July 21, 1931. W. D. KIMBALL ET AL 1,815,571

CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 1

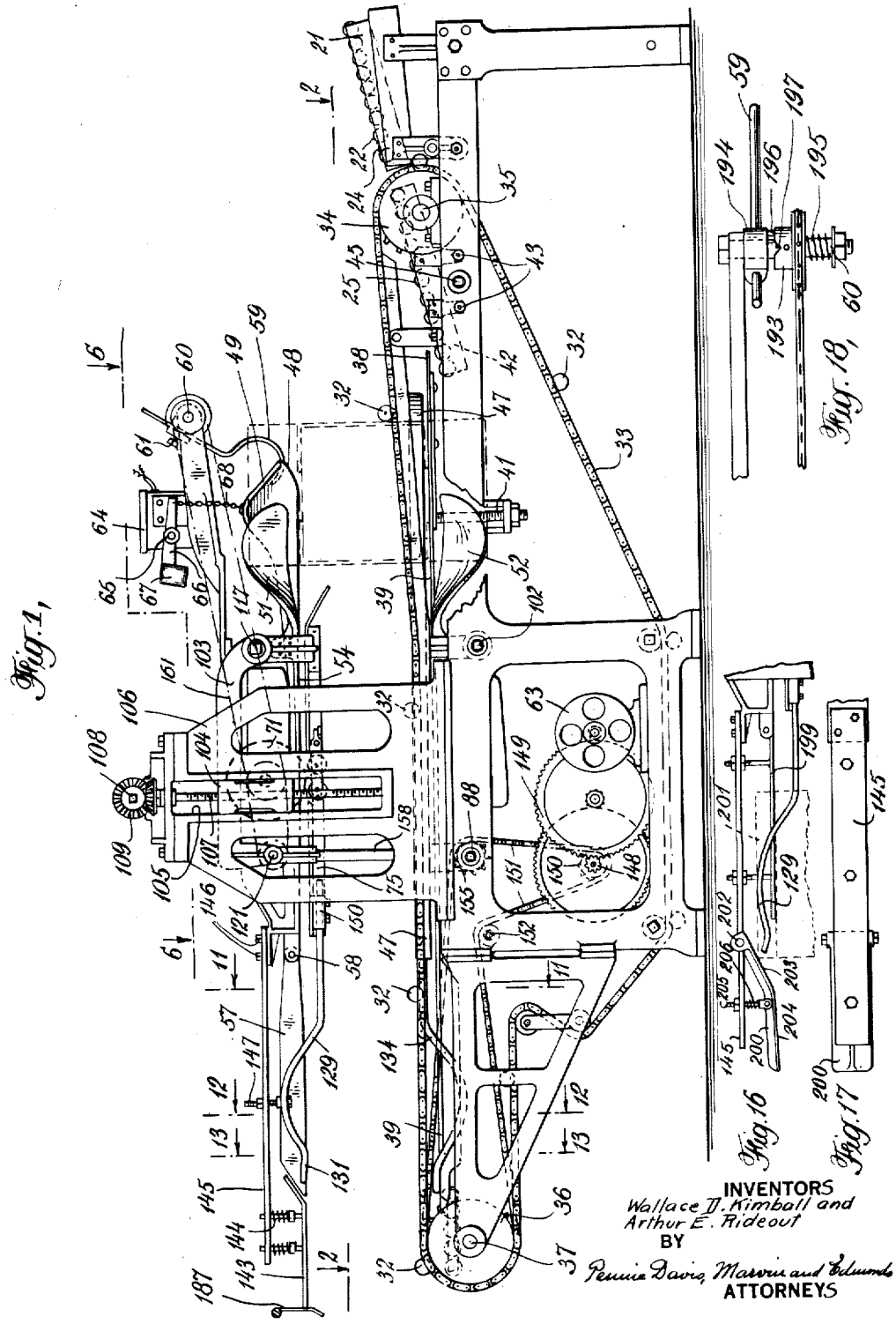


Fig. 1,

Fig. 18,

Fig. 16

Fig. 17

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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 2

Fig. 2

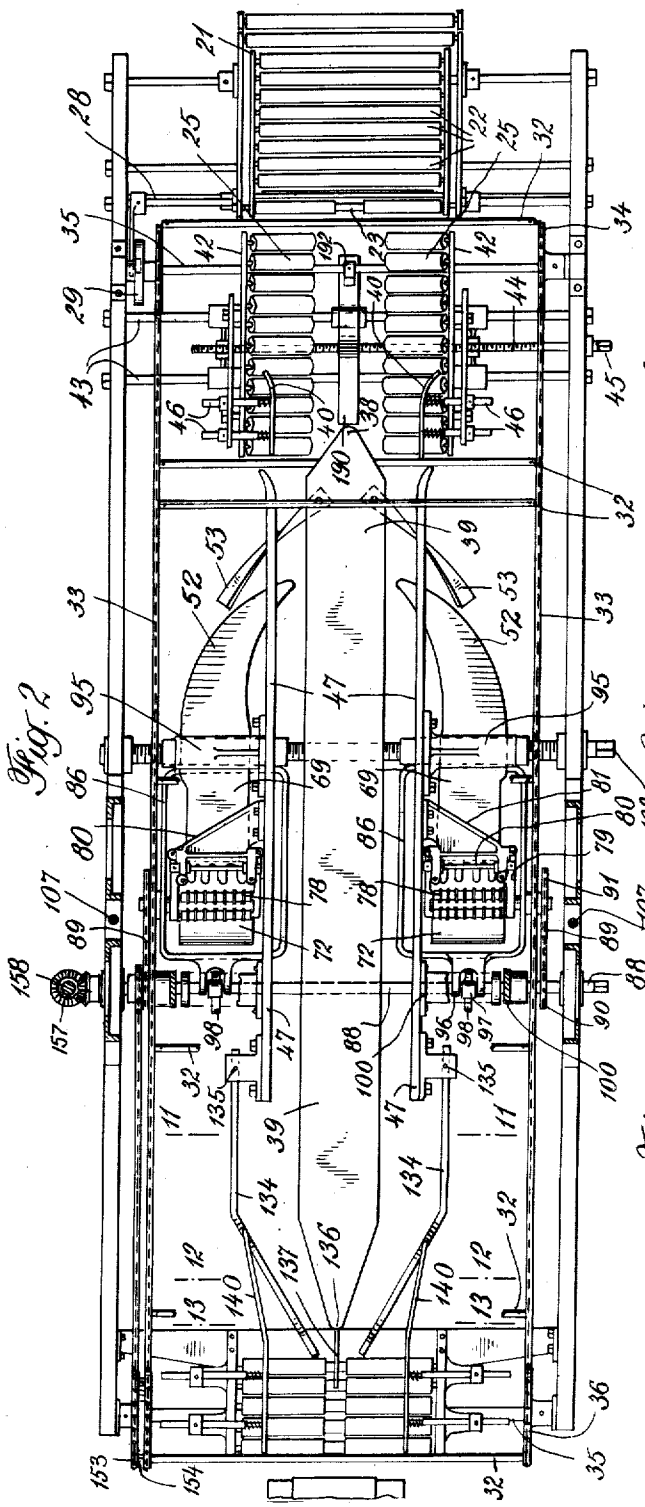


Fig. 13,

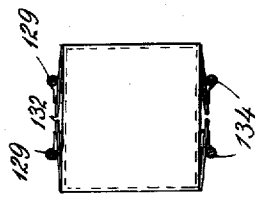


Fig. 12,

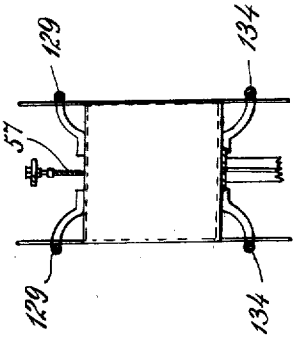
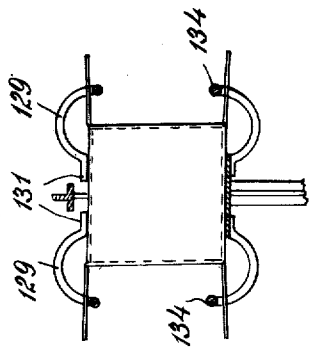


Fig. 11,



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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 3

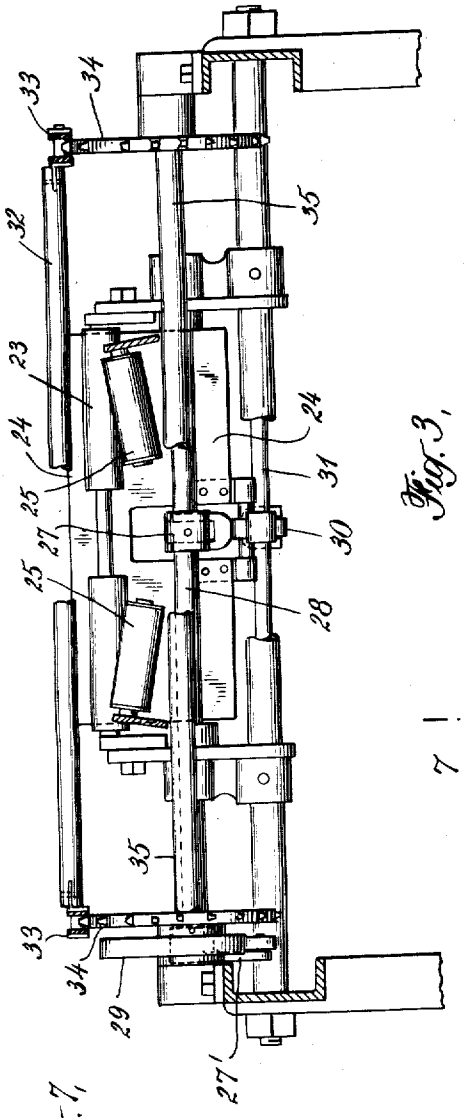


Fig. 7.

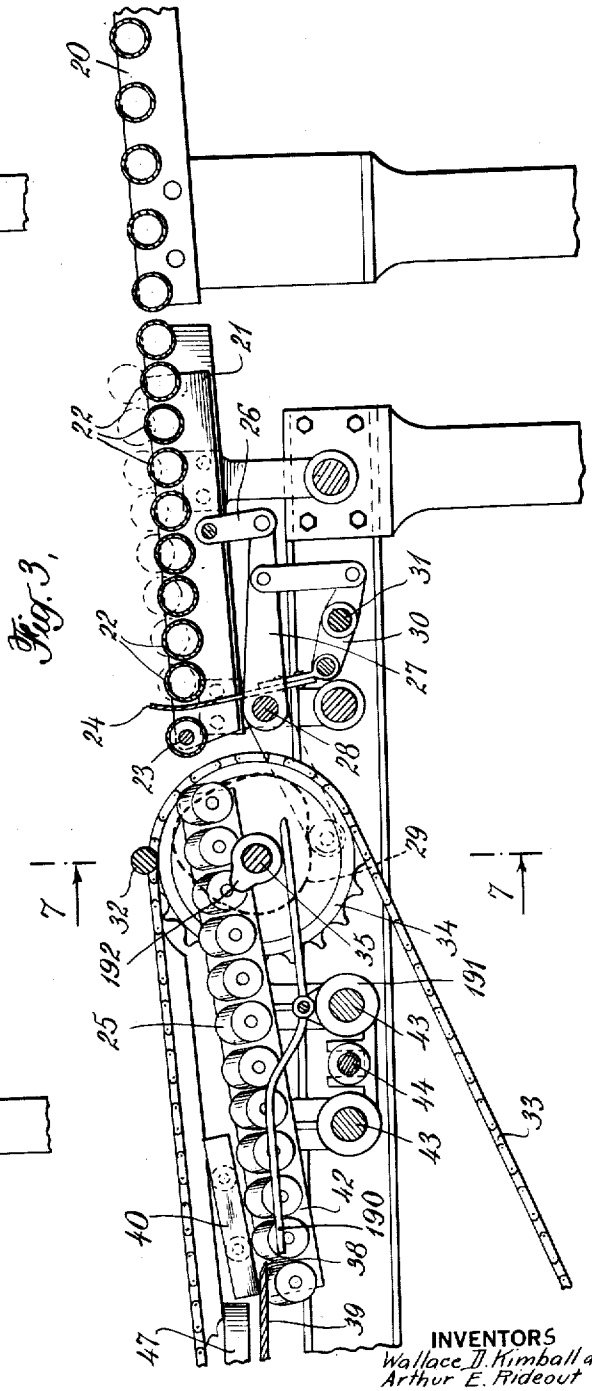


Fig. 3.

