

Nov. 17, 1959

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2,912,806

CARTON SEALING MACHINE

Filed Dec. 4, 1958

3 Sheets-Sheet 1

Fig. 1.

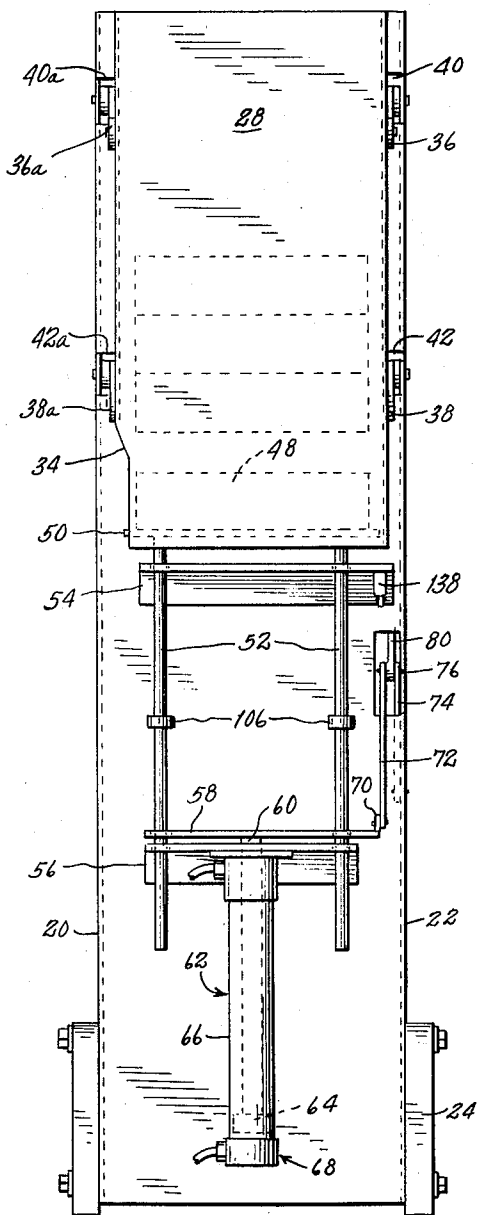
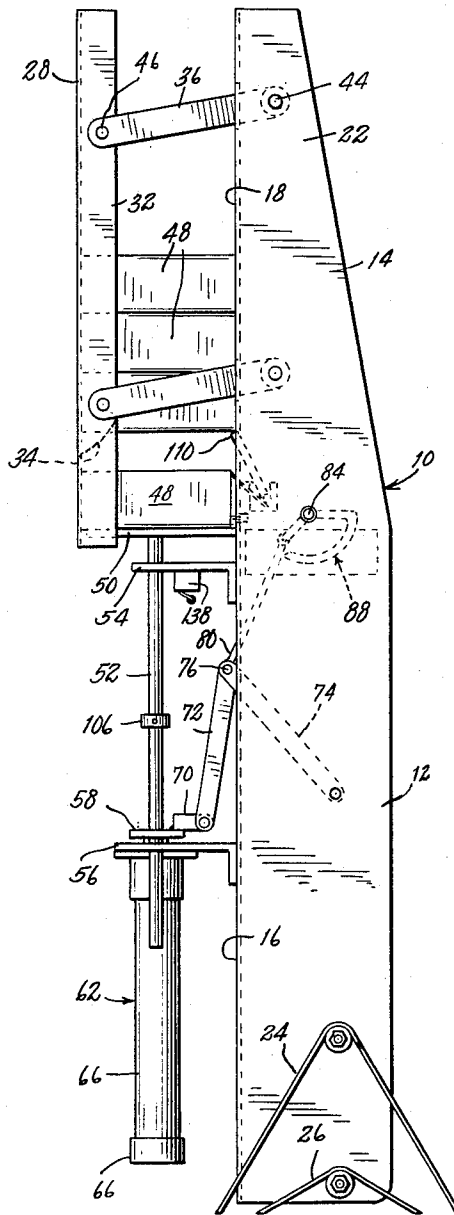


Fig. 2.



