Nov. 28, 1944. F. W. HUMPHNER 2,363,866

APPARATUS FOR APPLYING AND SEALING GUMMED TAPE

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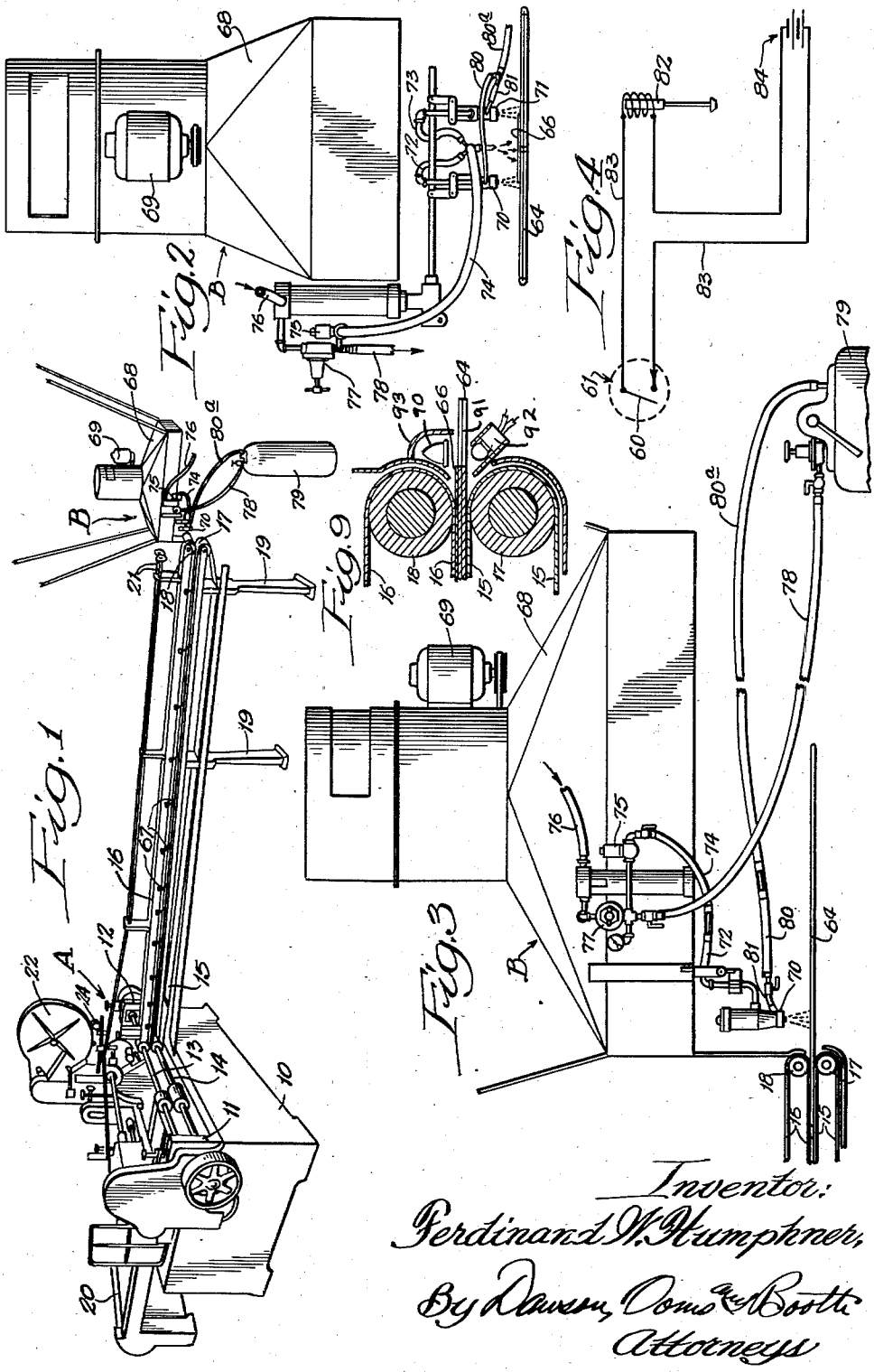


