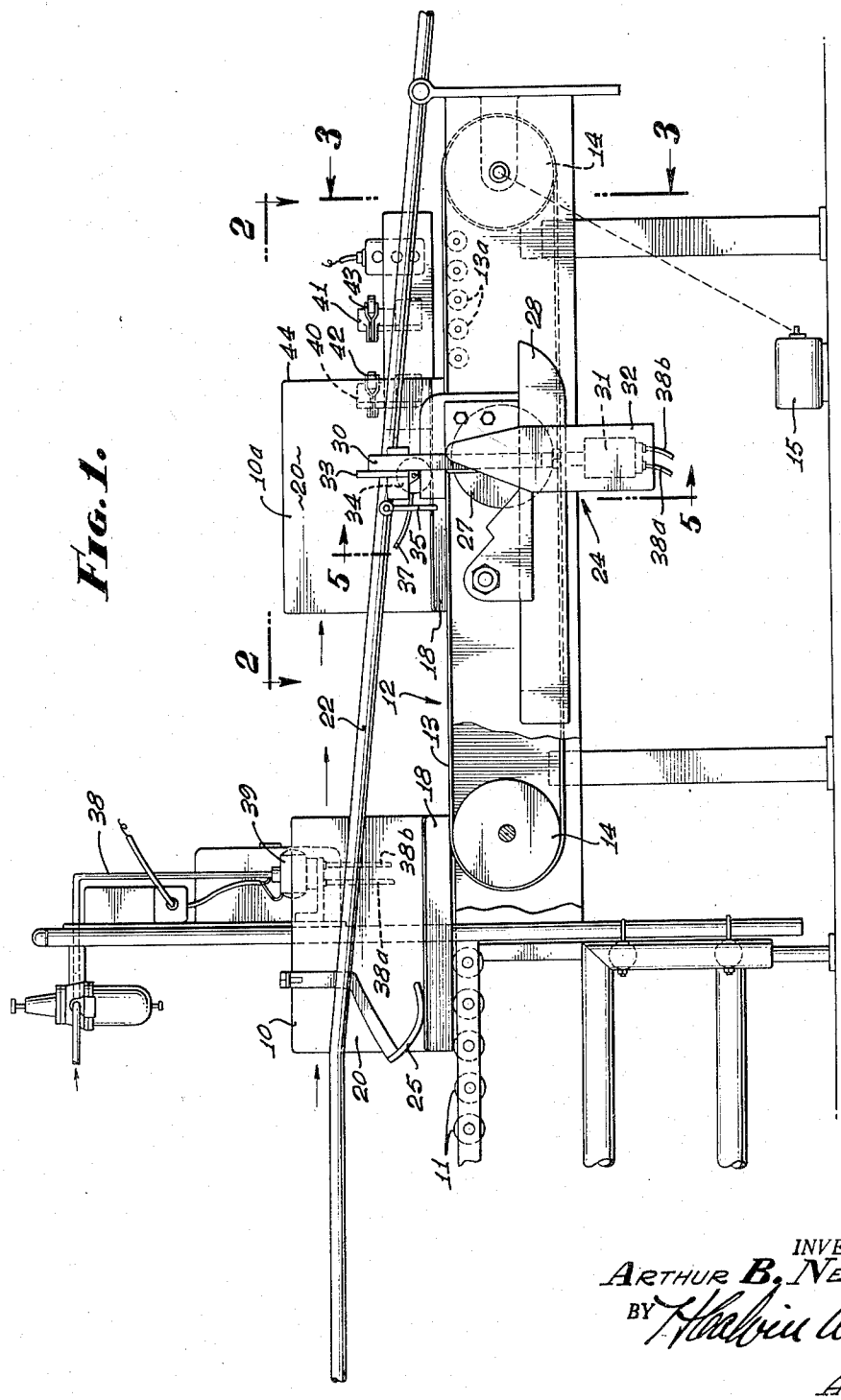
Aug. 27, 1957 A. B. NETZLEY 2,804,043

BOX FLAP GLUING MECHANISM

Filed July 6, 1954 3 Sheets-Sheet 1

FIG. 1.



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BOX FLAP GLUING MECHANISM

Filed July 6, 1954 3 Sheets-Sheet 2

FIG. 2.

