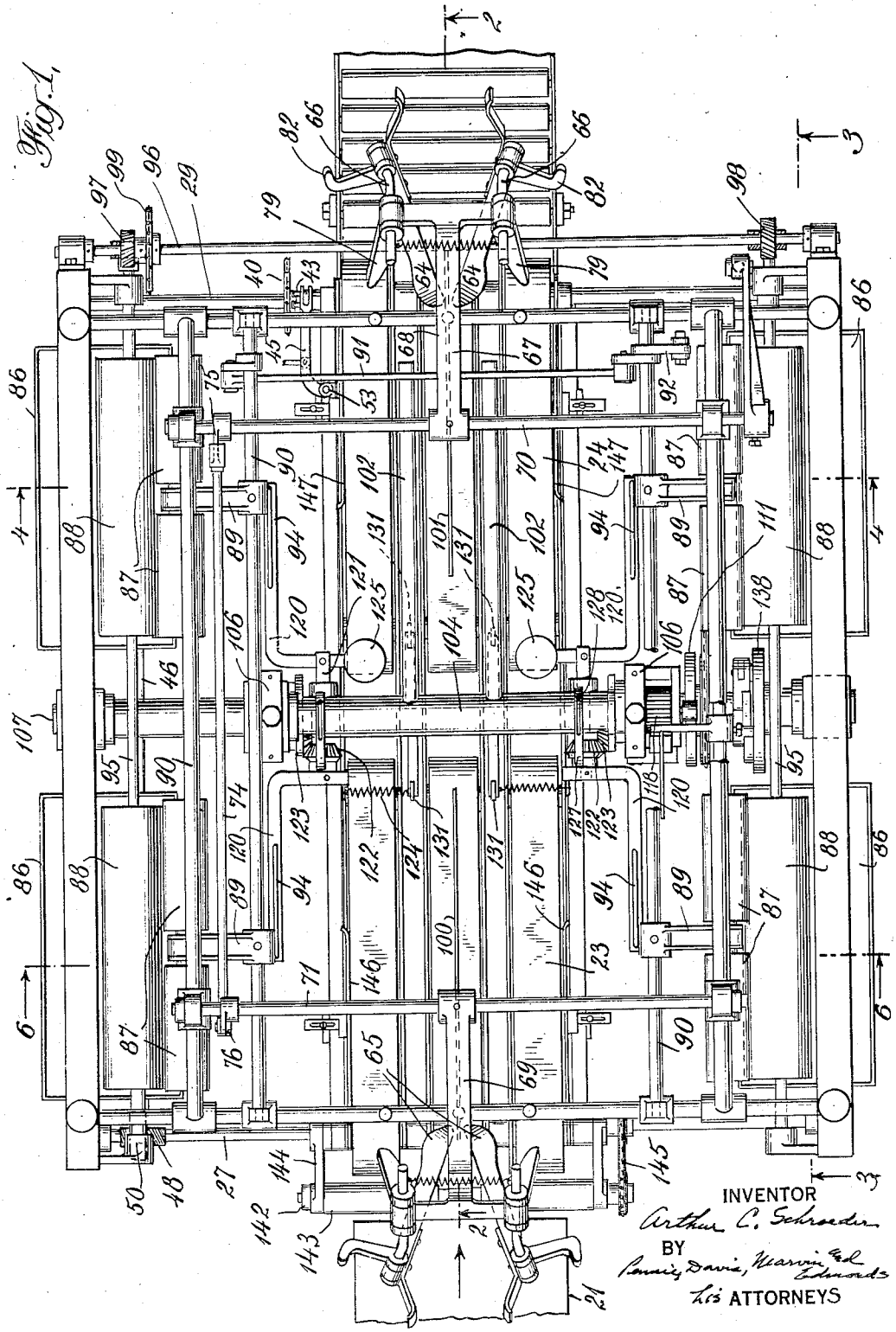
Oct. 28, 1930. A. C. SCHROEDER 1,779,985

CARTON SEALING APPARATUS

Filed Feb. 19, 1927 8 Sheets-Sheet 1

Fig. 1.



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CARTON SEALING APPARATUS

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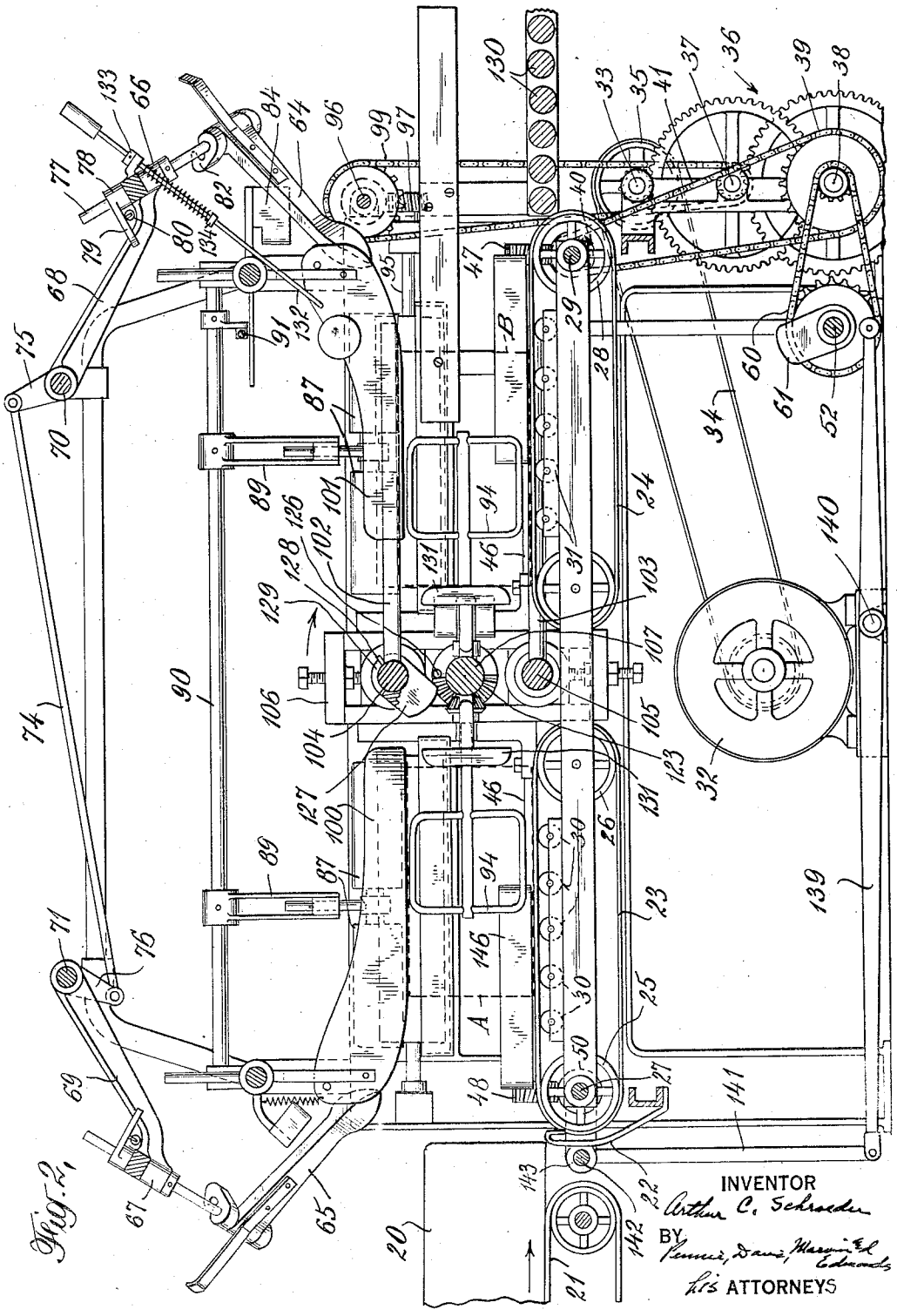


Fig. 2.