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 9

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Fig. 5

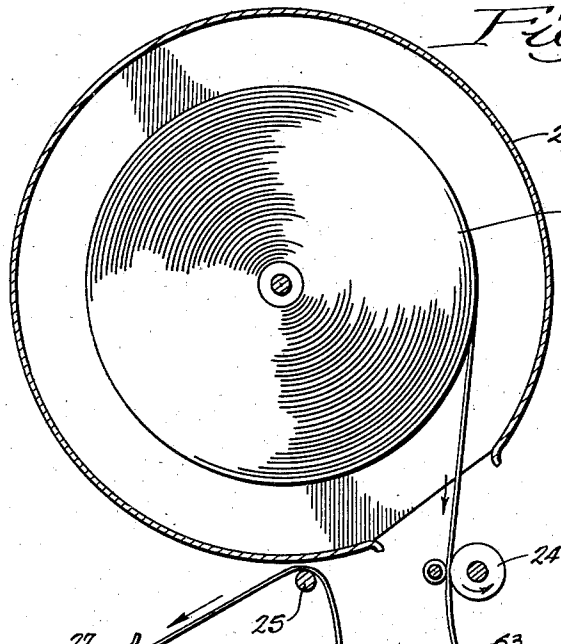
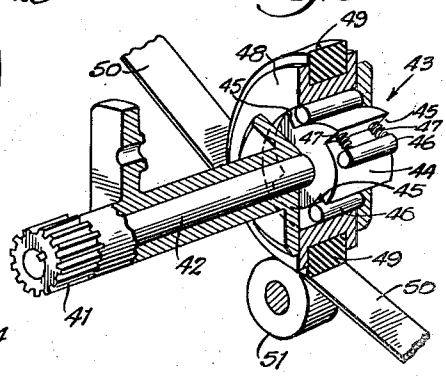


Fig. 6



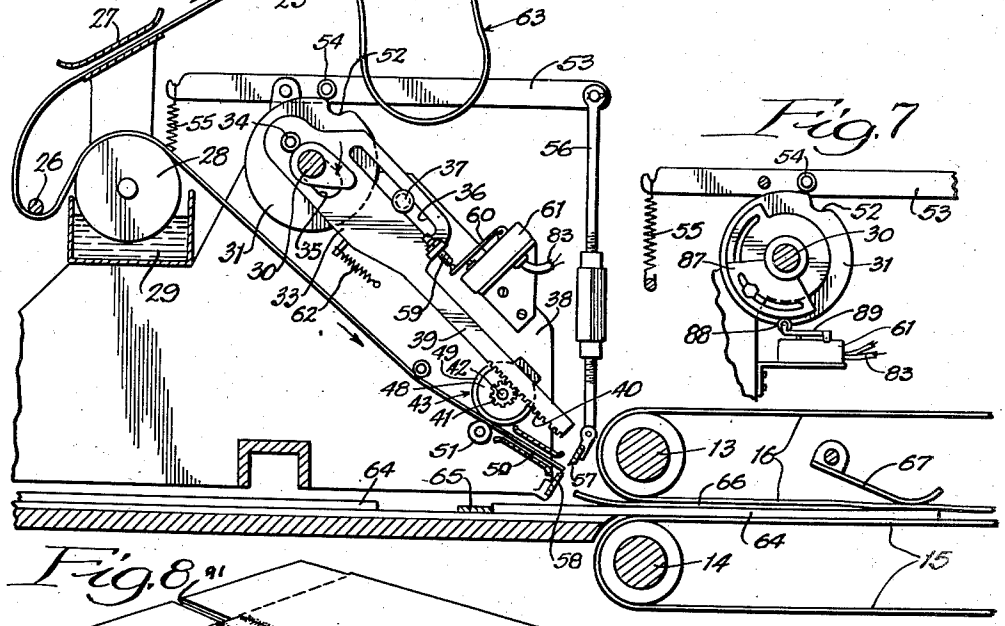
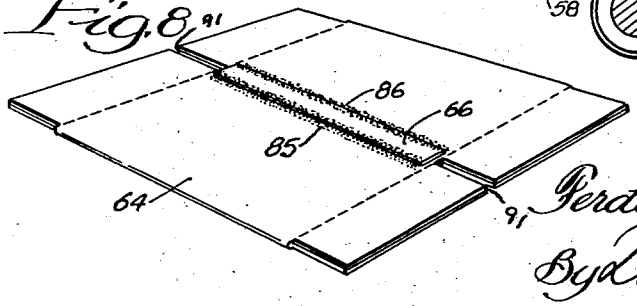


