April 20, 1943. S. R. HOWARD 2,316,867

PACKAGING MACHINE

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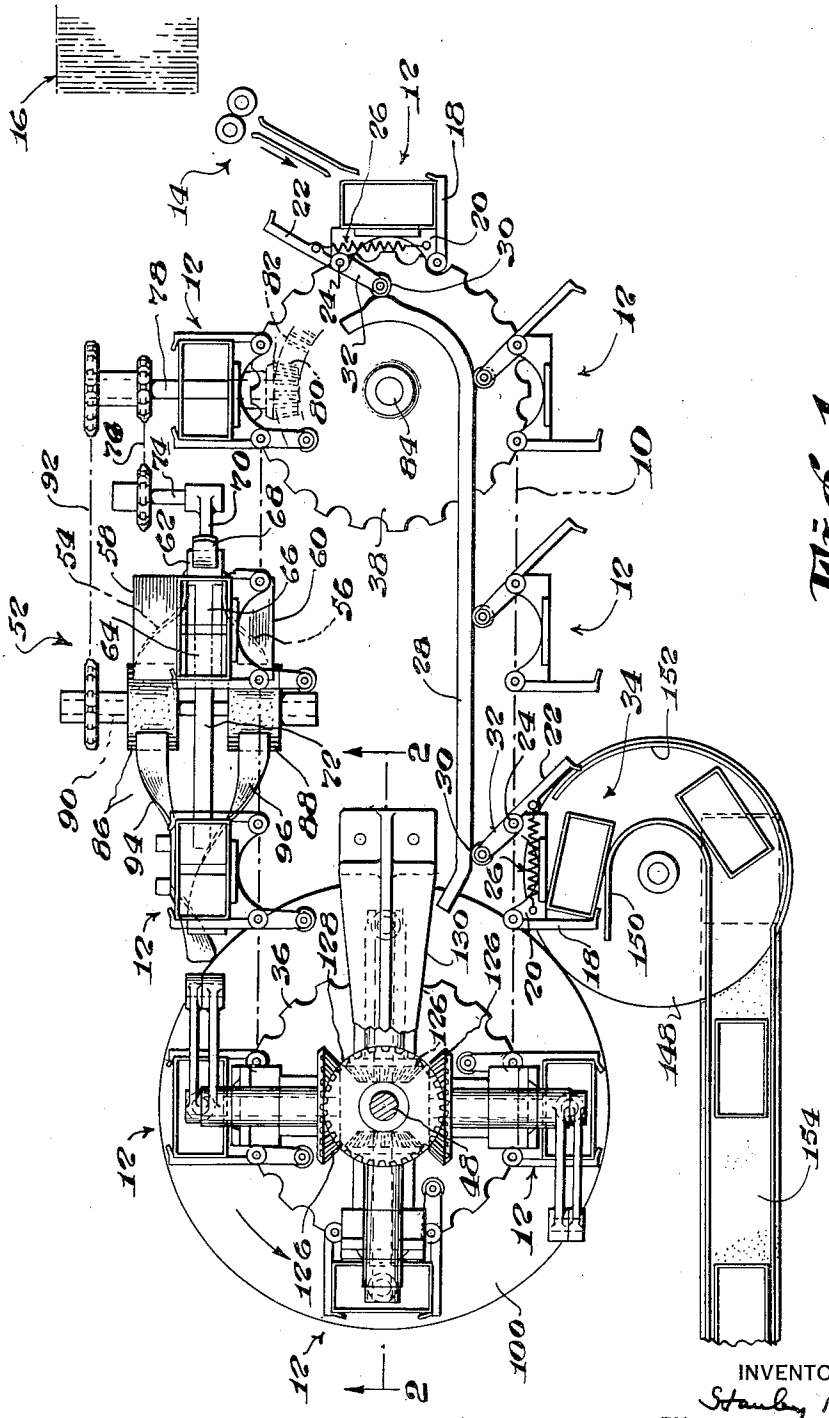


