Feb. 23, 1954 W. C. GIGLER 2,670,027

MACHINE FOR SEALING CARTONS

Filed Feb. 3, 1951 3 Sheets-Sheet 1

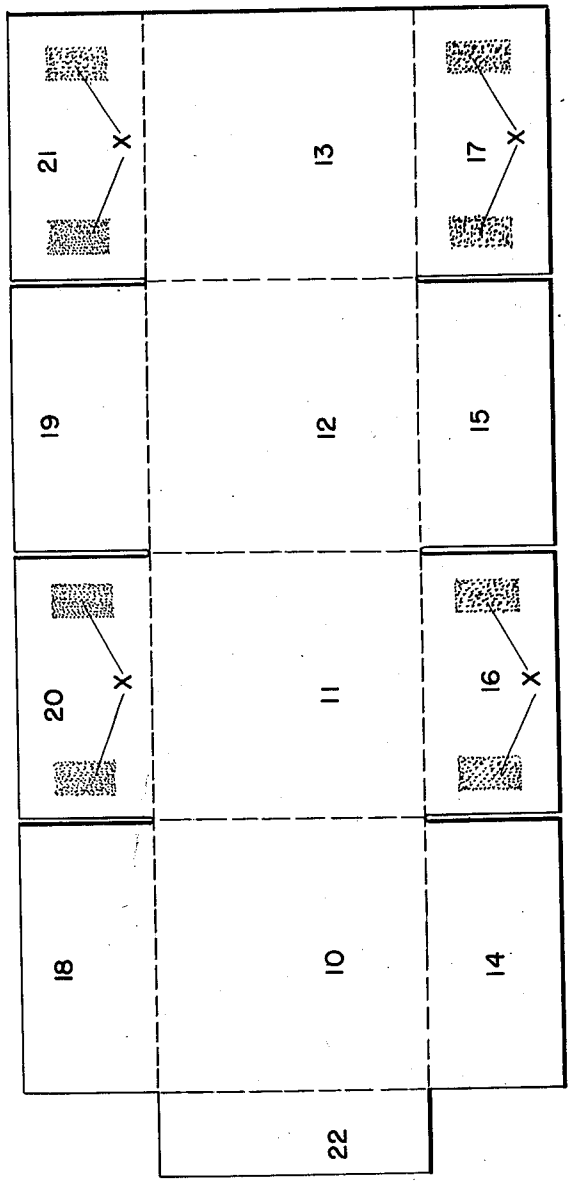

Fig. 1

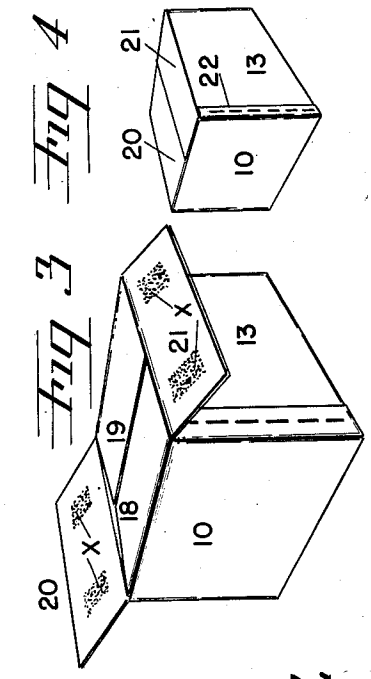

Fig. 4

Fig. 3

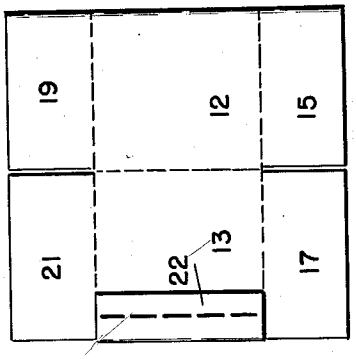

Fig. 2

INVENTOR.
WILFERD C. GIGLER
BY
F. L. Geisler.
ATTORNEY

Feb. 23, 1954 W. C. GIGLER 2,670,027

MACHINE FOR SEALING CARTONS

Filed Feb. 3, 1951 3 Sheets-Sheet 2

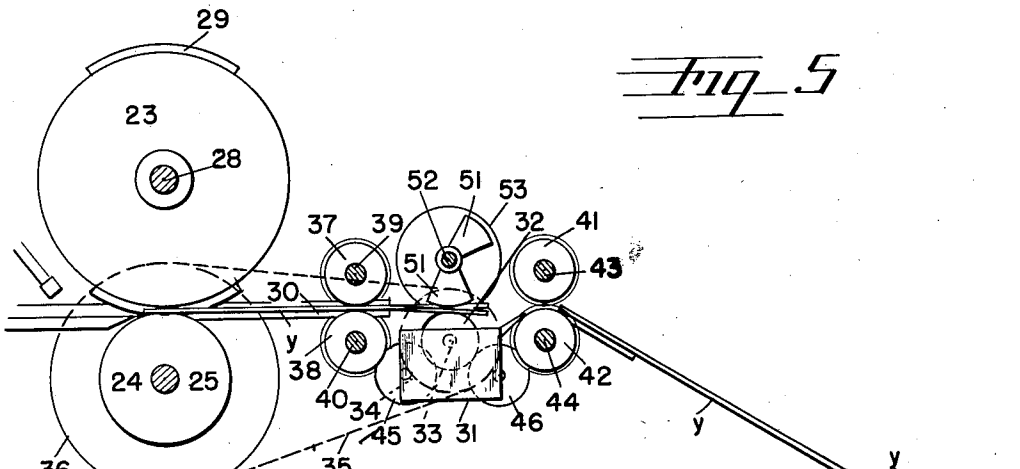

Fig. 5

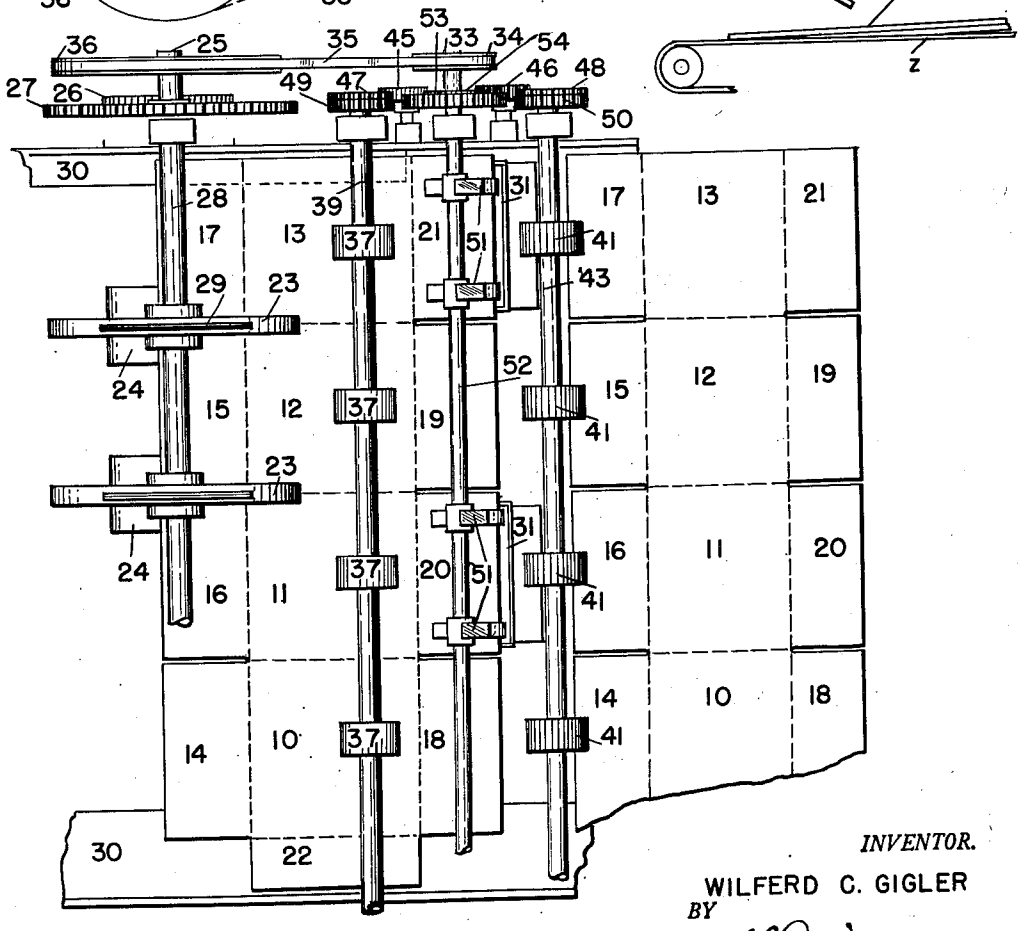

Fig. 6

INVENTOR.
WILFERD C. GIGLER
BY
F. R. Geisler.
ATTORNEY

Feb. 23, 1954 W. C. GIGLER 2,670,027

MACHINE FOR SEALING CARTONS

Filed Feb. 3, 1951 3 Sheets-Sheet 3

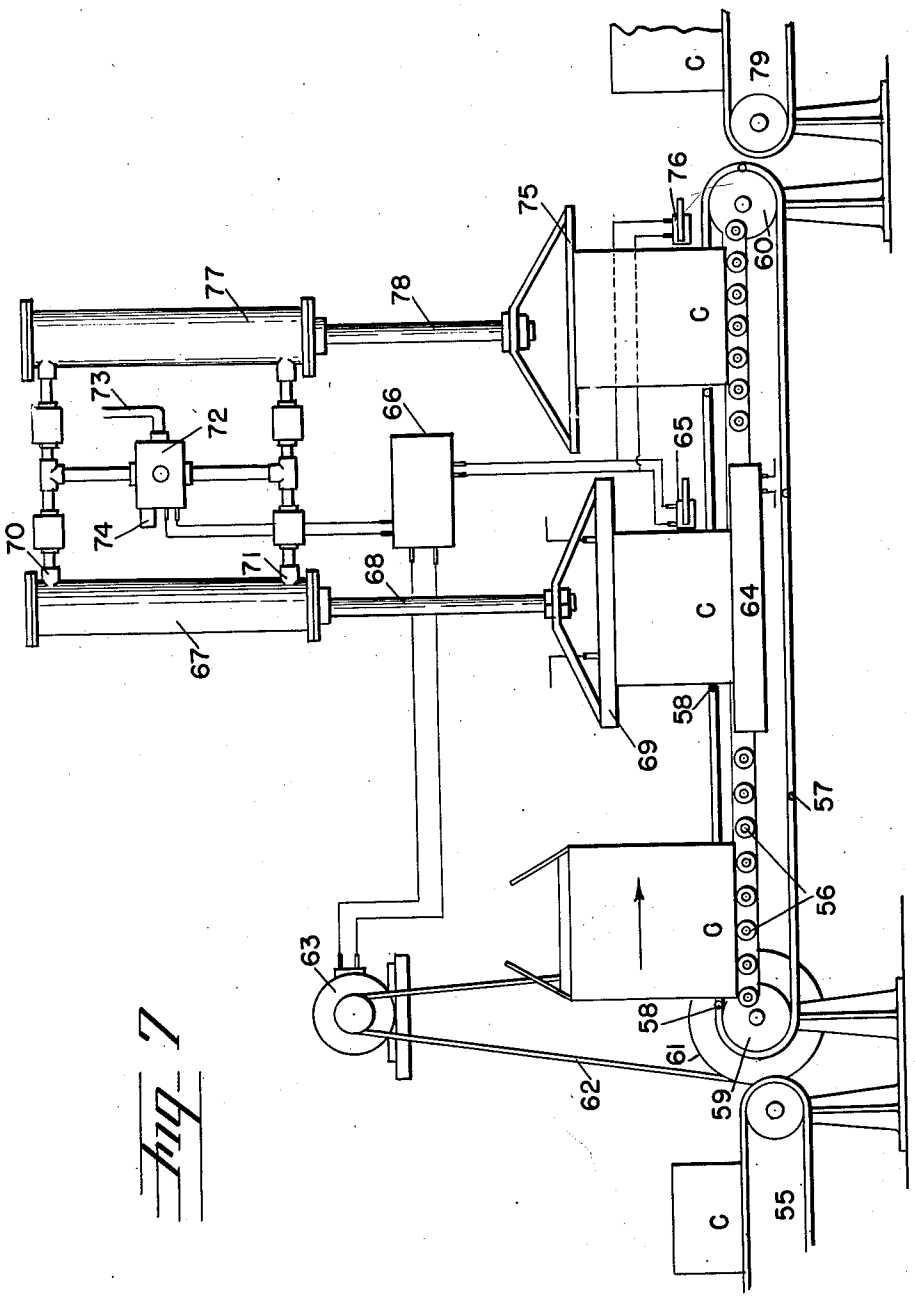

Fig. 7

INVENTOR.
WILFERD C. GIGLER
BY
F. R. Geisler
ATTORNEY

Patented Feb. 23, 1954 2,670,027

UNITED STATES PATENT OFFICE

2,670,027

MACHINE FOR SEALING CARTONS

Wilferd C. Gigler, Camas, Wash.

Application February 3, 1951, Serial No. 209,237

3 Claims. (Cl. 154—42)

1