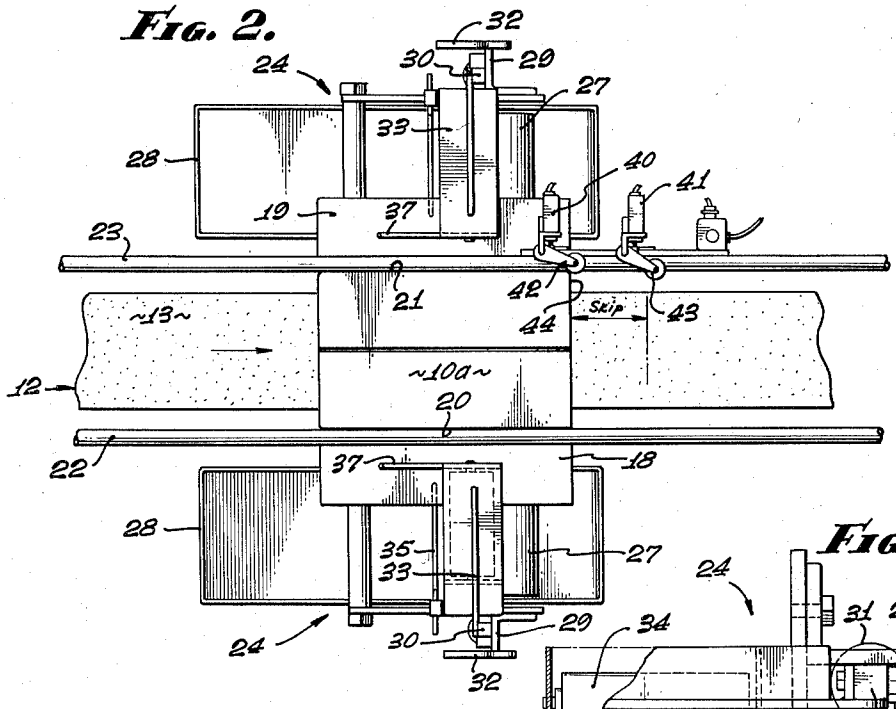
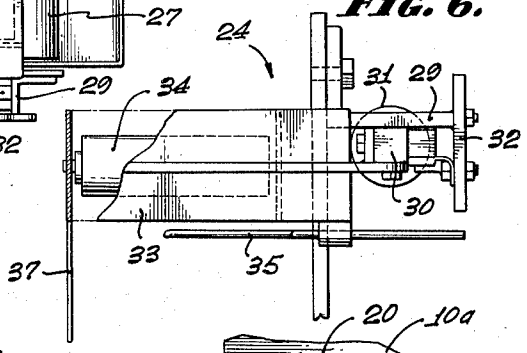


FIG. 6.



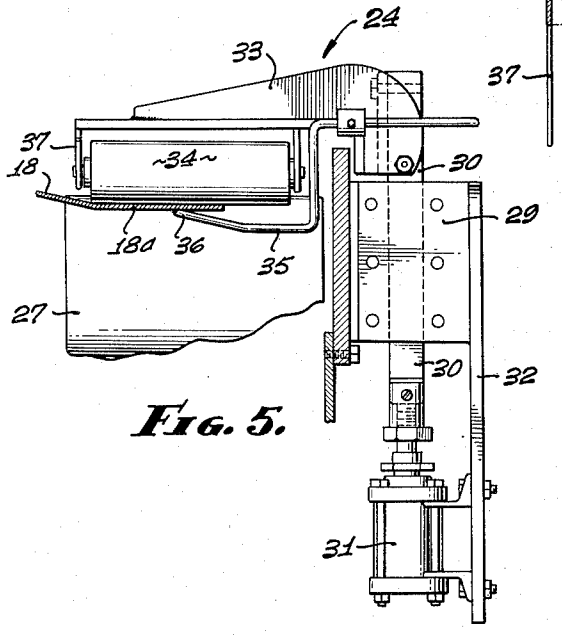


FIG. 5.

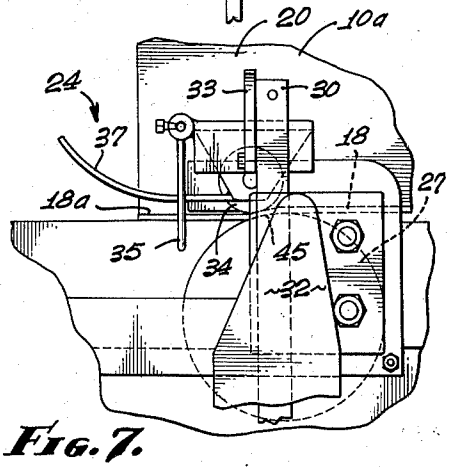


FIG. 7.