Fig. 1

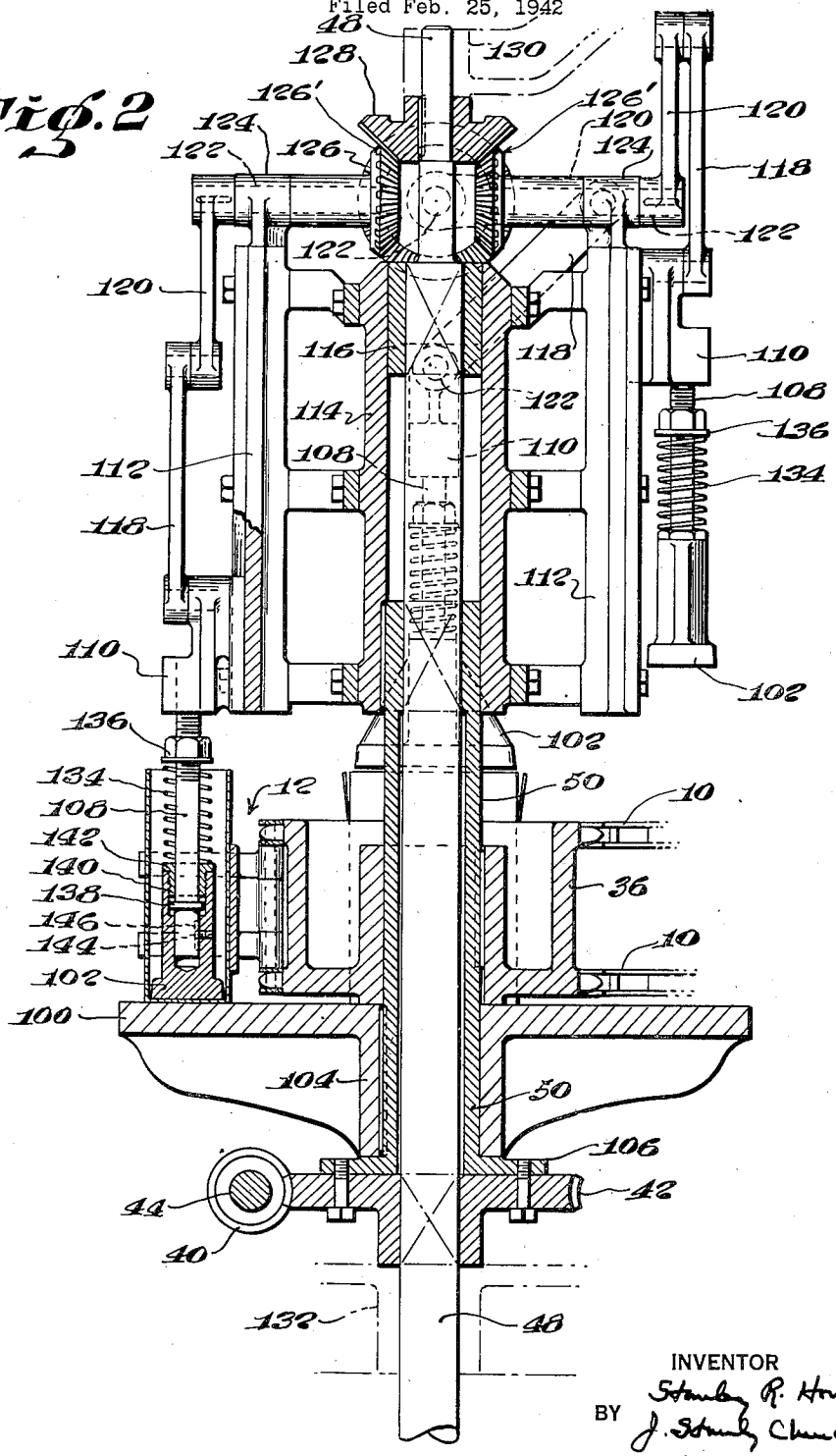
INVENTOR
Stanley R. Howard
BY J. Stanley Churchill
ATTORNEY

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Fig. 2



INVENTOR
Stanley R. Howard
BY J. Stanley Churchill
ATTORNEY

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PACKAGING MACHINE

Stanley R. Howard, Milton, Mass., assignor to Pneumatic Scale Corporation, Limited, Quincy, Mass., a corporation of Massachusetts

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11 Claims. (Cl. 93—36.3)

This invention relates to a packaging machine and more particularly to a bottom sealing machine for sealing the bottom flaps of cartons.

The invention has for an object to provide a novel and improved packaging machine of the character specified, capable of continuous operation at a relatively high rate of speed and in which provision is made for applying substantial pressure in a novel manner to the closed and sealed bottom flaps of a carton to firmly set the same during the continuous operation of the machine.

With this general object in view and such others as may hereinafter appear, the invention consists in the packaging 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 bottom sealing machine embodying the present invention; and Fig. 2 is a longitudinal cross section of the pressure applying mechanism, the section being taken on the line 2—2 of Fig. 1.