This invention relates in general to cardboard cartons and the like, particularly to cartons of rectangular shape, used as shipping and storage containers for various products and requiring sealing of the carton.

More specifically this invention relates to cartons which are produced in knocked-down condition and thereafter are set up, filled, and finally sealed, and the invention is concerned specially with the final sealing of such cartons.

Rectangular cartons of the type indicated are customarily formed with a plurality of flaps at top and bottom, the flaps being hinged to the side walls, and the sealing of the tops and bottoms of the cartons is generally done either by applying gummed tape over the abutting edges of the outer flaps or by gluing such flaps down on the underlying flaps at top and bottom. Either procedure requires a considerable amount of labor and time, and this is particularly true if the cartons which are being sealed are of different sizes. Thus while there are machines for applying moistened gummed tape to carton flaps for the sealing of the same, nevertheless when the cartons are of various sizes and without any particular sequence, it has heretofore been necessary to perform a large part of the work involved in the sealing by manual labor. Also heretofore much of the sealing of the bottom and of the top of such cartons has been entirely separate operations.

An object of the present invention is to provide an improved carton which can be sealed with a minimum of time and effort.

Another object of the invention is to provide an improved carton adapted for sealing by mechanical means which means will be capable of being operated largely automatically.

A related object of the invention is to provide an improved carton on which the sealing of the flaps on top and bottom can take place simultaneously.

An additional object of the invention is to provide a special carton sealing device specifically adapted for use with such improved cartons.

A further object of the invention is to provide an improved sealable carton and means for sealing such carton which will be practical to use when such cartons of various sizes are required to be sealed in succession.

These objects and other incidental advantages I have been able to attain satisfactorily by having special heat-sealable adhesive applied to the carton flaps in the manufacture of the carton, and by employing a special device for performing the final sealing operation of the filled carton, as will be hereinafter briefly described with reference to the accompanying drawings.

2

In the drawings:

Fig. 1 is a plan of the finished blank for my improved carton;

Fig. 2 is a plan view of the same blank, with the ends secured together to complete the side structure, and with the blank in folded or knocked-down position;

Fig. 3 is a perspective view of the carton set up and filled and with the top flaps ready for closing;

Fig. 4 is a similar view of the carton with the top sealed;

Fig. 5 is an elevation of a machine for preparing the carton blank;

Fig. 6 is a top plan view of the same; and

Fig. 7 is a diagrammatic elevation of the sealing means by which the final sealing of the bottom and top of each carton is achieved automatically and regardless of the size of the carton.

