May 30, 1939. J. VAN BUREN 2,160,008

METHOD OF AND MACHINE FOR SEALING BOXES OR CARTONS

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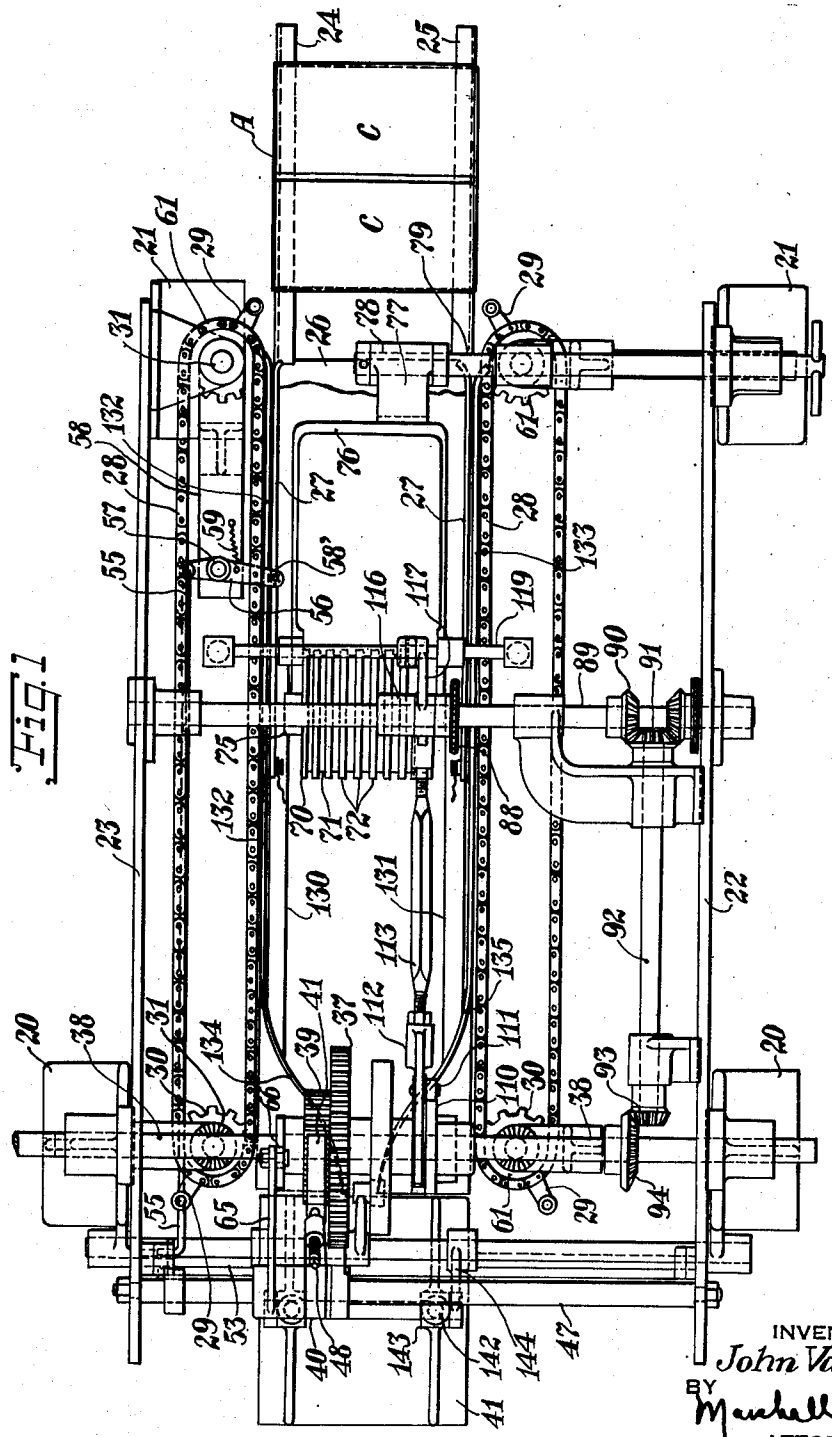


