Oct. 1, 1963 E. E. MARSHALL 3,105,334

CASE SEALER

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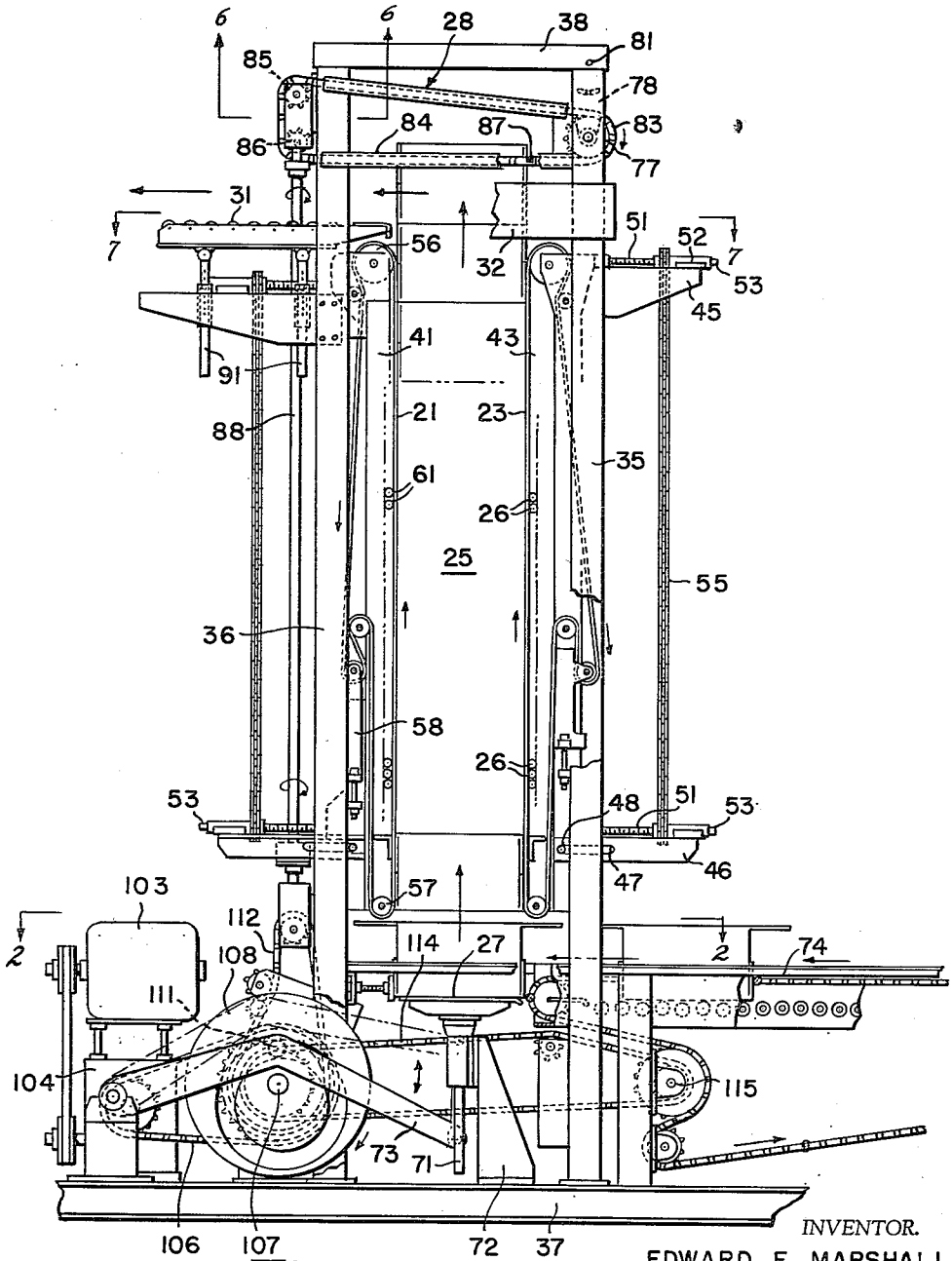


Fig. 1.