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CARTON SEALING APPARATUS

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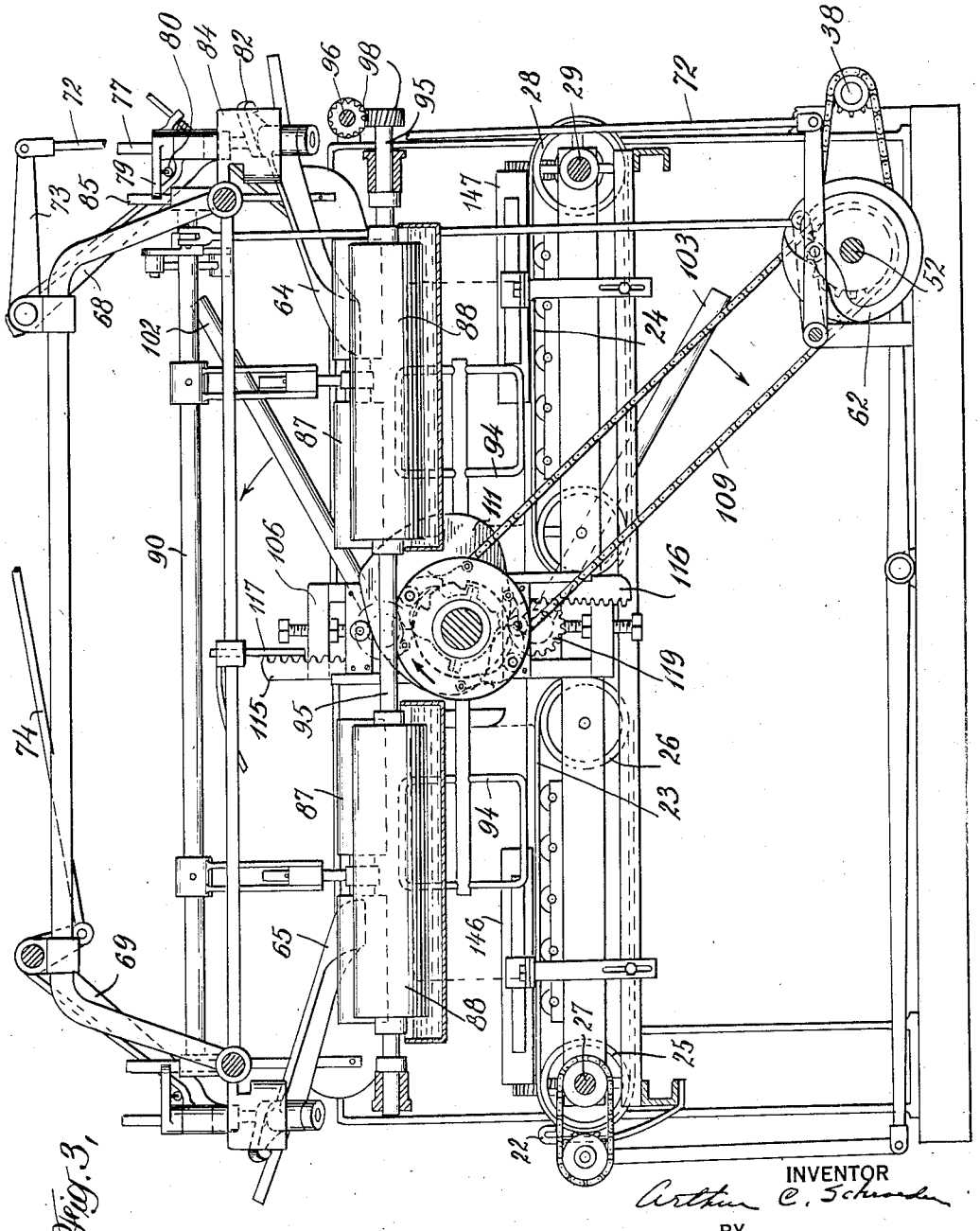


Fig. 3.

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CARTON SEALING APPARATUS

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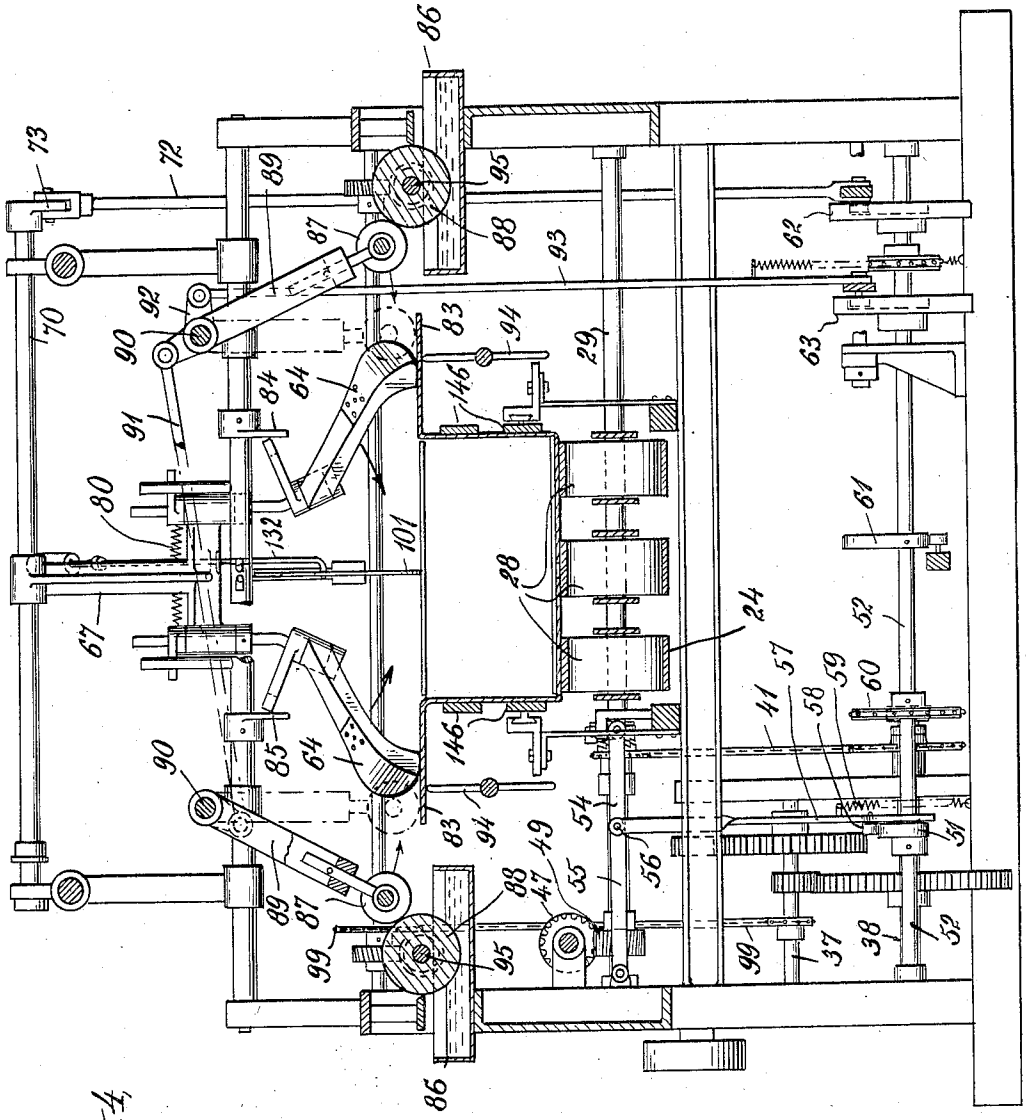


Fig. 4.

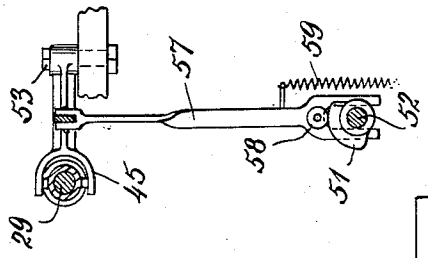
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CARTON SEALING APPARATUS

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Fig. 8.



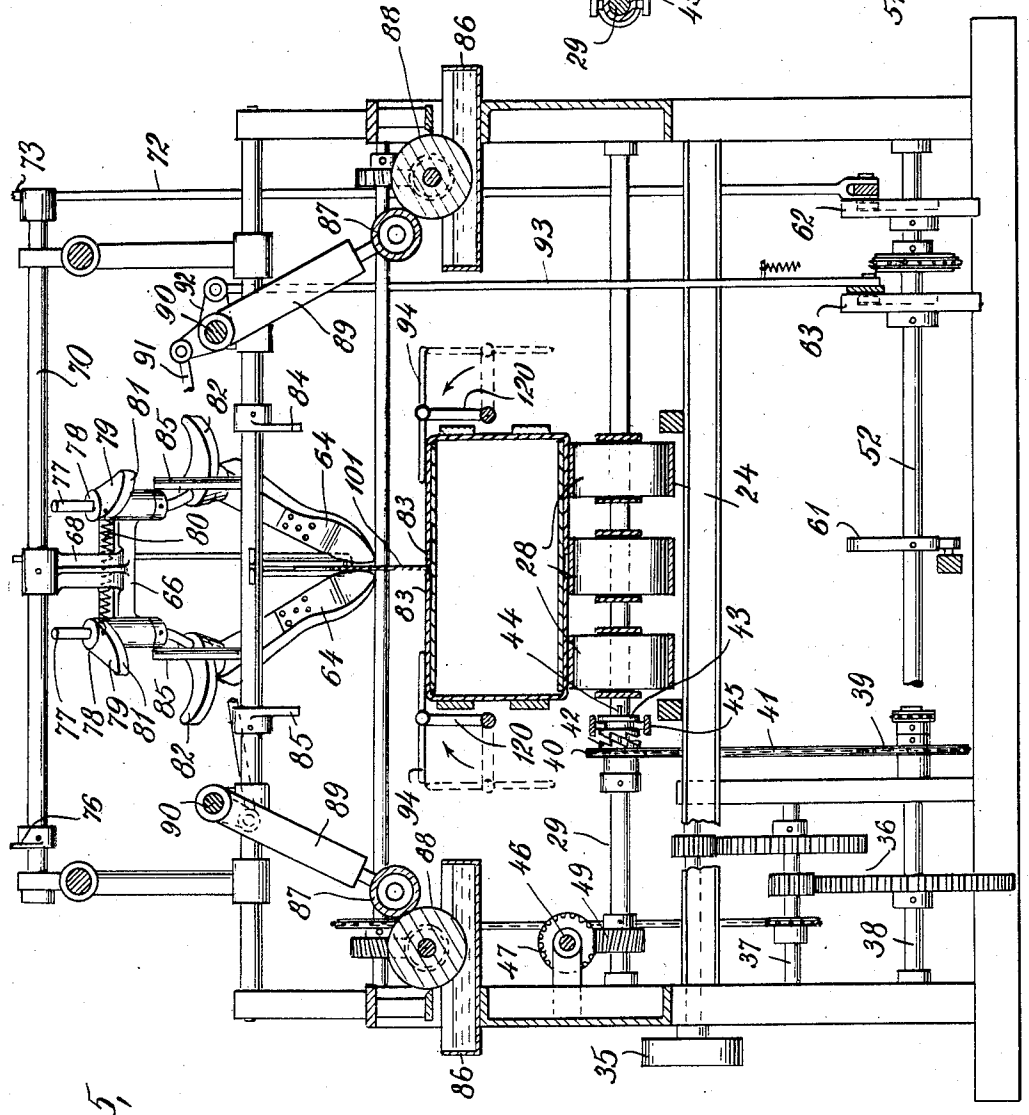


Fig. 5.

