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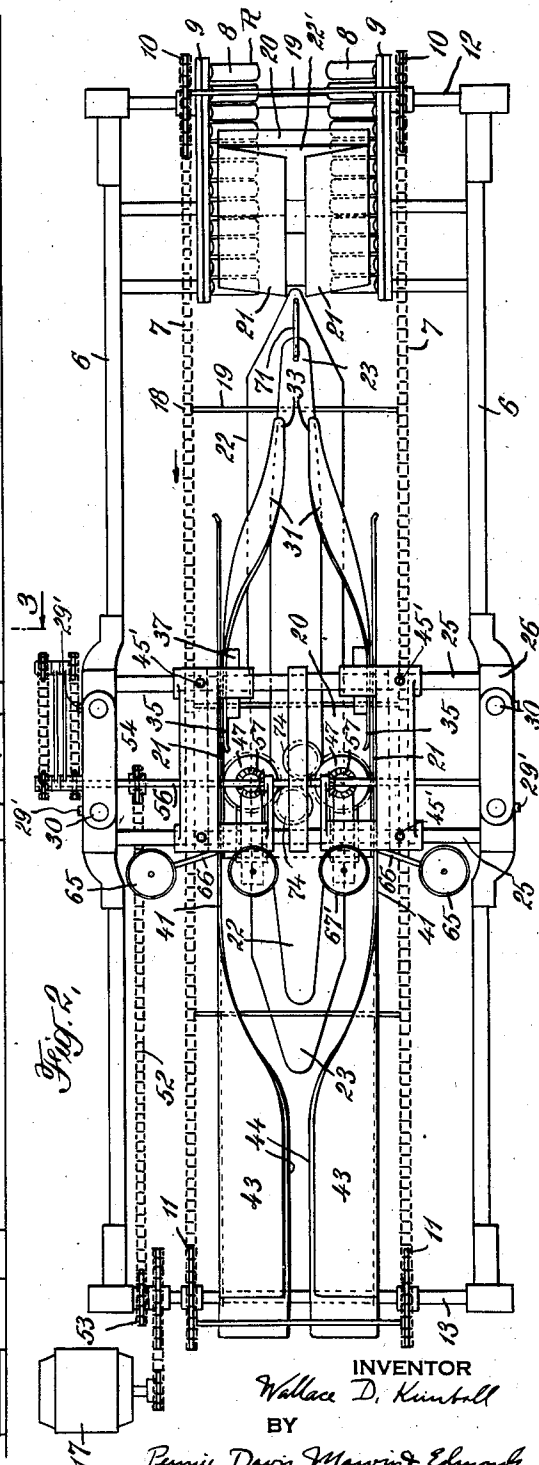
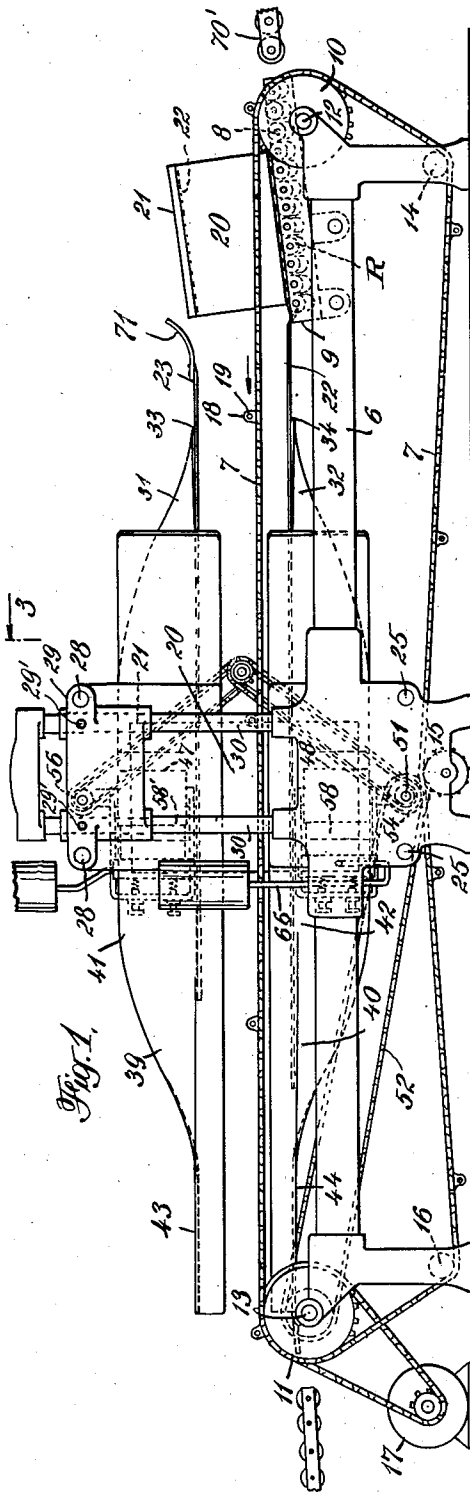
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2,109,537

