation of the machine comprising two control mechanisms, the operation of one of which would normally cause a condition in the operation of the machine which would initiate the operation of the other control mechanism, and means for rendering said other control mechanism inoperative so long as the first mentioned control mechanism remains operative.

In testimony whereof I have signed my name to this specification.

STANLEY R. HOWARD.