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Aug. 27, 1957 A. B. NETZLEY 2,804,043

BOX FLAP GLUING MECHANISM

Filed July 6, 1954 3 Sheets-Sheet 3

FIG. 4.

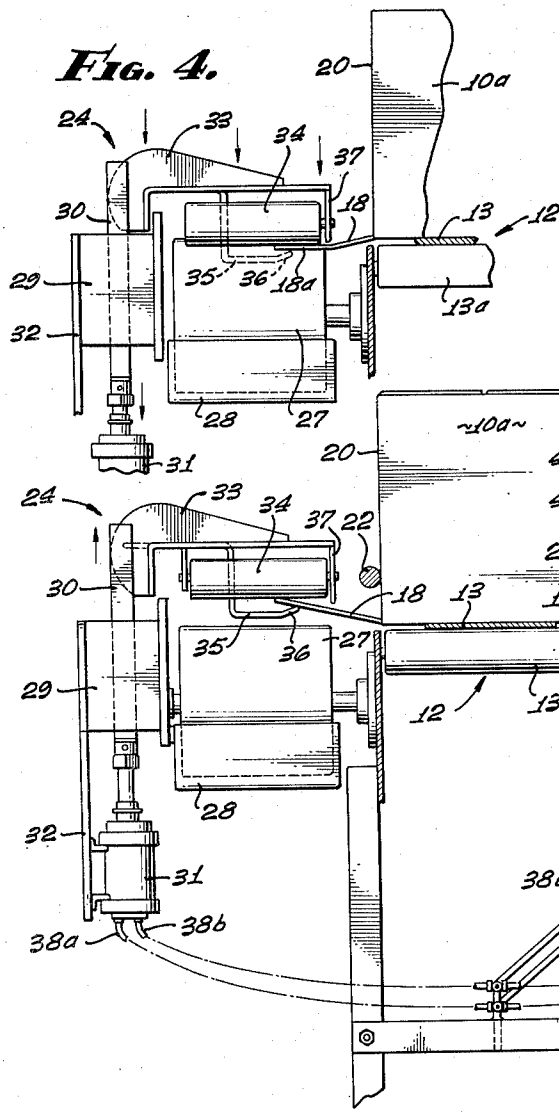
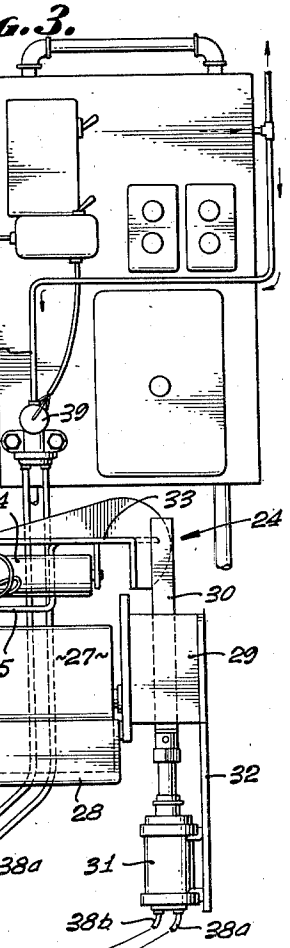


FIG. 3.



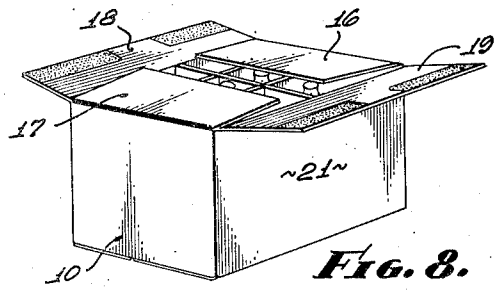


FIG. 8.

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2,804,043

BOX FLAP GLUING MECHANISM

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Application July 6, 1954, Serial No. 441,371

12 Claims. (Cl. 118—2)

This invention has to do with apparatus for applying adhesive to box flaps and particularly with apparatus for guiding and pivoting box flaps into and out of engagement with adhesive applying surfaces. Primarily the invention is directed to the objective of eliminating waste of adhesive substance through the provision of novel apparatus for automatically gluing only certain critical areas of box flaps.