Fig. 1

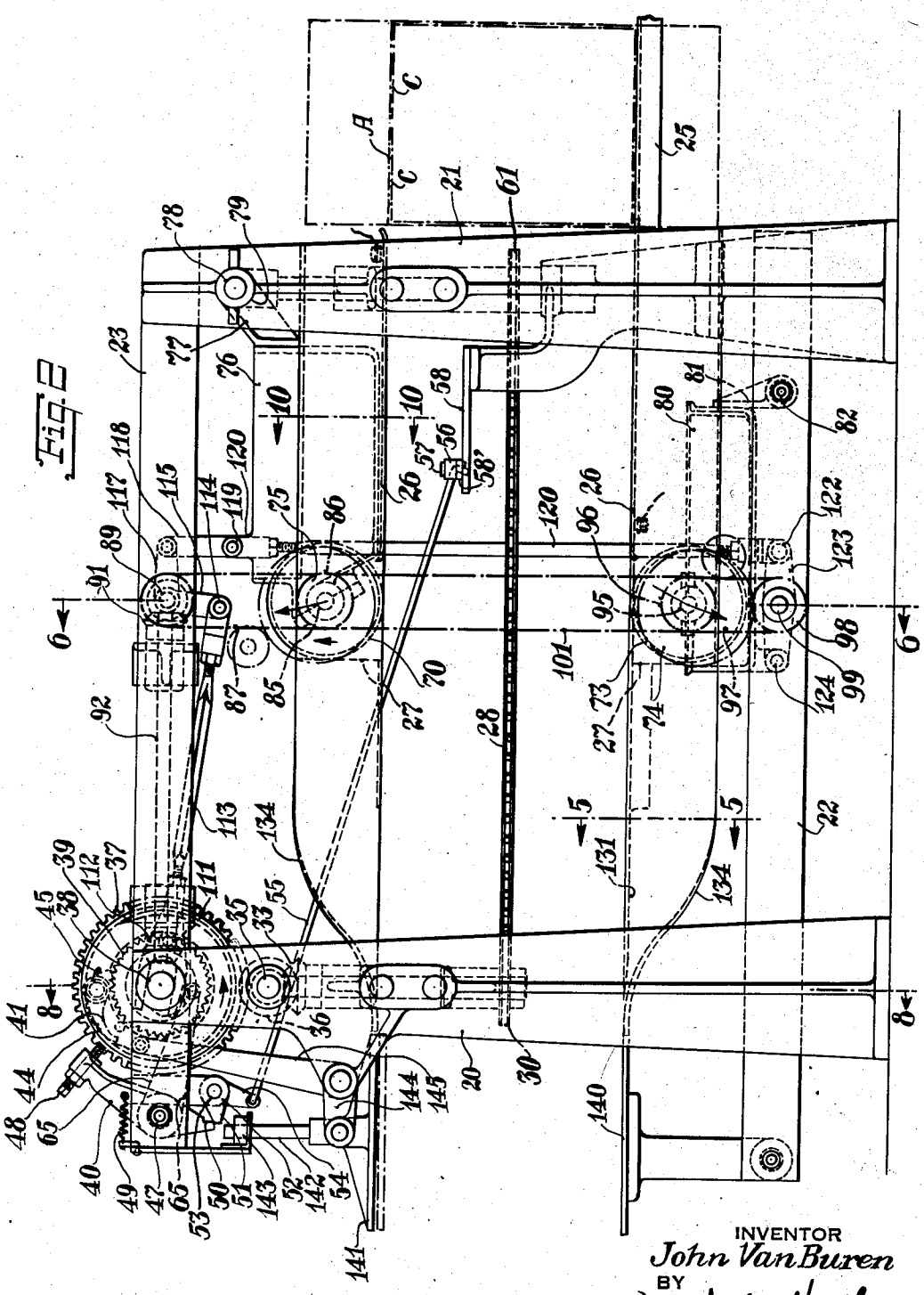
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Fig 2