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CARTON SEALING APPARATUS

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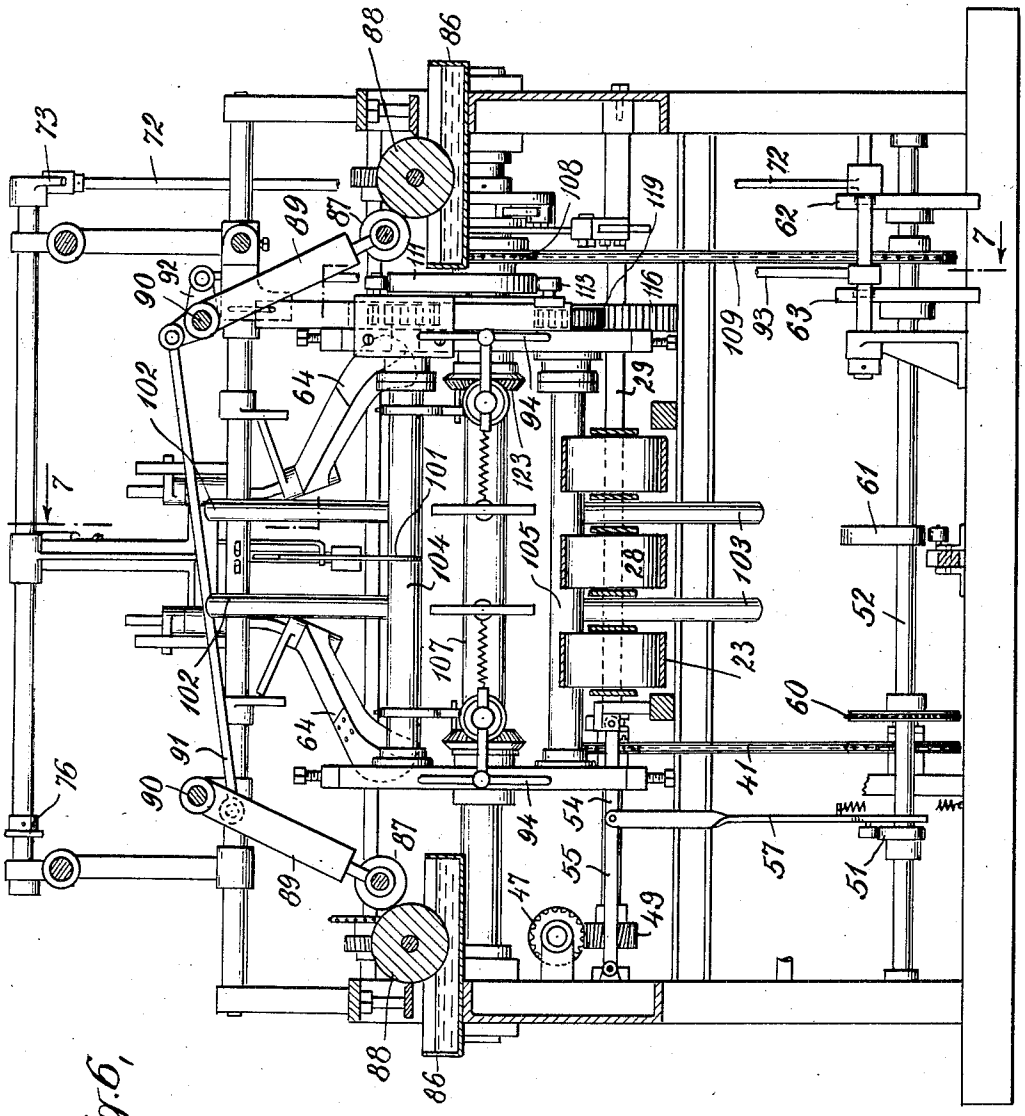


Fig. 6.

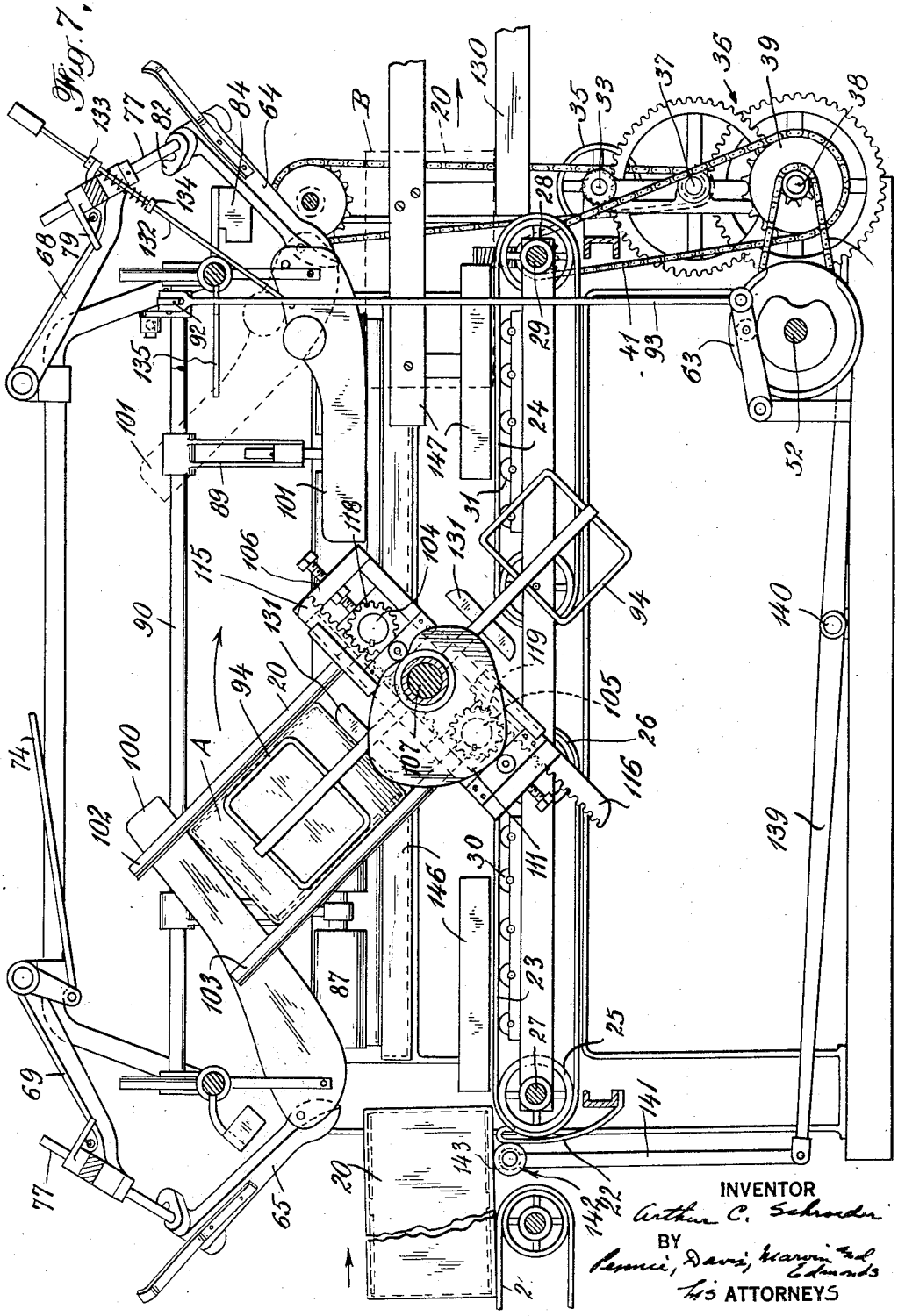
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CARTON SEALING APPARATUS

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Fig. 7.



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CARTON SEALING APPARATUS

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Fig. 9.