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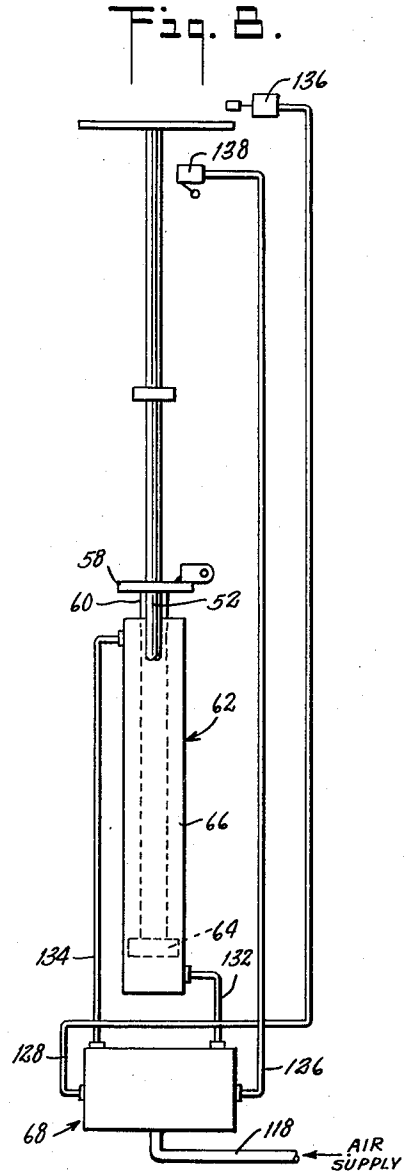
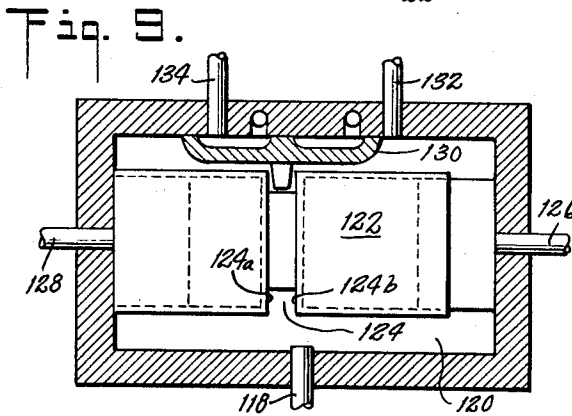
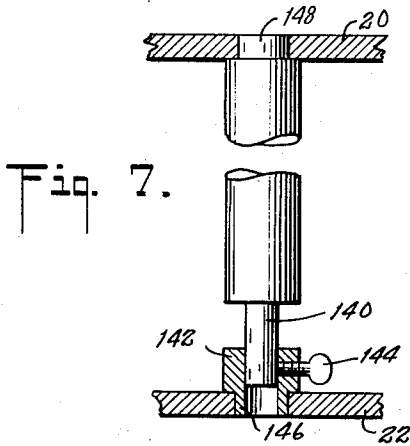
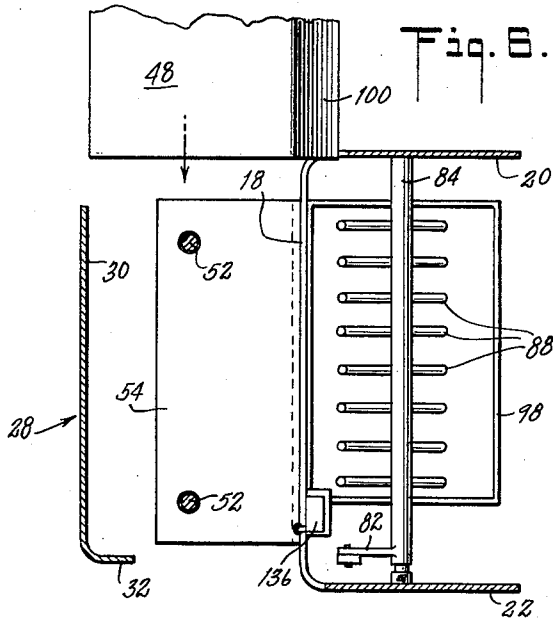
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CARTON SEALING MACHINE

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15 Claims. (Cl. 53—76)

This invention relates to a carton sealing machine. Specifically, the invention relates to a compact, semi-automatic machine for sealing the end flap of filled cartons.