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Fig. 4

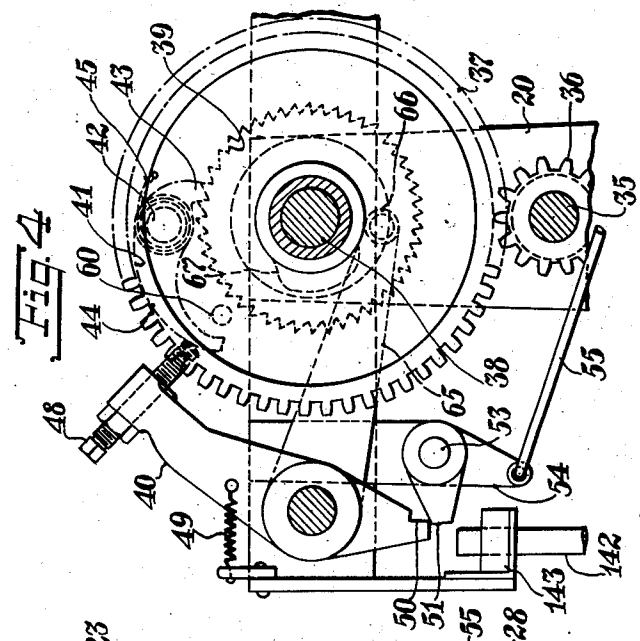


Fig. 5

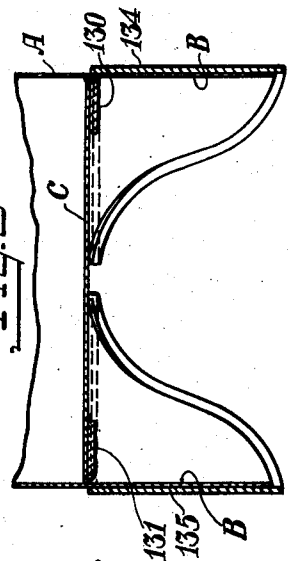
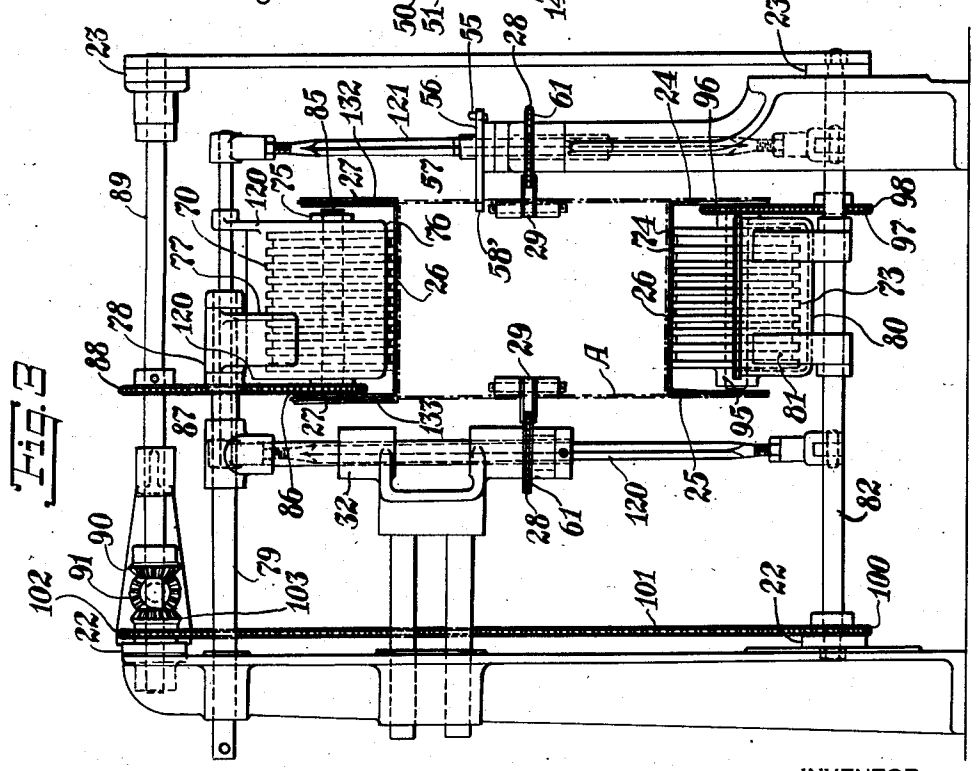


Fig. 3



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Fig. 7

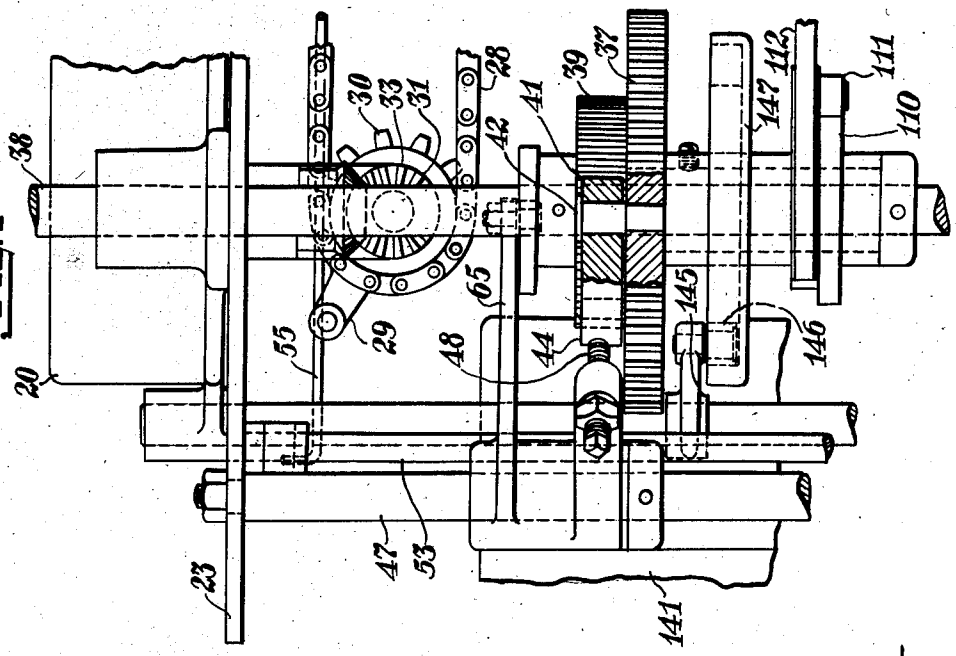
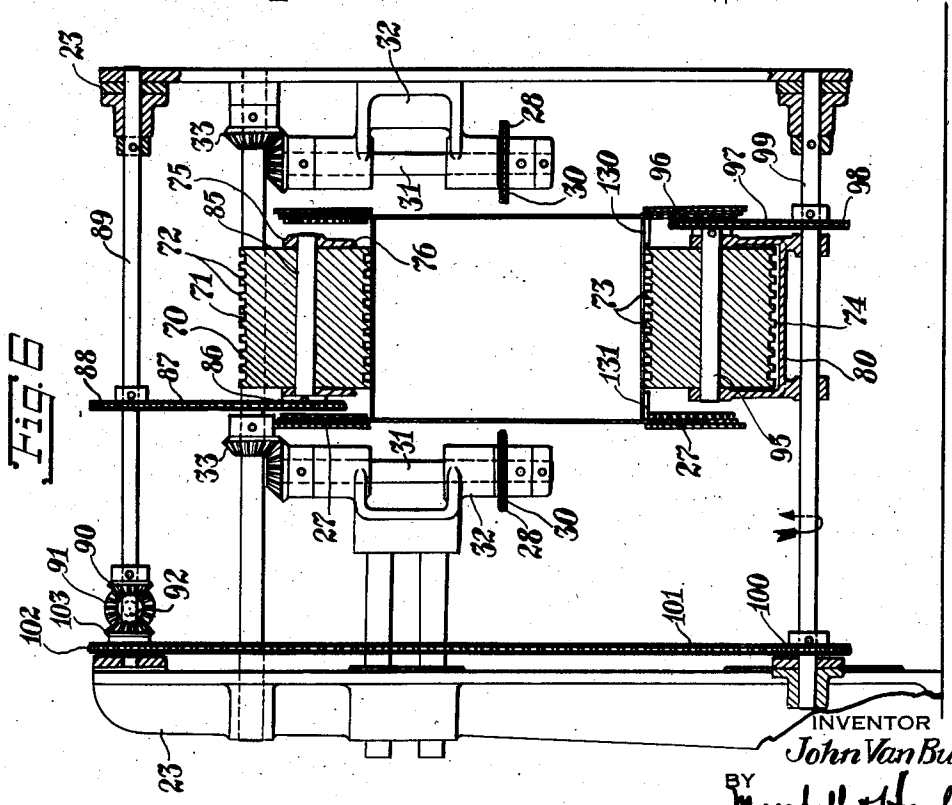