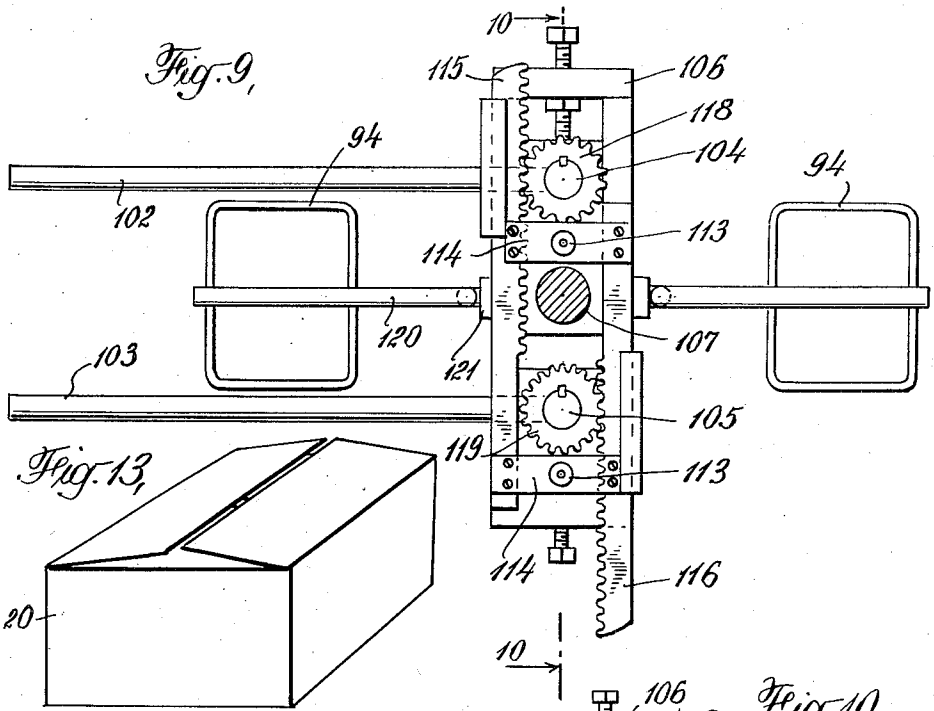


Fig. 13.

Fig. 11

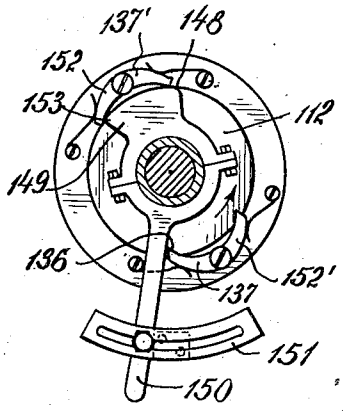


Fig. 10.

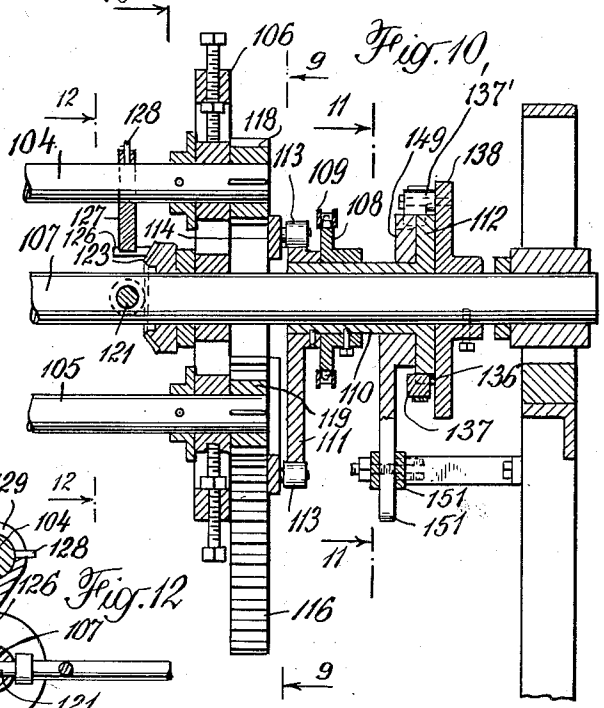
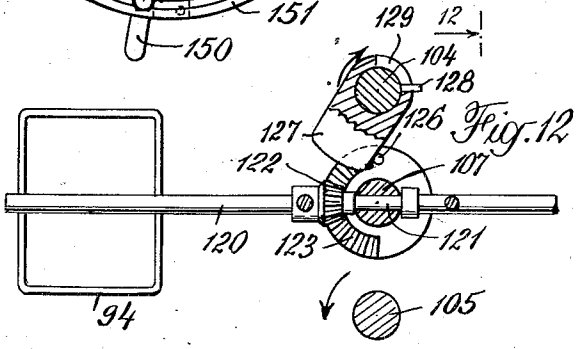


Fig. 12



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UNITED STATES PATENT OFFICE

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CARTON-SEALING APPARATUS

Application filed February 19, 1927. Serial No. 169,438.

This invention relates to improvements in apparatus for sealing cartons.

In packing certain classes of merchandise, such for example as soap, canned milk, soup and the like, cartons made of material such as fibre board or "composition", or "corrugated board" have come into quite general use. These cartons are usually closed by pairs of inner and outer flaps at both the top and bottom. According to the most convenient practice the cartons are filled with the merchandise before the flaps at either the top or bottom are sealed; both top and bottom flaps are, however, folded to the approximate position which they will finally occupy, and the carton is set aside until such time as it may be sealed.

The present invention has to do particularly with an improved apparatus for receiving such filled cartons with their flaps closed but unsealed, and performing such operations upon the carton as are necessary to completely seal the carton flaps and deliver the carton in sealed condition.

The principal object of the present invention is to provide an apparatus for sealing cartons which is entirely automatic in its operation, and requires no attention from an operator after it has once been adjusted to accommodate the particular size and quality of carton which it is desired to seal.

It is an additional object of the present invention to provide an apparatus in which the cartons remain stationary while the flaps are manipulated for the purpose of sealing them.

The general principle underlying the present invention is that of providing mechanism at a plurality of stations for simultaneously sealing the flaps of like faces of a plurality of cartons, and turning the cartons as they advance progressively from one station to the next so as to present an unsealed carton face to each succeeding station.

A further object of the invention is to provide mechanism of improved construction for manipulating the flaps, applying adhesive, that is gumming them, and for feeding the cartons to the sealing mechanism.

A further object of the invention is to provide a carton sealing apparatus which is capable of being readily reversed in its direction of operation for the purpose of removing damaged cartons which inadvertently may be allowed to reach the machine.

Briefly the carton sealing apparatus comprises carton feeding mechanism for periodically admitting the cartons one at a time to the apparatus, carton advancing mechanism for carrying the cartons admitted by the feeding mechanism forward to the first station, and for carrying the completely sealed cartons from the next station out of the machine; flap sealing mechanism at each station including flap openers, gumming mechanism and flap closers; and turning mechanism between adjacent stations for turning the carton angularly so as to present an unsealed face to each succeeding station.

The invention will be further described in detail in connection with the apparatus illustrated in the accompanying drawings which show by way of example an embodiment of the invention wherein two stations are provided, and consequently having a single turning mechanism disposed between these two stations. In the apparatus illustrated the turning mechanism operates through an angle of 180° and therefore completely turns over or inverts the carton. Also, in the apparatus illustrated, the turning mechanism transfers the carton from the first to the second station simultaneously with the turning movement.

In these drawings

Fig. 1 is a plan view of the machine with motor and drive omitted for clearness; turning of carton just completed; about to open flaps and gum;

Fig. 2 is a central longitudinal section taken on line 2—2 of Fig. 1;

Fig. 3 is a longitudinal side section taken on line 3—3 of Fig. 1; flap openers have moved down underneath the flaps but have not yet opened them; the turning mechanism is in the act of returning the turnover bars to the first station to receive another carton;

Fig. 4 is a transverse section taken on line 4—4 of Fig. 1 looking toward the exit or rear end of the machine, showing the flap openers

in outermost position, and showing also the adhesive applying mechanism;

Fig. 5 is a transverse section, similar to Fig. 4 with certain parts omitted, showing the flap openers withdrawn from the carton and showing also the movement of the flap supporters to close the flaps;

Fig. 6 is a section taken on line 6—6 of Fig. 1 looking toward the exit end of the machine, showing in elevation the mechanism for operating the flap supporters to close the flaps (see also Fig. 12); and also showing an elevation of the turnover mechanism (see also Figs. 9–11);

Fig. 7 is a longitudinal section taken on broken line 7—7 of Fig. 6 showing the turnover mechanism in the operation of inverting a carton; also showing the discharge of a completely sealed carton as well as a fresh carton being fed into the machine;

Fig. 8 is a detail of the clutch actuating mechanism;

Figs. 9 to 11 inclusive illustrate the turnover mechanism in detail;

Fig. 12 is a detail section of the flap closing mechanism taken on line 12—12 of Fig. 10; and

Fig. 13 is a perspective view of a carton before it is sealed.

Referring now to the accompanying drawings the cartons 20 are supplied to the machine on a suitable conveyer such for example as the endless belt 21. It is not unusual for this conveyer to be arranged on a gentle incline so that the cartons descend by gravity toward the sealing apparatus. The foremost carton 20 will therefore advance under the influence of gravity against a stop 22 secured in fixed position to a part of the frame of the sealing apparatus.

In describing the apparatus, however, instead of tracing the movement of a carton throughout the machine, we will assume that two cartons (shown in dotted lines at A and B, Fig. 2) have already been placed respectively at the first and second stations. It will be understood that the first station is at the entrance end of the machine which is to the left in Fig. 2 and that the second station is at the exit end of the machine which is to the right.

With cartons A and B in the positions just described the turning over of carton B has just been completed and carton A has just been admitted to the apparatus and advanced to the position shown. The flap sealing mechanism is about to open the flaps. Starting with the apparatus in this position we shall trace through the cycle of operation of the machine during which the structure of the various parts of the apparatus will be explained.