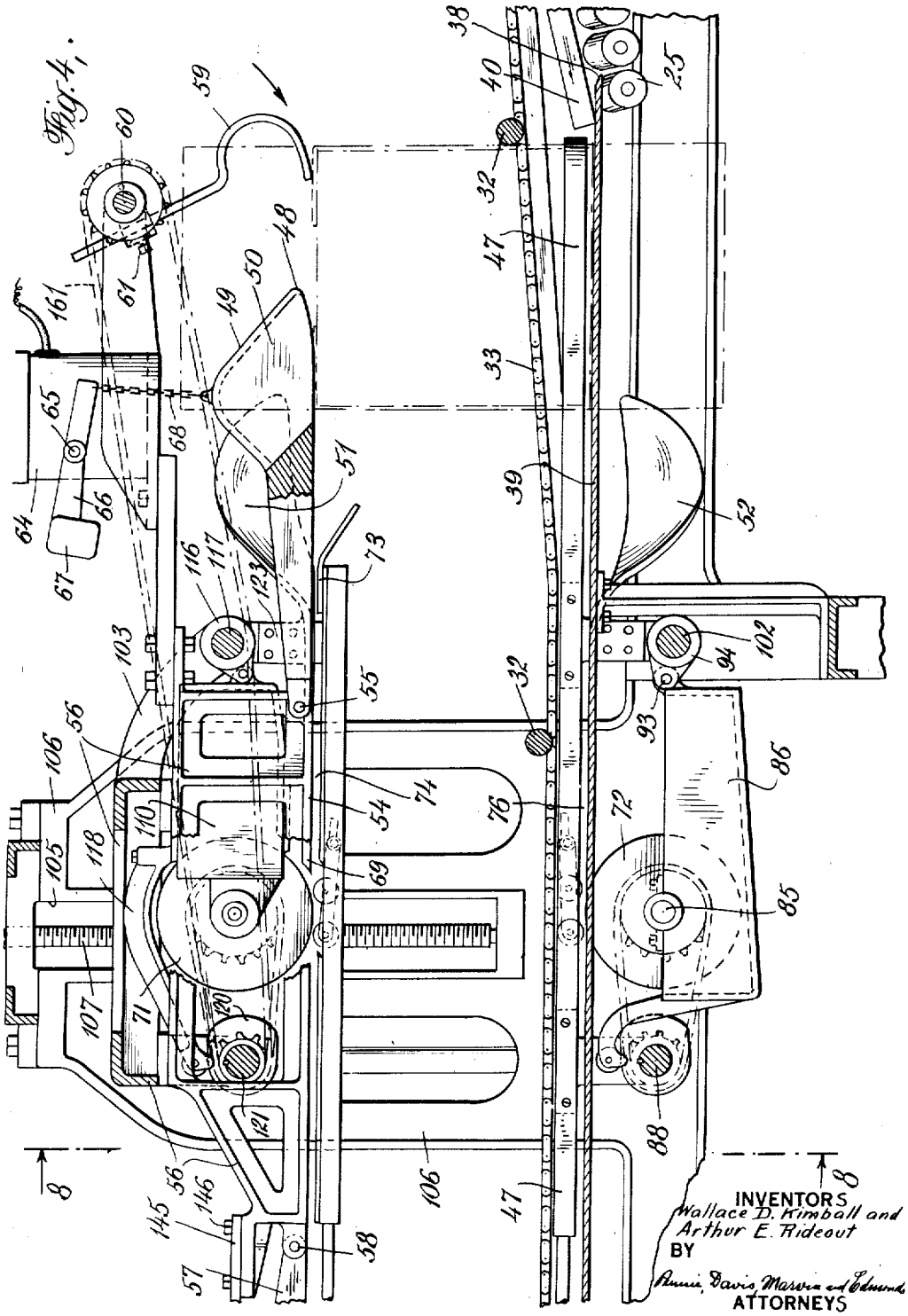
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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 4

Fig. 4.



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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 5

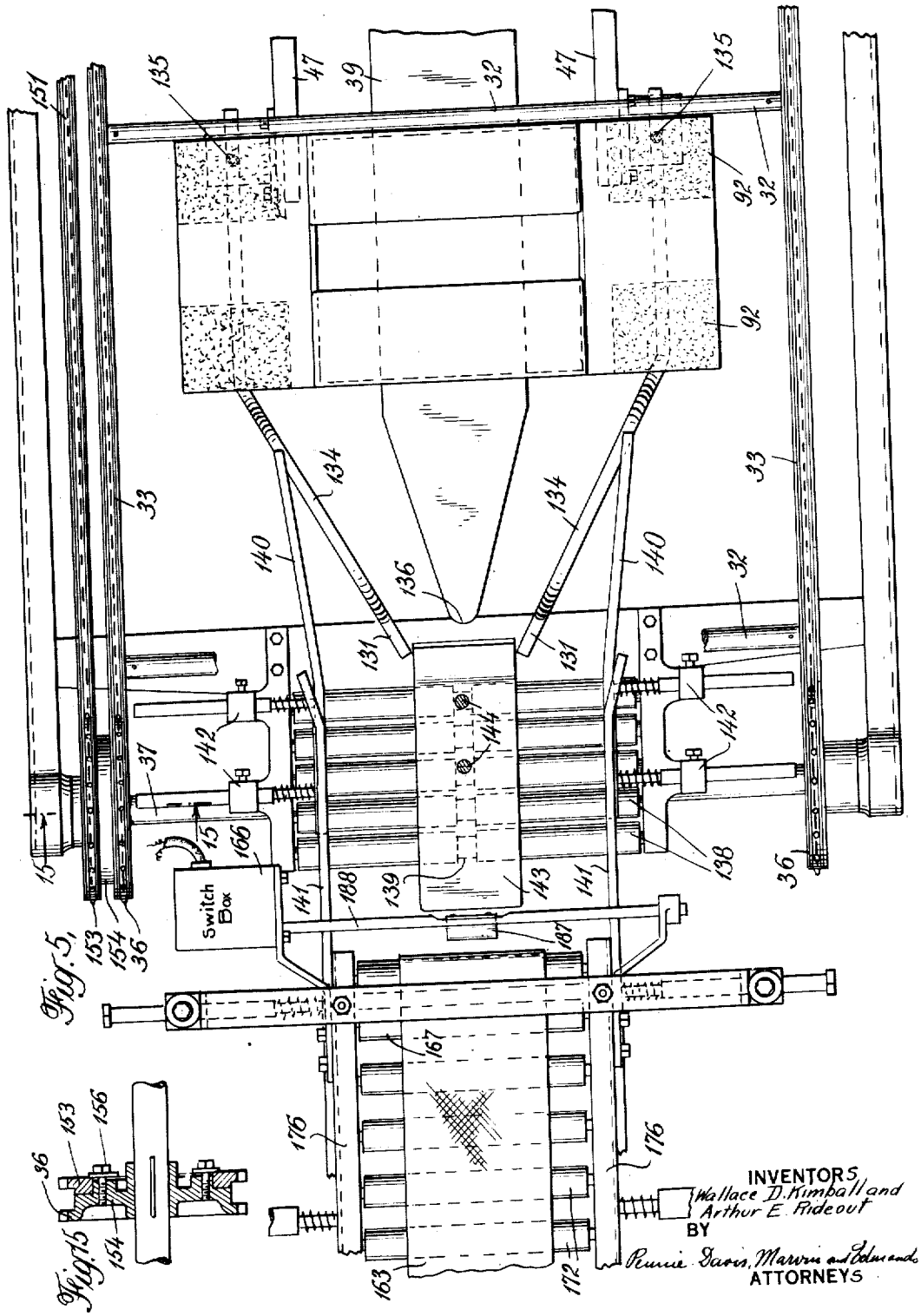


Fig. 5.

Fig. 15

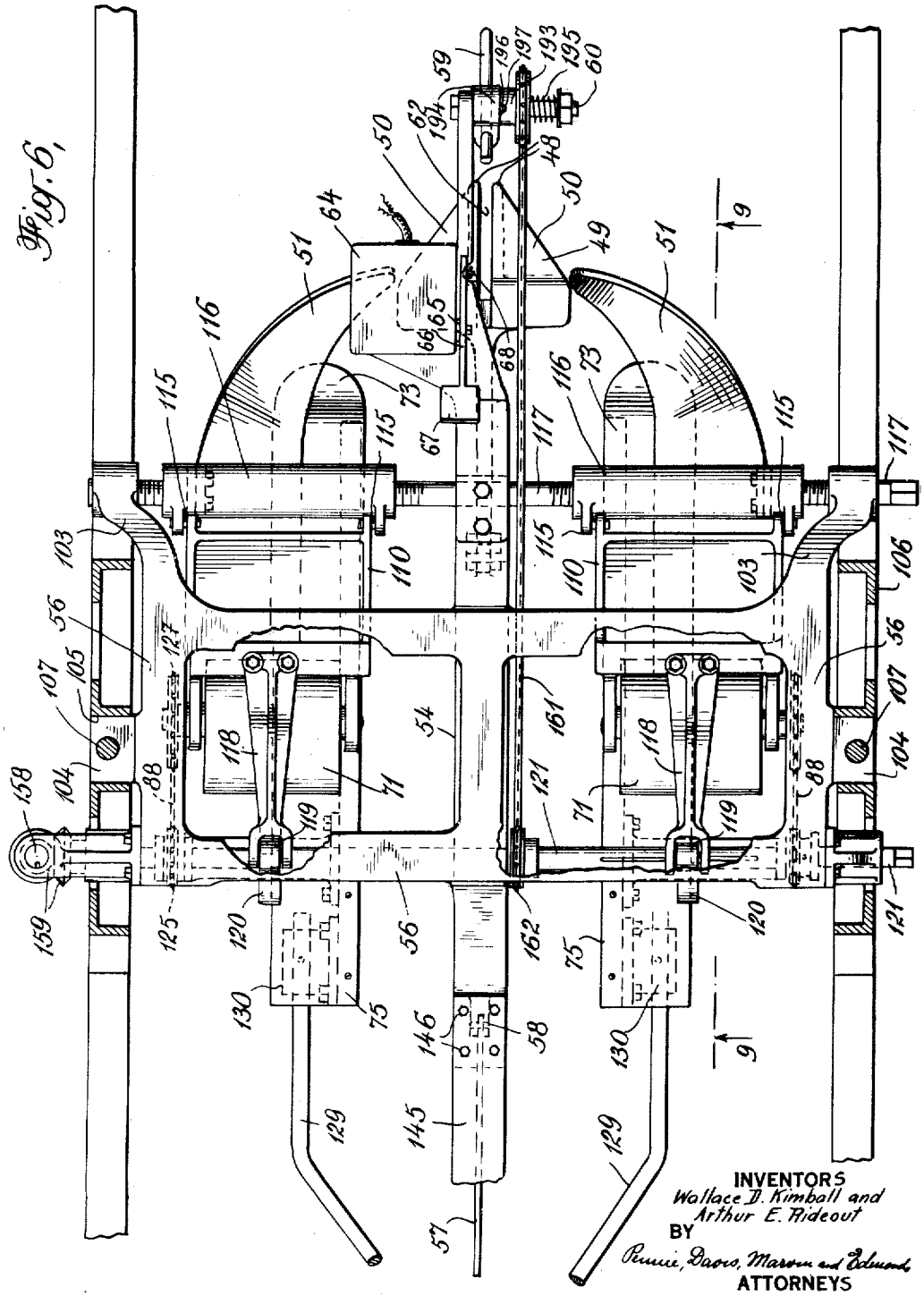
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Filed Nov. 30, 1926 9 Sheets-Sheet 6

Fig. 6.