The carton blank shown in Fig. 1 is more or less of the customary shape for blanks for rectangular cartons. The broken lines in this figure indicate the fold lines for the various walls and flaps. The section portions 10, 11, 12 and 13 constitute the side walls. The flaps 14 and 15 are the inner flaps for the bottom and the flaps 16 and 17 are the outer flaps for the bottom. Similarly the flaps 18 and 19 are the inner flaps for the top and the flaps 20 and 21 are the outer flaps for the top. The faces shown of the sections and flaps are all inside faces with respect to the final carton.

In the finishing of the blank, heat-softenable glue or adhesive is applied to the alternate flaps 20 and 21, constituting the outer flaps for the top of the carton, and also similarly to the alternate flaps 16 and 17 constituting the outer flaps for the bottom of the carton, as will later appear. In the carrying out of my invention it is sufficient if the heat-softenable adhesive is applied to these outer flaps only in limited areas on the same, such as in the areas indicated at x in Fig. 1. In Figs. 5 and 6 I show a simple device for completing the forming of the blank and applying the heat-softenable adhesive at these areas x.

Referring to Figs. 5 and 6, which are more or less diagrammatic and are not drawn to any scale, the upper slotter knife rolls and the cooperating lower slotter rolls, for forming the slots between the flaps 21, 19, 17, 15, etc., of the blank are indicated by the reference characters 23 and

24. The lower slotter rolls 24 are secured to a shaft 25. A gear 26 (Fig. 6) secured near the end of shaft 25 meshes with a gear 27 secured on the end of the shaft 28, the upper slotter knife rolls 23 being carried on the shaft 28. Suitable means (not shown), such as an electric motor, drives the shaft 25 and with it the shaft 28 and the slotter rolls. The upper slotter knife rolls 23 have knife segments 29 on their peripheries which enter grooves in the lower slotter rolls 24. As the carton blanks (indicated at *y* in Fig. 5) pass under and beyond the slotter knife rolls 23 they are supported at their outer edges on rails or skid plates 30, and since the cardboard from which the carton blanks are made is fairly stiff the supporting of the blanks at their outer edges by their rails 30 is sufficient to hold them horizontal.

A pair of glue pans 31 are located beyond the slotting rolls and below the path of travel of the carton blanks. These pans 31 are supplied with heat-softenable adhesive and are kept heated by steam or by electric elements (not shown) at the proper temperature for maintaining the adhesive in the pans in a liquid or viscous condition. A pair of glue-applying rolls 32 are located in each pan 31 and are secured on a common shaft 33. A sprocket wheel 34 is mounted on the end of the shaft 33 and a sprocket chain 35 connects sprocket wheel 34 with a sprocket wheel 36 mounted on the end of driven shaft 25.

Upper and lower draw rolls 37 and 38, mounted on shafts 39 and 40 respectively, are located between the slotter rolls and the glue pans, and are adapted to engage each carton blank as it leaves the slotter rolls and move the blank along on the rails 30 and over the glue pans to a second set of upper and lower draw rolls 41 and 42 mounted on the shafts 43 and 44 respectively.

A gear 54, secured on shaft 33, meshes with a pair of intermediate gears 45 and 46 which in turn mesh with gears 47 and 48 respectively mounted on shafts 49 and 44. Gears 47 and 48 in turn mesh respectively with gears 49 and 50 secured to shafts 39 and 43 respectively.

The glue-applying rolls 32 are mounted at such level that they will come within a small fraction of an inch of the under face of the carton blank when the latter is supported on the rails 30. In order to bring the desired flap portions of the blank into contact with the glue-applying rolls 32 I provide a series of adjustable segments 51 mounted on a shaft 52, which shaft extends parallel to the shaft 33 of the glue-applying rolls 32. The radius of the arcuate peripheries of the segments 51 is of sufficient length to cause these segments, when coming into contact with a carton blank, to press the blank downwardly sufficiently to cause the blank momentarily to contact the underneath glue-applying rolls. A gear 53, secured to the end of shaft 52 engages the gear 54, thus causing rotation of the shaft 52 and segments 51 with the rotation of the glue-applying rolls 32.