The usual flap structure of pasteboard boxes consists of inside and outside pairs of flaps which are folded together and bonded by liquid adhesive. In order to save pasteboard material the inside flaps are normally shortened in width so that a gap is left between the ends of these flaps when they are folded into alignment. This gap is of course covered by the outside pair of flaps when the latter are folded down upon and glued to the inside pair.

Liquid adhesive is usually applied to the entire inner surfaces of the outside flaps to ensure complete bonding between contacting flap surfaces and also to save time. This practice results in a waste of the adhesive covering those portions of the outside flaps which do not come into bonding contact with the inside flaps, but which overlap the gap between the inside flaps. Eliminating the application of adhesive to such portions of the outside flaps would result in considerable saving.

In accordance with the present invention, it is made possible to automatically apply adhesive to those portions of the outside box flaps which overlay the inside flaps when both pairs of flaps are folded together. The invention contemplates the provision of apparatus for applying adhesive to the inner surfaces of both outside flaps without transferring the glue to intermediate flap portions corresponding to the gap between the inside flaps.

More specifically, the invention concerns the provision of novel means for applying adhesive to a first portion of a box flap, skipping a second or intermediate portion of the flap, and applying adhesive to a third portion of the flap without at any time interrupting the movement of the box along a conveyor. Means are provided for guiding a moving box flap between a pair of positioning members, one of which holds the flap in firm engagement with an adhesive coated roller. When the moving box reaches a first predetermined position, the box flap is quickly pivoted out of contact with the roller and is maintained out of such contact until the box reaches a second predetermined position. At that time, the box flap is pivoted back into contact with the adhesive applying roller and held in that position until the end of the flap clears the roller.

The above described features of the invention will be more fully understood from the following detailed description of the drawings, in which:

Fig. 1 is a side elevational view of the apparatus;

Fig. 2 is a plan view taken on line 2—2 of Fig. 1;

Fig. 3 is a front elevational view taken on line 3—3 of Fig. 1;

Fig. 4 is a front elevational view of a portion of the apparatus shown in Fig. 3, illustrating a flap gluing operation;

Fig. 5 is an enlarged rear elevational view of Fig. 4, and is taken on line 5—5 of Fig. 1;

Fig. 6 is a top plan view of Fig. 5;

Fig. 7 is an enlarged side elevational view of the apparatus shown in Fig. 4, illustrating a box flap gluing operation; and

Fig. 8 is a pictorial view of a loaded carton illustrating the glued flaps.

In Figs. 1, 2, and 3 of the drawings, a box 10 is shown traveling from rollers 11 onto a conveyor 12 comprising an endless belt 13 mounted on rollers 13*a* and pulleys 14, one of which is driven by motor 15. The box 10 is loaded and is positioned upside down with inside flaps 16 and 17 shown at Fig. 8 turned inwardly, and outside flaps 18 and 19 turned outwardly from the sides 20 and 21 of the box. Side rails 22 and 23 guide the sides of the box as it is transported by the conveyor toward the automatic flap gluing mechanism indicated generally at 24. As the box rides onto the conveyor 12, a first pair of downwardly curved flap guides 25 mounted on the side rails intercept the side flaps 18 and 19 to pivot them downward so that they project outward from opposite sides 20 and 21 of the box.

The automatic flap gluing mechanism 24 comprises identical units on opposite sides of the conveyor, each of which includes a freely rotatable glue roller 27 positioned above a glue tray 28 containing liquid adhesive such as sodium silicate. As each roller is rotated, glue is transferred to and adheres to its surface. The top edge of the roller 27 is positioned approximately on a level with the top edge of the conveyor belt 13. A stationary guide 29 for vertical rod 30 is positioned on the outer side of the glue roller 27, and the rod is moved vertically by a pneumatic cylinder 31 attached to a base 32 supporting the guide. An arm 33 attached to the upper end of the rod 30 projects laterally over the glue roller 27, and a hold-down roller 34 and flap-riser finger 35 are hung from the arm, the finger and roller together defining a movable head structure. The hold-down roller overlaps the glue roller 27 and is positioned slightly to the rear of the top of the glue roller with respect to the direction of travel of the box 10. Likewise, the flap-riser finger 35 overlaps the glue roller and is positioned to the rear and beneath the hold-down roller 34. The finger 35 extends laterally toward the conveyor 12 and has a slightly turned-up end portion 36 providing point contact with the glued flap instead of finger edge contact. Also attached to the arm 33 is a curved guide 37 which serves to guide the box flap 18 between the hold-down roller 34 and the flap-riser finger 35.