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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 7

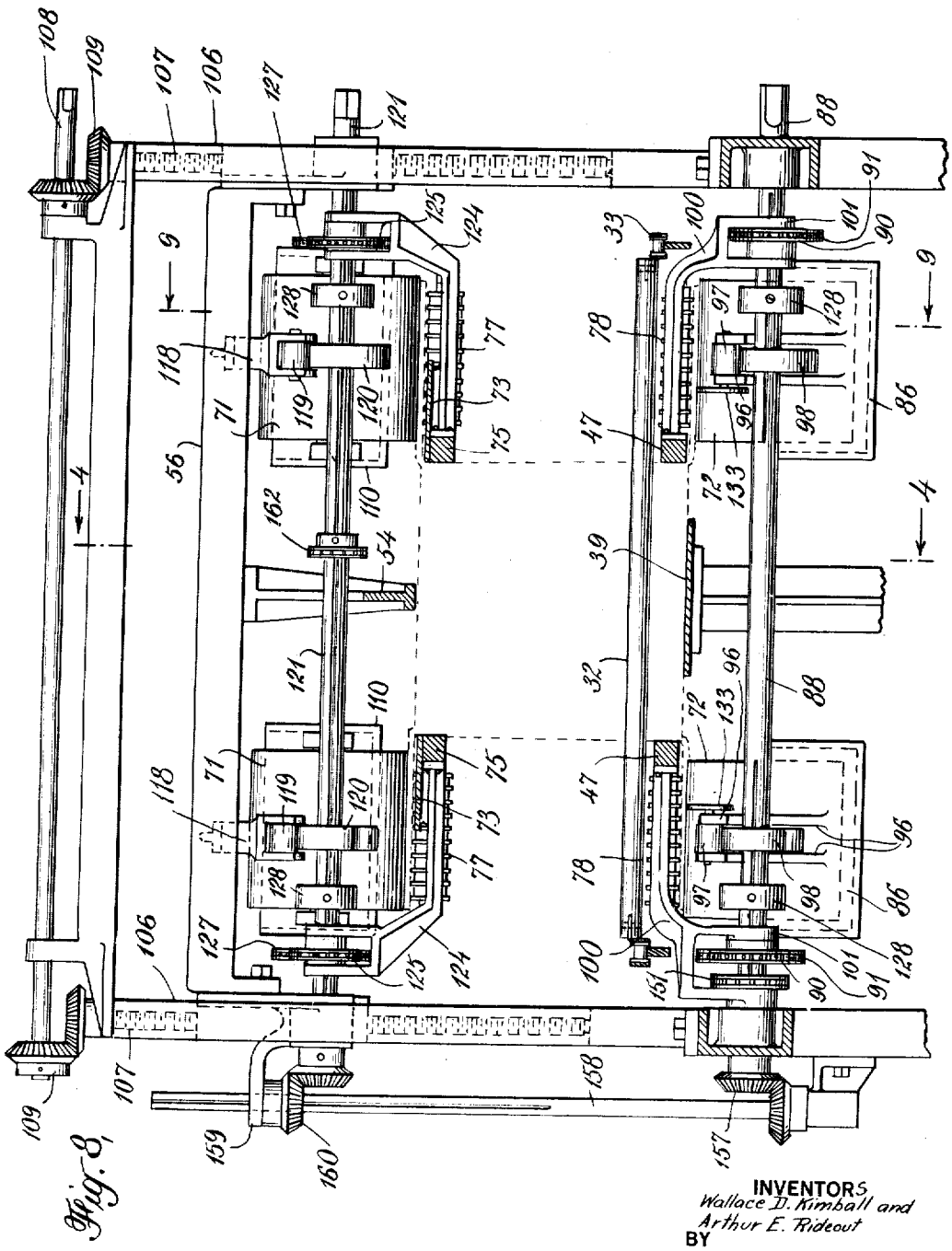


Fig. 8.

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CARTON SEALING MACHINE

Filed Nov. 30, 1926 9 Sheets-Sheet 8

Fig. 10

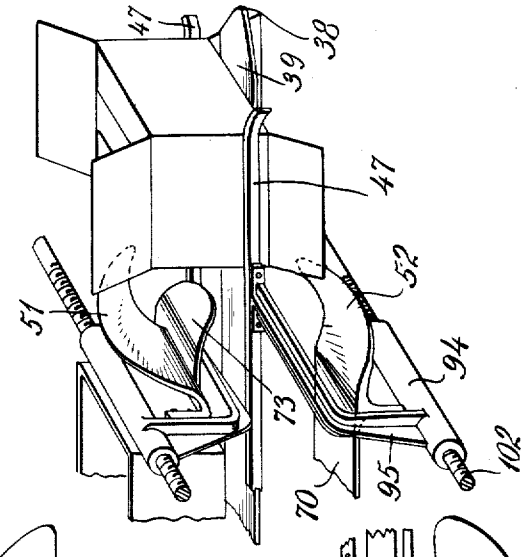
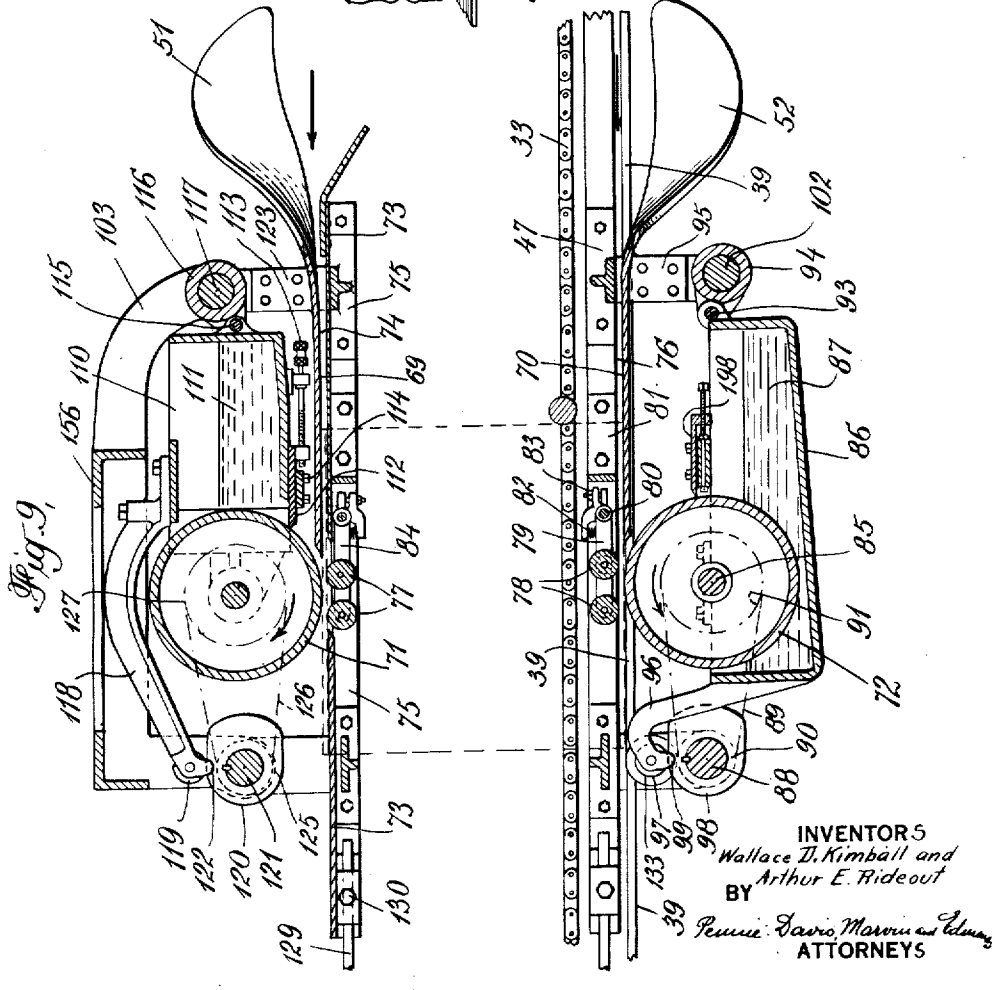


Fig. 9



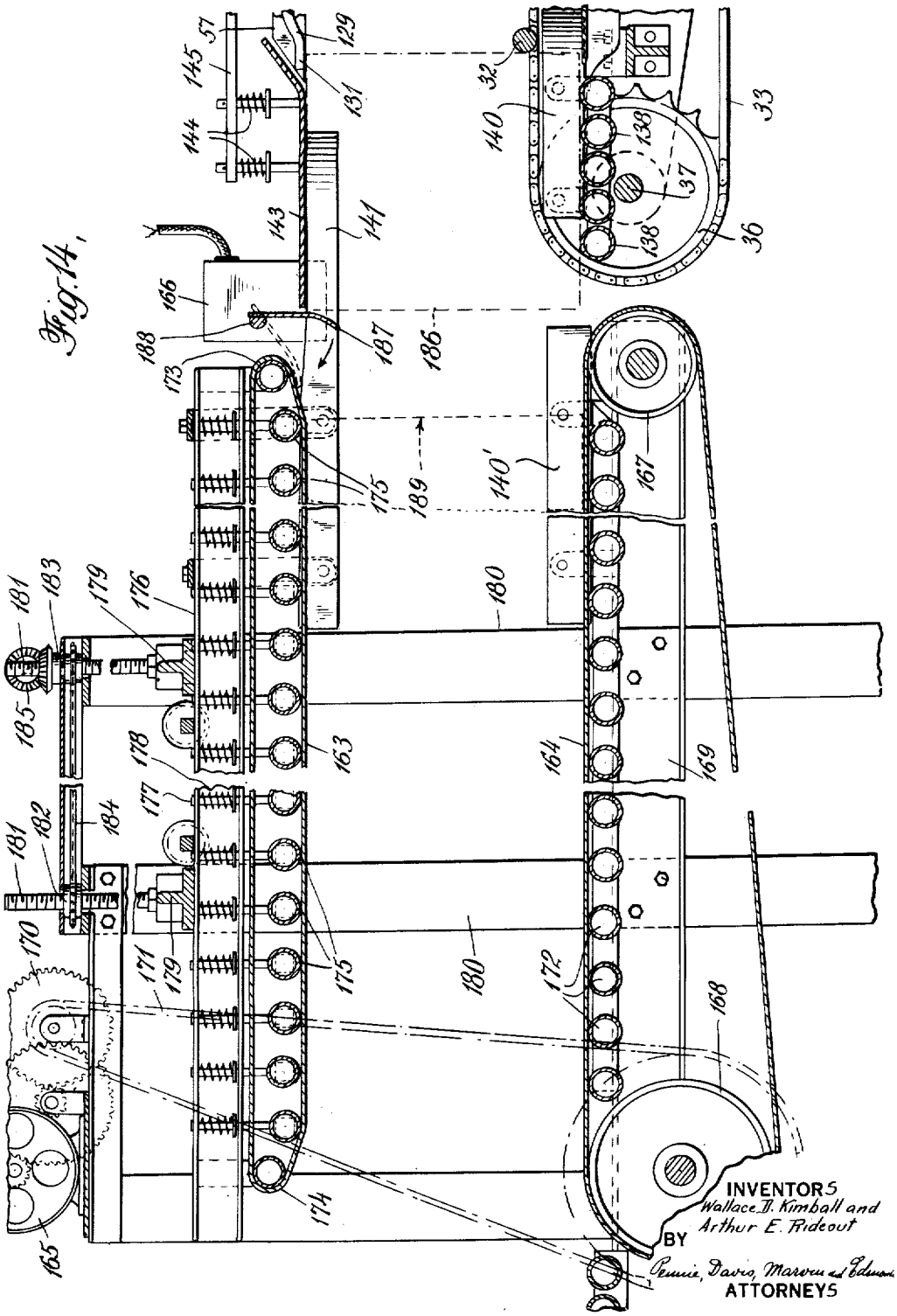
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Filed Nov. 30, 1926 9 Sheets-Sheet 9

Fig. 14.



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UNITED STATES PATENT OFFICE

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CARTON SEALING MACHINE

Application filed November 30, 1926. Serial No. 151,663.

This invention relates to apparatus for sealing fibre-board or composition cartons, and has to do particularly with that type of carton sealing apparatus in which the filled cartons are supplied to the apparatus with all of their flaps closed but not sealed.