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CASE SEALER

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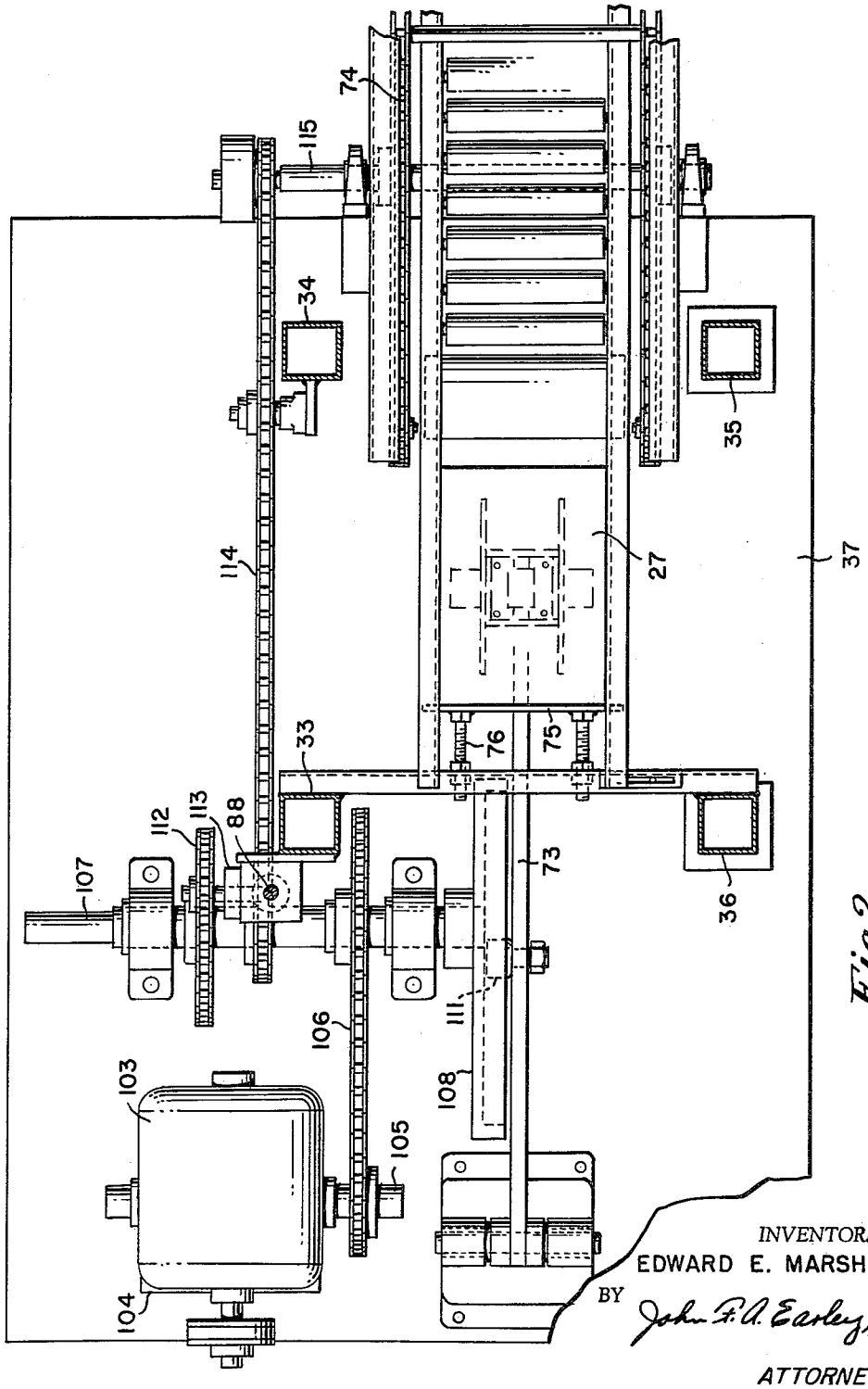


Fig. 2.