Fig. 7

Fig. 8



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APPARATUS FOR APPLYING AND SEALING GUMMED TAPE

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Application December 15, 1941, Serial No. 423,067

4 Claims. (Cl. 93—56)

This invention relates to apparatus for applying and sealing gummed tape and more particularly to apparatus for applying gummed tape to cartons and the like and for water-proofing the tape on the carton.

An object of the invention is to provide apparatus for forming hinges and the like for paper cartons of gummed tape or gummed paper and to seal the joints against moisture and humidity. Another object is to provide apparatus for applying gummed tape to cartons and for applying a water-proof material to the tape on the carton. Still another object is to provide automatic mechanism for applying and sealing gummed tape on cartons and the like.

Another object of the invention is to provide mechanism for spraying a water-proof material on a gummed tape joint on cartons and the like. Yet another object is to provide for the applying of gummed tape to a surface and the spraying of a water-proof material on the gummed tape after it is applied, the entire operation being carried out as the surface to which the tape is applied is passed through a machine on a conveyer mechanism. A further object is to provide in a tape-applying machine, mechanism for synchronizing the tape-applying means with means for spraying a water-proof material on the applied tape.

Other features and advantages will appear from the following specification and drawings, in which—

Figure 1 is a perspective view of an apparatus embodying the invention; Fig. 2 is a side elevational view of the spraying mechanism; Fig. 3 is an end elevational view of the same mechanism; Fig. 4 is a diagram of the electrical circuit used with the apparatus; Fig. 5 is a vertical sectional view partly in elevation showing the main portion of the tape-applying mechanism; Fig. 6 is a fragmentary perspective view partly broken away showing the feed roller for the tape applying mechanism; Fig. 7 is a fragmentary view in elevation showing a modified mechanism for synchronizing the tape applying machine with the spraying machine; Fig. 8 is a perspective view of a collapsed carton having a strip of tape applied thereto; and Fig. 9 is a fragmentary vertical sectional view showing a modified actuating means for synchronizing the tape applying machine with the spraying machine.

In the use of gummed tape and gummed paper for sealing and forming hinges for paper and cardboard cartons and the like, the accessibility of the goods within the carton to moisture and atmospheric humidity presents a serious problem. The steps of a method of forming a gummed tape hinge or seal on a carton which is resistant to moisture and humidity as well as the product formed by the method are set forth and claimed in my co-pending application, Serial No. 418,398, filed November 8, 1941 for Water resistant gummed paper product and method of forming the same.

The present invention relates to apparatus for applying the gummed tape to the carton and for waterproofing the tape joints, the entire operation being continuous and automatic.

In the embodiment of the invention described herein and referring particularly to Fig. 1, a tape-applying machine A is associated with mechanism B for spraying a water-proof material on the applied tape.

The tape-applying machine A includes a base 10 which supports the walls 11 and 12 in which the rotatable shafts 13 and 14 are mounted. Conveyor belts 15 and 16 pass about the shafts 14 and 13 respectively and are supported at the opposite end of the machine on shafts 17 and 18. Standards 19 are provided to support the conveyer.

Cartons may be fed from the platform 20 through the tape-applying machine to the spraying mechanism B. Control rods 21 extend from the main portion of the tape applying machine to the end thereof adjacent the spraying mechanism B and are arranged to be handled by an operator who may stand at this end of the machine.

As seen particularly in Fig. 5, the tape-applying machine includes a housing 22 and a web 23 of gummed tape or gummed paper, a constant feed roller 24 for advancing the tape from the web 23, idling rollers 25 and 26 and a guide channel 27 for feeding the tape into the applying mechanism proper. A moistening roller 28 is disposed within a water bath 29 and arranged to moisten the gummed surface of the tape as it passes the roller.