The invention has for its object the provision of a carton sealing apparatus which requires no attention except to be started and occasionally lubricated, and which is therefore completely automatic in its operation. In fact the apparatus of the present invention has been tried out in actual practice, and has been found to be so thoroughly automatic in its operation that it is entirely practical to install it upon an isolated floor of a building, the unsealed cartons being fed to the machine by gravity from the floor above, and the completely sealed cartons being delivered from the machine ready for shipment. No operator or other attendant is required on this floor except to occasionally oil the wearing parts of the machine, or to restart the machine should a damaged carton inadvertently be allowed to reach the apparatus.

In the apparatus of the present invention the cartons are successively and automatically admitted to the operation thereupon of devices for unfolding the flaps, for applying adhesive to appropriate portions of the flaps, for folding the flaps back into the closed position, and for subjecting the closed flaps to pressure for a sufficient length of time for the adhesive to become set to a sufficient degree to permit the cartons to be handled without danger of opening.

We have illustrated a preferred embodiment of our invention in the accompanying drawings. In these drawings

Fig. 1 is a side elevation of the complete apparatus for manipulating the flaps and applying the adhesive, including the mechanism for automatically admitting or feeding the cartons successively to the flap manipulating mechanism;

Fig. 2 is a horizontal section of the apparatus shown in Fig. 1 taken on line 2—2 of Fig. 1, the mechanism for manipulating the upper flaps being consequently removed;

Figs. 3, 4 and 5 are enlarged fragmentary views of different portions of the apparatus shown in Figs. 1 and 2, Fig. 3 being a vertical section of that portion at the right hand or entrance end of Fig. 1, Fig. 4 being a vertical section of the central portion of the apparatus, and Fig. 5 being a plan of the left hand end of the apparatus shown in Fig. 1 with certain parts removed, and including a portion of the apparatus shown in Fig. 14;

Fig. 6 is an enlarged fragmentary horizontal section taken on the line 6—6 of Fig. 1. This is also a plan of the apparatus shown in Fig. 4, certain parts being removed for the sake of clearness.

Fig. 7 is a transverse vertical section taken on the line 7—7 of Fig. 3 looking toward the automatic feeding mechanism;

Fig. 8 is a transverse vertical section taken on the line 8—8 of Fig. 4 showing the action of the adhesive applying mechanism;

Fig. 9 is a vertical longitudinal section taken on lines 9—9 of Figs. 8 and 6 showing the devices for unfolding the flaps and further details of the adhesive applying mechanism;

Fig. 10 is a perspective view of a carton with its flaps partially unfolded under the action of the devices shown in Fig. 9;

Figs. 11, 12 and 13 are somewhat diagrammatic fragmentary vertical sections taken respectively on the lines 11—11, 12—12, and 13—13 of Fig. 2 showing the progressive stages of the refolding of the adhesive coated flaps to the closed position;

Fig. 14 is an enlarged vertical section of the portion of the complete carton sealing apparatus which applies sealing pressure to the adhesive coated and reclosed flaps, this figure including also a small portion of the extreme left hand end of the apparatus shown in Figs. 1 and 2;

Fig. 15 is a sectional view taken on line 15—15 of Fig. 5 of a detail;

Fig. 16 is a side elevation of a portion of the apparatus shown in Fig. 1 illustrating a modified form of the devices for completing the closing of the flaps;

Fig. 17 is a plan view of the devices shown in Fig. 16; and

Fig. 18 is a plan view of the slip connection or friction drive for the rotary flap holder.

Fibre-board or composition cartons are limited in their physical dimensions by the strength of the material of which they are constructed and a definite maximum size of carton has been determined upon by the manufacturers of these articles. Accordingly the present apparatus is made to accommodate cartons of this maximum size, and by virtue of the provisions for adjustment of the machine where necessary, the present apparatus is adapted to seal cartons of any size smaller than this maximum. These various adjustable features will be readily perceived as the description proceeds.

Referring now to the accompanying drawings, the cartons approach the right hand end of the machine as viewed in Figs. 1 and 2 on a roller table or conveyor 20 (see Fig. 3) and because of the inclination of this table they advance under the influence of gravity in close succession, the cartons at the head of the line being pushed forward by the pressure of those in the rear. The cartons do not enter the sealing machine in close formation, however, but are successively and automatically admitted to or fed into the machine by the feeding mechanism illustrated in Figs. 1, 2 and 3.

This feeding mechanism comprises a pitching table 21, made up of a series of rollers 22 which are suitably mounted in appropriate side frame members as may be seen in Fig. 2, the forward ends of these members being pivoted on a shaft 23 which also forms the bearing for the last roller of the pitching table. When this pitching table 21 is in the position shown in Fig. 3 where the plane of its rollers 22 is in alignment with the plane of the roller table 20, the carton which is at the front of the column approaching roller table 20 advances onto pitching table 21 and is arrested by a trigger 24.

When a carton is to be fed into the sealing mechanism, pitching table 21 is tilted about shaft 23, raising rollers 22 to the dotted position of Fig. 3 and simultaneously withdrawing trigger 24 which pitches the carton on the table 21 forward onto a set of inclined rollers 25. The second carton of the column advances until it strikes the first of rollers 22 and is by it held back from entering upon the pitching table. The length of the pitching table between trigger 24 and the last roller 22 is approximately equal to the width of the smallest standard size carton, and somewhat greater than half the width of the largest standard size carton, so that although the larger cartons project beyond the last roller 22, they will nevertheless be tilted forward by the rise of the pitching table.

The pitching table 21 is tilted about its pivot shaft 23 by means of a link 26 (Fig. 3) pivoted to the end of a lever 27 that is secured at the center of a supporting shaft 28 (see Fig. 7). Shaft 28 is rocked by means of a cam 29 which coacts with a roller on a second lever 27′ secured to one end of shaft 28. Trigger 24 is raised and lowered through its connection with a rocking lever 30 mounted on shaft 31, this lever being connected at its opposite end by means of a link to lever 27. Depression of the forward end of lever 27 by cam 29 will therefore raise the rear end of the pitching table 21 and simultaneously retract trigger 24 below the surface of rollers 22 and allow the carton on the pitching table to descend onto the sloping rollers 25. Promptly after this movement of the carton has taken place the pitching table is returned by cam 29 to the lower position.

In timed relation to the descent of the carton onto rollers 25 a driving bar 32 rises behind the carton and pushes it through the flap manipulating and adhesive applying portion of the apparatus. By referring to Figs. 1 and 2 it will be seen that a number of these driving bars 32 are mounted at their ends in uniformly spaced relation upon a pair of endless chains, one at each side of the machine. These chains pass over suitable sprockets at each end of the flap manipulating and adhesive applying portion of the machine, sprockets 34 being mounted on a shaft 35 at the feeding or entrance end of the machine, and sprockets 36 being mounted on shaft 37 at the discharge end of the machine. The spacing of driving bars 32 is sufficient to accommodate the largest size of carton, and even with this size it carries the cartons through the machine in spaced relation from one another.

The endless chains 33 are driven continuously in the same direction at uniform speed by an electric motor through gearing which is to be described later. Cam 29 which actuates pitching table 21 through rock shaft 28 is mounted on sprocket shaft 35, thus actuating the pitching table in timed relation to the progress of driving bars 32, and the remainder of the mechanism.

It will be observed that the rollers of roller table 25 are inclined in two directions. The longitudinal plane of the rollers is inclined at approximately the same angle with the angle of the pitching table 21 when raised to its upper position, as may be seen be referring to Fig. 1, and besides this the rollers are divided into two groups, one on each side of the machine, and the axes of the rollers of these two groups are inclined toward one another as may be seen most clearly in Figs. 7 and 2. This inclination of the two groups of rollers permits the outer bottom flaps of the carton to drop slightly at an angle to the bottom of the carton, opening the inner edges of these flaps away from the inner bot-

tom flaps sufficiently to permit the tongue 38 of the supporting table 39 to enter between these inner and outer bottom flaps.

The opening between these flaps is limited in extent because of the limited inclination of the axes of the two sets of rollers 25, and in order properly to center the carton with respect to tongue 38, flaring guides 40 receive the carton as it advances on rollers 25 and guide it toward the tongue 38 so that the tongue will enter centrally of the carton where the opening between the upper and lower flaps is greatest. The height of tongue 38 is adjustable by means of a screw 41 (Fig. 1) which is threaded into the frame of the machine and bears at its upper end against the lower surface of supporting table 39 which is made of material sufficiently flexible to allow tongue 38 to be raised or lowered enough for the adjustment.

When the cartons contain articles that are relatively heavy such, for example as cans of evaporated milk or the like, the weight of these cans tends to force downwardly both the inner and outer flaps, particularly as the outer flaps have dropped down onto the inclined rollers of roller table 25. The cans at the center of the carton will descend further than those at the sides, and there is a tendency of those cans at the sides to tip towards the center of the carton. Guides 40, however, are adjusted to press firmly against the outer surfaces of the sides of the carton in close proximity to the bottom edges thereof and this holds the side walls of the carton straight and prevents them from being bent outwardly at the bottoms and aids in preventing the cans from tipping.

The weight of the cans or other contents of the cartons may be sufficient to cause the inner flaps to be forced downwardly at the center of the carton a sufficient distance to interfere with the movement of the carton onto the upper surface of the supporting table 39. In order to reduce the friction at this point and to prevent damage to the inner bottom flap by the tongue 38 a pivoted lifting bar 190 shown in Figs. 2 and 3 is provided. This lifting bar is pivoted on shaft 43 by means of a collar 191 to which the bar is rigidly secured, and an actuating cam 192 mounted upon shaft 35 cooperates with the rear end of bar 190 so as to cause this end to be depressed, and the forward end to be elevated. Inasmuch as cam 192 is mounted upon the same shaft which carries sprockets 34 for the drive chains 33, the elevation of the forward end of bar 190 is caused to take place in timed relation to the advance of the driving bars 32 so that each carton is given a slight lift thereby just as it approaches the point 38 of the supporting table 39. The timing of cam 192 is so arranged that although lifting bar 190 engages the outer carton flaps, the upper forward edges of these flaps are pressed against the bottom of point 38 of the supporting table 39 while the carton is lifted onto the supporting table resting on its inner flaps. The immediate recession of the lifting bar 190 allows the outer flaps to drop back onto the inclined rollers 25. The brief duration of the lifting of the carton is not sufficient to interfere with its advance.

The extent of the initial opening of the outer bottom flaps is controlled not only by the inclination of rollers 25 but by the lateral spacing of the two groups of rollers. Provision is made for conveniently adjusting this lateral spacing for this reason, and also to adapt the apparatus to the accommodation of cartons of different length. In speaking of the length of the carton, we are considering that its length is the dimension crosswise of the machine (see Fig. 10). For the purpose of this adjustment the two groups of inclined rollers 25 are individually mounted in separate frames 42 (Fig. 3) having depending arms which slide upon parallel cross bars 43. The crosswise adjusting movement by which the two groups of rollers 25 are brought closer together or spaced further apart is effected by shaft 44 having both a right and left handed thread. This shaft is rotated by a crank or other convenient form of handle which may be applied to the squared end 45 of this shaft.

The flaring centering guides 40 are mounted, one on each of frames 42, so that adjustment of their spacing as made simultaneously with the adjustment of the rollers 25. These guides are preferably resiliently mounted as indicated by the springs shown in Fig. 2 and they may also be adjusted with respect to frames 42 by means of the bolts and lock nuts 46.

As the carton is carried forward, the inner bottom flaps remain in their closed position since the carton rests upon these flaps which slide upon the smooth flat surface of supporting table 39. The carton is maintained in its centered relation on the supporting table by a pair of long guide bars 47 extending well toward the rear of the machine from a point near the ends of guides 40. These guides coact with the ends of the carton just above the supporting table 39.