Fig. 8



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Fig. 9

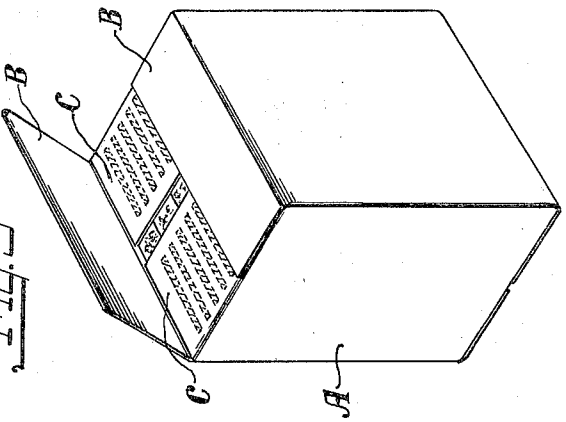


Fig. 10

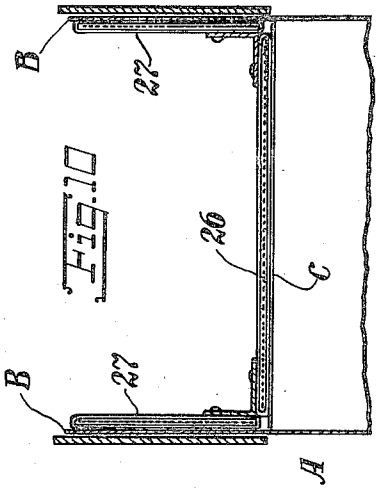
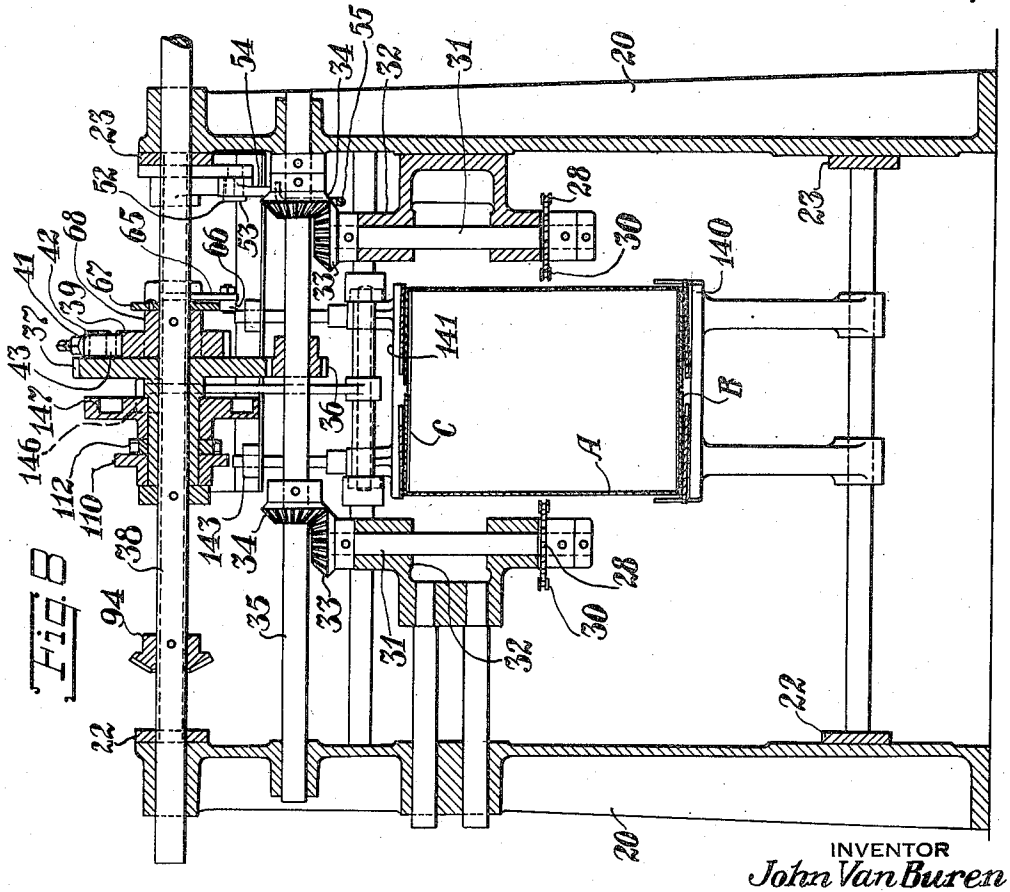