CARTON CLOSING MACHINE

Filed June 12, 1935

2 Sheets-Sheet 1



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Fig. 3,

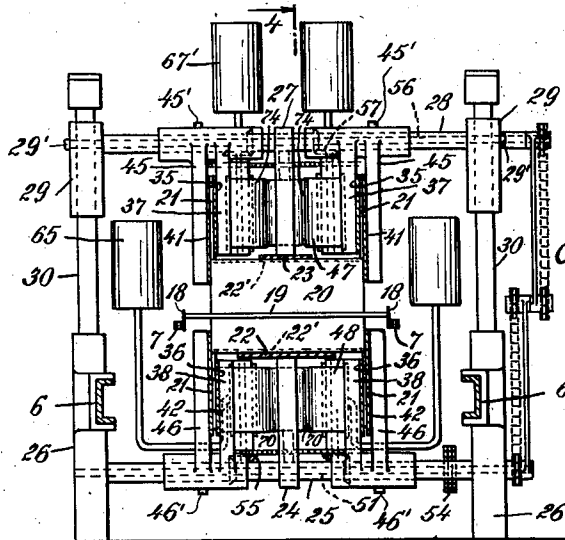


Fig. 4,

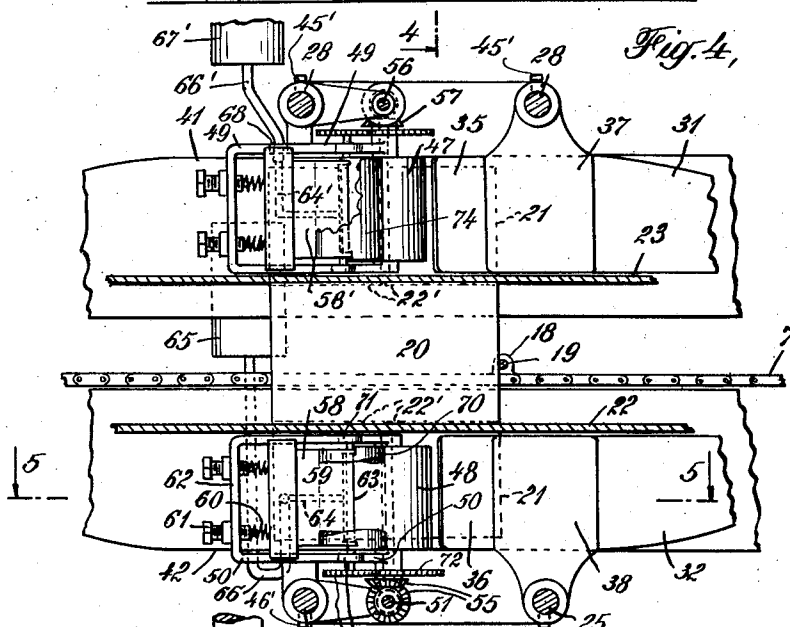
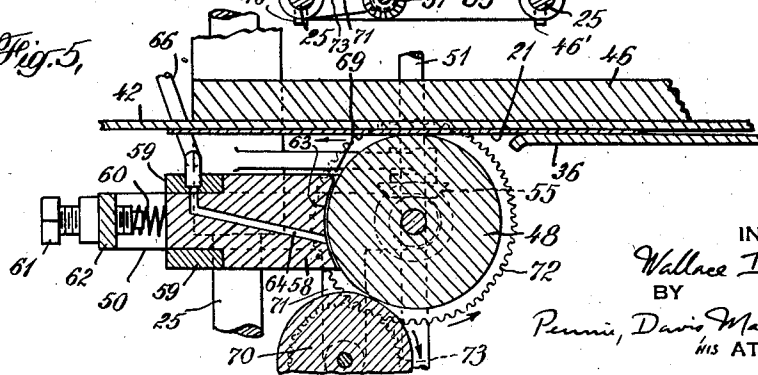