The carton A rests upon its closed but unsealed bottom flaps and carton B rests upon its closed sealed flaps and the cartons are supported upon a pair of sets of endless belts 23 and 24 of the carton advancing mechanism. Belt set 23 is carried upon suitably spaced pulleys 25 and 26, pulley 25 secured upon a shaft 27 adjacent the entrance end of the machine, and pulleys 26 being suitably journaled near the center of the machine adjacent the turning mechanism. Belt set 24 is similarly positioned at the exit end of the machine, the driving pulleys 28 thereof being secured to shaft 29. The spacing of these pulleys may be seen in Figs. 4, 5, 6 and 1. The upper passes of belts 23 and 24 are supported in horizontal position by series of table rolls 30 and 31 respectively so as to provide smooth horizontal supports for the bottoms of cartons A and B.

The belts 23 and 24 are periodically driven as follows. An electric or other motor 32 drives a shaft 33, journaled at the exit end of the machine, by means of a belt 34 which passes over a pulley 35. A train of gearing indicated generally at 36 serves to connect shaft 33 with two other shafts 37 and 38, and to operate these two shafts at correspondingly reduced rotational speeds. A sprocket 39 is provided on shaft 38 by which a sprocket 40 which is loosely mounted on belt shaft 29 is driven by an endless chain 41. Sprocket 40 forms a part of a clutch 42, the coacting movable member 43 of which is splined as indicated at 44 to shaft 29. The movable clutch member 43 is slidable longitudinally by means of a bifurcated arm 45 so as to throw the clutch into and out of gear and thus control the rotation of shaft 29 and the advance of the cartons. Shaft 29 is operatively connected with the other belt driving shaft 27 by means of a shaft 46 extending longitudinally of the machine and provided at its ends with spiral gears 47 and 48. These gears coact respectively with spiral gears 49 on shaft 29 and 50 on shaft 27. In this way shaft 27 is driven smoothly in unison with shaft 29 so that both of the endless belts 23 and 24 are advanced together whenever clutch 42 is thrown in.

The bifurcated arm 45 which throws clutch 42 into and out of gear is controlled by the mechanism shown in Figs. 8 and 4 by means of a clutch operating cam 51 which is secured to a cam shaft 52. The arm 45 is pivoted at 53 as shown in Figs. 8 and 1 to the frame of the machine so as to allow the arm to move in a horizontal plane passing through shaft 29. The means for operatively connecting the cam 51 to the arm 45 comprises the toggle members 54 and 55 pivoted to each other at 56 and also pivoted respectively to the arm 45 and to the frame of the sealing machine. A vertical link 57 is pivoted to the toggle members at their common joint 56 and has a roller 58 which travels on the surface of the cam. A spring 59 is arranged to keep roller 58 in contact with the cam and therefore

tends to open the toggle and bias the clutch 42 to the closed position. The clutch is thrown out of gear and the motion of the carton advancing belts 23 and 24 stopped when the cam raises link 57 against the action of spring 59.

The cam shaft 52 is driven at an extremely slow rotative speed by means of a chain 60 from the slow speed shaft 38 of gearing 36. This cam shaft carries cams in addition to the clutch cam 51 by which the various mechanisms of the sealing machine are caused to operate in appropriately timed relation with respect to one another. Thus cam 61 which we will call the feeding cam controls the carton feeding mechanism by which the cartons are admitted to the sealing apparatus at the appropriate time, and cam 62 actuates the flap opening mechanism; also cam 63 actuates the adhesive applying or gumming rolls. These various mechanisms are to be described below.

Having referred briefly to these parts of the apparatus, let us now return to the consideration of the sequence of operations performed upon the cartons by the carton sealing apparatus. It will be remembered that cartons A and B have been assumed to be in position in the two operating stations of the machine, carton A being at the first station, and carton B being at the second station.

With the cartons at these stations the flap sealing mechanism commences to operate, clutch 42 having been thrown out by clutch cam 51 so that the carton advancing belts 23 and 24 are stationary. The flap sealing mechanism at each station is identical and the two mechanisms are actuated simultaneously so as to open the outer top flaps of both cartons A and B at the same time. These flap openers consist of a pair of fingers 64 for opening the flaps of carton B and 65 for operating upon flaps of carton A. The fingers are suitably shaped at their ends to enter beneath the outer carton flaps which usually open slightly at the center of the carton as indicated at Fig. 13 due to the natural stiffness of the material. The fingers 64 and 65 are caused first to move inwardly beneath the carton flaps with their inner ends close to one another, and are then forced apart so as to open the carton flaps by turning them on their hinges.

The pairs of arms 64 and 65 are mounted respectively upon the T-shaped heads 66 and 67 of a pair of rocker arms 68 and 69 respectively. These rocker arms 68 and 69 are fixed to rock shafts 70 and 71 respectively. The details of the mounting of arms 64 and 65 upon the rocker arms 68 and 69 are of especial construction which will be presently described.

As soon as cartons A and B reach the first and second stations as above referred to the ends of fingers 64 and 65 are caused to descend toward the carton flaps by means of the flap opening cam 62 which is operatively connected with shaft 70 by means of a connecting rod 72 and a crank arm 73. The angular movement thereby imparted to shaft 70 is transmitted to shaft 71 by means of connecting rod 74 and the cranks 75 and 76.

The mounting for securing the pair of fingers 64 to the heads 66 of the arm 68 comprises a pair of rods 77, one for each finger 64, upon the lower ends of which these fingers are pivoted so as to permit angular movement of the fingers with respect to the rods. The lower ends of these rods are bent outwardly so that angular movement of the rods alters the position of the pivotal axis of the fingers 64 thereon. The upper portions of these rods passing through apertures in the head 66 are rotatable therein. Collars are secured to rods 77 above and below the head 66 so as to prevent the rods from moving laterally in these apertures, and the upper collars 78 are each provided with projections 79 which extend inwardly at right angles to the rods. These projections serve two functions. First, they provide means to which to secure the spiral spring 80 which by tending to angularly displace rods 77 urges outwardly the lower bent portions of the rods to the position shown in Fig. 5. Second, cam surfaces 81 are formed on these projections for the purpose of gradually swinging the lower bent portions of the rods 77 inwardly to change the angular position of the pivotal axis of the fingers 64 for a purpose which will appear presently. A second pair of cam-like projections 82 are secured directly to the fingers 64 and extend substantially at right angles thereto for the purpose of rotating the fingers about their pivotal axes on the rods 77.

The mounting of the pair of fingers 65 upon the arm 69 is exactly the same as just described in connection with fingers 64.

The ends of fingers 64, continuing their descent under the action of cam 62 as above referred to, enter beneath the outer top flaps 83 of cartons A and B raising these flaps somewhat because of the thickness of the fingers. When the pairs of fingers 64 and 65 have advanced beneath the flaps to the position shown in Fig. 3 the cam projections 82 and 79 come in contact respectively with stationary vertical plates 84, and vertical stationary bars 85 on the frame of the apparatus. This causes a simultaneous rotation of fingers 64 about their pivotal axes upon rods 77 and a rotation of the rods 77 themselves which displaces the pivotal axes from their normal outward position to which they are biased by spring 80. As the result of the compound movement thus given to fingers 64 the ends of fingers 64 are forced apart and in so moving travel substantially in a single horizontal plane even though the arms 68 continue to move downwardly. The motion of

the fingers 64 after cams 82 and 79 come into action unfolds the flaps 83 and opens them to the position which they occupy in Fig. 4, and this outward movement is not interfered with by the engagement of the fingers with the inner carton flaps because such engagement is prevented by the change in angular position of the pivotal axes of the fingers.

The flaps are now in position to receive adhesive which is applied to the upper surfaces of the opened flaps by the gumming mechanism. The gumming mechanism comprises for each station a pair of adhesive receptacles 86, a pair of adhesive applying rollers 87 and a pair of adhesive transfer rollers 88 for lifting the adhesive from the receptacles 86 and spreading it in a thin film upon the surfaces of rollers 87. Adhesive rollers 87 are mounted at the ends of rocker arms 89 which are fixed to a pair of shafts 90 that extend longitudinally of the machine so as to carry the rocker arms 89 and adhesive rollers 87 for both the first and second stations.

These rock shafts are connected by a connecting rod 91 and short cranks, as in the case of shafts 70 and 71 of the flap opening mechanism, so that rotation of either of the two shafts 90 causes the other shaft to rotate an equal amount in the opposite direction. One of shafts 90 is provided with an actuating crank 92, and a connecting rod 93 joins this crank with the adhesive roller actuating cam 63.

The timing of the flap opening cam 62 and adhesive roller cam 63 is such that as the adhesive rolls 87 are moved in the direction of the arrows in Fig. 4, the fingers 64 have reached their outermost position and recede just in advance of rolls 87. As the rolls 87 reach the dotted position shown in Fig. 4 they come in contact with the upper surfaces of flaps 83 and the film of adhesive is transferred from the rolls to the flaps, the flaps being supported and held in contact with the adhesive rolls during this operation by means of the rectangular shaped flap supports 94.

The advance of rolls 87 is continued until adhesive is swept upon as much of the surface of flaps 83 as is desired, and then the cam 63 causes the movement of the rolls 87 to reverse and returns them to their normal outward position in contact with the adhesive transfer rolls 88 so that the film of adhesive which has been removed may be replenished. The transfer rolls 88 are rotated continuously. These rolls are secured upon a pair of shafts 95 which extend longitudinally of the machine along each side thereof, thereby carrying the transfer rolls 88 for both the first and second stations. Shafts 95 are appropriately journaled near their ends in the machine frame, and are interconnected at the exit end of the machine by means of a cross shaft 96 and spiral gearing 97 and 98. The cross shaft 96 is driven by a chain 99 from a sprocket on shaft 37 of the gearing 36.