Fig. 8



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UNITED STATES PATENT OFFICE

2,160,008

METHOD OF AND MACHINE FOR SEALING BOXES OR CARTONS

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Application November 11, 1937, Serial No. 173,960

12 Claims. (Cl. 93—6)

This invention relates to a method of and a machine for sealing boxes or cartons.

After boxes or cartons of cardboard or like relatively heavy material are filled it is common to apply glue to the carton flaps and seal them by hand. This has not generally been done by machine operation since it takes so long for the glue to dry that the operation would have to be intermittent to allow the glue to set or dry or a relatively long machine would be necessary to permit it to dry.

This invention has for its salient object to provide a machine for and a method of applying glue or adhesive and closing cartons, so constructed and arranged and so carried out that the adhesive or sealing material will dry or set quickly.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which:

Fig. 1 is a top plan view of the machine constructed in accordance with the invention;

Fig. 2 is a side elevational view of the machine shown in Fig. 1;

Fig. 3 is an end elevation of the machine illustrated in Figs. 1 and 2;

Fig. 4 is an enlarged elevational view illustrating the drive and trip mechanism for the feeding belts which feed the carton through the machine;

Fig. 5 is a vertical sectional elevation taken substantially on line 5—5 of Fig. 2;

Fig. 6 is a vertical sectional elevation taken substantially on line 6—6 of Fig. 2;

Fig. 7 is a plan view on an enlarged scale and partly in section, of the drive shaft and cam control mechanism for controlling the various operative parts of the machine;

Fig. 8 is a vertical sectional elevation taken substantially on line 8—8 of Fig. 2;

Fig. 9 is a perspective view of a carton adapted to be sealed on the machine; and

Fig. 10 is an enlarged sectional elevation of the upper end portion of the carton showing the heating means for heating the folded flaps and outer flaps of the carton, this view being taken substantially on line 10—10 of Fig. 2.

The invention briefly described consists of a method of and machine for sealing boxes, and in carrying out the method a carton of the usual construction is used, having inner and outer flaps at the top and bottom thereof. The inner bottom flaps are closed and the box is filled and thereafter the upper inner flaps are closed. The box is then pushed into the machine with the outer flaps at the top and bottom thereof disposed vertically, and as the box moves into the machine the outer surfaces of the folded flaps and the inner surfaces of the outer flaps are heated and glue or adhesive is then applied to the outer surfaces of the folded inner flaps. As the carton then continues its movement through the machine the outer flaps are folded to closed position on the inner flaps and due to the application of the heat in the manner described the adhesive quickly dries and the box will be effectively sealed as it issues from the machine.

In the machine for carrying out the method heating means is provided for applying heat in the manner above described and the sealing means or adhesive applying means is so operated as to interrupt the application of the adhesive as the carton moves through the machine, so that adhesive will not be applied at the gap between the inner edges of the folded flaps. The carton feeding means is so arranged that when the carton is pushed into the machine the control mechanism which controls the operation of the carton feeding means is operated to start this feeding mechanism in operation and after a box has been fed through the machine the feeding operation means is automatically discontinued.

Further details of the invention will appear from the following description.

In the particular embodiment of the invention illustrated in the drawings, the machine frame comprises a plurality of uprights 20 and 21 which are connected by suitable longitudinal frame members 22 and 23.

The machine will preferably be located adjacent the delivery end of a wrapping machine and at one end thereof is provided with supporting rails 24 and 25 for supporting a box or carton A. The carton is of the usual construction and has at each end thereof outer flaps B, B and inner flaps C, C.

The carton is placed on the supporting rails 24, 25 with the inner bottom flaps folded inwardly and resting on the rails and the outer bottom flaps extending downwardly in a vertical direction outside the outer surfaces of the rails 24 and 25. When the box is supported in this manner it is filled with wrapped packages or articles and the upper inner flaps C, C are folded downwardly against the material disposed in the box. The outer flaps B, B are extended upwardly in the manner shown in Fig. 10, the upper and lower outer flaps on the two sides of the box

being disposed in the planes of the sides of the box.