Carton closing and sealing machines are common in the packaging industry, but known machines are so large and expensive that they are not economically available for use in many operations which today resort to the manual sealing of filled cartons.

It is, therefore, the primary object of this invention to provide a compact, inexpensive carton sealing machine which is largely automatic in its operation, and which can be used to advantage in packaging operations in which, for one reason or another, known sealing machines cannot be employed to an advantage.

The objectives of the invention are served herein by a machine which provides a pressure face and an articulated platen, forming therebetween a carton throat adapted to receive and to apply pressure to a series of cartons being sealed, in combination, with means for applying an adhesive to the flaps to be sealed and means for advancing cartons step-by-step through the carton throat wherein sealing contact is established and maintained long enough to insure a good seal.

The machine is characterized by a unique operating and control mechanism wherein a single motor device first operates an adhesive applying mechanism by which adhesive is applied to the underside of a carton flap to be sealed, and which then operates to advance the carton into the carton throat.

These and other objects, advantages and features of the machine will be pointed out in the following specification when read in conjunction with the drawings forming a part hereof and in which a presently preferred embodiment of the machine is illustrated.

In the drawings:

Fig. 1 is a face elevational view of a preferred form of the carton sealing machine comprising the invention herein;

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

Fig. 3 is a fragmentary side elevational view, partly in cross-section, showing the elements thereof at an intermediate point of an operative cycle;

Fig. 4 is a view similar to that of Fig. 3, however, showing the elements thereof at the end of an operative cycle;

Fig. 5 is a fragmentary view along line 5—5 of Fig. 4;

Fig. 6 is a cross-sectional view along line 6—6 of Fig. 4;

Fig. 7 is a detail view, partially in cross-section, illustrating the mounting of a paste comb pivot shaft;

Fig. 8 is a diagrammatic representation of a pneumatic operating motor and its related control system; and

Fig. 9 is a cross-sectional view through a pilot valve associated with the pneumatic operating motor of Fig. 8.

Reference to Figs. 1 and 2 will show that the operative parts of the sealing machine herein are mounted

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on a supporting channel 10 which consists of a base 12 and a head 14. The supporting channel consists of a lower face 16 and a pressure face 18 formed as an upward continuation of the lower face 16, a first side flange 20 and a second side flange 22. The supporting channel is held in an upright position, as shown in Figs. 1 and 2, by means of a pair of feet 24 and 26 at opposite sides thereof.

Attached to the head 14 of the supporting channel 10 is a pressure platen 28 which is in the form of a channel-like member having a platen face 30 (Figs. 3 and 4) disposed in confronting relationship to the pressure face 18 of the supporting channel head 14. As indicated in Fig. 6, the pressure platen 28 is preferably co-extensive, or nearly so, in width with the pressure face 18 of the supporting channel head 14 and the platen face 30 is defined by a pair of inwardly extending platen flanges 32 and 34. The pressure platen 28 is mounted on the supporting channel head 14 for limited parallel movement in respect to the pressure face 18 by means of parallel platen links 36 and 36a, near the top thereof, and a second pair of parallel platen links 38 and 38a, near the bottom thereof. The platen links are of equal length such that as the pressure platen 28 is raised or lowered, the space between its face 30 and the pressure face 18 of the supporting channel head 10 are maintained in parallelism.

The extent of movement of the pressure platen 28 is limited by the length of platen link slots 40, 40a, through which the respective upper platen links 36, 36a extend and by the length of similar slots 42, 42a, through which the respective lower platen links 38, 38a extend. One end of each of the platen links is mounted for rocking movement on studs extending inwardly from the side flanges 20 and 22 of the supporting channel head 14, as, for example, the stud 44 which mounts one end of the upper platen link 36. The other end of the platen links engage studs extending outwardly from the platen flanges 32 and 34 of the pressure platen, as, for example, in the case of a stud 46 on which the upper platen link 36 is connected to the flange 32 of the pressure platen.

From the foregoing, it can be seen that the pressure face 18 of the supporting channel head 14 and the platen face 30 of the pressure platen 28 between them form a yielding throat through which packages 48 undergoing sealing are adapted to pass.