Fig. 5,



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CARTON CLOSING MACHINE

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8 Claims. (Cl. 93—36.4)

This invention relates to improvements in machines for folding and sealing the flaps of packing containers such as cartons of the type used for packaging canned goods, soap and the like.

In packing articles such as canned goods, soaps or cereal packages, the articles are properly arranged within cartons of paper, cardboard or like material having upper and lower sets of side and end flaps, bendably connected to the edges thereof. The filled cartons are propelled in an endwise direction along a suitable conveyor and the top and bottom side flaps are bent outwardly to horizontal positions, an adhesive is applied to the inner surfaces thereof and the flaps are then folded down over the end flaps against the top and bottom of the carton and sealed in overlapping relation to the end flaps.

The folding of the side flaps outwardly to horizontal positions necessitates the use of rather complex folding mechanism and greatly increases the size and particularly the width of the packaging machinery. Further, the movement of the side flaps to outwardly extending horizontal positions and back to closed positions consumes considerable time and accordingly necessitates a packaging machine of considerable length. In previously known packaging machines, it has been found necessary to employ this horizontal disposition of the carton flaps because known adhesive applying apparatus could not properly apply or distribute the adhesive material on flaps disposed in other than horizontal or substantially horizontal positions.

With the above and other considerations in mind, it is proposed in accordance with the present invention to provide an improved carton closing machine in which the side flaps on the tops and/or bottoms of the cartons are opened only to vertical or substantially vertical positions during the sealing operation. More particularly, the invention contemplates the provision of mechanism for opening the carton side flaps to substantially vertical positions, applying adhesive to the side flaps in such positions and then closing and sealing the side flaps to the closed end flaps on the top and/or bottom of the carton. The invention also contemplates the provision of an improved adhesive applying mechanism for general use in which the adhesive applying action is the same regardless of the angle of the surface to which the adhesive is applied with respect to the horizontal.

The invention will be best understood by reference to the accompanying drawings in which cer-

tain embodiments thereof have been disclosed. In the drawings:

Figure 1 is an elevation of a carton or package closing machine embodying my invention;

Figure 2 is a plan view of the machine shown in Figure 1;

Fig. 3 is a sectional view taken along the line 3—3 of Figure 1 and viewed in the direction of the arrows;

Figure 4 is a sectional view taken along the line 4—4 of Figure 3 and viewed in the direction of the arrows; and

Figure 5 is an enlarged sectional view taken along the line 5—5 of Figure 4 and viewed in the direction of the arrows.

The carton closing machine of the invention comprises generally mechanism in which a series of cartons or packages are continuously propelled horizontally while various sealing or closing operations are performed thereon. Referring to Figures 1 and 2, in the disclosed embodiment of the invention, the machine comprises an elongated frame portion 6 provided with parallel longitudinally extending propelling chains 7 at the opposite sides thereof. Suitably supported at the entrance end of the frame 6 is a slightly inclined roll conveyor R comprising a plurality of oppositely disposed parallel rollers 8 carried in suitable side members 9 and slanted downward toward the center of the frame as shown. The propelling chains 7 are endless and pass over the sprockets 10 and 11 carried respectively by the transverse shafts 12 and 13 journaled at the opposite ends of the frame 6. The lower spans of the chains 7 may be carried by idler sprockets or equivalent means 14, 15, and 16, as shown in Figure 1. The chains 7 are continuously moved in the direction indicated by the arrows by a motor 17 or other source of power which is suitably connected as shown to drive the shaft 13 to which the chain carrying sprockets 11 are fixed. Oppositely disposed lugs 18 carrying a cross bar 19 therebetween are fixed to the chains 7 at suitable intervals, and each such cross bar serves to propel a carton through the machine. One such carton 20 has been shown in a central position on the machine and an identical carton has been shown on the inclined roll conveyor R, but it should be understood that in normal operation, a similar carton would be propelled by each of the cross bars 19.