Each pneumatic cylinder 31 is connected with a compressed air line 38 through two air lines 38*a* and 38*b* leading to solenoid control valve 39. Operation of this valve admits air to one of the two lines 38*a* or 38*b* leading to the pneumatic cylinders 31 to actuate the rods 30 either upward or downward. The solenoid control valve 39 is in turn electrically controlled by microswitches 40 and 41, which are positioned to the front of the gluing mechanism 24 and at one side of the conveyor so that the switch contact arms 42 and 43 may engage the side 21 of the box as it moves along the conveyor. The two microswitch arms 42 and 43 are spaced apart a distance equal to the desired width of a portion of the box flap which is to be left free of adhesive.

In operation, as the forward box 10*a* approaches the automatic gluing mechanism 24, the outer portion 18*a* of each of the box flaps 18 and 19 is guided between a hold-down roller 34 and a flap-riser finger 35. At this time the arms 30 are in the down position, as shown in Figs. 4, 5, 6, and 7, so that each of the flaps is carried

into engagement with a glue roller 27 by a hold-down roller 34. In this connection it will be noted, as shown in Fig. 7, that the hold-down roller 34 extends slightly below the top of the glue roller 27 so that the box flap is forced against the top surface of the glue roller and carries over an arc 45 of the roller, ensuring complete transfer of adhesive from the surface of the glue roller to the inside surface of the box flap. When the forward box edge 44 contacts the arm 42 of the first microswitch 40, compressed air is admitted to the pneumatic cylinders 31 to lift the arms 30 causing the flap-riser fingers 35 to engage and pivot the flaps upward and out of contact with the glue rollers 27. Fig. 3 illustrates the position of the box flaps 18 and 19 after they have been so lifted.

As the front edge of the box travels forward between the two microswitch arms 42 and 43, no adhesive is transferred to the box flaps 18 and 19. However, when the front edge 44 of the box contacts the second microswitch arm 43, the solenoid control valve 39 admits compressed air to the opposite ends of the pneumatic cylinders 31 to quickly force the arms 30 downward, thus causing the hold-down rollers 34 to pivot the box flaps downwardly into firm engagement with the adhesive coated rollers 27. As the box is carried forward, glue is transferred to the second portion of the box flaps until the flaps clear the glue rollers 27.

The two portions of the outside box flaps to which adhesive is transferred correspond to the portions of the inside box flaps which are overlapped by the outside flaps, as illustrated in Fig. 8. No adhesive is transferred to the intermediate portions of the outside box flaps corresponding to the gap between the inside flaps, and a considerable saving of adhesive is achieved for each box. It should also be noted that no time is lost in applying adhesive to the selected portions of the box flaps since forward travel of the boxes is at no time interrupted.

I claim:

1. Apparatus for selectively applying liquid adhesive to a box flap surface, comprising a conveyor arranged for transporting a box therealong with the box flap projecting in swingable condition at one side of the conveyor, an adhesive applicator positioned alongside said conveyor for applying adhesive to said surface during flap travel past the applicator, means engageable with the flap during said travel for holding it in position to receive adhesive from said applicator and mounted for movement in a direction normal to the plane in which the flap lies during adhesive application thereto, said means including a member at the applicator side of said plane and movable to the opposite side thereof, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said member to the opposite side of said plane effecting flap swinging away from said applicator preventing adhesive application to said surface.

2. Apparatus for selectively applying liquid adhesive to a box flap surface, comprising a conveyor arranged for transporting a box therealong with the box flap projecting in swingable condition at one side of the conveyor, an adhesive applicator positioned alongside said conveyor for applying adhesive to said surface during flap travel past the applicator, means engageable with the flap during said travel for holding it in position to receive adhesive from said applicator and mounted for movement in a direction normal to the plane in which the flap lies during adhesive application thereto, said means including a member at the applicator side of said plane and movable to the opposite side thereof and a pressure element at the opposite side thereof for engagement with the opposite flap surface to urge said flap against the applicator, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said member to the opposite side of said plane effecting flap swinging away from said applicator preventing adhesive application to said surface.