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CASE SEALER

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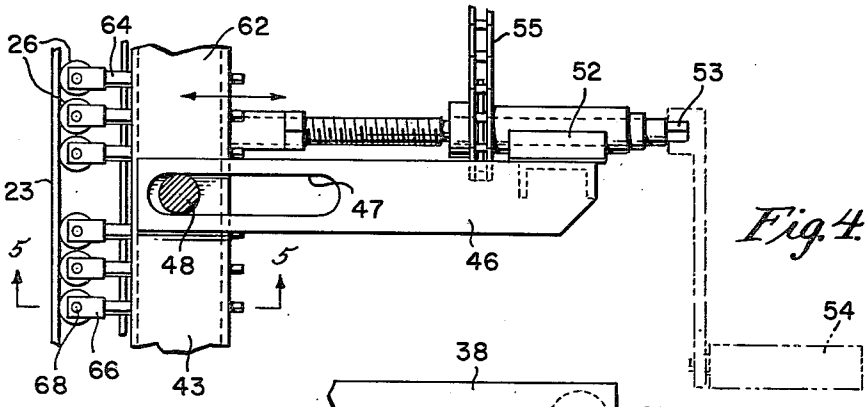


Fig. 4.

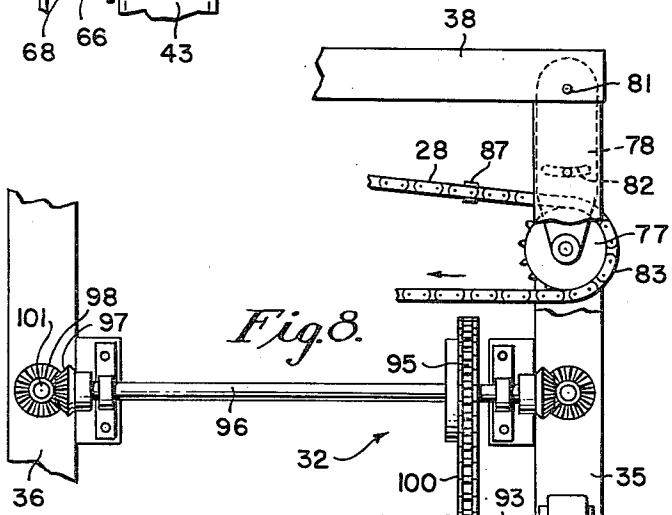


Fig. 8.

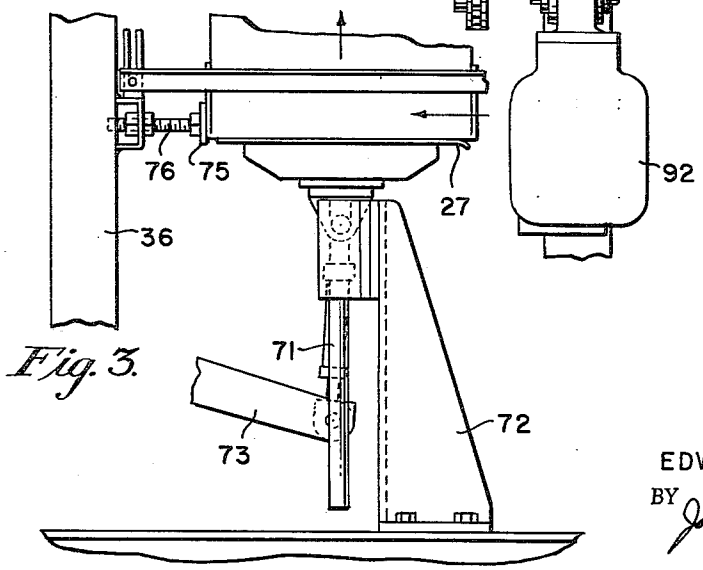


Fig. 3.

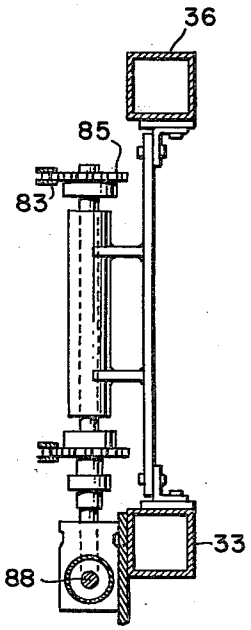


Fig. 6.