In general, the present invention contemplates a novel and improved sealing machine adapted to close and seal the flaps of cartons while the latter are continuously conveyed through the machine, and, in which provision is made for applying substantial pressure to the closed and sealed flaps to firmly set the same during the continuous movement of the cartons. In the preferred embodiment of the invention provision is made for supporting the cartons in carton holding pockets mounted upon a continuously moving carrier chain and with the top and bottom flaps of the carton extending beyond the top and bottom respectively of the pocket. The cartons thus held are advanced past flap closing and adhesive applying mechanism for adhesively securing together the bottom flaps of the carton. In order to firmly press and set the adhesively sealed flaps, pressure applying mechanism of novel and improved structure is provided, and, in the illustrated embodiment of the invention such pressure applying mechanism comprises a vertically reciprocal plunger or forming block arranged to be introduced into the open end of the continuously moving carton and to be moved along therewith. The plunger thus inserted is arranged to cooperate with a continuously moving bottom plate to effect substantial pressure upon the folded and sealed bottom flaps while the carton is supported in the carton holding pocket. Thereupon, the plunger is removed from the carton and the latter is discharged from the machine to be delivered to subsequent machines for filling and top closing the cartons.

Referring now to the drawings, in general, the different features of the invention have been shown for illustrative purposes as embodied in a packaging machine in which provision is made for feeding collapsed cartons from a stack or supply thereof and for opening successive cartons and delivering them into successive carton holding devices forming a part of a continuously travelling endless conveyer. The latter functions to present the cartons to successive operating stations where the extended bottom flaps of the cartons are supplied with adhesive and closed while the cartons are held and continuously advanced by the carton holding devices on the conveyer. Thereafter, successive cartons are presented to pressure applying mechanism by which the closed and sealed bottom flaps are firmly set in their operative position. The bottom sealed cartons are then automatically discharged from the machine onto an outgoing conveyer which may deliver the cartons to subsequent machines for filling the cartons, and for closing and sealing the top flaps to complete the packaging operation.

As herein shown, the illustrated machine includes continuously driven conveyer chains 10 provided with a plurality of spaced carton holding and gripping members 12 adapted to receive opened cartons from carton feeding mechanism indicated generally at 14 and to operatively support the cartons with their top and bottom flaps in open condition.

The carton feeding mechanism 14 may comprise any usual or preferred form of carton feeding mechanism now upon the market, such as is illustrated in the United States patent to Robinson No. 1,599,248, dated September 7, 1926. Such mechanism essentially comprises a magazine for holding a supply of collapsed cartons 16 in a vertical position. Provision is made, during the operation of the machine, for withdrawing the endmost collapsed carton from the stack, opening it, and introducing it into one of the carton holding devices or pockets 12 upon the continuously moving chains 10. Inasmuch as the details of the carton feeding mechanism in itself form no part of the present invention, reference is made to the above patent for a further and more complete disclosure and description thereof.

As herein illustrated, each pocket 12 includes a relatively fixed arm 18 extended from a bracket 20 carried by the chains 10, and a movable arm 22 pivotally mounted upon a stud 24 in the

bracket 20. The pivotally mounted arm 22 is normally held in engagement with the side of the carton by a spring 26 in order to retain the carton firmly in the pocket. As herein shown, a stationary cam 28 disposed adjacent the chain 10 is arranged to cooperate with a roller 30 carried by an extension 32 of the arm 22 in order to open the pocket at the discharge station, indicated generally at 34, to permit the carton to be removed. The cam piece 28 is extended to hold the pocket in its open position until it passes the carton feeding station 14 whereupon the arm 22 is again closed upon the thus deposited carton.

The carrier chains 10, as herein shown, are arranged to run over double sprockets 36, 38 and are continuously driven through connections from a worm 40, and worm gear 42, see Fig. 2, the worm shaft 44 being rotated through any usual or preferred driving connections, now shown. The worm gear 42 is rotatably mounted upon a central stationary shaft 48, the worm gear having secured thereto a hollow shaft 50 upon which the double sprocket 36 is keyed.

The carton thus held with its top and bottom flaps extended is moved through the flap holding and adhesive applying mechanism indicated generally at 52 where the narrow end flaps are tucked and folded in, the side flaps spread outwardly and provided with adhesive, and then folded inwardly to close the flaps as the carton is continuously moved therethrough. As herein shown, the flap folding and adhesive applying mechanism 52 includes a stationary rail having flared edges 54, 56 arranged to engage and spread outwardly the two side flaps 58, 60 and having a forwardly extended portion 62 arranged to engage the leading end flap 64 and to fold it inwardly as the carton is moved past the same. The trailing end flap 66 is arranged to be engaged by a curved plate 68 carried by a rotating arm 70, and, in operation, the trailing end flap is tucked under the forwardly extended portion 62, both end flaps being retained in their closed position by a longitudinally extended narrow rail 72 while the outspread side flaps are provided with a coating of adhesive. The rotating arm 70, as herein shown, is fast upon a short shaft 74 and is arranged to be continuously rotated in timed relation to the advance of the cartons through connections including a chain and sprocket drive 76, shaft 78, and bevel gears 80, 82, the latter being fast on a shaft 84 to which the double sprocket 38 is fixed.