Thus, as will now be apparent from Fig. 6, after each carton blank leaves the slotting rolls it passes over the glue pans and receives applications of the heated adhesive on the flaps 21, 29, 17 and 16. After leaving the second pair of draw rolls 41 and 42 the carton blank is dropped on to a suitable conveyor, indicated at *z* in Fig. 5. The adhesive on the carton flaps dries almost immediately and the finished carton blank, in the form illustrated in Fig. 1, may be shipped or stored in such position, or may have the ends of the wall portions secured together so as to place the carton more in readiness for use. This is done by securing the end wall flap 22 (Fig. 1) to the wall portion 13, this securing being done either by stapling or by gluing, whereupon the carton will be in condition ready for immediate use but in knocked-down condition, and will appear as illustrated in Fig. 2.

When the carton is to be filled it is set up in the usual manner with the inner and outer bottom flaps folded in. However, with my improved carton, the sealing of the bottom flaps is not done until the final sealing of both top and bottom is performed. The set-up carton is placed on a suitable support, platform or conveyor, and is filled. When the filling is completed the two inner top flaps 18 and 19 are folded over (Fig. 3) and finally the outer top flaps 20 and 21 are folded over. The carton is then ready for the final sealing of the top and bottom, an operation which takes place quickly and automatically with my improved carton and with the special sealing means to be presently described, and the final filled and sealed carton will then appear as illustrated in Fig. 4. The means by which the sealing of the top and bottom carton is performed is diagrammatically shown in Fig. 7.

In Fig. 7 an endless conveyor 55 delivers the cartons, as they are filled, to the heat sealing means, diagrammatically illustrated, the filled cartons being indicated by the reference character *c*. From the conveyor 55 the filled cartons are delivered to a gravity roll section or series of rollers 56. A pair of conveyor chains 57 located at the ends of the rollers 56, moving in unison and carrying transverse flight bars 58, pass around pairs of sprocket wheels 59 and 60. On the shaft to which the sprocket wheels 59 are secured a pulley 61 is also secured and this pulley 61 is driven (in clockwise direction as viewed in Fig. 7) by means of a belt 62 from a motor 63.

The series of rollers 56 are in two groups and a stationary platen 64 is located in the space between the two groups. The platen 64 contains electric heating elements connected to a suitable source of electric energy and a thermostatic heat control (not shown) so that the top face of the platen can be heated to, and maintained at, a desired predetermined sealing temperature.

As each filled carton is delivered from the conveyor 55 on to the rollers 56 it is engaged by one of the flight bars 58 and moved along (from left to right as viewed in Fig. 7) over the first group of rollers and on to the platen 64 until the carton engages a spring-controlled finger of an electric switch 65. A pair of wires connect the switch 65 with a time switch 66 and the closing of the switch 65 results in actuation of the time switch 66.

An air cylinder 67 operates a piston and a downwardly-extending piston rod 68. A platen 69 is secured to the lower end of the piston rod 68. This platen 69, like the platen 64, is provided with electric heating elements and a thermostatic control (not shown) so that the platen 69, and in particular the bottom face thereof, can be maintained at a predetermined desired sealing temperature. The cylinder 67 has ports 70 and 71 near the top and bottom ends respectively and these ports are connected through the medium of an electrically operated control valve 72 to a suitable source of compressed air (not shown), received through the pipe 73, and to an exhaust port 74. Thus in one operating position of the valve 72 air will be delivered to the lower port 71 of the cylinder 67 and exhausted

from the upper port 70, thus moving the piston rod 68 and platen 69 upwardly, while another operating position of the electrically-operated valve 72 will reverse the flow of air to the cylinder 67, producing downward movement of the piston rod 68 and platen 69.