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CASE SEALER

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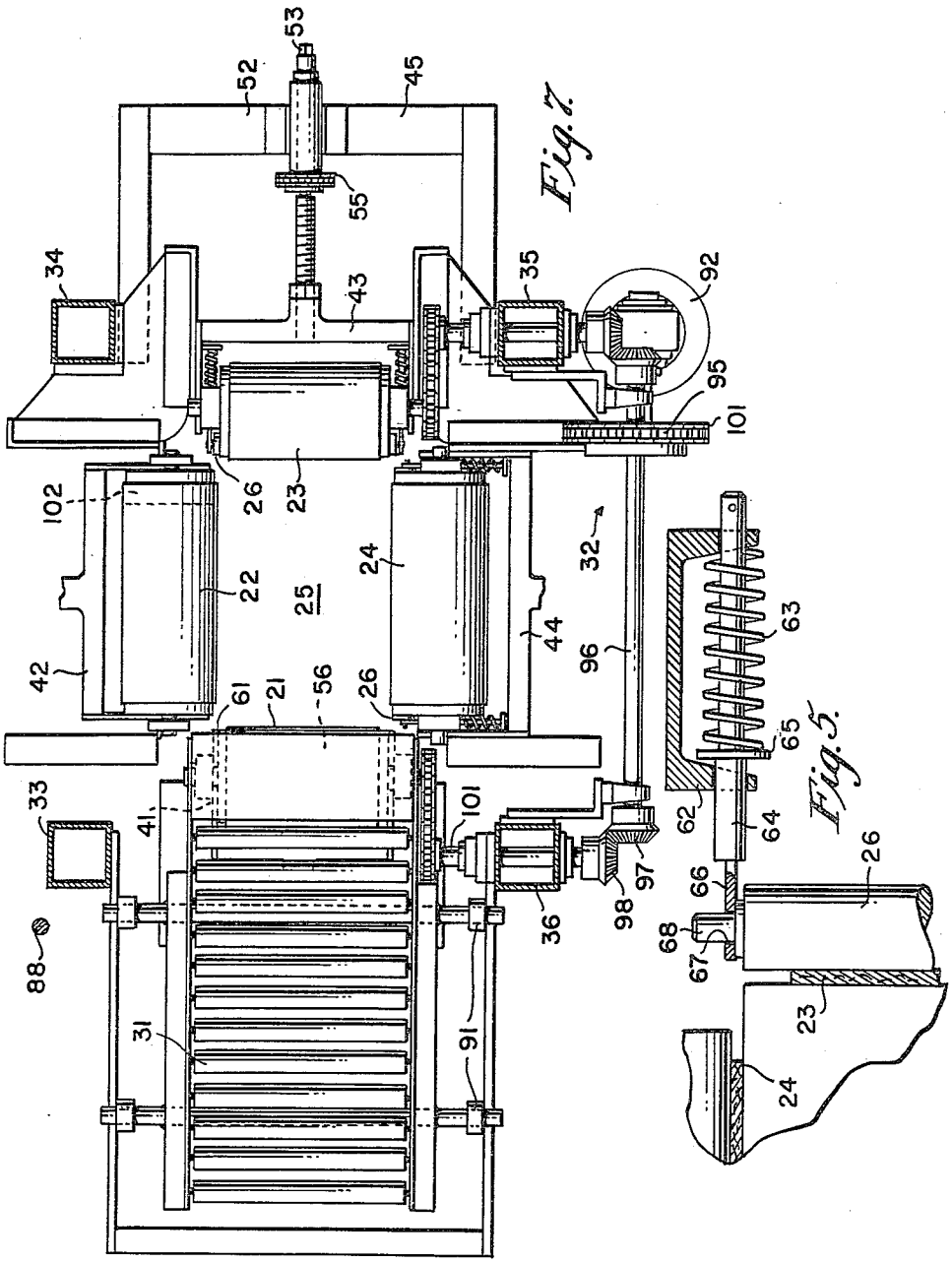


Fig. 4.

Fig. 5.