At the inlet end of the machine there are provided heaters for heating the outer surfaces of the inner flaps C, C and for heating the inner surfaces of the outer flaps B, B. These heaters are shown particularly in Fig. 10 which illustrates a heater 26 for heating the outer surface of the inner flaps at the top of the box and heaters 27, 27 which are arranged vertically and heat the inner surfaces of the outer flaps B, B. The heaters 26 at the top and bottom of the box are shown also in Fig. 2.

In order to feed the container or carton through the machine there are provided a pair of endless feeding members or chains 28, 28 disposed at the sides of the machine and provided with lugs 29 which engage the rear surface of the box and push the box through the machine.

The chains 28, 28, as shown in Fig. 8, are carried by sprocket wheels 30, 30 mounted on vertical shafts 31, 31 supported in bearings 32. At the upper end of each of the shafts 31 is secured a bevel gear 33 which meshes with a bevel gear 34, the gears 34, 34 being secured to a shaft 35. This shaft also has mounted thereon and secured thereto a spur gear 36 which meshes with a spur gear 37 loosely mounted on the main drive shaft 38.

The shaft 35, shafts 31, 31 and chains 28, 28 are intermittently driven, this intermittent drive being controlled in the following manner:

A ratchet wheel 39, shown particularly in Figs. 4 and 8, is fixed to the shaft 38 and a pawl 41 is pivoted at 42 to the spur gear 37 and is provided with a tooth 43 at one end thereof adapted to engage the ratchet wheel 39. The other end of the pawl 41 has a tail 44. The pawl 41 is normally pressed into engagement with the ratchet teeth of the ratchet 39 by means of a spring 45. The pawl is, however, controlled by a lever 40 which is mounted on a fixed pivot 47 and is provided with an adjustable pin 48 at one end thereof adapted to engage the tail 44 of the pawl 41. The lever 40 is normally actuated in an anticlockwise direction by means of a spring 49. The other end of the lever 40 has a notch 50 formed therein adapted to be engaged by a lug or arm 51 on a bell crank lever 52 mounted on a shaft 53 on which is also mounted the other end of the bell crank lever shown at 54. The arm 54 is connected by a link 55 to a lever 56 mounted on a fixed pivot 57 on a bracket 58 secured to the frame of the machine. The other end of the lever 56 extends inwardly, as shown at 58', into the path of movement of one side of the carton or box A. The lever 56 is normally actuated in an anticlockwise direction by a spring 59.

The trip mechanism above described operates as follows: Before the box is fed into the machine the tripping lever 40 will be disposed in set position with the lug or arm 51 disposed in the notch at the lower end of the lever 40. When the lever is held in this position the pin 48 will engage the tail 44 of the pawl 41 and hold the tooth 43 of the pawl out of engagement with the ratchet teeth of the ratchet 39. A fixed pin 60 limits the movement of the tail 44 of the pawl 41 in an anticlockwise direction, viewing Fig. 4.

When a carton is pushed inwardly into the machine and engages the inner end 58' of the lever 56 this lever will be swung on its pivot 57 and will pull the link 55, swinging the arm 54 in an anticlockwise direction and causing a like movement in the lug or arm 51, thus releasing the lug from the notch 50 in the lever 40. This will permit the spring 49 to pull the lever 40 in an anticlockwise direction to the position shown in Fig. 2, thus releasing the pin 48 from engagement with the tail 44 of the pawl 41. Thereupon the pawl will be swung in an anticlockwise direction by the spring 45 causing the pawl tooth 43 to engage the ratchet wheel 39. As the pawl engages the ratchet wheel the ratchet wheel will drive through the pawl the spur gear 37 which meshes with and drives the spur gear 36 mounted on the shaft 35. As this shaft is rotated the bevel gear connections will drive the shafts 31, 31, the sprocket wheels 30, 30 and the chains 28, 28 carried thereby. At their opposite ends the chains 28, 28 are supported on freely rotatable or idler sprockets 61, 61.

In order to re-set the trip mechanism after a box has been fed through the machine and the flaps thereof have been closed and sealed, there is provided a re-set mechanism comprising an arm 65 mounted on the shaft or spindle 47 which carries the lever 40. The arm 65 has a roller 66 mounted on the free end thereof engaging a cam 67 which is carried by the shaft 38, but is fixed to the hub 68 of the ratchet wheel 39. When the ratchet wheel has made a complete revolution the cam 67 will swing the arm 65 in a clockwise direction, thus swinging the lever 40 in a clockwise direction to permit the lug 51 to enter the notch 50 and hold the lever in operative position to release the pawl from the ratchet wheel, until the lever 56 is again tripped by the next box pushed into the machine.

As the box is being fed into the machine between the heating plates 26, 26 the outer surfaces of the inner flaps C, C at the top and bottom of the box will be heated. Furthermore, the inner surfaces of the outer flaps B, B will be heated by the heaters 27, 27. After the box has passed beyond the heaters the outer surfaces of the upper folded flaps C, C will be engaged by an adhesive applying roller 70 having a plurality of peripheral grooves 71 which form peripheral circular projecting portions 72.

The outer surfaces of the lower flaps C, C will be engaged by peripherally projecting portions 73 of a similar adhesive applying roller 74.