Mounted within the throat, between the pressure face 18 and the platen face 30, is an elevator platform 50. This platform is supported by a pair of elevator rods 52 which are guided for vertical movement in an upper guide bracket 54 and a lower guide bracket 56. The guide brackets 54 and 56 are attached to the lower face 16 of the supporting channel 10, as by welding, for example. The elevator rods 52 also pass freely through holes in a crosshead 58 which is fixed to the end of a piston rod 60 constituting an operative element of a pneumatic operating motor 62; the pneumatic operating motor 62 being comprised of the piston rod 60, a piston 64, a cylinder 66, and a pilot valve 68.

Welded to one end of the crosshead 58 is a lug 70 which constitutes a pivot point for a first toggle lever 72 which, together with a second toggle lever 74, forms a toggle system by which motion is imparted to a paste applying mechanism. The first and second toggle levers 72 and 74 are pivoted together by means of a pivot pin 76, and the second toggle lever 74 has its other end mounted on a stud 78 which extends inwardly from the flange 22 of the supporting channel base 12 about which the lever 74 is adapted to rock. The pivot pin 76, by which the toggle links 72 and 74 are connected, also connects an operating shaft 80 to the toggle system. The

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operating shaft 80 extends from the pivot pin 76 of the toggle link system upwardly to a connecting finger 82 formed as a radial extension at one end of a paste comb pivot shaft 84; the free end of the operating shaft 80 and the free end of the connecting finger being connected by means of a pivot pin 86. The opposite ends of the paste comb pivot shaft 84 are journaled for rocking motion respectively in the first side flange 20 and in the second side flange 22 of the head section 14 of the supporting channel 10. The paste comb pivot shaft 84 carries a plurality of paste applying teeth 88 which, as best shown in Figs. 3 and 4, each comprises a generally radial steam portion 90 by which they are fixed to the paste comb pivot shaft 84 and a generally arcuate shaped portion 92 terminating in a free end 94 by which paste may be applied to the underside of a carton flap, as to be described more fully hereinafter.

It is now apparent that if air is admitted to the pneumatic operating motor 62 through its pilot valve 68 the piston 64 and the piston rod 60 will operate to carry the crosshead 58 upwardly. The toggle links 72 and 74 will be moved to the position shown in Fig. 3 such that the operating shaft 80 will rock the paste comb pivot shaft 84 in a clockwise direction with the result that the teeth 88 of the paste comb are moved through a body of paste 96 in a paste pan 98 to apply drops of paste to the inner surface of a carton end flap 100, as shown in Fig. 3.

The elevator platform 50 normally occupies the position shown in Figs. 1 and 2 when the piston rod 60 is retracted into the cylinder 66 of the pneumatic operating motor 62. In this position, the elevator platform 50 is at the lower edge of a flap slot 102 (Fig. 4) formed across the lower part of the pressure face 18. The flap slot 102 is at least as wide as the width of a carton on which the machine is intended to operate. Thus, when a carton 48, filled and sealed but for the flaps at one end, is laterally inserted into the throat formed between the platen face 30 and the pressure face 18 such that it rests on the elevator platform 50, its outer flap 100 will extend through the flap slot 102 at an angle, as shown in Fig. 3. If the pneumatic operating motor 62 is now operated to project its piston rod 60, the paste applying mechanism will operate as previously described to deposit spots of paste on the underside of the carton flap 100. After the application of the paste spots, it will be necessary to press the paste on the underside of the flap 100 into contact with an intumed underlying flap 104 such that an adhesive seal is effected. The actual sealing operation takes place upon the continued projection of the piston rod 60 whereby the carton 48 is elevated in the throat formed between the platen face 30 and the pressure face 18.

The elevator rods 52 carry a pair of stop collars 106 which are adapted to cooperate with the crosshead 58 to move the elevator rods 52 and the elevator platform 50 upwardly. Thus, as the pneumatic operating motor 62 continues to project its piston rod 60, the crosshead 58 will come into contact with the stop collars 106 with the result that the elevator rods 52 are carried upwardly during the movement of the crosshead 58 which is to follow. The upward limit of the piston rod 60 is shown in Fig. 4, wherein it can be seen that the elevator platform 50 has been carried upwardly into the carton throat to a point above the flap slot 102. During such upward movement, the flap 100 of the carton will move into contact with an out turned lip 108 which defines the upper edge of the flap slot 102. As the elevator platform 50 continues to push the carton 48 upwardly in the carton throat, the carton flap 100 will be pressed into contact with the underlying flap 104, such that an adhesive connection between the two is established. It is the object of the mechanism herein to maintain a constant pressure against the sealed end of the carton for a sufficient period of time to insure an effective adhesive

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connection between the carton flaps. To this end, the carton throat is made sufficiently long that a number of sealed cartons are accommodated therein before the first carton is present at the top of the throat from which it is removed.