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CASE SEALER

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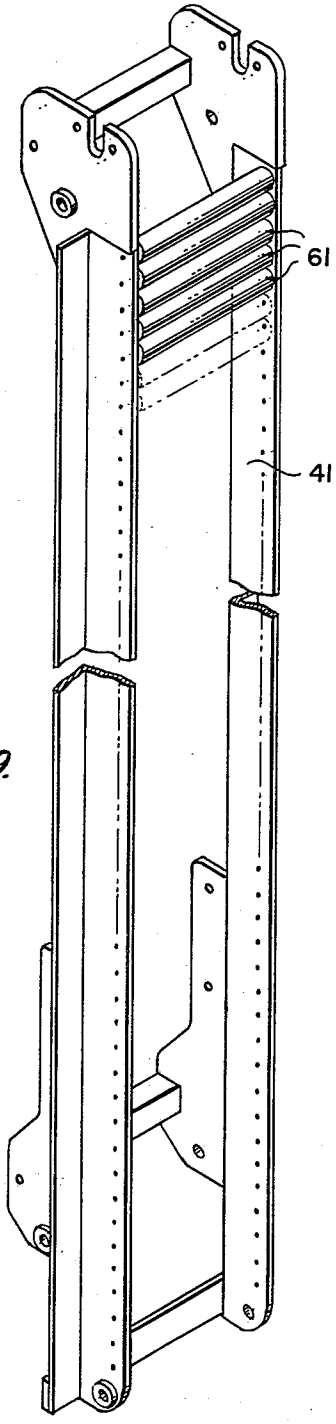


Fig. 9.

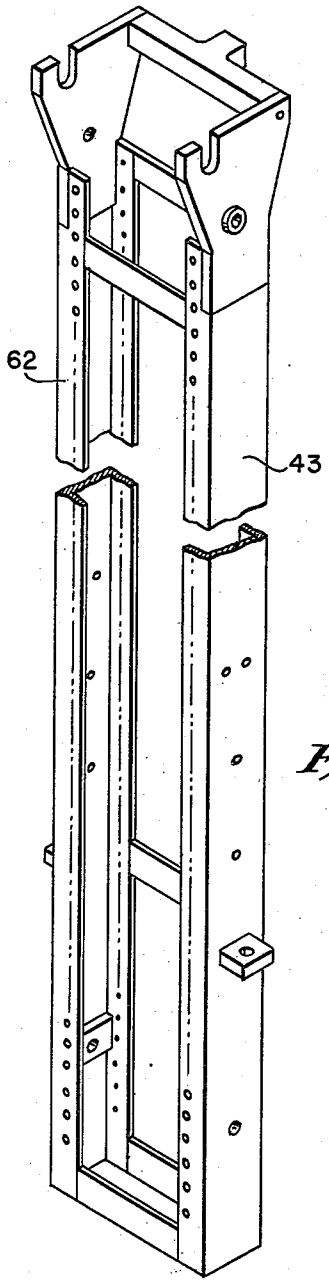


Fig. 10.

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CASE SEALER

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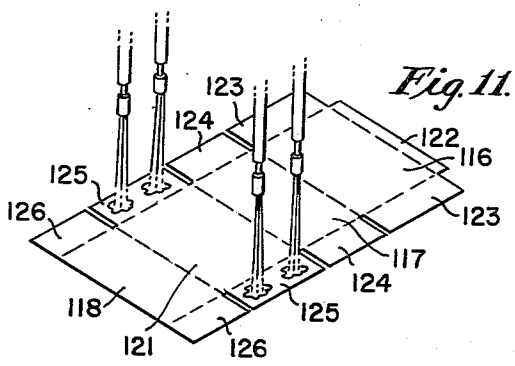


Fig. 11.

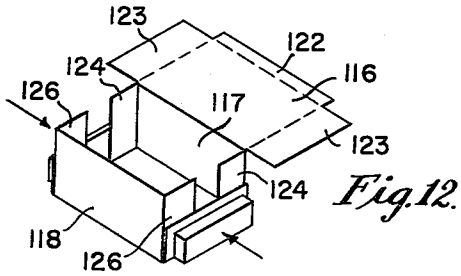


Fig. 12.

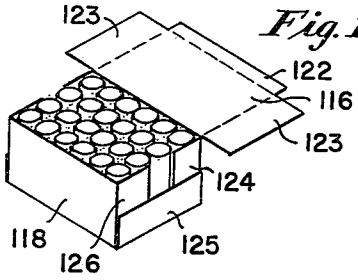


Fig. 13.