As illustrated in Fig. 1, the outspread side flaps 58, 60 are arranged to pass over adhesive applying rollers 86, 88 mounted upon a shaft 90 arranged to be rotated through a chain and sprocket drive 92 connected to the shaft 78. The rotation of the rollers 86, 88 is such that the surface speed thereof is equal to the forward movement of the cartons whereby to provide a uniform film of adhesive to the inner surface of each side flap. Thereupon, as the cartons progress through the flap folding and adhesive applying mechanism, the side flaps 58, 60 are successively engaged and folded upon the bottom of the carton by stationary curved rails 94, 96 to complete the folding and sealing operation in preparation for the pressure applying operation to firmly set the adhesively secured flaps.

Referring now to Fig. 2, the pressure applying mechanism includes a rotatable disc 100, upon which the bottom of the carton is arranged to rest during the pressure applying operation, and a plurality of vertically reciprocal plungers 102 arranged to enter successive cartons, and, in cooperation with the rotatable disc, effect substantial pressure against the adhesively sealed flaps. As herein shown, the disc 100 is keyed to the hollow shaft 50, the hub 104 of the disc resting upon a flanged portion 106 of the hollow shaft, and the double sprocket 36 bearing against the top of the disc, as shown in Fig. 2. Each plunger member 102 is yieldingly mounted upon a stud 108 secured to a slide member 110 mounted to reciprocate vertically in a grooved supporting member 112. The supporting member 112 is attached to a rotatable member 114 fixed to the upper end of the hollow shaft 50, and is rotatable therewith about the central stationary shaft 48. A bushing 116 is provided for the upper end of the rotatable member 114, as shown.

Provision is made for reciprocating the plungers 102 in timed relation to the arrival of successive cartons to the pressure applying mechanism, and, as herein shown, each slide member 110 is connected by a link 118 to a crank arm 120 keyed to a shaft 122 journalled in a hub 124 formed on the top of each supporting member 112. Each shaft 122 is provided with a bevel gear 126, 126' fixed thereon and arranged to mesh with a stationary bevel gear 128 keyed to the central stationary shaft 48. With this construction it will be seen that, in operation, as the plunger units are rotated about the central shaft 48 with the rotatable member 114, the bevel gears 126, 126' are rolled about the stationary bevel gear 128 to effect rotation of the crank arms 120 thus raising and lowering the plunger members as they are revolved about the central shaft. The central shaft 48, as indicated in dotted lines in Fig. 2, is supported at its upper end in a bracket 130 attached to the machine frame, and, at its lower end, is mounted in a base member 132 forming part of the machine frame.

It will be observed that although the pitch diameters of the gears 126, 126' vary in order to fit them into the space available, they are arranged to engage different portions of the relatively wide face of the stationary gear 128 so that, in operation, a ratio of one to one may be maintained to effect one complete revolution of each of the several crank arms 120 as the latter are revolved one revolution about the central shaft. In operation and as shown in Fig. 2, a plunger 102 is in its raised position as it is revolved into alignment with an oncoming carton and is gradually lowered into the carton until it engages the bottom thereof whereupon substantial pressure is brought to bear against the bottom flaps as the plungers are yieldingly pressed thereagainst.

As shown in Fig. 2, the yieldable mounting for each plunger 102 comprises a coil spring 134 interposed between the top of the plunger and a nut and washer 136 mounted on the rod 108. The plunger head 102 is vertically movable on the rod 108, and, as herein shown, is limited in its outward movement by the provision of a collar 138 on the rod 108 arranged to bear against a shoulder 140 of a threaded member 142 received in the top of the plunger, as clearly illustrated in cross-section in Fig. 2. A set screw 144 provided in the plunger head and arranged to be projected into a longitudinal groove 146 provided in the lower end of the rod, serves to prevent rotation of the plunger head on its own axis. Thus, when the plunger head is brought into engagement with

the bottom of the carton, the downward stroke of the slide member 110 and rod 108 is continued, the overstroke being taken up by the yielding connection, and during the first part of the withdrawing stroke the pressure is continued until the limit of extension of the head is reached, thus obtaining a relatively long period of compression during the continuous movement of the carton.