The outer top and bottom flaps are in a slightly open position, the top flaps having a natural tendency to spring upward because of the resiliency of the material, and the bottom flaps descending for the same reason aided by the influence of gravity. The points 48 of the pivoted unfolding head 49 (see Fig. 6) enter the opening thus made below the outer top flaps and the diverging surfaces 50 of this head force the flaps partially open into position to be acted upon by the upper flap unfolders 51. The bottom outer flaps may fall freely to an approx-

imately vertical position as soon as their rear edges pass beyond the last roller of the sloping rollers 25, but in order to insure that these flaps are forced downwardly and outwardly the appropriate distance to be received by the lower flap unfolders 52, a pair of flaring members 53 supported by table 39 are provided (see Fig. 2).

The inner bottom flaps are held closed throughout the passage of the carton through the apparatus because the carton is supported on table 39, but it is also necessary to maintain the top inner flaps closed, or nearly closed throughout the passage of the carton through the machine. This function is performed by the lower surface of unfolding head 49 and by the lower surface of a foot 54 to which head 49 is pivoted at 55, this foot 54 being carried centrally on a vertically adjustable frame 56 which will be described later. Foot 54 has a vertically movable fin 57 pivoted thereto at 58 at the rear end of the machine for continuing the function of holding the inner flaps closed and for preventing the overlapping of the outer flaps, as will appear later on.

The rear inner top flap is held down so as to cause it to pass beneath unfolding head 49 by means of a rotary flap holder 59 which is driven in timed relation with the approach of each carton under unfolding head 49. Flap holder 59 is mounted for rotation on a shaft 60 and may be adjusted by means of the clamping screw 61 to accommodate cartons of different thickness or height. Unfolding head 49 is slotted centrally as shown at 62 in Fig. 6 in order to permit the rotation of flap holder 59 as it moves in close proximity to the head 49 in order to prevent the possibility of the inner flap beneath it from rising above the points 48 and being folded in the reverse direction.

The details of the mounting for flap holder 59 are shown in Fig. 18 and include a clutch which is capable of being automatically disengaged when the flap holder meets a predetermined resistance to rotation. This prevents the flap holder from damaging the cartons and reduces the liability of accident by catching the hands or clothing in the rotating flap holder. To this end the mounting comprises a pair of coacting driving and driven collars 193 and 194 respectively. Driving collar 193 constitutes the hub of a sprocket over which passes a chain which is positively driven from other parts of the apparatus as will be described further on. Both of the collars are loosely mounted upon shaft 60 and driving collar 193 is urged toward driven collar 194 by means of a spiral spring 195. This brings the pin 196 on collar 194 into cooperative engagement with a groove 197 on collar 193 whereby the rotation of the sprocket is transmitted to the flap holder 59. If the flap holder meets an obstacle in its path, however, the sloping walls of groove 197 will force out the pin 196, collar 193 and sprocket sliding longitudinally on shaft 60 against the action of spring 195.

The unfolding head 49, besides serving the purposes mentioned above, performs the additional function of causing the automatic stopping of the entire machine in the event that a damaged or improperly filled carton is presented to the machine for sealing. The machine is driven by an electric motor 63 (Fig. 1) and in the controlling circuit of this motor, in addition to the usual manually operated starting and stopping switch (not shown), there is provided an automatically operated switch. This switch is mounted within a housing 64 and is opened and closed by rock shaft 65 which projects through the wall of the housing and to which an arm 66 is secured. A weight 67 is attached to one end of this arm and unfolding head 49 is supported by the other end of the arm through a chain 68. Under normal conditions the weight of unfolding head 49 overbalances weight 67 just sufficiently to hold the switch in the closed position, but if the outer top flaps are damaged so that they do not assume the correct position, and force the unfolding head 49 upward, the weight 67 opens the switch and stops driving motor 63. Or, if the carton is improperly packed so that the inner top flaps are pushed upwardly by the contents and cannot assume their proper horizontal position, the same automatic opening of the switch will be effected.

We have now brought the carton to the position shown in Fig. 10, where both the top and bottom outer flaps are being unfolded under the action of the unfolders 51 and 52 respectively. Both of these unfolders comprise relatively wide plates which are curved into warped surfaces, being curved inwardly at their bluntly pointed outer ends so as to receive the flaps from the unfolding head 49 and the flaring members 53 respectively. The surfaces of these unfolders are so shaped, as may be seen in Figs. 1, 2, 4, 6, 9 and 10, that the respective flaps in sliding forward in contact with these surfaces are unfolded outwardly into the horizontal position, as shown in dotted outline in Fig. 8, where the adhesive is being applied to the tops of the unfolded top flaps and to the bottoms of the unfolded bottom flaps.

Referring now more particularly to Fig. 9, the unfolders 51 and 52 straighten out into flat guide plates 69 and 70 by which the flaps are held in the flat horizontal position and brought to the adhesive applying rollers 71 and 72. Although the resiliency of the upper flaps usually keeps them in contact with the lower surface of unfolders 51 and plates 69, plates 73, bent downwardly at their front

ends, are provided to guide the upper flaps into slots 74 between the plates 69 and plates 73. The lower flaps move forward in the horizontal position in slots 76 formed by the plates 70 and guides 47. Plates 73 are mounted on bars 75 and these two elements together serve as guides (see Fig. 8) for the upper ends of the cartons to maintain them in properly centered relation to the adhesive applying mechanism. Plates 73 are interrupted opposite the adhesive applying rollers 71 as may be seen in Fig. 9 and plates 70 terminate at the adhesive rollers 72.

The adhesive is applied to the top flaps by passing them each between a pair of fixed but resiliently mounted ribbed rollers 77 and the vertically movable adhesive carrying rollers 71. The adhesive is applied to the bottom flaps by passing them between a similar pair of fixed but resiliently mounted ribbed rollers 78 and vertically movable adhesive carrying rollers 72. The ribs on rollers 77 and 78 are arranged substantially as indicated in Figs. 8 and 2.

Each pair of rollers 78 is carried in a frame 79 (Fig. 2) which is pivoted on a pin 80 in a bracket 81 that is bolted to the side of one of the long guides 47. Springs 82 (Fig. 9) serve to yieldingly urge the rollers 78 downward and the vertical position of the surfaces of roller 78 can be adjusted by means of a stop screw 83, one end of which contacts with an arm projecting on the opposite side of pin 80 from springs 82. Rollers 77 are carried in a similarly constructed mounting 84, shown in Fig. 9.

The lower adhesive applying rollers 72 are mounted on shafts 85 which are journaled in the side walls of vertically movable adhesive receptacles 86. The lower surfaces of rollers 72 dip into the body of adhesive 87 and carry a film of adhesive onto the undersides of the bottom carton flaps. Rollers 72 are positively driven from a cam shaft 88 by means of chains 89 which are carried on sprockets 90 and 91.

It is not desirable to apply the adhesive to the entire surfaces of the flaps, but rather to apply it to certain portions only as indicated for example by the shaded portions 92, shown in Fig. 5. This leaves the centers of the flaps opposite the gap between the inner flaps uncoated with adhesive so that it is prevented from soiling the contents of the carton. This is taken care of in the present apparatus by automatically raising and lowering the adhesive applying rollers 71 and 72. Both of these rollers are normally in adhesive applying position and are moved out of this position, the upper roller being raised and the lower roller being lowered, while the centers of the flaps are passing the rollers.

In order to provide for this automatic movement of the lower rollers 72, each of the adhesive receptacles 86 which carry the rollers is pivotally mounted at its front end at 93 upon the sleeve 94 of a bracket 95. The front end of each receptacle 86 is supported by a goose-neck arm upon the outer end of which is mounted a roller 97 that rides upon the surface of a cam 98. Cam 98 is splined to shaft 88 so as to be positively rotated thereby but the cam is slidable lengthwise along the shaft to permit the lateral adjustment of the rollers 72, as will be described below. In order to cause the cams 98 to slide on shaft 88 as the rollers 72 and receptacles 86 are laterally adjusted, the goose-neck arms 96 have ears 99 which depend on each side of these cams.

Cam shaft 88 is journaled in the side frames of the machine and serves not only as the support for the adhesive receptacle 86 through the cams and rollers, but also for the support of other laterally adjustable parts of the apparatus. Thus the long guide bars 47, which are secured to inwardly projecting arms of bracket 95 (see Fig. 10), are also secured to brackets 100 (see Figs. 2 and 8) which are supported by bearings 101 on cam shaft 88. The sleeves 94 of brackets 95 are supported upon a shaft 102 onto which they are threaded with right and left hand threads respectively. The turning of this shaft 102 by means of a crank applied to its squared end, effects the desired lateral adjustment of each of the several parts which are connected to and supported by brackets 95. Thus the long guide bars 47 are simultaneously brought closer together or moved further apart merely by rotation of shaft 102; also the ribbed rollers 78, whose supporting brackets 81 are carried by these long guide bars. Moreover, the adhesive receptacles 86 and adhesive rollers 72 carried thereby are similarly and simultaneously moved through the mounting of their pivots 93 on the sleeves 94. Also the lower unfolders 52 and guide plates 70, which are supported entirely by brackets 95, are adjusted with respect to one another at the same time. By means of this construction, therefore, a quick, convenient and accurate adjustment of all of these various parts is effected through a single adjusting means, namely the shaft 102.

The upper adhesive applying rollers 71, as well as all of the other mechanism above line 2—2 of Fig. 1 is supported for operation and adjustment in frame 56 previously mentioned. These various parts are shown to best advantage in Figs. 6, 4, 8 and 9. The frame 56, shown in plan view in Fig. 6, is generally of rectangular construction having a pair of arms 103 projecting at one side toward the front of the machine. The frame has a pair of projections 104 which fit closely, but are movable in vertical slots or ways 105 that are provided in the upstanding wide portions 106 which are stationary parts of the machine frame. These projections 104 are tapped to receive long adjusting screws

107 which are mounted to rotate in the upstanding portions 106, their rotation being accomplished by means of a single shaft 108 which extends transversely across the top of upstanding portions 106 and which is connected with screws 107 by beveled gearing 109.

By placing a crank on the square end of shaft 108, therefore, it is an easy matter to raise or lower frame 56 together with the upper adhesive applying rollers 71 and their associated mechanism which will presently be described, as well as the unfolding head 49, the unfolders 51, the rotary flap holder 59, the fin 57, and all of the other parts which are mounted upon frame 56. This adjustment is of course provided for the purpose of shifting these various elements of the machine to accommodate cartons of greater or smaller height. The projections 104 are of considerable length vertically as may be seen in Fig. 1, so that the frame 56 may be supported with a sufficient degree of firmness inasmuch as some of the parts supported thereby extend to a considerable distance on one side or the other of this center of support.

Referring now to the upper adhesive applying mechanism, the rollers 71 which carry the adhesive to the upper surfaces of the upper carton flaps are mounted upon the adhesive receptacles 110 so as to move vertically therewith as in the case of the lower adhesive applying rollers 72 and receptacles 86. The upper rollers 71, however, are mounted at the front ends of the receptacles 110 and project through apertures in the front walls of these receptacles into contact with the body of adhesive 111. The diameter of rollers 71 is greater than the height of receptacles 110 and these rollers in reality constitute a portion of the front walls and serve to retain the adhesive within the receptacles.

The bottoms of the receptacles are each provided with scrapers or doctor blades 112 (see Fig. 9) which contact with the surface of the roller 71 to prevent the escape of the adhesive and to allow the rollers to carry downwardly only a relatively thin film of adhesive which is applied to the surfaces of the carton flaps supported by the ribbed rollers 77. The blades 112 are horizontally adjustable to take up for wear and to vary the thickness of the film of adhesive and this adjustment is obtained by means of the knurled screws 113 as shown on Fig. 9. After the proper adjustment of the blades is made, they are securely clamped in place by means of the bolts 114. Similarly adjusted and similarly clamped doctor blades 198 are provided for the lower adhesive applying roller 72, the operation of which will be understood from an inspection of Fig. 9.

The receptacles 110 are supported at their front ends by pivots 115 on sleeves 116 which are threaded with right and left hand threads respectively upon a rotatable shaft 117 which is journaled in the ends of the arms 103 of the frame 56 (Figs. 6 and 9). At their front ends the receptacles 110 are supported by arms 118 bolted thereto and extending over the tops of adhesive rollers 71 and terminating in rollers 119 which rest upon cams 120 on a cam shaft 121. Cams 120 are exactly similar in shape to cams 98 which actuate the lower adhesive applying rollers 72 thereby raising and lowering rollers 71 in precisely the same manner as rollers 72 are actuated.