The main drive shaft 30 is provided with a cam 31 having a recess 52 on the periphery thereof. An arm 33 is eccentrically mounted on the cam 31, being secured to the cam by the pin 34. The arm 33 may be provided with an elongated slot 35 which extends about and receives the drive shaft 30. A second slot 36 in the arm 33 receives a pin 37 mounted on the support standard 38. The arrangement of the drive shaft 30 and the pin 37 in the slots 35 and 36 respectively produces a reciprocating motion of the arm 33

when the drive shaft 30 and the cam 31 carried thereby are rotated.

The lower portion 39 of the arm 33 is equipped with a rack 40 which engages a gear 41 on the shaft 42 to drive the same.

As seen particularly in Fig. 6, an overrunning clutch 43 is mounted on the shaft 42. This clutch may be of any suitable type and, as shown, includes a central member 44 which is equipped with a plurality of peripheral grooves 45 and with rollers 46 connected to one face of each groove by springs 47. About the central member 44 is an annular band or collar 48 which carries an annular rubber roller 49.

With this clutch construction, the shaft 42 is permitted to move freely in a clockwise direction without moving the collar 48 and roller 49, while movement of the shaft 42 in a counter-clockwise direction produces rotation of the collar 48 and roller 49.

The roller 49 is adapted to engage the strip of tape 50 which is being fed through the machine and idling roller 51 engages the opposite side of the tape which passes through the guide channel 52.

As the shaft 30 is rotated by any suitable power means, the arm 33 reciprocates and causes the rack 40 to move back and forth in a reciprocating motion, rotating the gear 41 and shaft 42. The shaft 42 is alternately rotated in opposite directions and, when moved in a counter-clockwise direction, produces rotation of the roller 49. The roller 49 thus serves as a ratchet feed roller which engages the strip of tape 50 and feeds it forwardly in the machine.

The standard 38 also supports a lever 53 which carries a roller 54 adapted to be received in the recess 52 of the cam 31. The lever 53 is pivotallly mounted on the standard 38 as a fulcrum and is equipped at one end with a spring 55 which continuously urges the end of the lever downwardly and at the other end with a depending rod 56 which carries at its end a knife blade 57. The knife blade 57 is adapted to cooperate with a cutting surface 58 to sever the strip of tape which passes the same.

When the roller 54 is received within the recesses 32 of the cam 31, the lever 53 and the depending rod 56 are lowered to bring the knife blade 57 into engagement with the strip of tape and sever the same.

The arm 33 is also equipped with a contact pin 59 which is arranged to engage the contact 60 of the switch 61 to close the electrical circuit of the switch with each downward movement of the arm 33. A small spring 62 continuously urges the arm downwardly to eliminate any lost motion therein.

In the tape-applying machine, the web of gummed tape is drawn from the housing 22 by the constant feed roller 24 and passes along the idling rollers 25 and 26 and through the guide channel 27 and then into engagement with the moistening roller 28. The tape as drawn from the housing 22 will form a slack loop 63 from which the tape may be drawn by the ratchet feed roller 49.

After the tape has been moistened by the moistening roller 28, it is fed forwardly at spaced intervals by the ratchet feed roller 49 and passes through the guide channel 52. As each strip of tape of predetermined length passes through the guide channel 52, the knife blade 57 is brought into engagement with the tape to sever the same.

Cartons or boxes 64, in collapsed condition, are carried through the machine by a conventional conveyer with the cartons being spaced at predetermined distances along the conveyer. Each carton is in engagement with a lug 65 which urges it through the machine. As the carton reaches a position adjacent the feed mechanism, it is passed between the shafts 13 and 14 and the endless conveyer belts 15 and 16 carried thereby. At the same time, a strip of tape 66 which has been fed forwardly by the ratchet feed roller is passed between the conveyer belts 15 and 16 in engagement with the upper surface of the carton. The moist tape is thus applied to the carton and after a predetermined portion of the tape has been so applied, the knife blade 57 severs the piece of tape. Spring guide lugs 67 in engagement with the upper conveyer belt 16 maintain the same in engagement with the carton and the tape thereon.