Thereafter, in the operation of the machine, the plunger is completely withdrawn from the carton and the latter is discharged upon a rotatable disc 148 and guided between rails 150, 152 onto an outgoing conveyer 154. As previously described, the movable side 22 of the pocket 12 is arranged to be opened at the discharge station upon engagement of the roller 30 with the stationary cam piece 28 to permit the carton to be withdrawn from the pocket 12 as it passes the discharge station 34.

From the description thus far it will be observed that in the operation of the machine, the flaps are sealed during the movement of the carton through a straight path, while the application of pressure to the sealed flaps is caused to take place during the movement of the cartons through a curved path. In this manner ample time is afforded for proper setting of the sealed flaps, while permitting the machine to operate at relatively high speed.

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. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets, each constructed to hold a carton with at least one set of end flaps extended, means for closing and adhesively sealing said end flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same including a reciprocal member adapted to enter a carton while the latter is supported in said continuously moving pocket and to exert substantial pressure upon said sealed flaps.

2. In a packaging machine, in combination, continuously moving carton supporting means arranged to support a carton with at least one set of flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same, including a presser member arranged to enter a carton while the latter is supported in said continuously moving carton supporting means.

3. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets, each constructed to hold a carton with at least one set of flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same comprising a vertically reciprocal member arranged to enter a carton while supported in said continuously moving pocket and a continuously moving supporting member cooperating with said vertically reciprocal member to perform the pressure applying operation.

4. In a packaging machine, in combination, a moving carrier provided with a plurality of carton holding pockets, each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same comprising a presser member arranged to engage the inner surface of the sealed carton flaps and to move along with the carton while the latter is supported in said moving pocket and a moving supporting member cooperating with said presser member to perform the pressure applying operation, said presser member and said supporting member being mounted for relative movement to effect the pressure applying operation.

5. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets, each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps including a plurality of vertically reciprocal members arranged to enter successive cartons and to move along therewith to perform the pressure applying operation.

6. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same including a plurality of vertically reciprocal and revolubly mounted plungers arranged to enter successive cartons held in said continuously moving pockets and to move along therewith during the pressure applying operation.

7. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed flaps to firmly set the same including a plurality of vertically reciprocal and revolubly mounted plungers arranged to enter successive cartons held in said continuously moving pockets and to move along therewith during the pressure applying operation and a rotatable flap supporting member cooperating with said revolubly mounted plungers.

8. In a packaging machine, in combination, a continuously moving carrier provided with a plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps, and means for applying substantial pressure to said adhesively sealed bottom flaps to firmly set the same including a plurality of vertically reciprocal and revolubly mounted plungers arranged to enter successive cartons held in said continuously moving pockets and to move along therewith during the pressure applying operation and a rotatable flap supporting member cooperating with said revolubly mounted plungers, said plungers and said supporting member being mounted for relative yielding movement whereby to permit the application of pressure to be maintained for a relatively long period of time.

9. In a packaging machine, in combination, a continuously moving carrier mounted to move in a straight path during one part of its movement and in a curved path during another part of its movement, said carrier provided with a

plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps while the said carrier is traveling in the straight portion of its path, and means for continuously applying substantial pressure to said adhesive sealing flaps for a substantial period of time to firmly set the same while said carrier is traveling through said curved portion of its path.

10. In a packaging machine, in combination, a continuously moving carrier mounted to move in a straight path during one part of its movement and in a curved path during another part of its movement said carrier provided with a plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps while the said carrier is traveling in the straight portion of its path, and means for applying substantial pressure to said adhesive sealing flaps to firmly set the same while said carrier is traveling through said curved portion of its path, said pressure applying means including a vertically reciprocal member adapted to enter a carton while supported in said continuously moving pocket to apply said pressure.

11. In a packaging machine, in combination, a continuously moving carrier mounted to move in a straight path during one part of its movement and in a curved path during another part of its movement said carrier provided with a plurality of carton holding pockets each constructed to hold a carton with at least one set of its flaps extended, means for closing and adhesively sealing said flaps while the said carrier is traveling in the straight portion of its path, and means for applying substantial pressure to said adhesive sealing flaps to firmly set the same while said carrier is traveling through said curved portion of its path, said pressure applying means including two cooperating relatively movable presser members disposed to engage opposed surfaces of said set of sealed flaps, said presser members being mounted to move with the carton in said curved path.

STANLEY R. HOWARD.