Each cam 120 is splined to shaft 121 so as to be positively driven thereby but is slidable along the shaft by the pressure of ears 122 at the sides, (Fig. 9) so that the cams will follow the lateral adjustment of the rollers 71 and adhesive receptacles 110. This lateral adjustment is obtained by rotation of shaft 117, similarly to the various adjustments previously mentioned, by applying a crank or handle to the squared end of this shaft. Unfolders 51 and plates 69 and 73 previously described are supported upon brackets 123 which extend downwardly from the sleeves 116. The bars 75 which guide the upper sides of the receptacles are also supported by brackets 123 and by another pair of brackets 124 (see Fig. 8) which extend outwardly towards the sides of the machines and then upwardly so as to be suspended from the cam shaft 121.

The upper ends of brackets 124 bear loosely on shaft 121 so as to be freely slidable when they are adjusted by rotating screw threaded shaft 117, and are bifurcated for the purpose of causing a pair of sprocket wheels 125, which drive the adhesive rollers 71, to slide laterally on shaft 121 during this adjustment. Sprockets 125 drive adhesive rollers 71 by means of chains 126 and sprockets 127 which are secured to the shafts of the adhesive rollers.

The rollers 71 and 72 are driven at a surface speed which is equal to the speeed at which the rods 32 advance in driving the cartons through the apparatus, and the shape of cams 98 and 120 is such that during one-half of each revolution thereof each of rollers 72 and 71 are brought into contact with the carton flaps and during the other half of the revolution they are moved out of contact therewith. With cams of this shape and with approximately a 2:1 gear ratio between driving sprockets 90 and 125 and their driven sprockets 91 and 127, the adhesive is applied in patches 92 as shown in Fig. 5, as previously referred to. The extent of patches 92 can be varied by changing the shape of the cams 90 and 120 and for this purpose additional cams 128 may be provided, these cams also being splined to the cam shafts and slidable at will into position to replace the cams 90 and 120.

In the dotted position of the carton shown in Fig. 9 adhesive is being applied to the up-

per surfaces of the out-folded top flaps and to the lower surfaces of the out-folded bottom flaps. The out-folded positions of these flaps are shown more clearly in dotted lines in Fig. 8 where the upper sets of adhesive applying rollers 71 have been pressed into contact with the upper surfaces of the top flaps which are supported on their undersides by the ribbed rollers 77. The lower set of adhesive applying rollers 72 is raised into contact with the lower surfaces of the bottom flaps, pressing the flaps against the ribbed rollers 78.

As the carton leaves the adhesive applying rollers 71 and 72, it advances along the supporting table 39 toward the refolding mechanism illustrated in Fig. 5. The upper flaps when they pass out from beneath adhesive rollers 71 continue to be supported on plates 73 and bars 75 but the inherent resiliency in the material may cause the flaps to spring upward to some extent, or possibly to return to approximately the original closed position which they occupied upon entering the machine. Whether or not this takes place, however, these upper flaps are positively acted upon by the refolders 129 which consist of metal rods adjustably mounted in sockets 130 on the left hand ends of bars 75. The inner ends of these refolders being attached to bars 75 they lie underneath the carton flaps as is seen in Fig. 11.

The refolder bars 129 are straight for a portion of their length as may be seen in Figs. 1 and 6, and then are bent toward one another. These converging portions of the refolders are curved first upwardly as shown in Figs. 1 and 11, and then downwardly in a sweeping curve terminating in straight horizontal portions 131. The effect of this curvature of the refolders is to move the top flaps upwardly to the vertical position shown in Fig. 12 and to the closed, or substantially closed, position, shown in Fig. 13, where the refolders are now on top of the flaps, pressing them gently against the inner top flaps. Instead of metal rods, the refolders may be made of cast metal if desired and in the form of bars or plates having warped surfaces for performing the refolding operations.

As these top flaps approach the closed position, there is some tendency, for one reason or another, for them to overlap slightly at their inner edges 132 and for the purpose of preventing this overlapping and insuring a perfect uniform contact between the adhesive coated surfaces of the outer flaps and the surfaces of the inner flaps, the fin 57 is provided. Fin 57 consists of a relatively long narrow metal bar pivoted at 58 to the foot 54, as previously described, and rests freely upon the inner top flaps, these flaps sliding beneath the fin. Fin 57 acts to separate the inner opposed edges of the outer top flaps a relatively small amount, depending upon the thickness of the fin, as the flaps are folded by the refolders 129 toward the closed position, thus preventing any possibility of overlapping of the edges of the flaps. The fin terminates just beyond the ends 131 of the refolders where the refolding of the flaps has been completed.

The bottom carton flaps are refolded in a somewhat similar manner to the top carton flaps. When the bottom flaps leave the adhesive rollers 72, their tendency is to fall downwardly and as they are below the guide bars 47, and as the plates 70 terminate in front of the adhesive rollers 72, there is nothing to support these flaps. Therefore in order to prevent them from being damaged by coming in contact with the goose-neck arms 96 of the adhesive receptacles 86, guard rollers 133 (see Figs. 8 and 9) are provided and are conveniently mounted on the same pins by which the rollers 97 are carried in the ends of arms 96.

After the flaps pass these rollers they usually tend to drop toward the vertical position, but in case they do not, they are forced downwardly by a pair of lower refolders 134, as is indicated in Fig. 11. These lower refolders are shaped similarly, but reversely, to the upper refolders so as to cause the bottom flaps to be turned about their hinges from the out-folded position shown in Fig. 11 to the vertical position shown in Fig. 12 and then to the closed position shown in Fig. 13.

Inasmuch as the refolders 129 and 134 are supported upon the guide bars 75 and 47 respectively, the position of these refolders is adjusted simultaneously with the adjustment of bars 75 and 47, by the rotation of adjusting shaft for vertical movement 108 and the adjusting shaft for horizontal movement 117, as previously described.

It will be remembered that the carton is resting upon the inner bottom flaps which are sliding along the smooth surface of supporting table 39. Table 39 at its left end is gently tapered to a rounding point indicated at 136 and the bends in the lower refolders are arranged opposite the converging sides of the table at appropriate angles to cause the upper adhesive coated surfaces of the outer bottom flaps to be gradually pressed against the inner bottom flaps as they pass off from table 39 over the tapering point thereof. A fin member 137 (Fig. 2) is secured directly at the end of the rounding point 136 which acts similarly to fin 57 to prevent the overlapping of the inner edges of the flaps as they are folded into position.

As the carton passes off from the end of table 39, it is received upon a set of flat table rolls 138 which are cut away at their centers as indicated at 139 to permit the fin 137 to

extend over one or two of these rollers and to prevent any excess adhesive from escaping onto them. Inasmuch as it is necessary to terminate the guide bars 47 and 75 just ahead of the refolding position, as may be seen in Fig. 2, so as to allow the flaps to be folded about their hinges, the carton in sliding through the refolding position may tend to get out of alignment. The flaring guide bars 140 are provided to properly realign the carton so that the flap-closing operation may be appropriately completed, and are positioned in close proximity to the surfaces of rolls 138 so as to coact with the sides of the carton at the very bottom and thereby press together the inner edges of the outer bottom flaps to close up the gap left between these edges by the fin 137, thereby causing the edges of the flaps to meet evenly. Guides 140 are yieldingly and adjustably mounted, as shown at 142 (Fig. 5) on the frame of the flap manipulating and adhesive applying mechanism. These guides are continued at 140′ on the sealing pressure applying mechanism so that the inner marginal edges of the flaps are held in meeting relation until the adhesive is set sufficiently to prevent them from opening up. Guides 140 and 140′ would be made continuous except for the fact that they have to be interrupted in order to allow the driving bars 32 to pass over and around sprockets 36.

A pair of guides 141 are appropriately mounted on the sealing pressure applying mechanism to coact with the sides of the carton at the top as will be explained below, and serve the same purpose as guides 140 and 140′ in closing the gap left between the upper outer flaps by the fin 57.

When the carton has been guided by means of guides 140 from the flap refolding position on to the lower flap closing rollers 138, the outer upper flaps are pressed firmly together along their central opposed edges by means of a presser plate 143 which is bent up at its forward end so as to cause the carton to slide smoothly thereunder. This plate is yieldingly mounted by means of springs 144 on a bar 145 which extends outwardly from the adjusting and supporting frame 56 (Fig. 6), being rigidly secured to the central portion thereof by means of bolts 146. Fin 57 is supported when no carton is beneath it by means of a bolt 147 which passes through an aperture in this bar 145, and bolt 147 is provided with an adjusting nut by which the position of the suspended fin may be readily varied.

The set of rollers 138 and the plate 143 which complete the closing of the flaps are provided because the refolder bars 129 and 134 act merely to return the respective flaps to their approximately closed positions. Plate 143 and rollers 138 serve to complete the closing operation which has been started when the flaps pass the ends of the refolders. Rollers 138 act upon the entire surface of the bottom flaps, and plate 143 presses the inner opposed margins of the outer top flaps against the surfaces of the inner top flaps over a substantial area which is sufficient to bring the contacting surfaces into a permanent fixed relationship.

Instead of the fin 57 which serves to prevent the flaps from overlapping one upon the other, the mechanism shown in Figs. 16 and 17 may be utilized. This also makes the use of presser plate 143 unnecessary. This mechanism comprises a thin strip 199, and a pivoted and spring pressed presser foot 200 which are mounted upon bar 145. Strip 199 in a sense takes the place of fin 57 in that it serves to hold down the inner carton flaps. However, strip 199 may be of any suitable width and is comparatively narrow vertically and terminates short of the presser foot 200 so as not to interfere with the folding of the outer flaps 201 of the carton. Strip 199 does not therefore perform any function in separating the inner margins of the flaps 201 as does the fin 57.

The presser foot 200 is pivoted at 202 to the bar 145 and is provided with a sloping forward surface 203 which curves into a nearly horizontal surface 204. The member is held normally in the position shown in Fig. 16 by means of the rod 205 over which is placed a spring 206 which urges the member toward its lowermost position. The member is relatively wide as shown in Fig. 17 so as to act simultaneously upon both of the carton flaps 201. As the carton moves forward the front corners of flaps 201 are engaged by the sloping surface 203 and deflected downwardly from the position where they are left by the refolder bars 129 toward the completely closed position. Since the corners of the flaps 201 are acted upon in the same plane by the single sloping surface 203 they approach each other in abutted relation and the chance for overlapping is extremely slight. As the carton moves underneath the horizontal portion 204 guides 141 come into action against the sides of the carton and bring the inner edges of the flaps 201 into closely adjacent relation. The pressure of spring 206 causes the marginal portions of both flaps 201 to be forced into sealing relation with the surfaces of the inner flaps.

This completes the description of the flap manipulating and adhesive applying portion of the present apparatus aside from pointing out the details of the chain and gear drive for the various parts of the apparatus. A description of this driving gear will now be given before describing the sealing pressure applying mechanism illustrated in Fig. 14.

Electric motor 63 (Fig. 1) drives a shaft 148 through an appropriate reduction gearing indicated generally by numeral 149. Shaft 148 carries a sprocket 150 which drives

main drive chain 151 (Figs. 1 and 5). Main drive chain passes over an idler 152 and thence to the changeable portion 153 of a double sprocket 154 which is mounted at one side of the machine on a sprocket shaft 37 which extends laterally from side to side of the machine at the rear end next to the sealing pressure applying mechanism. Chain 151 thence passes to a sprocket 155 on shaft 88 and then returns to sprocket 150.

The double sprocket 154 which is driven by chain 151 is secured to shaft 37 and drives the chains 33 at each side of the machine which carry the carton drive bars 32. Sprocket 36 for the chain 33 which is on the same side of the machine as drive chain 151 is the fixed portion of the double sprocket 154 (Fig. 15). The section 153 of this double sprocket which is driven by main drive chain 151 is made to be rotatable relative to the fixed portion of the sprocket so that by loosening cap screws 156 section 153 may be rotated with respect to the main or fixed portion. This provides an adjustment for the positions of driving bars 32 with respect to the remainder of the sealing machine mechanism. Hence, for example, driving bars 32 may be readily adjusted with respect to the adhesive roller cams 98 and 120 so as to cause the uncoated portions to occur at the centers of the flaps.