When a carton engages the finger of switch 65, causing the time switch 66 to be actuated for a predetermined interval, the time switch, during the resulting period of such actuation, opens the circuit to the motor 63, temporarily stopping operation of the motor 63, and causes the valve 72 to be turned temporarily into position whereby compressed air will be delivered into the upper port 70 of the cylinder 67 and allowed to be exhausted from the lower port 71. Consequently when the carton has been moved on to the lower heated platen 64 and comes into engagement with the finger of the switch 65, the result is that, for a predetermined interval as determined by the time switch 66, the movement of the transverse bars 58 will cease while the upper heated platen 69 will move down on to the top of the carton. During this interval, the heat from the two platens 64 and 69 softens the adhesive on the outer flaps at the bottom and top of the carton respectively and this heating and pressing of the flaps results in the sealing of the carton bottom and top. A few seconds is all that is required for the heat sealing operation, the heat from the two heated platens being sufficient to soften the adhesive on the inside of the adjacent flaps of the carton without causing any scorching of the flaps during the brief interval of contact.

After the expiration of the interval for which the time switch 66 is set, the switch 66 returns to normal position, closing the contact to the motor 63, causing the motor 63 to resume operation, and changing the position of the valve 72 back to normal position and causing the delivery of compressed air into the lower port 71 of cylinder 67 and lifting the platen 69 from contact with the carton. The carton is then moved off of the lower platen 64 and on over the second group of rollers.

Since the carton remains in contact with the heated platens for such a short time, I have found it preferable to hold the carton flaps in sealing position for another brief interval while the adhesive cools and is given an opportunity to set again. For this purpose I provide a second but unheated platen 75, so arranged as to bear down on the top of the carton while the carton is again temporarily halted on the second group of rollers.

A second electric switch 76 is so positioned that a carton below the second platen 75 will engage a spring control finger of this switch 76. The switch 76 is similar to switch 65 and, as indicated in Fig. 7, is also connected to the time switch 66. A second cylinder 77, similar to cylinder 67, has a piston and piston rod 78 and the unheated platen 75 is secured to the bottom of the piston rod 78. The control valve 72 also controls the passage of air into cylinder 77 in the same manner as into the cylinder 67. Thus when a carton contacts the second switch 76 the motor 63 is again temporarily stopped and the cold platen 75 is moved down on to the carton located below the platen. This movement of the platen 75 holds the top flaps of the carton in pressing engagement with the underneath flaps while the adhesive is given an opportunity of cooling and setting. Then, after termination of the period

as provided by the time switch 66, the second platen 75 is returned to its normal raised position and the carton, with the sealing now completed, is moved further along to the right and finally delivered on to the conveyor 79.

The piston rods 68 and 78 are made of sufficient length so that their respective platens will engage the tops of even small cartons. However, piston rod 68 is not made long enough to permit the platen 69 to be moved down into actual contact with the bottom platen 64, and likewise piston rod 78 is not long enough to permit the platen 75 to reach the rollers beneath the platen, but suitable springs or other cushioning means (not shown) preferably are provided for the pistons in both cylinders 67 and 77 to stop the movement of the pistons at the end of their maximum travel in either direction without excessive vibration or shock to the supporting mounting for the cylinders.

It will be evident from this description and from Fig. 7 that cartons of various sizes can be handled with the sealing mechanism which I have devised, and that when a carton is set up and filled and the top flaps are folded over into position for sealing, only a minimum amount of attention is required for the completion of the sealing. No adjustment of this sealing mechanism whatsoever is required for cartons having a considerable range of size. This is a very important feature of my invention.

There are several heat-softenable adhesives on the market which can be used satisfactorily in my improved carton. One such adhesive which I have found very successful is manufactured by the Monsanto Chemical Company of Seattle, Washington under the trade-name of "Vuecote" and contains castor oil and resin. The time switch 66 must of course be set in accordance with the time required for softening the adhesive on the carton flaps and with regard to the amount of heat furnished by the heated platens 64 and 69. The heat-softenable adhesive used should of course be capable of softening in a few seconds under the influence of the heat which may practically be applied to the carton flaps, and the adhesive must also be capable of setting again in an equally short time.

Modifications in the construction of the heat sealing device, which I have illustrated and briefly described, would of course be possible within the scope of the invention.