The cartons 20 handled by the disclosed embodiment of the invention are preferably of the type having side flaps 21 and end flaps 22 which fold over the top and bottom surfaces of the car-

ton. The end flaps 22' are preferably folded beneath the side flaps 21 and the side flaps preferably meet at the center of the carton when folded down over the end flaps 22'.

5 The machine is provided with an elongated central carton carrying plate or table 22 having tapered ends, as shown in Figure 2. An upper plate 23 is disposed parallel to the table 22 and spaced therefrom a distance equal to the height
10 of the cartons 20. The table 22 and plate 23 are supported in any suitable manner. As shown in Figures 1, 2, and 3, the table 22 is carried by an element 24 supported on the lower transverse cross rods 25 fixed to the frame elements 26, and
15 the upper plate 23 is carried by an element 21 supported on the upper transverse cross rods 28. The ends of the cross rods 28 are fixed to elements 29 which are supported by and vertically adjustable on the pairs of side posts 30 fixed to
20 the frame elements 26.

An upwardly curved rod 71 is attached to the entrance end of the upper table 23 and serves to fold the upper carton end flaps 22' down beneath the table 23. The entrance end of the lower table
25 22 is curved downwardly to hold the lower carton end flaps 22' closed as the carton moves onto the table 22.

Suitable cam plates are provided for opening and closing the carton side flaps as the cartons
30 progress through the machine. The upper and lower flap opening cam plates 31 and 32 have entrance ends 33 and 34, which lie in a horizontal plane and are respectively disposed on the upper surface of the upper plate 23 and on the lower
35 surface of the table 22, as shown in Figure 1. The exit ends 35 and 36 of the cam plates 31 and 32 are vertically disposed and are respectively carried by the upper brackets 37 adjustably secured to the cross rods 28 and the lower brackets
40 38 adjustably secured to the cross rods 25, as shown in Figures 3 and 4. The plates 31 and 32 are flared upwardly and outwardly from their entrance ends 33 and 34 to their exit ends 35 and 36 as shown. The upper and lower flap closing
45 cam plates 39 and 40 have vertical side portions 41 and 42 which extend in overlapping spaced relation to the vertical exit ends 35 and 36 of the flap opening cam plates 31 and 32 respectively. The flap closing cam plates 39 and 40 bend inwardly to horizontal positions as they approach
50 the exit end of the machine, and their exit ends are substantially aligned respectively with the upper and lower plates 23 and 22, but spaced from the exit ends of these plates as shown in
55 Figures 1 and 2. The flap closing cam plates 39 and 40 are respectively adjustably carried by the brackets 45 on the upper cross rods 28 and the brackets 46 on the lower cross rods 25, as shown in Figure 3.

60 Vertically disposed adhesive applying cylinders are provided to apply silicate or other suitable adhesive to the inner surfaces of the side flaps 21 on the cartons 20. One such cylinder is preferably provided for each side flap 21, and accord-
65 ingly, two pairs of cylinders 47 and 48 are provided, the cylinders of the pair 47 acting on the upper side flaps and the cylinders of the pair 48 acting on the lower side flaps. As shown in Figures 3, 4, and 5, the cylinders 47 and 48 are disposed just beyond the exit ends 35 and 36 of the
70 flap opening cam plates 31 and 32, and are spaced from the vertical entrance portions 41 and 42 of the flap closing cam plates 39 and 40 by a distance equal to the thickness of the carton side
75 flaps 21. The upper cylinders 47 are journaled

in brackets 49 fixed to one of the upper cross rods 28, and the lower cylinders 48 are journaled in similar brackets 50 fixed to the lower cross rods 25.