The spray mechanism B for applying a water-proof material to the tape on the carton includes a hood 68 of conventional construction having therein a suitable motor 69 for operating the same. The hood 68 may be supported in any suitable manner and may, in turn, serve as a support for the spraying device. The spraying equipment includes a pair of nozzles 70 and 71 connected by conduits 72 and 73 to an air inlet 74 which, in turn, is provided with a solenoid controlled valve 75. Air or other gaseous medium under pressure may be obtained through a main air inlet 76 and passed through a regulator 77 to the solenoid valve 75 and the inlet 74.

From the pressure regulator, air may also be passed through the conduit 78 to a tank 79 of a suitable water-proof liquid. Another conduit 80a leads from the tank 79 to inlets 80 and 81 to the nozzles 70 and 71. Suitable valves may be inserted in the various conduits for controlling the flow of fluid therethrough.

The tank or container 79 of the water-proof liquid may be maintained under constant pressure in accordance with conventional spraying practices so that when air is passed from the inlets 72 and 73 into the nozzles 70 and 71, the liquid is sprayed therefrom. Preferably, the nozzles are constructed so as to provide for a narrow spray which may be received upon the edges of the tape 65 on the carton 64.

Any suitable material may be used in the spray mechanism for the purpose of water-proofing the edges or body of the tape. For example, a suitable varnish or lacquer may be used.

As seen from the circuit diagram shown in Fig. 4, the solenoid 82 of the valve 75 may be controlled by the opening and closing of the switch 61 in the tape-applying machine, the solenoid being equipped with the switch by any suitable electrical connections 83 through a source of current 84.

Preferably, the operation of the solenoid 82 is synchronized with the operation of the tape-applying machine so that the switch 61 is closed at the appropriate time to operate the spray nozzles only while the tape is passing therebeneath. The cartons are periodically spaced along the conveyer mechanism and an arrangement may readily be worked out whereby the switch 61 is closed as the strip of tape 66 on the carton 64 is brought into adjacent relation with the nozzles 70 and 71. The switch 61 is maintained in closed position as long as the tape is passing the nozzles 70 and 71. As the end of the tape is reached, the switch is opened to permit the closing of the valve 75.

The spraying operation preferably applies the

waterproof material along the edges 85 and 86 of the tape 66.

A modified form of actuating means for the switch 61, as shown particularly in Fig. 7, may be used to control the operation of the solenoid valve 75. On the cam 31 may be mounted a plate 87 which is adapted to engage a roller 88 on the contact strip 89 of the switch 61. The plate 87 engages the roller 88 and closes the switch 61 during a portion of the cycle of the rotation of the cam 31. During this period the circuit of the solenoid 82 is closed and the spray mechanism is in operation. The position of the plate 87 on the cam 31 is so arranged that the plate 87 first engages the roller 88 as the tape 66 on the carton 64 is brought into adjacent relation with the spray nozzles 70 and 71, thus synchronizing the operation of the tape applying machine and the spraying mechanism. The plate 87 releases the roller 88 when the end of the tape 66 reaches the nozzles 70 and 71.

Another modified form of actuating means as shown particularly in Fig. 9 is based on a photoelectric cell construction. Adjacent the rollers 17 ad 18 at the end of the conveyor mechanism a suitable photoelectric cell unit 90 may be supported. The cell unit is preferably arranged immediately above the carton 64 which is carried by the conveyor mechanism and in alignment with the slot 91 in the end thereof. A lamp 92 is placed below the carton so that after the slotted portion of the carton has passed, the body of the carton will intercept the beam from the lamp 92 to the cell 90. The beam will remain intercepted until the body of the carton has passed the lamp and the slot 91 at the other end of the carton is disposed between the lamp 92 and the cell 90.

The photoelectric cell may be arranged in a circuit with the solenoid 75 so that the spray mechanism is rendered operative only while the beam from the lamp 92 is intercepted by the carton 64. A suitable shield 93 may be disposed about the photoelectric cell to protect the same from the spraying mechanism.