I claim:

1. In a device for heat-sealing a carton of the character described having top and bottom flaps treated with heat-softenable adhesive, a heated platen positioned to support said carton, means for moving said carton onto and off of said platen, a second heated platen located above said first platen and in substantial registration therewith, means for moving said second platen up and down, a control for said platen-moving means, said control normally maintaining said second platen in raised position, means operating said control to cause temporary downward movement of second platen, said control also connected with said carton-moving means, whereby to halt operation of said carton-moving means while said second platen is resting on the top of said carton, an unheated platen located beyond said first and second platens and above the path of said carton, said carton-moving means acting to move said carton from said first platen into position beneath said unheated platen, means for moving said unheated platen up and down, and a control

for said last mentioned means normally maintaining said unheated platen in raised position but operable to cause temporary downward movement of said unheated platen, said carton-moving means also connected with said last mentioned control, whereby to halt operation of said carton-moving means while said unheated platen is resting on the top of said carton.

2. In a device for heat-sealing a carton of the character described having top and bottom flaps treated with heat-softenable adhesive, a heated platen, mens for moving said carton onto and off of said platen, a second heated platen located above said first platen and in substantial registration therewith, means for moving said second platen up and down, a control for said platen-moving means, said control normally maintaining said second platen in raised position, means operating said control to cause temporary downward movement of said second platen, a contact element actuating said control operating means, said element so located as to be contacted by said carton when said carton is moved onto said first mentioned platen, whereby said second platen will automatically be caused to move down and rest on the top of said carton when said carton is moved onto said first platen, said control also connected with said carton-moving means, whereby to halt operation of said carton-moving means while said second platen is resting on the top of said carton, an unheated platen located beyond said first and second platens and above the path of said carton, said carton-moving means acting to move said carton from said first platen into position beneath said unheated platen, means for similarly moving said unheated platen up and down, a control for said last mentioned means normally maintaining said unheated platen in raised position but operable to cause temporary downward movement of said unheated platen, said carton-moving means also connected with said last mentioned control, whereby to halt operation of said carton-moving means while said unheated platen is resting on the top of said carton, and a second contact element actuating said last mentioned control so located as to be contacted by the carton when said carton is moved beneath said unheated platen.

3. A device for heat-sealing a carton of the character described having top and bottom flaps treated with heat-softenable adhesive, said device including a heated platen, means for moving said carton onto and off of said platen, a second heated platen located above said first platen and in substantial registration therewith, means for moving said second platen up and down, a control for said platen-moving means, said control normally maintaining said second platen in raised position, means operating said control to cause temporary downward movement of said second platen, a time switch in said control operating means, a contact element actuating said time switch and said control operating means, said element so located as to be contacted by said carton when said carton is moved onto said first mentioned platen, whereby said second platen will automatically be caused to move down and rest on the top of said carton when said carton is moved onto said first platen and to remain on said carton top for a predetermined period governed by said time switch, said time switch also connected with said carton-moving means, whereby to halt operation of said carton-moving means while said second platen is resting on the top of said carton, an unheated platen located beyond said first and second platens and above the path of said carton, said carton-moving means acting to move said carton from said first platen into position beneath said unheated platen, means connected with said second platen moving means for similarly moving said unheated platen up and down, a control for said last mentioned means normally maintaining said unheated platen in raised position but operable to cause temporary downward movement of said unheated platen, said time switch and said carton-moving means also connected with said last mentioned control, whereby to halt operation of said carton-moving means while said unheated platen is resting on the top of said carton, and a second contact element actuating said last mentioned control so located as to be contacted by the carton when said carton is moved beneath said unheated platen.

WILFERD C. GIGLER.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,543,843	Gwinn	June 30, 1925
1,974,256	Bergstein	Sept. 18, 1934
2,160,008	Van Buren	May 30, 1939
2,281,304	Gillian	Apr. 28, 1942
2,341,845	Mark et al.	Feb. 15, 1944
2,555,874	Coughlin	June 5, 1951