Section 153 may be taken off entirely if desired and replaced by another section having a different number of teeth and in this way the relation of the speed of the cartons along the supporting table 39 may be varied with respect to the speed of the shaft 88 and the cam shafts, and rotary flap holder 59 which are driven by it. Another way of securing the same result is to replace sprocket 155 on shaft 88 by one having a different number of teeth. Hence by appropriate selection of sprockets 153 and 155 the timing of rotary flap holder 59 and of the raising and lowering of adhesive applying rollers may be adjusted so that the machine may be prepared to operate upon cartons of different length.

Shaft 88 which is driven by sprocket 155 and hence by main chain 151, it will be remembered, is the lower cam shaft which serves both to rotate the lower adhesive applying rollers 73 and to raise and lower them into and out of contact with the bottom flaps. This shaft is journaled in the fixed sides of the frame of the apparatus. At the rear side of the machine (which is shown at the left in Fig. 8), shaft 88 is provided with beveled gearing 157 and a vertical shaft 158. Vertical shaft 158 is journaled at its lower end in a fixed portion of the machine frame, and at its upper end in a bracket 159 which extends outwardly from adjusting frame 56.

Upper cam shaft 121 which actuates the upper adhesive applying roller 71, is journaled also in frame 56 just below bracket 159 and by means of beveled gearing 160 this shaft is driven from vertical shaft 158. The beveled gear 160 which is on shaft 158 slides loosely on the shaft but is splined thereto, so that as the frame 56 is moved up or down, the vertical movement of this gear is not restricted.

The rotary flap holder 59 which is carried by shaft 60 is rotated by means of a chain 161 driven by a sprocket 162 on shaft 121 (see Fig. 6).

Both of shafts 88 and 121 are square at their front ends similarly to the adjusting shafts 102 and 117 so that the same handle may be applied to either of shafts 88 or 121 to set the various movable parts of the machine in motion by hand during the adjustment of the several parts of the machine in setting it up for operation.

We will now refer to Fig. 14 which shows the sealing pressure applying portion of the carton sealing apparatus. This mechanism is supported in an elongated frame which is perhaps somewhat longer than the apparatus shown in Figs. 1 and 2. The apparatus comprises upper and lower endless belts 163 and 164 respectively, arranged to coact with the tops and bottoms of a plurality of cartons to apply suitable pressure to the completely closed flaps thereof to effectively seal the same.

The lower endless belt 164 is driven by a suitable motor 165 in a direction to cause the cartons thereon to advance toward the left. The upper endless belt 163 is driven by frictional engagement with the tops of the cartons. The motor 165 is controlled by an electric switch 166 to automatically advance the cartons in a periodic or step-by-step movement as is to be described more fully below.

The lower endless belt 164 passes over a supporting pulley 167 at the receiving end of the mechanism and a driving pulley 168 at the delivery end of the mechanism, these pulleys being mounted upon suitable shafts carried in longitudinal frame members 169 which extend along each side of the mechanism. Motor 165 drives pulley 168 through the train of reduction gearing indicated at 170 and a chain or belt 171. Pulleys 167 and 168 support the upper pass of the endless belt 164 at the elevation of the table rolls 138 so that the cartons may slide easily from the flap manipulating mechanism into the sealing pressure applying mechanism.

Endless belts 163 and 164 are of substantial width as may be seen from Fig. 5 so as to apply uniform sealing pressure to the longitudinal opposed margins of the outer flaps of the carton for a considerable distance on both sides of these margins. A series of rolls 172 of about the same diameter as the table rolls 138 is mounted for rotation in the frame members 169 between pulleys 167 and 168 and serves to support the

endless belt 164 at sufficiently frequent intervals to cause the belt to exert a substantially uniform pressure against the surfaces of the lower flaps.

The upper endless belt 163 is carried on supporting rolls 173 and 174 at the respective ends of the mechanism and between these rolls a plurality of suitably spaced intermediate rolls 175 are provided for the purpose of backing the endless belt 163 and causing a substantially uniform sealing pressure to be applied to the upper carton flaps. Rolls 173 and 174 are mounted near the ends of a pair of longitudinal frame members 176 at an elevation slightly above that of rolls 175 so as to cause the sealing pressure to be gradually applied and released. Rolls 175 are mounted for limited vertical movement in the frame members 176 through the instrumentality of the rods 177 which move in a pair of spaced apertures in the frame members, and this vertical movement of each roll 175 is opposed by springs 178 surrounding rods 177. The resilient mounting of the rolls 175 further assists in producing a gradual application of the sealing pressure, and also compensates for slight variations in the surfaces of the carton flaps, and slight variations in the height of the cartons.

The guides 141 which guide the cartons in their passage from the flap manipulating and adhesive applying mechanism into the sealing pressure applying mechanism, and which also serve to appropriately position the closed upper flaps are resiliently and adjustably mounted near the end of the feeding pressure applying mechanism. The upper edges of these guides as may be seen in Fig. 14 are positioned above the endless belt 163 and even above the surfaces of the first few rollers 175, these rollers being shorter than the remaining rollers, so that the guides can act upon the very corners of the carton and therefore in the plane of the outer carton flaps. By applying pressure in this way against these flaps they are readily brought together at the center to close up the space left by the fin 57 before the adhesive has had a chance to set. The positioning of these guides at the very corners of the carton assures that the sides of the carton will be left straight and neat rather than being bulged outwardly at the corners. Guides 140′ are mounted in exactly the same relative position with respect to the lower belt 164, and the first few rollers 172 are also shorter than the remainder of these rollers so as to allow the guides to act upon the cartons at their very corners.

The longitudinal frame members 176 are suported upon a pair of transverse bars 179, each of which extends between a pair of uprights 180 disposed near each end of the sealing pressure applying mechanism. Provision is made for allowing bars 179 to be moved vertically in guide-ways attached to uprights 180, and this vertical movement is effected by long adjusting screws 181. Adjusting nuts 182 and 183 are mounted at the upper ends of uprights 180 and by rotating these nuts the adjusting screws 181 are caused to move up or down. The nuts 182 and 183 are each provided with sprockets over which passes an endless chain 184 to cause the screws 181 to be adjusted in unison. To facilitate the rotation of the nuts 182 and 183 a horizontal shaft (not shown) is provided upon which a beveled gear 185 is mounted, this gearing meshing with a similar one which is secured on adjusting nut 183. By applying a crank or handle to the square end of this shaft the raising and lowering of endless belt 163 is readily accomplished, either for the purpose of adjusting the sealing pressure, or for resetting the apparatus for cartons of a different height.

The operation of this sealing pressure mechanism is as follows. As a carton such as the one indicated in dotted lines at 186 reaches the end of the flap manipulating and adhesive applying mechanism, it strikes a lever 187 which depends midway across the apparatus from a transverse shaft 188. This shaft extends into the switch box 166 and actuates the switch therein. It will be remembered that the motion of the cartons through the flap manipulating and adhesive applying mechanism of Figs. 1 and 2 is a continuous uniform motion. As the carton 186 strikes the lever 187, it therefore raises this lever gradually in the direction of the arrow shown in Fig. 14 toward the dotted position there indicated.

In the vertical position of lever 187 shown in full lines the switch is open and motor 165 and the endless belts 163 and 164 are at rest. It requires only a slight movement of lever 187 out of the vertical position, however, to close the switch and immediately start motor 165 at full speed. Hence as soon as carton 186 has moved lever 187 a short distance the endless belts 163 and 164 are set in motion. Carton 186 continues to be driven forward at its previous uniform speed by the bar 32 of the flap manipulating mechanism until its forward end is forced between the upper and lower endless belts 163 and 164. The switch in switch box 166 is maintained closed as the lever 187 moves upward to the dotted position. As soon as the carton 186 is grasped between the two endless belts it is jerked forward thereby away from bars 32 inasmuch as the endless belts 163 and 164 are driven at a considerably higher speed than the chains 33 which drive the bars 32.

As soon as the lever 187 falls behind the rear end of the carton to its normal vertical position it promptly opens the switch 166 and the power to motor 165 is thus cut off. The inertia of the moving parts of the seal-

ing pressure applying mechanism is not very great but is sufficient to carry the rear end of the carton underneath the first of rollers 175 where it stops in the position shown in dotted lines at 189. When the next carton again raises lever 187 the endless belts 163 and 164 are again set in motion as soon as lever 187 is moved slightly out of its vertical position. As belts 163 and 164 advance more rapidly than chain 33 and are moving at full speed while the carton following is raising lever 187, the carton ahead will be spaced from the carton following by about two inches.

Reviewing briefly the operation of the complete apparatus, the cartons advance in close succession over the conveyor table 20 from the filling station where they receive their contents and have both the upper and lower flaps placed in closed position but unsealed. The cartons are fed one at a time by means of tilting table 21 into the flap manipulating and adhesive applying portion of the apparatus shown in Figs. 1 and 2. They are driven through this apparatus at constant speed, sliding forward over the inclined groups of rollers 25, and then onto and throughout the length of supporting table 39. While in this portion of the apparatus, both the upper and outer flaps are first unfolded, and then gummed by the application of a suitable adhesive to appropriate portions of the flap surfaces.

After this the flaps are automatically refolded and pressed into closed position and the cartons are delivered automatically to the sealing pressure applying mechanism which takes them one at a time and advances them intermittently between the pressure applying endless belts. The length of time during which the sealing pressure is applied by these belts is sufficient to cause the adhesive to set sufficiently to allow the cartons to be handled without fear of the flaps being accidentally opened.

By causing the cartons to come to rest for a few seconds periodically while advancing through the sealing pressure applying mechanism the contacting surfaces of the flaps are brought into more intimate contact and a better sealing is effected. Moreover, the spacing of the cartons allows a freer escape of moisture from the adhesive, so that both of these features assist in causing the setting of the adhesive in a relatively short period of time so that the length and space occupied by the apparatus is materially reduced.

We claim:

1. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a pointed supporting table having the point thereof disposed in over-lapping relation with said carton supporting means so as to enter between the partially opened outer bottom flaps and engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means for opening said flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

2. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means having surfaces sloping from the sides of the carton towards the center thereof so as to support the carton with its outer bottom flaps partially open, a support in advance of said carton supporting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means for opening said flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

3. A machine for sealing filled cartons comprising means for receving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means and inclined in the direction of travel of the carton, said means being adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support disposed near the lower end of said inclined carton supporting means adapted to engage the inner bottom flaps as the carton moves forward and support the carton and its contents and leave both outer bottom flaps free, means for opening said flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

4. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, a pair of groups of rollers in advance of said carton receiving means, the rollers of said groups sloping toward one another and in-

clined in the direction of travel of the carton, thereby permitting the outer bottom flaps to open partially, a pointed supporting table having the point thereof disposed in overlapping relation to the lower end of said rollers so as to enter between the partially opened outer bottom flaps and engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means for opening said flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

5. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support in advance of said carton supporting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, said support having a tongue projecting into proximity with said carton supporting means and adjustable vertically with respect thereto to cause said partially open flaps to advance beneath said tongue, means for opening said flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

6. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means inclined in the direction of travel of the carton and having surfaces sloping from the sides of the carton towards the center thereof so as to support the carton with its outer bottom flaps partially open, a support in advance of said carton supporting means having a tongue adapted to enter above the partially open outer bottom flaps and engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, guiding means for guiding the carton while on said carton supporting means onto said support, means for opening said outer flaps outwardly into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

7. In a machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton through the machine, stationary means for folding the outer top carton flaps to a position to expose the inner surfaces of said flaps, means for gumming said surfaces, means for thereafter closing said gummed flaps against the inner top flaps to thereby seal the carton, and a pivotally mounted unfolding head having a point and upwardly and outwardly diverging surfaces, said head being positioned so that its point will enter between the unsealed inner and outer top flaps to initially open the same and present them to said stationary folding means.

8. In a machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton through the machine, stationary means for folding the outer top carton flaps to a position to expose the inner surfaces of said flaps, means for gumming said surfaces, means for thereafter closing said gummed flaps against the inner top flaps to thereby seal the carton, a vertically movable unfolding head mounted in a predetermined position to enter between the unsealed inner and outer top flaps to initially open the same and present them to said stationary folding means, a control switch for the carton advancing means operatively associated with said unfolding head, said switch being opened by the movement of the head out of said predetermined position to thereby automatically stop the advance of the carton.