In operation, the cartons are placed on the rear platform 20 of the tape-applying machine A. The cartons are fed forwardly through the machine at spaced intervals and as the cartons pass between the rollers 13 and 14 and the endless conveyor belts 15 and 16 thereon, a strip of tape is fed forwardly between the conveyor belts and applied to the carton. As soon as a predetermined length of tape has been fed forwardly, the knife blade 57 severs the strip of tape. In the meanwhile, as the arm 33 is moved downwardly to feed the tape between the conveyor belts 15 and 16, the switch 61 is closed to set the spray mechanism in operation. The pin 59 is so adjusted in position with respect to the arm 33 so as to be released from contact with the contact strip 60 by the upward movement of the arm 33 at the time that the end of the strip 66 of tape passes the spray nozzles 70 and 71.

The apparatus may be used to spray a waterproof material such as varnish or lacquer along the edges of the tape 66 on the carton 64, or, if desired, the spray nozzles may be adjusted so as to coat the entire surface of the tape with the waterproof material. If the entire exposed surface of the tape is to be coated with the waterproof material, one of the nozzles may be eliminated and the cone of spray of the other nozzle may be broadened to cover the width of the tape.

When the waterproof material has been sprayed on the tape on the cartons, it may be dried on the tape in any suitable manner. When the waterproof material is applied along the edges of the tape, it will, upon drying, serve to protect the edges of the adhesive layer of the tape. Ordinarily the tape which is used will contain a waterproof material therein, for example, as a binder for reinforcing fibers. This waterproof material in the tape serves to protect the main body of the adhesive from moisture and the waterproof material which is applied by the spraying process may need only protect the edges of the adhesive layer.

Any suitable power means may be used to actuate the tape applying mechanism, since tape applying mechanisms and conventional actuating means therefor are well-known. Such construction will not be shown or described in detail herein.

Although the invention has been described in connection with a particular embodiment thereof and various details have been set forth for the purpose of illustrating the invention, it will be apparent that various changes and modifications may be made in the apparatus as described without departing from the spirit of the invention.

I claim:

1. Apparatus of the character described for applying gummed tape to cartons and the like and sealing the tape with a waterproof material, comprising means for applying gummed tape to a carton, means for spraying a waterproof material on the exposed surface of said tape, valve means for controlling the operation of said spraying means, means for passing a carton with the gummed tape thereon along said spraying means, and means actuated by said tape applying means and synchronized therewith for opening said valve only when the tape is in position adjacent said spraying means.

2. Apparatus of the character described for applying gummed tape to cartons and the like and sealing the tape with a waterproof material, comprising conveyor mechanism for advancing the cartons, means for applying gummed tape to the cartons carried by the conveyor, means for spraying a waterproof liquid along the edges of the tape, valve means for controlling the operation of said spraying means, and means actuated by said tape applying means and synchronized therewith for opening said valve only when the tape is in position adjacent said spraying means.

3. Apparatus for applying gummed tape to cartons and the like and sealing the tape against moisture, comprising a conveyor mechanism for advancing the cartons in predetermined spaced relation, means for applying gummed tape to the cartons carried by said conveyor, means for spraying a waterproof liquid on said tape on said cartons, valve means for controlling the operation of said spraying means, and electrically operated means actuated by said tape applying means for opening and closing said valve means, said electrically operated means being so constructed as to open said valve means and permit said spraying means to operate only when the tape on the carton is passing the spraying means.

4. In apparatus for applying gummed tape to cartons and the like and for sealing the tape against moisture, conveyor mechanism for advancing cartons in a predetermined spaced relation, a feed roller for frictionally engaging the tape and for advancing the same at periodic intervals, means for applying the tape advanced by said roller to the surface of a carton, spray

mechanism for applying waterproof material to the tape on said carton, valve means for controlling the operation of said spray mechanism, a reciprocating arm for actuating said roller in one direction, an electrical circuit, a switch in said circuit for opening and closing the same, a solenoid in said circuit for actuating said valve means, and contact means for opening and closing said switch, said means being so constructed and arranged as to synchronize the movement of said arm and the spaced relation of said cartons with the spray mechanism whereby the spray mechanism is in operation only when the tape on said cartons is in adjacent relation to the spray mechanism.

FERDINAND W. HUMPHNER.