The pressure platen 28 is sufficiently heavy to provide the necessary force to press the sealed end of the cartons against the pressure face 18 of the supporting channel head. It will be appreciated that the platen links 36, 38, etc. will permit constriction of the carton throat to the size of the cartons being processed therein, such that the weight of the pressure platen 28 is supported by the cartons themselves. This insures a sufficient pressure against the sealed flaps of the carton to establish a perfect seal.

A sealed carton or cartons are held above the flap slot 102 by means of a series of stop fingers 110 which, as best seen in Fig. 5, project through respective slots 112 formed in the pressure face 18 of the supporting channel head. The stop fingers 110 are formed in the free end of a stop plate 114 which is pivoted for rocking movement in a pair of stop plate pivot brackets 116 and 116a fixed, respectively, to the side flanges of the supporting channel head 14. Thus, when the elevator mechanism advances a carton upwardly in the carton throat, the advancing carton on the elevator platform 50 will rock the stop fingers 110 outwardly to permit the carton to pass but when the elevator platform 50 is withdrawn, after having advanced a carton beyond the stop fingers 110, the stop fingers will fall back into the carton throat to engage the bottom edge of the carton so advanced thereby supporting the bottom carton and any cartons thereabove in the sealing throat.

The operation of the machine is largely automatic by reason of a control system for the pneumatic operating motor 62 which includes a control valve in the path of a carton being inserted into the machine which initiates the sealing operation and a second control valve which is in the path of the crosshead 58 which terminates the sealing operation and restores the mechanism to a rest position.

Fig. 8 is a diagrammatic view of the pneumatic operating motor 62 and the associated control mechanism. Air from a suitable source of compressed air is admitted to the pilot valve 68 by way of a conduit 118. As seen in Fig. 9, the pilot valve comprises a valve chamber 120 in which reciprocates a valve spool 122. The valve spool 122 has a circumferential recess 124 which presents a pair of surfaces 124a and 124b of equal size such that air under pressure entering by way of the conduit 118 will maintain the valve spool 122 centrally located within the valve chamber. Opposite ends of the valve chamber are connected to vent conduits 126 and 128, respectively, such that if either of the vent conduits 126 or 128 is vented to the atmosphere the balanced condition within the pilot valve will be destroyed and the pilot valve will move toward the vented side of the valve chamber 120. The valve spool 122 is connected to a slide valve 130 which controls the entrance and egress of air from the cylinder 66 by alternately opening and closing air passages 132 and 134 which connect the pilot valve, respectively, to the bottom of the cylinder 66 and to the top thereof.

The vent conduit 126 has a spring pressed ball vent valve 136 at its far end, this valve being located adjacent the rear end of the elevator platform 50 in such position that as a carton 48 is properly positioned on the elevator platform 50 when the platform is in its retracted position, as shown in Fig. 3, the carton will contact the valve 136 and open the same, venting the left side of the valve chamber 120 to atmosphere by way of the vent conduit 128. The end of the vent conduit 126 with a similar spring pressed ball vent valve 138 attached thereto is located under the upper guide bracket 54, as shown in Figs. 1 and 2, such that when the crosshead 58 is

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moved to its extreme upper position, it will contact the vent valve 138 and open the same, thereby venting the right side of the valve chamber 120 to atmosphere. Thereupon the slide valve 130 will be shifted to connect the pressure conduit 134 to the pressure source.