The adhesive applying cylinders 47 and 48 are
5 rotated at a peripheral velocity equal to the rate of movement of the tangent carton flaps 21. In the driving means shown, a lower cross shaft 51, journaled in the frame elements 26, is driven from the end shaft 13 through the chain 52 and
10 sprockets 53 and 54. The cross shaft 51 drives the lower adhesive applying cylinders 48 through the bevel gears 55. An upper cross shaft 56 journaled in the elements 29 is driven from the shaft 51 through a flexible drive linkage C, and the
15 shaft 56 drives the upper adhesive applying cylinders 47 through the bevel gears 57. The bevel gears 55 and 57 are preferably splined or otherwise arranged to be longitudinally movable along the respective cross shafts 51 and 56 so that when
20 the upper and lower horizontally adjustable brackets 45 and 46 are moved along the cross rods 28 and 25, the bevel gears may be maintained in driving engagement.

With the arrangement described, the machine
25 is adjustable to accommodate cartons of various sizes. Thus by moving the elements 29 vertically along the vertical side posts 30, the upper cam plates 31 and 39 together with the upper plate 23 may be moved up and down to accommodate
30 cartons of various heights. Similarly, cartons of various widths may be accommodated by moving the pairs of brackets 45 and 46 inwardly and outwardly along the respective cross rods 28 and 25, thus changing the horizontal spacing between the
35 two upper flap opening cam plates 31 and flap closing cam plates 39, and between the two lower flap opening cam plates 32 and flap closing cam plates 40. Any suitable means may be provided for moving the elements 29 and the brackets 45
40 and 46 and for locking these elements and brackets in their various adjusted positions. Thus, as shown, set screws 29' may be provided in the elements 29 for holding these elements in their vertically adjusted positions and similarly, set
45 screws 45' and 46' may be respectively provided on the horizontally adjustable brackets 45 and 46.

I prefer to employ improved means for supplying the silicate or other adhesive to the surface
50 of each of the cylinders 47 and 48. Since substantially identical adhesive applying mechanism is used on each such cylinder, the construction of one such mechanism only will be described in detail, and similar reference characters with distinctive exponents will be used to designate the
55 corresponding parts of the adhesive applying mechanisms on the other cylinders.

As best shown in Figures 4 and 5, an adhesive
60 applying block 58 is mounted to slide radially toward and away from the cylindrical surface of the adhesive applying cylinder 48 by means of two parallel guide plates 59 fixed to opposite sides of the block and extending beyond the upper and lower ends thereof into embracing engagement
65 with the opposite sides of the bracket 50. The block 58 is pressed against the surface of the cylinder 48 by one or more springs 60 compressed between the block and the ends of the adjustable bolts 61 threaded through the vertical member
70 62 of the bracket 50. The inner surface of the block 58 is arcuate and is of the same radius of curvature as the adhesive applying cylinder 48, whereby a snug engagement between the block and the cylinder is obtained. The arcuate surface of the block 58 engages the cylindrical sur-
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face of the cylinder 48 adjacent the top and bottom of the block only, the central portion of the arcuate block surface being recessed across the block as shown at 63. The recess 63 is preferably arcuate and very shallow, having a depth such that the adhesive used may be held therein by the surface tension between the adhesive and the spaced surfaces of the cylinder and the block recess. Depending upon the viscosity of the adhesive used, the recess 63 may have a depth of from approximately three-thousandths of an inch upwards.

An adhesive supplying passage 64 opening into the recess 63 is formed through the block 58 and an adhesive reservoir 65 disposed above the block 58 is connected to the passage 64 by a pipe 66. On the lower adhesive cylinders 48, the passage 64 extends laterally to the side of the block 58 and the pipe 66 passes downwardly beneath the vertical cam plate portion 42 and then upwardly to the reservoir 65. The passage 64' in the block 58' of each upper cylinder 47 passes out of the top of the block 58', and the feed pipe 66' from the reservoir 67' passes through a slot 68 in the bracket 49.