3. Apparatus for selectively applying liquid adhesive to a box flap surface, comprising a conveyor arranged for transporting a box therealong with the box flap projecting in swingable condition at one side of the conveyor, an adhesive applicator positioned alongside said conveyor for applying adhesive to said surface during flap travel past the applicator, means engageable with the flap during said travel for holding it in position to receive adhesive from said applicator and mounted for movement in a direction normal to the plane in which the flap lies during adhesive application thereto, said means including a member at the applicator side of said plane and movable to the opposite side thereof and a pressure element at the opposite side thereof for engagement with the opposite flap surface to urge said flap against the applicator, a guide positioned in advance of said means for directing said flap between said member and element, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said member to the opposite side of said plane effecting flap swinging away from said applicator preventing adhesive application to said surface.

4. Apparatus for selectively applying liquid adhesive to the inside surfaces of an outer pair of box flaps, comprising a conveyor arranged for transporting a box therealong with said flaps projecting in swingable condition at opposite sides of the conveyor, a pair of adhesive transfer rollers positioned on opposite sides of the conveyor for rolling engagement with said surfaces transferring adhesive thereto during flap travel past the rollers, means engageable with the flaps during said travel for holding them in position to receive adhesive from said rollers and mounted for movement in directions normal to the planes in which the flaps lie during adhesive transfer thereto, said means including a pair of members at the adhesive roller sides of said planes and movable to the opposite sides thereof and a pair of pressure rollers at said opposite sides of the planes in advance of said adhesive rollers for engagement with the opposite surfaces of the flaps urging the flaps against the adhesive rollers, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said members to the opposite sides of said planes effecting flap swinging away from said adhesive rollers preventing adhesive application to said surfaces thereof.

5. The invention as defined in claim 4 comprising a pair of arms at opposite sides of the conveyor each mounting the pressure roller and member at said side for simultaneous movement in said direction.

6. The invention as defined in claim 5 in which said members comprise fingers angled toward said planes for point contact with said flap surfaces.

7. The invention as defined in claim 5 in which said other means includes mechanism connected with the arms for displacing them in said directions, and a control for said mechanism mounted for contact with the box during its travel past the adhesive rollers and operative upon said contact to actuate said mechanism.

8. The invention as defined in claim 7 in which said control includes a pair of electrical switches spaced apart in the direction of box movement a distance substantially equal to the gap between the inner box flaps when in closed condition, said switches respectively being operative to effect flap displacement away from and back against said adhesive rollers.

9. The invention as defined in claim 8 in which said mechanism comprises a pneumatic cylinder, and said control includes a valve controlled by said switches connected in compressed air delivering relation with said cylinder.

10. The invention as defined in claim 9 including guides carried by said arms and extending in advance of said pressure rollers and members for directing said flaps therebetween.

11. The combination, comprising a conveyor, a box

supported by the conveyor for movement therealong with a box flap projecting in swingable condition at one side of the conveyor, an adhesive applicator positioned alongside said conveyor and applying adhesive to a flap surface during flap travel past the applicator, means engaging the flap during said travel holding it in position to receive adhesive from said applicator and mounted for movement in a direction normal to the plane in which the flap lies during adhesive application thereto, said means including a member at the applicator side of said plane and movable to the opposite side thereof, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said member to the opposite side of said plane effecting flap swinging away from said applicator preventing adhesive application to said surface.

12. The combination, comprising a conveyor, a box supported by the conveyor for movement therealong with an outer pair of box flaps projecting in swingable condition at opposite sides of the conveyor, a pair of adhesive transfer rollers positioned on opposite sides of the conveyor in rolling engagement with flap surfaces transferring adhesive thereto during flap travel past the rollers, means

engaging the flaps during said travel holding them in position to receive adhesive from said rollers and mounted for movement in directions normal to the planes in which the flaps lie during adhesive transfer thereto, said means including a pair of members at the adhesive roller sides of said planes and movable to the opposite sides thereof and a pair of pressure rollers at said opposite sides of the planes in advance of said adhesive rollers for engagement with the opposite surfaces of the flaps urging the flaps against the adhesive rollers, and other means responsive to the progress of box travel along the conveyor for moving said first means to displace said members to the opposite sides of said planes effecting flap swinging away from said adhesive rollers preventing adhesive application to said surfaces thereof.

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