From the foregoing it can be seen that as a carton to be sealed is inserted into the sealing machine by positioning the same upon the elevator platform 50 when the elevator is in its lower position, the rear of the carton as it is fully inserted will operate the vent valve 136 thereby venting the left side of the valve chamber 120 to atmosphere via the vent conduit 128. The valve spool 122 will thereupon move to the left within the valve chamber 120 such that the inlet 132 to the bottom of the cylinder 66 is opened. The piston 64 within the cylinder will be driven upwardly with the result that the crosshead 58 will operate the toggle links 72 and 74 from the position illustrated in Fig. 2 to that illustrated in Fig. 3. The flap 100 of the carton 48 will extend through the flap slot 102 as shown in Fig. 3 and thereby be in position to receive the application of paste as the paste comb teeth 92 are oscillated through the paste 96 in the paste pan 98. As the crosshead 58 continues to move upwardly, the paste comb will recede and the crosshead will engage the stop collars 106 such that the elevator rods 52 and the elevator platform 50 will begin to rise upwardly. During upward movement of the elevator platform 50, the carton 48, to whose flap the paste has been applied, will be carried upwardly such that the flap 100 will contact the flap closing lip 108 by which the flap will be turned inwardly as relative movement continues. Upon continued upward movement of the elevator platform 50, the flap 100 will be pressed into contact with the underlying flap 104 such that a good seal is developed between the flaps as previously described. As the elevator platform 50 reaches the upper end of its stroke, the stop fingers 110 will engage the bottom edge of the carton 48 and hold the carton against retrograde movement. At this time the crosshead 58 will come into contact with the vent 138 and open the same, the vent valve 136 having been released in the meanwhile by removal of the carton from contact therewith. When the vent valve 138 is opened, the right side of the valve chamber 120 will be vented to atmosphere by way of the vent conduit 126 such that the valve spool 128 will move to the right in the valve chamber, thereby venting the lower end of the cylinder 66 to atmosphere via its conduit 132 and admitting air to the upper end of the cylinder 66 via the conduit 134. The piston 64 will now be driven downwardly in the cylinder 66 such that the piston rod 60 and the crosshead 58 are returned to their normal position, as shown in Figs. 1 and 2.

Whether or not a pneumatic operating motor such as the motor 62 is employed will depend largely on the environment in which the sealing machine is to be used. Many food processing plants, such as dairies and bakeries, are required, for sanitary reasons, to cleanse all processing areas and equipment by the application of abundant quantities of water and for such installations, pneumatic operating motors are ideal since there is no water sensitive electrical equipment and circuitry employed in such equipment. For other installations, however, it may be entirely suitable to operate the sealing machine by means of electrical drive equipment.

The use of adhesives in any equipment demands that the adhesive receptacles and adhesive applying devices be readily removable for cleansing purposes. Accordingly, the paste pan 98 is removably mounted within the supporting channel and the paste comb pivot shaft 84 is removably mounted in the first and second side flanges 20 and 22 of the supporting channel. One way of mounting a paste comb pivot shaft for quick removal is shown in Fig. 7, wherein the shaft 84 (teeth not shown) has an elongated spindle 140 of reduced diameter at one end

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thereof which is adapted to receive and support a bearing hub 142 which may be fixed to the spindle 140 by means of a thumb screw 144. The spindle 140 is sufficiently longer than the bearing hub 142 to permit the bearing hub to slide inwardly on the spindle 140 thereby retracting its bearing surface 146 from the second side flange 22 in which it is journaled. When the bearing hub 142 is inwardly retracted, the opposite bearing 148 of the shaft 84 can be withdrawn from the first side flange 20 without difficulty and the entire paste comb assembly can be removed simply by removing the pivot pin 86 which connects the operating shaft 80 with the connecting finger 82 of the paste comb pivot shaft.

Removal of the paste comb assembly is important for still a further reason. Fig. 5 indicates a total of nine paste applying teeth constituting the means by which spots of paste are applied to the carton flap. This number may be desirable for one type of sealing operation, whereas more or fewer teeth may be more suitable for other sealing operations. Therefore, paste comb assemblies having a different number of paste applying teeth may be provided such that the machine can be adapted easily to the requirements of a particular sealing operation. Furthermore, the amount of paste applied by any particular paste applying tooth is dependent in large measure on the area at the end of the tooth which makes contact with the carton flap to be sealed. Therefore, if more or less paste is to be applied at any given spot on the flap being operated on, a paste comb can be selected which has even a greater or a less contact area. In other words, the end 94 of the teeth may be made blunt or relatively pointed to control the amount of paste that any tooth will apply and the ready interchangeability of the paste applying combs facilitate the selection of a comb of proper design for any particular operation.