The edge of each block 58 or 58' at which the cylindrical surface of the adhesive supplying cylinder 47 or 48 passes under the arcuate surface of the block is preferably tapered or rounded off as shown at 69 in Figure 5. This permits excess adhesive carried by the cylinder to crowd back into the cavity formed by the recess 63 as the cylinder rotates.

It is sometimes preferred to provide doctor rollers for evenly distributing the adhesive over the surfaces of the adhesive applying cylinders 47 and 48. As shown in Figure 5, a doctor roller 70 is journaled between lateral extensions 71 of the bracket 50 in a position parallel to the adhesive applying cylinder 48. The cylindrical surfaces of the cylinder 48 and the roller 70 are spaced a small distance apart and this spacing may be adjustable if desired. The doctor roller 70 is driven from the shaft of the adhesive applying cylinder 48 through the gears 72 and 73 which are proportioned as shown to propel the roller 70 at a slightly higher peripheral velocity than the cylinder 48. The adjacent cylindrical surfaces of the cylinder 48 and the roller 70 move in the same direction as indicated by the arrows. Similar doctor rollers 74 are provided in connection with the upper adhesive applying cylinders 47 as shown in Figures 2, 3, and 4.

In the operation of the described machine, filled cartons, such as the carton 20, are delivered to the roll conveyor R at suitable intervals by means such as the conveyor 70', and are advanced by the chains 7 and cross bars 19. As each carton descends the roll conveyor R, its lower side flaps 21 open out slightly due to the weight of the carton contents and rest on the inwardly slanting rolls 8. The upper side flaps of the carton are also slightly opened due to the stiffness of the material from which they are formed. The top and bottom end flaps 22' of the carton remain closed due to their engagement by the partially closed overlying side flaps 21.

As the carton 20 reaches the end of the conveyor R, the tapered entrance end of the table 22 passes between the slightly opened lower side flaps 21 and the closed lower end flaps 22' of the carton, and at the same time, the upper plate 23 passes under the upper side flaps and along the closed upper end flaps. As the carton progresses,

the upper cam plates 31 move the upper side flaps outward through approximately 90° to substantially vertical positions against the vertical entrance ends 41 of the upper flap closing cam plates 39. At the same time, the lower flap opening cam plates 32 swing the lower side flaps out to substantially vertical depending positions against the lower vertical plates 42, the contents of the carton being carried by the closed lower end flaps 22' which rest on the central table 22. As the carton side flaps 21 pass the exit ends 35 and 36 of the flap opening cam plates 31 and 32, the adhesive applying rollers 47 and 48 engage the inner surfaces of these flaps and apply a film of silicate or other adhesive thereto. As the side flaps 21 move out of engagement with the cylinders 47 and 48, the flap closing cam plates 39 and 40 fold these side flaps down on the closed top and bottom end flaps 22' of the carton. The horizontal exit end portions 43 and 44 of the flap closing cam plates 39 and 40 hold the side flaps 21 against the end flaps 22' until the adhesive has set sufficiently to retain the side flaps in their closed positions. As each adhesive applying cylinder 47 or 48 rotates, the film of adhesive in the recess 63 between the arcuate block 58 and the surface of the cylinder is drawn out of this recess in an even layer on the cylinder surface. If foreign matter becomes wedged in one of the recesses 63, or if for any other reason bare streaks or portions are left on the surfaces of the cylinders 47 or 48 as they leave the blocks 58, the doctor rollers 70 or 74, which carry adhesive on their surfaces, immediately apply adhesive to such bare portions and so insure a uniform adhesive layer on each cylinder surface when it contacts with the carton side flap. In this manner, a uniform application of adhesive to the carton flaps is obtained.

I claim:

1. In a machine of the character described, means for advancing in an endwise direction cartons having side flaps for covering at least one of the horizontal surfaces thereof, with such side flaps in substantially vertical positions, means for applying adhesive to the side flaps while in such substantially vertical positions comprising a substantially vertical rotating cylinder engaging each of said side flaps and an arcuate block engaging such cylinder and having a recess supplied with adhesive extending across the arcuate surface thereof and means for closing the side flaps after the adhesive has been applied thereto.