The roller 70 is mounted in bearings 75 formed on an adhesive receptacle 76 having a rearwardly extending lug 77 pivoted at 78 on a stub shaft 79. The roller 70 extends into a portion of the receptacle 76 and rotates in the direction of the arrow carrying the adhesive from the receptacle to the outer surfaces of the folded flaps C, C, thus applying the adhesive in strips, as shown particularly in Fig. 9.

The roller 74 rotates in the opposite direction and engages the outer surfaces of the bottom folded flaps C, C, applying adhesive thereto in a similar manner, the roller 74 rotating in a receptacle 80 having lugs 81 extending downwardly thereon and mounted on a pivot 82.

The adhesive applying rollers are driven in the following manner: The upper roller 70 is mounted on a shaft 85 having a sprocket wheel 86 at one end thereof connected by a chain 87 to a sprocket wheel 88 mounted on a shaft 89. Shaft 89 has secured thereto a bevel gear 90 which meshes with a bevel gear 91 fixed on a shaft 92 having secured to the opposite end thereof a bevel gear 93 which meshes with a bevel gear 94 carried by the shaft 38.

The adhesive applying roller 74 is mounted on a shaft 95 which has secured thereto a sprocket wheel 96 which is connected by a chain 97 to a sprocket wheel 98 secured to a shaft 99. On one end of the shaft 99 is mounted a sprocket wheel 100 which is connected by a chain 101 to a sprocket wheel 102 and the sprocket wheel 102 has secured thereto a bevel gear 103 which meshes with the bevel gear 91 carried by the shaft 92.

The adhesive applying rollers 70 and 74 are continuously rotated in the manner above described and it will be seen that the roller 74 is rotated in an anticlockwise direction, whereas the roller 70 is rotated in a clockwise direction, viewing Fig. 2. It should be noted that the roller shafts 85 and 95 are rotatably mounted respectively in the receptacles 76 and 80.

Means is provided for moving the adhesive applying rollers away from the folded flaps as the box passes through the machines and reaches the position in which the axes of the rollers are disposed opposite the gaps between the inner edges of the flaps C, C. This is accomplished in the following manner:

As above stated, the adhesive receptacles 76 and 80 are pivotally mounted respectively on the pivots 78 and 82. Shaft 38 is provided with a cam 110 which is engaged by a roller 111 carried by the bifurcated end 112 of a link 113. The bifurcated end of the link straddles the shaft 38, as shown in Fig. 2. The other end of the link 113 is pivoted at 114 to an arm 115 carried by a sleeve 116 rotatably mounted on the shaft 89. The sleeve 116 also has formed thereon and projecting therefrom an arm 117 which is connected by a link 118 to a rod 119. This rod extends through brackets 120 formed on the receptacle 76 and thus as the cam 110 rotates the link or pitman 113 will be oscillated or reciprocated swinging the arms 115 and 117 and thereby raising or lowering the link 118, rod 119 and receptacle 76. The cam 110 controlling this operation is so designed that the receptacle 76 and the roller 70 will be raised out of engagement with the container flaps C, C at the top of the container when the carton or container A reaches a position beneath the axis of rotation of the roller 70.

The rod 119 is also connected in the manner hereinafter described to the receptacle 80 in such a way as to cause this receptacle and the adhesive applying roller 74 carried thereby to be lowered at the same time as the upper roller 70 is raised. The rod 119 has secured thereto and extending therebelow two links 120 and 121. These links are pivoted at their lower ends to a rod 122 which is connected to a lever 123 pivoted on the shaft 99 and pivoted at its other end at 124 to the receptacle 80. Thus, as the rods 120 and 121 are raised the pivotal movement of the lever 123 about the axis of the shaft 99 will cause the receptacle 80 and the adhesive applying roller 74 carried thereby to be depressed.

After the carton A passes between the adhesive applying rollers and has applied to the flaps C, C thereof adhesive in the manner illustrated in Fig. 9, the carton is fed onto ledges or supports 130 and 131. During the feeding movement of the carton through the machine the upper and lower outer flaps B, B are guided between outer vertical guiding plates 132 and 133 and the heating members or plates 27, 27. The heating members extend only as far as the delivery side of the adhesive applying rollers, but the guiding plates 132 and 133 extend beyond these members and are curved inwardly, as shown at 134 and 135, to fold the outer flaps B, B at the top and bottom of the carton inwardly against the inner flaps C, C. It will be understood from the illustration in Figs. 1 and 2 that two guiding plates 132 and 133 are provided at the top and bottom of the machine in order to fold the two flaps at the upper and lower ends of the carton inwardly against the folded flaps C, C.

After the outer flaps B, B have been folded inwardly against the inner flaps C, C the carton is delivered onto a support 140 and there is vertically disposed above this support a presser head 141 carried by plungers 142. The plunger is slidably mounted at 143 and is vertically reciprocated by a bell crank lever comprising arms 144 and 145. At the upper end of the arm 145 is mounted a roller 146 which is controlled by a cam 147 mounted on the shaft 38. The cam is so constructed that when a box or carton has been closed and has been deposited on the support 140 the cam will cause the bell crank lever 145, 144 to be swung in an anticlockwise direction on its pivot, viewing Fig. 2, thereby depressing the presser head 141 and pressing the outer flaps B, B tightly against the inner flaps C, C.