Each of the adhesive rolls 87 is broken away in the center as indicated in Figs. 1, 2, and 3 so as to leave a portion at the center of each flap which is uncoated with adhesive, this being desirable inasmuch as the inner margins of the inner flaps of the cartons ordinarily do not meet. If the surface of the outer flaps between the margins of the inner flaps is coated with adhesive it is liable to soil the contents of the carton. Adhesive rolls 87 are provided with an adjustable mounting at the ends of rock shafts 89 so as to facilitate the adjustment of the rolls with respect to the flap supports 94, and so as to accommodate cartons of different size.

The operation of the mechanisms just described is the same for both the first and second stations so that the flaps 83 of both cartons A and B have been opened simultaneously, and adhesive has been applied to them simultaneously.

The flaps having been gummed the next operation is that of turning the flaps to their closed position which is accomplished by movement of the rectangular supports 94 which served to support the flaps during the application of the adhesive. This movement of supports 94 takes place as indicated in Fig. 5 and refolds the flaps 83 about their hinges so that their gummed surfaces are pressed down upon the surfaces of the inner carton flaps. During this closing of the flaps thin blades or fins 100, and 101 rest upon the inner carton flaps of cartons A and B respectively. If flaps 83 do not turn accurately on their hinges each time they are refolded, their inner margins will tend to overlap one another and the thin fins 100 and 101 provide smooth surfaces over which the inner margins of the flaps 83 slide as they approach their final position, and thus the flaps are forced outwardly bringing the corners of the carton into proper position and separating the margins of the flaps by the thickness of the fins.

The flap supporters and closers 94 are a part of the mechanism for turning or inverting the carton, and having proceeded to the point where the flaps of both cartons are closed by these members, we will now return in our description to mention the events which have taken place in connection with this turning mechanism since the cartons A and B arrived at stations 1 and 2 respectively, or, in other words, to recite the movements of certain members of the turning mechanism which have occurred during the opening, gumming and closing of the flaps.

The carton turning mechanism consists of two sets of bars 102 and 103 which when

parallel with one another form a cradle for the carton and transfer it bodily from the first station to the second station as may be seen by referring to Fig. 7. Bars 102 and 103 are secured at their inner ends to shafts 104 and 105 which extend transversely of the sealing apparatus and are rotatably mounted at each end in a rectangular framework 106. Framework 106 comprises similar rectangular members firmly mounted upon a central shaft 107 at the ends of shafts 104 and 105 and spaced inwardly somewhat from the respective sides of the sealing machine. Shaft 107 is journaled at each side of the sealing machine in the machine frame. Inasmuch as the two members of the frame 106 are both firmly mounted upon shaft 107 they may be turned together bodily, and when so turned the rotation of shafts 104 and 105 is prevented as will be presently described, the bars 102 and 103 being held in parallel relation as shown in Fig. 7 thereby forming the cradle for the carton. When the turning of the carton is completed, however, the bodily rotation of frame 106 is arrested and shafts 104 and 105 are set rotating so as to return bars 102 and 103 in the direction shown by the arrows in Fig. 3 from the second station to the first station.

This return movement of bars 102 and 103 commences as soon as these bars reach the position shown in Fig. 2 where they have just deposited carton B at station 2, or, in other words, this return movement of bars 102 and 103 starts substantially simultaneously with the descent of fingers 64 and 65 toward the carton flaps, and in Fig. 3 when fingers 64 and 65 have entered beneath the flaps bars 102 and 103 are well on their way towards the first station.

This backward rotation of bars 102 and 103, and the entire operation of the turnover mechanism including the control of the movement of turnover frame 106 is accomplished in the following manner.

Referring particularly to Fig. 10 and also to Figs. 3, 7, 9 and 11 a sprocket 108 is driven continuously in the same direction by means of a chain 109 from the continuously rotating cam shaft 52. Sprocket 108 drives a quill 110 upon the inner end of which a large cam 111 is secured, and on the outer end of which a disc 112 is mounted. Cam 111 and disc 112 therefore rotate continuously as long as motor 32 is operating.

The disc 112 is arranged to drive the turnover frame shaft 107 to bodily rotate the turning frame 106, and cam 111 serves to rotate the shafts 104 and 105 which support the turnover bars 102 and 103, all as will presently appear. Since we are at the point of our cycle of operations where the turnover bars 102 and 103 are returning to the front of the machine, we will first describe the operation of cam 111. Coacting with points on this cam 180° apart is a pair of rollers 113 which are mounted upon cross pieces 114 (Fig. 9) which serve to connect two rack bars 115 and 116 which are arranged to slide upon the opposite sides of the member of turnover frame 106 which is adjacent cam 111. As long as turnover frame 106 is bodily rotating with the shaft 107 there is no relative movement between cam 111 and the turnover frame and consequently rack bars 115 and 116 do not move relative to the turnover frame.

In the condition of affairs illustrated in Fig. 3 rack bar 115 engages a relatively long stop member 117 fixed to the frame of the sealing machine thereby holding the turnover frame 106 stationary. In the position of the parts shown in Fig. 3, therefore, cam 111 is moving rack bars 115 and 116 downwardly relative to frame 106. This movement causes the teeth of the racks which engage pinions 118 and 119 fixed respectively to turnover bar shafts 104 and 105, to rotate these shafts in their journals and move the turnover bars 102 and 103 in the direction shown by the arrows in Fig. 3. The flap closers 94 are secured at each end of a double crank shaped member 120 (Fig. 1) and the central portion 121 of this crank turns freely in an aperture passing through shaft 107 at right angles to the frame members 106 and adjacent thereto. A beveled gear 122 on the central portion 121 meshes with a beveled gear sector 123 which turns loosely on shaft 107. The double crank 120 is rotated by this beveled gearing as will appear below to cause the flap supporters 94 to move from the dotted position shown in Fig. 5 to the full line position to effect the closing of the flaps. Crank 120 is biased to the position shown in Fig. 1 which corresponds with the dotted position of Fig. 5 by means of a spring 124 and also by a weight 125. This flap supporting mechanism is duplicated on the two sides of the carton near the ends of turnover frame 106.

As the rotation of shafts 104 and 105 progresses carrying the bars 102 and 103 nearly to their horizontal position at station 1, and just after the adhesive rolls 87 have receded after gumming flaps 83, a pin 126 (Fig. 12) which projects from the side of beveled gear sector 123 is engaged by an element 127 mounted upon turnover bar shaft 104. Element 127 is loosely mounted upon shaft 104 which at this position is caused to rotate with the shaft because of the presence of a pin 128 which extends from the surface of the shaft and engages one end of a slot 129 in element 127. The continued rotation of shaft 104 therefore causes the beveled gear sector 123 which as mentioned above is loosely mounted on shaft 107 to rotate, thus rotating beveled gear 122, and the double crank 120 and causing the flaps 83 to be closed by the movement of the supporters 94. The lengths of element

127 are such that when the double crank 120 has moved through an angle of 90°, pin 126 passes beyond the end of element 127 and the double cranks fly back to their normal position under the influence of springs 124 and weights 125.

Just after this closing of the flaps takes place the clutch 42 is thrown in by clutch cam 51 and the carton advancing mechanism is set in operation. Carton B having been completely sealed immediately starts on its movement out of the machine being carried forward on belt 24 and discharged onto the conveyer table 130. Belt 23 slides for a moment on the bottom of carton A, the forward end of which is against the stop members 131.

Fin 101 at station 2 is thrown up to the dotted position shown in Fig. 7 by a slight further raising of arm 68 under the influence of flap opening cam 62, this movement of the arm 68 being transmitted to the fin through a rod 132. Rod 132 is pivoted to the fin 101 and passes through an aperture in the head of arm 68. Collars 133 and 134 are adjustably mounted upon rod 132 for adjusting the movement of the fin. When the fin is thrown up to the dotted position just referred to it is caught in a pair of friction fingers 135 which hold the fin in this position after the arms 68 have again descended.

The turnover bars 102 and 103 have now completed their return movement to the first station and at this instant rack bar 115 (Fig. 3) reaches the bottom of stop 117, and a notch 136 in disc 112 (Figs. 11 and 10) engages a spring pressed pawl 137 which is pivoted on the face of a second disc 138 that is secured firmly to turning frame shaft 107. It will be remembered that disc 112 rotates continuously and hence the bodily rotation of the turnover frame now commences, the lower bars 103 passing upwardly between the spaced pulleys 28 of the belt 23 and gradually raising carton A off from this belt. The upper turnover bars 102 are in contact with the top of carton A and are maintained in fixed relation parallel to bars 103 through the pinion rack and cam mechanism previously described.

At this time feeding cam 61 (Fig. 2) has rotated to a position almost 180° from the position shown in that figure and has engaged a roller on the end of a long lever 139 which is pivoted at 140 about midway of the machine and extends to the forward end of the sealing apparatus where it is connected by a link 141 with a lifting mechanism 142 which begins to lift the forward end of the carton 20. This mechanism (Fig. 1) comprises a roller 143 which is pivoted at the outer ends of a pair of arms 144 and positively driven by chain 145 from shaft 27 of the carton advancing mechanism.