While the fundamentally novel features of the invention have been illustrated and described in connection with a specific embodiment of the invention, it is believed that this embodiment will enable others skilled in the art to apply the principles of the invention in forms departing from the exemplary embodiment herein, and such departures are contemplated by the claims.

I claim:

1. In a carton sealing machine, a pressure face and an articulated platen forming therebetween a carton throat adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located in one end of said throat, adhesive applying means located along one side of said platform for applying adhesive to the flap of a carton on said platform, a drive motor, means for initiating operation of said drive motor, a connection between said drive motor and said adhesive applying means for first applying an adhesive to the flap of a carton on said platform, a connection between said drive motor and said platform for thereafter advancing said platform to advance a carton thereon in said carton throat, and means for restoring said platform after each carton sealing operation.

2. In a carton sealing machine, a vertical pressure face and a vertical articulated platen forming therebetween a vertical carton throat adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located at the bottom of said throat, adhesive applying means located along one side of said platform for applying adhesive to the flap of a carton on said platform, a drive motor, means for initiating operation of said motor, a connection between said drive motor and said adhesive applying means for first applying an adhesive to the flap of a carton on said platform, a connection between said drive motor and said platform for thereafter raising said platform to advance a carton thereon in said carton throat, and means for restoring said platform after each carton sealing operation.

3. In a carton sealing machine, a vertical pressure

7. In a carton sealing machine, a pressure face and an articulated platen forming therebetween a carton throat adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located in one end of said throat, a slot in said pressure face along one side of said platform for receiving the flap of a carton to be sealed, adhesive applying means located beyond said slot, a drive motor, carton operated means located in the path of a carton on

12. In a carton sealing machine, a pressure face and an articulated platen forming therebetween a carton throat

adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located in one end of said throat, a slot in said pressure face along one side of said platform for receiving the flap of a carton to be sealed, oscillating adhesive 5 applying means located beyond said slot, a drive motor, a connection between said drive motor and said adhesive applying means for oscillating said adhesive applying means to first apply an adhesive to a carton flap extending through said slot, a connection between said drive motor and said platform for thereafter advancing said platform to advance a carton thereon in said carton throat, and means for restoring said adhesive applying means and said platform after each carton sealing operation.

13. In a carton sealing machine, a pressure face and an articulated platen forming therebetween a carton throat 15 adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located in one end of said throat, a slot in said pressure face along one side of said platform for receiving the flap of a carton to be sealed, adhesive applying means located beyond said slot, a drive motor, a connection between said drive motor and said adhesive applying means for first applying an adhesive to a carton flap extending through said slot, a connection between 20 said drive motor and said platform for thereafter advancing said platform to advance a carton thereon in said carton throat, and means operable by a carton on said platform for energizing said drive motor.

14. In a carton sealing machine, a pressure face and an articulated platen forming therebetween a carton throat adapted to receive and apply pressure to a series 30 of cartons being sealed, a carton supporting and advancing

platform located in one end of said throat, a slot in said pressure face along one side of said platform for receiving the flap of a carton to be sealed, adhesive applying means located beyond said slot, a reciprocating motor, a direct connection between said drive motor and said adhesive applying means for first applying an adhesive to a carton flap extending through said slot, a lost motion connection between said drive motor and said platform for thereafter advancing said platform to advance a carton thereon in said carton throat, and means operable by a carton on said platform for energizing said drive motor.

15. In a carton sealing machine, a vertical pressure face and a vertical articulated platen forming therebetween a vertical carton throat adapted to receive and apply pressure to a series of cartons being sealed, a carton supporting and advancing platform located at the lower end of said throat, adhesive applying means located at one side of said platform for applying adhesive to a carton flap to be sealed, a drive motor, means operable by a carton on said platform for energizing said drive motor, a connection between said drive motor and said adhesive applying means for first applying an adhesive to the flap of a carton on said platform, a lost motion connection between said drive motor and said platform for thereafter raising said platform to advance a carton thereon in said carton throat, and means operable by said connection between said motor and said platform for reversing said drive motor and for thereby restoring said adhesive applying means and said platform after each carton sealing operation.

No references cited.