Summary of operation

From the foregoing description it will be clear that the carton is first placed on the supports or rails 24 and 25 with the inner flaps C, C, at the top and bottom folded inwardly and the outer flaps B, B at the top and bottom disposed at the planes of the sides of the carton. It should be understood that the carton is first filled before the upper flaps C, C are folded inwardly. Thereafter the carton is pushed into the machine and as the front end thereof engages the inwardly extending end 58' of the lever 56 this lever will be swung on its pivot, thus exerting a pull on the link 55 and permitting the spring 49 to release the pin 48 carried by the trip lever 40 from engagement with the tail 44 of the pawl 41. Thus, the pawl is permitted to move into operative engagement with the ratchet wheel 39 and the feed conveyors 28, 28 to be set in operation to feed the carton through the machine. As the carton passes between the upper and lower adhesive applying rollers 70 and 74 adhesive will be applied to the upper and lower folded flaps C, C in the manner shown in Fig. 9. When the carton reaches a midway position beneath the rollers the rollers 70 and 74 will be respectively raised and lowered to withdraw them from operative position until the carton has passed beyond the position when the gap between the inner edges of the flaps C, C is disposed between the rollers. The rollers then return to operative position and apply adhesive to the other flaps C, C.

Before the adhesive is applied, however, the outer surfaces of the flaps C, C are heated by the heaters 26 and the inner surfaces of the flaps B, B are heated by the heaters 27, 27. Since these flaps are heated in this manner the adhesive will dry much more quickly than it would if the flaps were cold or were not heated.

After the adhesive has been applied in the manner above described the curved folding plates will cause the outer flaps B, B to be folded inwardly against the inner flaps in the usual well known manner. After the carton has been closed it is fed to the support 140 and the presser head 141 is forced downwardly, thus pressing the outer flaps B, B at the top and bottom thereof firmly

against the inner flaps. Due to the condition of the inner and outer flaps when the adhesive is applied the adhesive dries very quickly and when the cartons are removed from the support 140 the flaps will be firmly sealed.

Although one specific embodiment of the invention has been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A method of sealing cartons having inner and outer flaps which consists of applying heat to the inner surfaces of the outer flaps, applying adhesive to the outer surfaces of the inner flaps and folding the outer flaps inwardly into contact with the inner flaps.

2. A method of sealing cartons having inner and outer flaps which consists of applying heat to the inner surfaces of the outer flaps and to the outer surfaces of the inner flaps, applying adhesive to the outer surfaces of the inner flaps and folding the outer flaps inwardly into contact with the inner flaps.

3. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means engageable with the inner surfaces of the outer flaps for heating said inner surfaces while the outer flaps are disposed in open position, means for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

4. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for heating the inner surfaces of the outer flaps, means for heating the outer surfaces of the inner flaps, means for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

5. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means engageable by the carton as it is pushed manually on said supports for setting the carton feeding means in operation, means for engaging and heating the inner surfaces of the outer flaps while said flaps are in open position, means for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

6. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for engaging and heating the inner surfaces of the outer flaps while said flaps are in open position, means for applying adhesive to the outer surfaces of the inner flaps, means for moving said adhesive applying means out of adhesive applying position for a predetermined period in the movement of the carton, and means for folding the outer flaps onto the inner flaps.

7. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for engaging and heating the inner surfaces of the outer flaps while said flaps are in open position, means disposed above and below the path of movement of the carton for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

8. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for heating the inner surfaces of the outer flaps, means disposed above and below the path of movement of the carton for applying adhesive to the outer surfaces of the inner flaps, means for moving said adhesive applying means out of adhesive applying position for a predetermined period in the movement of the carton, and means for folding the outer flaps onto the inner flaps.

9. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for heating the inner surfaces of the outer flaps, means for heating the outer surfaces of the inner flaps, means for applying adhesive to the outer surfaces of the inner flaps, means for moving said adhesive applying means out of adhesive applying position for a predetermined period in the movement of the carton, and means for folding the outer flaps onto the inner flaps.

10. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for engaging and heating the inner surfaces of the outer flaps while said flaps are in open position, means including positively driven rollers disposed above and below the path of movement of the carton for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

11. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, heating plates above and below the path of movement of the carton engageable with the folded flaps for heating the outer surfaces thereof, heating means at the sides of the path of movement of the carton engageable with the inner surfaces of the open outer flaps for heating said surfaces, means for applying adhesive to the outer surfaces of the inner flaps, and means for folding the outer flaps onto the inner flaps.

12. A carton sealing machine comprising means for supporting a carton with the inner flaps in folded or closed position and outer flaps in open position, means for feeding the carton when so supported, means for engaging and heating the inner surfaces of the outer flaps while said flaps are in open position, means including adhesive receptacles and rollers disposed above and below the path of movement of the cartons for applying adhesive to the outer surfaces of the inner flaps, means for moving said receptacles to dispose said rollers out of adhesive applying position for a predetermined period in the movement of the carton.

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