2. In a machine of the character described, means for advancing cartons having closed side flaps for covering at least one of the horizontal surfaces thereof, means for opening the side flaps to substantially vertical positions, means for applying adhesive to the opened side flaps while in substantially vertical positions comprising a substantially vertical rotating cylinder tangentially engaging each of said flaps, means for rotating said cylinder and means for maintaining a thin arcuate layer of adhesive in contact with said cylinder comprising a block having an arcuate surface in contact with said cylinder and having a recess extending across said arcuate surface and forming a cavity between said block and the cylindrical surface of said cylinder and means for supplying an adhesive to said cavity.

3. In a machine of the character described, means for advancing in an endwise direction cartons having closed top and bottom side and end flaps for covering the horizontal surfaces thereof, means for opening the top and bottom side

flaps to substantially vertical positions, means for applying adhesive to the inner surface of each of the opened top and bottom side flaps while in substantially vertical positions comprising a substantially vertical rotating cylinder positioned for tangential engagement with each such substantially vertical side flap, a block having an arcuate surface engaging the cylindrical surface of said cylinder and having a recess across said arcuate surface forming a cavity between said block and said cylinder, means for supplying adhesive to said cavity and means for rotating said cylinder and means for closing the top and bottom side flaps onto said closed end flaps after the adhesive has been applied.

4. In a machine of the character described, a cylinder, a block having an arcuate surface in engagement with the cylindrical surface of said cylinder, means for resiliently pressing the arcuate surface of said block into engagement with the cylindrical surface of said cylinder, an arcuate recess extending across the arcuate surface of said block between the ends thereof and forming an arcuate cavity between said block and said cylinder, and means for supplying an adhesive to said cavity.

5. Adhesive applying mechanism comprising a rotary cylinder, a block having an arcuate surface in engagement with the cylindrical surface of said cylinder, means for resiliently pressing the arcuate surface of said block into engagement with the cylindrical surface of said cylinder, an arcuate recess extending across the arcuate surface of said block between the ends thereof and forming an arcuate cavity between said block and said cylinder, means for supplying an adhesive to said cavity and means for rotating said cylinder.

6. Adhesive applying mechanism comprising a cylinder, a block having an arcuate surface in engagement with the cylindrical surface of said cylinder, an arcuate recess extending across the arcuate surface of said block and forming a cavity between said block and said cylinder, means for supplying an adhesive to said cavity, means for rotating said cylinder relative to said block,

a doctor roller parallel to and adjacent the cylindrical surface of said cylinder for distributing adhesive thereon, and means for rotating said doctor roller at a higher peripheral velocity than said cylinder.

7. Adhesive applying mechanism comprising a rotary cylinder having its axis substantially vertical, a block having spaced horizontal arcuate-surfaced extensions adjacent the opposite ends thereof respectively snugly engaging and extending circumferentially about the cylindrical surface of said cylinder adjacent the opposite ends of the cylinder, said block having an arcuate surface between said extensions lying substantially parallel to and closely adjacent the cylindrical surface of said cylinder, said extensions and said arcuate surface forming an arcuate cavity extending axially substantially from end to end of said cylinder and circumferentially about a portion of the cylindrical surface of said cylinder, means for applying an adhesive to said cavity and means for rotating said cylinder.

8. Adhesive applying mechanism comprising a rotary cylinder having its axis substantially vertical, a block having spaced horizontal arcuate-surfaced extensions adjacent the opposite ends thereof respectively snugly engaging and extending circumferentially about the cylindrical surface of said cylinder, said block having an arcuate surface between said extensions lying substantially parallel to and closely adjacent the cylindrical surface of said cylinder, said arcuate surface of said block between said extensions having a rounded vertical edge along one side thereof, said extensions and said arcuate surface forming an arcuate cavity extending axially substantially from end to end of said cylinder and circumferentially about a portion of the cylindrical surface of said cylinder, means for supplying an adhesive to said cavity and means for rotating said cylinder in such a direction that the cylindrical surface thereof passes said block from the side of said recess having said rounded vertical edge.

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