9. Feeding mechanism for machines for sealing filled cartons comprising a support to which the cartons to be sealed are supplied, a tiltable table adjacent said support, a second support beyond said table, driving means for advancing the cartons from said second support through the sealing machine, means for advancing the carton from said first support onto said table, means at the forward end of said table for arresting the movement of a carton thereon, and means actuated in timed relation to said driving means for simultaneously tilting said table and rendering ineffective said arresting means so as to cause the carton on the table to advance onto said second support.

10. A machine for sealing filled cartons having their flaps closed but unsealed including means for advancing the cartons successively through the machine, an unfolding head for initially opening the outer top flaps of the carton, means for completing the folding of said flaps outwardly to a convenient position for applying adhesive thereto, adhesive applying means, means for refolding said outer flaps against the inner flaps to complete the sealing of the carton, and a fin mem-

ber operating between the opposed margins of the outer flaps as they are refolded to prevent the overlapping thereof, said machine having a main frame, and an auxiliary frame mounted for vertical movement upon said main frame, said auxiliary frame having a centrally disposed longitudinally extending bar for maintaining the inner flaps closed during the manipulation of the outer flaps, said unfolding head being pivoted to said frame near one end of said bar, and said fin being pivoted to the frame near the opposite end of said bar.

11. A machine for sealing filled cartons having their flaps closed but unsealed comprising a supporting frame, means for advancing the cartons successively through the machine, means for unfolding an outer carton flap outwardly to the horizontal position, and means for applying adhesive to said flap while in this position, said means including an adhesive receptacle pivoted at one end to the supporting frame and carrying an adhesive appplying roll arranged to have its cylindrical surface coated with adhesive from the receptacle, and a cam shaft journaled in the supporting frame of the machine for supporting said adhesive receptacle, said shaft being provided with a cam for raising and lowering said pivoted adhesive receptacle to move said roll into adhesive applying relation with the surface of said carton flap.

12. In a machine for sealing filled cartons mechanism for applying adhesive to the outfolded carton flaps comprising a pair of rotary parallel shafts supported in the frame of the machine, an adhesive receptacle supported by said shafts and carrying an adhesive applying roll arranged to have its cylindrical surface coated with adhesive from the receptacle, a bracket pivotally attached to one end of said receptacle and mounted in threaded relation upon one of said shafts, and a cam upon the second shaft for raising and lowering said receptacle about its pivot to move said roll into adhesive applying relation with a flap of the carton, and means for rotating said screw threaded shaft to vary the position of said receptacle and roll with respect to the flap.

13. In a machine for sealing cartons, means for folding an outer flap thereof outwardly to the horizontal position, and mechanism for applying adhesive thereto while in this position comprising a receptacle for a body of liquid adhesive having an aperture in a vertical side wall thereof, a roller rotatably mounted in proximity to said wall and projecting into the receptacle and filling said aperture to retain the body of adhesive therein, and a doctor blade mounted upon the receptacle and coacting with the cylindrical surface of said roller as it emerges from the receptacle to cause a suitable relatively thin film of the adhesive to be carried forward by the roller, and means for bringing the surface of said flap into contact with the roller to transfer said film of adhesive thereto.

14. In a machine for sealing cartons, means for folding an outer flap thereof outwardly to the horizontal position, and mechanism for applying adhesive thereto while in this position comprising an adhesive receptacle having an adhesive applying roller rotatably mounted thereon and arranged to receive adhesive therefrom, a cam shaft having a cam coacting with one end of said receptacle to periodically move the receptacle to bring the roller into adhesive applying relation with said flap, and a second rotatable shaft for supporting the opposite end of said receptacle, said shaft being arranged in threaded engagement with the receptacle whereby the receptacle may be adjusted in position along said shaft, said cam being slidable upon the cam shaft, and means being provided upon the receptacle for engaging the cam to cause the cam to follow the movement of the receptacle.

15. In a machine for sealing cartons, means for folding an outer flap thereof outwardly to the horizontal position, and mechanism for applying adhesive thereto while in this position comprising an adhesive receptacle having an adhesive applying roller rotatably mounted thereon and arranged to receive adhesive therefrom, a cam shaft having a cam coacting with one end of said receptacle to periodically move the receptacle to bring the roller into adhesive applying relation with said flap, sprockets on the cam shaft and roller respectively having a chain passing thereover for positively driving the roller and a second shaft for supporting the opposite end of said receptacle, said shaft being arranged in threaded engagement with said receptacle whereby by rotating the shaft the receptacle may be adjusted in position lengthwise thereof, said cam and sprocket being slidable along the cam shaft, and means actuated by the rotation of said second shaft for engaging said cam and sprocket to effect movement thereof simultaneously with the movement of the adhesive receptacle.

16. A machine for sealing filled cartons having their flaps closed but unsealed comprising flap manipulating mechanism for unfolding the flaps applying adhesive thereto and refolding the same, and sealing pressure applying mechanism for receiving the closed cartons from said flap manipulating mechanism and maintaining sealing pressure against said flaps until the adhesive has set, said mechanism comprising a pair of oppositely disposed endless belts adapted to receive the cartons therebetween, spring pressed rollers acting in spaced relation on the backs of said belts to urge them against the carton, driving means for driving one of said belts,

and means for controlling said driving means so as to advance the cartons step by step through said sealing pressure applying device thereby subjecting said cartons to periods of pressure alternately with the belts in rest and motion.

17. A machine for sealing filled cartons having their flaps closed but unsealed comprising flap manipulating mechanism for unfolding the flaps applying adhesive thereto and refolding the same, and sealing pressure applying mechanism for receiving the closed cartons from said flap manipulating mechanism and maintaining sealing pressure against said flaps until the adhesive has set, said mechanism comprising a pair of oppositely disposed endless belts adapted to receive the cartons therebetween, driving means for driving one of said belts, controlling means for controlling said driving means, and an actuating member for said controlling means disposed adjacent the entrance end of said belts and actuated by each carton as it enters between the belts.

18. A machine for sealing filled cartons having their flaps closed but unsealed comprising flap manipulating mechanism for unfolding the flaps applying adhesive thereto and refolding the same, and a sealing pressure applying device for receiving the closed cartons from said mechanism and maintaining sealing pressure against said flaps until the adhesive has set, said device comprising a pair of oppositely disposed endless belts adapted to receive the cartons therebetween, driving means for driving one of said belts, controlling means for controlling said driving means having a normal off position in which said driving means is at rest, and an actuating member adapted to coact with a portion of the carton which is about to enter the sealing pressure applying device for moving the controlling means to the on position to start said driving means, and means for returning the actuating member to the off position as soon as the carton has passed.

19. A machine for sealing filled cartons having their flaps closed but unsealed comprising flap manipulating mechanism for unfolding the flaps applying adhesive thereto and refolding the same, a driving bar acting upon the rear of each carton and driven at substantially uniform speed to advance the carton through said mechanism, a sealing pressure applying device for receiving the closed carton from said mechanism and maintaining sealing pressure against said flaps until the adhesive has set said device including a pair of oppositely disposed endless belts adapted to receive the carton therebetween, driving means for driving one of said belts at a substantially higher speed than that of said driving bar, controlling means for starting and stopping said driving means, and an actuating member for said controlling means normally maintaining the controlling means in the off position, said member projecting into the path of the carton as it passes from said flap manipulating mechanism and being thereby moved to the on position and held in said position until the carton is grasped by the relatively rapidly moving belt and moved away from said driving bar.

20. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support in advance of said carton supporting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means actuated in timed relation to the advance of the carton for momentarily elevating the forward end of the carton onto said support, means for opening the outer bottom flaps outwardly to adhesive applying position as the carton advances along said support, means for applying adhesive to said outer flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

21. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support in advance of said carton supporting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means including a lifting bar and actuating cam therefor for elevating the carton as it approaches said support, means for opening said flaps outwardly into adhesive applying position as the carton advances along said support, means for applying adhesive to said outer flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

22. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support in advance of said carton sup-

porting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps below the same, means for engaging the partially open outer flaps after their forward edges have advanced below said support to lift the contents of the carton and assist the inner flaps in sliding onto the upper surface of said support, means for opening the outer bottom flaps outwardly into adhesive applying position as the carton advances along said support, means for applying adhesive to said outer flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

23. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, carton supporting means in advance of said carton receiving means adapted to support the carton near its side edges and allow the inner margins of the outer bottom flaps to open partially, a support in advance of said carton supporting means adapted to engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, said carton supporting means sloping forwardly and carrying the front end of the carton below said support, means actuated in timed relation to the advance of the carton for lifting the front end thereof onto said support, means for opening the outer bottom flaps as the carton advances along said support into substantially horizontal position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

24. In a machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton through the machine, means for folding the outer top carton flaps to a position to expose the inner surfaces of said flaps, means for gumming said surfaces, means for thereafter closing said gummed flaps against the inner top flaps to thereby seal the carton, a substantially horizontal bar for holding the inner top flaps in approximately closed position during the folding and gumming of said outer top flaps, a rotary flap holder for forcing the rear inner top flap beneath the said bar, and means for driving said rotary flap holder including a yielding clutch mechanism whereby the rotation of said holder may be stopped when the resistance to rotation exceeds a predetermined amount.

25. In a machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton through the machine, means for folding a pair of outer carton flaps to a position to expose the inner surfaces of said flaps, means for gumming said surfaces, refolding means for refolding the flaps toward their closed position, and a presser foot of sufficient width to simultaneously coact with both flaps of said pair, said presser foot having a sloping forward surface by which the front corners of said flaps are simultaneously depressed to bring the flaps into contact with the inner flaps.

26. Feeding mechanism for machines for sealing filled cartons comprising a support to which the cartons to be sealed are supplied, a roller table tiltable about an axis adjacent the front end thereof and disposed adjacent said support, a stop movable adjacent the front end of the table at substantially right angles to the plane of the table, means for advancing cartons from said support onto said table and into engagement with said stop, sealing mechanism beyond said table, driving means for advancing the cartons one at a time through said sealing mechanism, and mechanism actuated in timed relation to said driving means for tilting said table, said mechanism including means for simultaneously withdrawing said stop so as to deliver a carton to said sealing mechanism.

27. A machine for sealing filled cartons comprising means for receiving a carton resting on its bottom flaps with its bottom flaps closed but unsealed, means for advancing the carton off of said carton receiving means, a pair of groups of rollers in advance of said carton receiving means, the rollers of said groups sloping toward one another and inclined in the direction of travel of the carton thereby permitting the outer bottom flaps to open partially, a pointed supporting table having the point thereof disposed in proximity to the lower end of said rollers so as to enter between the partially opened outer bottom flaps and engage the inner bottom flaps to support the carton and its contents and leave both outer bottom flaps free, means for opening said flaps outwardly into adhesive applying position, means for applying adhesive to said open flaps, and means for thereafter folding said flaps against the inner bottom flaps to thereby seal the bottom of the carton.

28. The combination with a carton sealing machine of a conveyor for conveying cartons to the machine, a tiltable device associated with said conveyor adapted when tilted to cause the foremost carton on the conveyor to slide into the sealing machine, a movable stop adjacent said device for engaging the foremost carton and thereby arresting the movement of the cartons on the conveyor, driving means for advancing the cartons through the sealing machine, and means actuated in timed

relation to said driving means for simultaneously withdrawing said stop and tilting said tiltable device.

In testimony whereof I affix my signature.

ARTHUR E. RIDEOUT.

In testimony whereof I affix my signature.

WALLACE D. KIMBALL.

relation to said driving means for simultaneously withdrawing said stop and tilting said tiltable device.

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CERTIFICATE OF CORRECTION.

Patent No. 1,815,571. Granted July 21, 1931, to

WALLACE D. KIMBALL ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 120, for "be" read by; page 3, line 100, for "as" read is; page 15, line 36, claim 23, for "substantially horizontal" read adhesive applying, and line 37 for "open" read outer; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of September, A. D. 1931.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.

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