As carton A rises it lifts the inner end of fin 100 which is pivoted at its opposite end on the frame of the machine, and when carton A has been elevated to about the position shown in Fig. 7 feeding mechanism 142 has raised the forward end of the new unsealed carton 20 above the top of stop 22, and allows the carton to advance onto the belt 23. If the endless belt 21 is inclined as previously mentioned the weight of the cartons behind the carton 20 will push this carton forward onto belt 23. If, however, belt 21 is substantially horizontal the tractive effort of the positively driven roll 143 will push carton 20 forward onto belt 23. As soon, however, as the rear end of carton 20 leaves the roll 143, cam 61 promptly lowers the roll so that the carton immediately behind will be arrested by the stop 22.

The belt 23 slowly carries carton 20 into the position previously occupied by carton A at the first flap sealing station. When the forward end of the carton strikes the stops 131 the belt will slide on the bottom of the carton and hold the carton firmly in place against these stops so that it will be in the right position to be operated upon by the flap sealing mechanism.

Guides 146 are placed along each side of belt 23 to insure that the cartons are held in the correct position laterally. Similar guides 147 cooperate with belt 24 in maintaining the lateral position of the cartons at the second station, and in delivering them from the apparatus onto the table 130.

As soon as carton A has been carried by the turnover mechanism beyond the end of fin 100 this fin falls back by gravity into horizontal position on the top of the new carton 20 which has now taken the place of carton A at the first station. The continued rotation of turnover frame 106 results in the depositing of carton A on belt 24 at the second station. During this transfer from station No. 1 to station No. 2, however, carton A has been inverted and the top carton flaps which were sealed at station No. 1 now rest upon belt 24, and the botton flaps of carton A are presented upwardly to the flap sealing mechanism of station 2. It will be remembered that fin 101 has, previous to the operation of the turnover mechanism, been lifted to the dotted position shown in Fig. 7, and held in this position by the friction fingers 135, and hence it is removed from the path of the carton.

Bodily rotation of turnover frame 106 is stopped by the simultaneous engagement of rack bar 115 with the stop 117 shown in Fig. 3, and the lifting of pawl 137 (Fig. 11) out of notch 136 by the corner 148 of the stationary but adjustable lifting cam 149 (Fig. 10). Lifting cam 149 is mounted in closely adjacent relationship to the disc 112 on the exterior of quill 110, and pawl 137 is made wide enough to overlap the lifting cam.

Lifting cam 149 is capable of being accurately adjusted by means of the handle 150 and sector 151 so as to accurately time the lifting of pawl 137 out of its slot with respect to the contacting of the rack bars with stop 117. A second pawl 137′ and notch corresponding to notch 136 are located 180° from pawl 137 and notch 136 to effect the next turnover operation and it will be understood that alternate turnover operations are effected by each of these pawls.

In order to provide for the operation of the turnover mechanism in the reverse direction to facilitate the removal of a damaged carton from the turnover frame, another set of pawls 152 and 152′ are provided, these being pivoted on the same pivots as pawls 137 and 137′ by extending in the opposite direction. Notches for the reception of these pawls are to be found in disc 112. The width of lifting cam 149 is made substantially equal to the distance between a pair of oppositely directed pawls as is to be seen in Fig. 11 so as to appropriately position the second corner 153 of this cam to lift pawls 152 and 152′ out of their coacting slots at the proper time when the turnover mechanism is reversed. If it were not for provision for reversing, lifting cam 149 could be very short since it is only necessary to force the pawl out of its notch in order to stop the rotation of the turnover frame.

Just before the carton A is deposited upon belt 24 clutch 42 is again thrown out by clutch cam 51 so that belt 24 will be stationary when it receives the carton.

As soon as the angular bodily movement of the turnover frame 106 is arrested by the release of pawl 137 and the engagement of rack bar 116 with stop 117, the relative movement of cam 111 with respect to the turnover frame again commences since cam 111 rotates continuously as previously described, and this relative movement again promptly starts the downward sliding movement of the rack bars 116 and 115 which again initiates the return movement of the turnover bars 103 and 102 in the direction of the arrows indicated in Fig. 3.

This brings us back to the same point in the cycle at which our description started, and the flap sealing mechanism again commences to operate, the first movement of this mechanism being the descent of flap opening fingers 64 and 65 beneath the flaps of the two cartons. The flap sealing operation which is now about to take place completes the sealing of carton A which is now in station 2, and seals one face, namely the upper face of carton 20 which is in station 1.

Briefly summarizing the cycle of operations of the sealing machine, assuming that cartons A and B are both in position at stations 1 and 2 on belts 23 and 24 respectively, the flap sealing mechanism consisting of the opening fingers 64 and 65, the gumming rolls 87, and the combined supporters and flap closers 94 operate on the outer flaps of the upper faces of both cartons. Meanwhile the turnover bars 102 and 103 of the turnover mechanism 106 are returning in the direction of the arrows shown in Fig. 3 from station 2 to station 1.

Upon the completion of this sealing operation the carton advancing mechanism comprising belts 23 and 24 is set in motion discharging carton B from the machine upon the conveyer table 130. Belt 23, however, merely slides on the bottom of carton A for a moment until the turnover mechanism lifts the carton from belt 23 at the commencement of turnover. As soon as carton A has been elevated enough to make room for a new carton at station 1 the carton feeding mechanism 142 admits the fresh carton and assists belt 23 in feeding it into position at the first station against the stops 131.

The continuation of the rotation of the turnover mechanism transfers carton A from station 1 to station 2 in the inverted position, the sealed face of carton A which was uppermost at station 1 being now in contact with belt 24, and its unsealed face which rested on belt 23 at station 1 being now placed upwardly at station 2 so as to be in position to be acted upon by the next operation of the carton sealing mechanism which promptly follows the turnover operation.

Tracing the path of a single carton through the sealing apparatus, we find that the carton enters the machine on a conveyer belt 21 and is automatically fed to the machine by the trigger mechanism 142 and carried further by the carton advancing belt 23 until the forward end of the carton strikes stop 131. Upon reaching this position the flap sealing mechanism comprising the flap opening fingers 65, the adhesive rolls 87, and the combined flap supporters and closers 94 successively open, gum, and close the flaps of the upper face only of the carton.

Upon completion of the sealing of this upper face of the carton the carton turnover mechanism lifts the carton bodily in the direction of the arrow of Fig. 7 and turns it completely over, depositing it upon carton advancing belt 24 at the second flap sealing station at the right hand end of the machine. During this turnover operation, a fresh carton is fed to station 1 on belt 23 by feeding mechanism 142, and when the turnover operation has been completed the flap sealing mechanism again operates to effect the sealing of the flaps on the top faces of both cartons, the face of the carton on belt 24, which is presented to the sealing mechanism being the bottom of this same carton which was in contact with belt 23 when the carton was in station 1. As soon as this operation of the flap sealing mechanism is completed the car-

ton at station 2 has been completely sealed and it is discharged upon the conveying table 130.

I claim:

1. In a machine for sealing filled cartons having two stations, means for successively advancing cartons to one of said stations, means for stopping each carton at said station, means for successively removing cartons from the other station, flap sealing means at each station for operating upon a portion of the carton flaps to seal the same while the cartons remain in stationary position, means for simultaneously actuating the flap sealing means at both stations, means for transferring the cartons from one of said stations to the other including means for inverting the cartons during said transfer, and means for stopping each carton at said second station.

2. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at each of a pair of spaced stations, and means for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning means comprising a bodily rotatable frame, supports carried by said frame for engaging the carton, and means for rotating said frame in appropriately timed relation to the operation of the flap sealing means.

3. In carton sealing machine, flap sealing means for sealing a portion the flaps of a carton at each of a pair of spaced stations, and means for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning mechanism comprising a bodily rotatable frame, supports for engaging the carton pivoted in said frame, means for rotating said frame to effect transfer of the carton to the succeeding station, means for maintaining said supports in fixed relationship to the frame during said rotation, and means for rotating said pivoted supports relative to the frame to return them to the preceding station.

4. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at a pair of spaced stations, and means for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning means comprising a bodily rotatable frame, supports for engaging the carton pivoted in said frame, rack and pinion mechanism carried by said frame and operatively connected with said supports, means for rotating the frame to effect transfer of the carton to the succeeding station, means for holding said rack stationary relative to the frame during said rotation, and means for sliding said racks relative to the frame to rotate said supports and return them to the preceding station.

5. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at a pair of spaced stations, and means for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning means comprising a bodily rotatable frame, supports for engaging the carton pivoted in said frame, rack and pinion mechanism carried by said frame and operatively connected with said supports, means for rotating the frame to effect transfer of the carton to the succeeding station, means for holding said rack stationary relative to the frame during said rotation, means for sliding said racks relative to the frame to rotate said supports and return them to the preceding station, and a fixed stop disposed in the path of one of said racks for arresting the rotation of said frame when it reaches the succeeding station.

6. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of the carton at each of a pair of spaced stations, and mechanism for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning mechanism comprising a bodily rotatable frame, a shaft for said frame, supports for engaging the carton pivoted to said frame, a continuously rotating driving member associated with said shaft, means operatively connecting said driving member with said pivoted supports to cause said supports to rotate relative to said frame when the driving member rotates relative to said frame, clutch mechanism for connecting said shaft with said driving member so as to cause said frame to be rotated, and means for disengaging said clutch mechanism during a portion of each revolution of the driving member, whereby the bodily rotation of said frame ceases and rotation of said pivoted supports relative to the frame is effected.

7. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at each of a pair of spaced stations, and mechanism for turning said carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said turning means comprising a bodily rotatable frame, a shaft for said frame, supports for engaging the carton pivoted to said frame, a continuously rotating driving member associated with said shaft, rack and

pinion mechanism carried by said frame and operatively connected to said supports, ratchet and pawl mechanism for connecting said shaft with said driving member so as to cause the shaft to be rotated, means for operatively connecting said driving member with said rack and pinion mechanism, and means for disengaging said ratchet and pawl mechanism during a portion of a complete rotation of the driving member whereby said rack and pinion mechanism is operated to rotate said pivoted supports during the remainder of the rotation of said driving member.

8. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at each of a pair of spaced stations, carton advancing and supporting means at each station comprising a plurality of parallel spaced belts, and mechanism for turning said carton and simultaneously transferring it from one of said stations to the other comprising a bodily rotatable frame, a plurality of carton supporting bars for engaging the top and bottom of said carton pivotally mounted at one end in said frame, and means for rotating said frame to effect transfer of the carton, said carton supporting bars being so disposed in said rotatable frame as to pass between said spaced belts during said turning movement to lift the carton from the spaced belts at one station, and deposit the carton upon the spaced belts at the other station.

9. In a carton sealing machine, flap sealing means for sealing a portion of the flaps of a carton at each of a pair of spaced stations, and means for turning said carton and simultaneously transferring it from the preceding station to the succeeding station, said turning mechanism comprising a bodily rotatable frame, supports for engaging the carton pivoted in said frame, means for rotating said frame to effect transfer of the carton to the succeeding station, means for maintaining said supports in fixed relationship to the frame during said rotation, means for rotating said pivoted supports relative to the frame to return them to the preceding station, said flap sealing means including flap closing members pivotally carried on said turning mechanism, and means operatively connecting said carton supports with said flap closing members so as to effect the rotation of said members during the rotation of the carton supports to close the carton flaps.

10. In a carton sealing machine, means for sealing the flaps of a carton, carton advancing mechanism for advancing the carton into position to be operated upon by said flap sealing means, a carton conveying device for conveying the cartons successively to a position adjacent the carton advancing mechanism, a stop associated with the carton advancing mechanism normally to prevent the cartons from the conveying device from passing onto the advancing mechanism, and periodically actuated means for elevating the forward end of the foremost carton on said conveying device above said stop so as to permit the carton to enter said advancing mechanism, said means being actuated in timed relation to said flap sealing means.

11. In a carton sealing machine, means for sealing the flaps of a carton, carton advancing mechanism for advancing the carton into position to be operated upon by said flap sealing means, a carton conveying device for conveying the cartons successively to a position adjacent the carton advancing mechanism, a stop associated with said advancing mechanism normally to prevent the cartons from passing onto said mechanism, and periodically actuated means for elevating the forward end of the foremost carton on said conveying device above the top of said stop, said elevating means including a positively driven feed roll for engaging the carton and urging it forward onto said advancing mechanism, said means being actuated in timed relation to said flap sealing means.

12. In a carton sealing machine, mechanism for opening the carton flaps comprising a pair of wedge shaped fingers adapted to enter between the outer and inner flaps, means for moving the forward ends of said fingers beneath the outer flaps while maintaining said fingers in close proximity to one another, and means for thereafter forcing said fingers apart to cause said flaps to be opened outwardly by rotation about their hinges.

13. In a carton sealing machine, mechanism for opening the carton flaps comprising a rock arm, a flap engaging finger operatively supported upon said arm, means for actuating said rock arm to carry the outer end of said finger beneath the carton flap, and means for thereafter moving the finger with respect to said arm to cause the finger to swing the flap about its hinge to open the same.

14. In a carton sealing machine, mechanism for opening a hinged carton flap comprising a pivoted rock arm, a finger pivoted on said arm having its pivotal axis at an angle to the axis of said arm, means for swinging the rock arm to cause it to approach the carton and bring the outer end of the finger under the flap, means for thereafter simultaneously swinging said finger on its axis and varying the angular position of said axis with respect to the rock arm whereby the end of the finger is moved substantially in a plane as the rock arm continues its approach toward the carton thereby swinging the flap outwardly about its hinge.

15. In a carton sealing machine, mechanism for opening a hinged carton flap comprising a rock arm pivoted to swing toward

said carton, a rod having its inner portion pivoted to the rock arm at right angles to the rock arm pivot, the outer portion of said rod being bent at an angle to the inner portion, a flap engaging finger pivoted on said outer portion of said rod so that its pivotal axis is thereby placed at an angle to the pivotal axis of the rod in the rock arm, means for swinging the rock arm to cause it to approach the carton and bring the outer end of said finger under the carton flap, means for guiding said finger to cause it to project toward the carton until the outer end of the finger has entered beneath said flap, and means for deflecting the finger as the rock arm continues its movement, including means for rotating said rod to vary the angle of the pivotal axis of the finger thereon so as to cause the outer end of the finger to move substantially in a single plane and unfold the flap about its hinge.

16. In a carton sealing machine, mechanism for opening a hinged carton flap comprising a rock arm pivoted to swing toward said carton, a rod having its inner portion pivoted to the rock arm at right angles to the rock arm pivot, the outer portion of said rod being bent at an angle to the inner portion, a flap engaging finger pivoted on said outer portion of said rod so that its pivotal axis is thereby placed at an angle to the pivotal axis of the rod in the rock arm, a cam secured to and projecting from said rod, and a second cam secured to and projecting from said flap engaging finger, means for swinging the rock arm to cause it to approach the carton and bring the outer ends of said finger underneath the carton flap, members adapted to coact with each of said cams fixed in the paths thereof so that continued swinging of the rock arm after the finger has entered beneath the flap causes simultaneous rotation of the finger on said rod and of said rod with respect to the rock arm, thus causing the outer end of said finger to move substantially in a single plane and unfold the flap about its hinge.

17. In a carton sealing machine, mechanism for opening a pair of hinged carton flaps comprising a rock arm pivoted to swing toward the carton, a pair of rods having their inner portions pivoted to the rock arm in substantially parallel relationship and at right angles to the rock arm pivot, the outer portion of each of said rods being bent at an angle to their inner portion, a pair of flap engaging fingers pivoted respectively on said outer portions of said rods so that their pivotal axes are thereby angularly disposed with respect to the pivotal axes of the rods in the rock arms, projections secured to each of said rods and a spring interconnecting these projections so as to normally urge the projections toward one another and hold the outer portions of said rods in symmetrical relationship, a projection secured to each of said fingers, means for swinging the rock arm toward the carton, and members disposed in the paths of each of said projections so as to cause the simultaneous rotation of said fingers upon said rods and of said rods in said rock arms, said members being arranged to coact with said projections after the fingers have entered beneath the pair of carton flaps to cause said fingers to move outwardly and unfold the flaps about their hinges.

18. In a machine for sealing cartons having oppositely hinged flaps, the combination of a pivoted rock arm, a pair of flap engaging fingers operatively supported upon said arm, means for swinging the rock arm to cause said fingers to open the flaps, means for gumming the flaps, means for closing the gummed flaps, a pivoted fin member for separating the opposite marginal edges of the flaps as they are moved to closed position, and an operative connection between said rock arm and said pivoted fin member whereby the receding movement of the rock arm lifts the fin member away from the carton.

19. In a carton sealing machine, flap sealing means at each of a pair of spaced stations for sealing a portion of the flaps of a carton at each station, means for turning the carton and simultaneously transferring it from the preceding station to the succeeding station so as to present an unsealed face to the sealing means at the succeeding station, said flap sealing means including at each station a pivoted fin member for preventing overlapping of the marginal edges of the carton flaps during the sealing operation, the fin member at the first station being lifted out of the path of the carton during the turning thereof by engagement with the top of the carton, and an operative connection between the pivoted fin member at the second station and said sealing means for lifting the fin member out of the path of the carton.

20. In a machine for sealing filled cartons, means for receiving the filled cartons with their flaps closed but unsealed, means for opening the flaps on one face of a carton, means for gumming said flaps and means for closing the same into sealed relationship, means for inverting and transferring the filled carton to a position to be acted upon by other flap manipulating mechanism operative upon the flaps of a given face of the carton said mechanism including means for opening, means for gumming and means for closing said flaps, and means for removing the carton from the apparatus.

21. A carton sealing machine comprising two flap sealing mechanisms for operating upon the flaps of the upper faces of two stationary cartons, means for actuating said sealing mechanisms simultaneously while the cartons remain in stationary position, and means for advancing the cartons successive-

ly from one of said mechanisms to the other, said means including means for turning each carton through an angle of 180° to thereby permit the sealing of the opposite faces of the carton.

22. In a carton sealing machine, a plurality of flap sealing mechanisms for operating upon the flaps of the faces of two stationary cartons which are in substantially the same plane, means for actuating said mechanisms simultaneously while the cartons remain in stationary position, and means for advancing the cartons successively from one of said mechanisms to the next, said advancing means including means for turning each carton through an angle of 180° to present an unsealed face to the respective flap sealing mechanisms.

23. In a machine for sealing filled cartons having two stations arranged in substantially the same plane, means for successively advancing cartons to one of said stations, means for stopping each carton at said station, means for successively removing cartons from the other station, flap sealing means at each station for operating upon the flaps of faces of the cartons which are in substantially the same plane while the cartons remain in stationary position, means for simultaneously actuating the flap sealing means of both stations, means for transferring the cartons from one of said stations to the other including means for inverting the cartons during said transfer, and means for stopping the cartons successively at said second station.

In testimony whereof I affix my signature.

ARTHUR C. SCHROEDER.