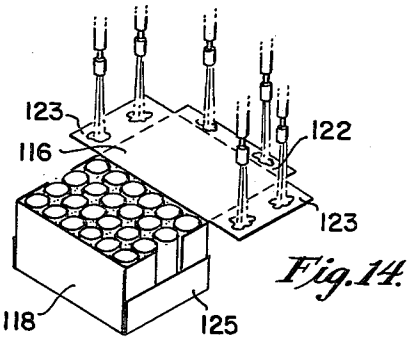


Fig. 14.

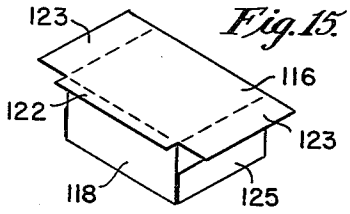


Fig. 15.

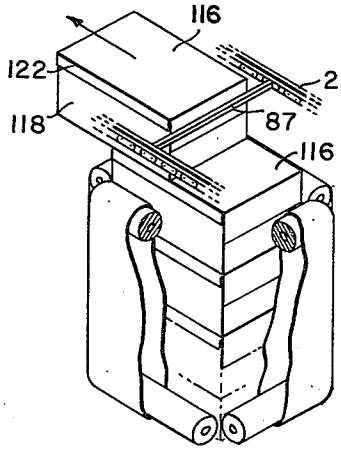


Fig. 17.

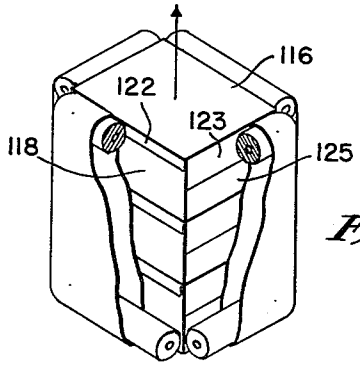


Fig. 16.

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United States Patent Office

3,105,334

Patented Oct. 1, 1963

3,105,334

CASE SEALER

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Filed Aug. 22, 1961, Ser. No. 133,249
11 Claims. (Cl. 53—38)

The term "glue" as used herein includes glue, cement, epoxy resin, or any other adhesive.

This invention relates to improvements in a case sealer, and more particularly concerns a vertical case sealer for sealing filled end-closing cases and a method of forming and sealing such cases.

Boxes or cases made of corrugated paperboard or the like are widely used to package cans or similar articles. The blank of an end-closing (or opening) case normally is smaller, and therefore less expensive, than the blank of a corresponding top-closing (or opening) case. For example, in packaging a case of twenty-four cans, an end-closing blank in normal use today would require up to thirty percent less paperboard than a top-closing blank. This difference in the amount of board required arises from the fact that the flaps on the ends of an end-closing case are smaller than the flaps on the top and bottom of a corresponding top-closing case, since many cases today are long and flat, thus making the area of the end of the case considerably smaller than the area of the top or bottom.

Accordingly, packers have long desired to use end-closing cases instead of top-closing cases because of the savings in paperboard and cost. However, the end-closing case has presented considerable difficulties in loading it with cans and the like, especially if a tight package is required.

Conventionally, the method of forming and filling an end-closing case is to take such a case as supplied by the manufacturer (in flattened condition with the manufacturer's flap connecting a side panel to the top or bottom panel), then erect the side, top and bottom panels to set-up condition so that it appears as a tube, fill the case with cans by pushing the cans sidewise through one end, and then glue and close both ends.

It can be very difficult to shove a load of cans sideways into a case from one end, especially if the case is a snug fit. Most can packers prefer a tight case because it lessens the likelihood of can damage during handling and shipping.

Accordingly, it is an object of this invention to provide a method of forming and sealing a filled end-closing case which overcomes the difficulties of the prior art.

It is another object to provide a method for easy top loading an end-closing case, and yet securing a snugly fitting case.

It is another object of this invention to provide a vertical case sealer for end-closing cases.

It is another object to eliminate the case manufacturer's step of precisely sealing the manufacturer's flap.

It is another object to provide a case sealer which exerts pressure in four directions, and closes and seals the manufacturer's flap as well as the end flaps of an end-closing case.

It is another object to provide a case sealer with strip-out means for clearing all cases from the sealing chamber when desired.

Other objects and advantages of this invention, including its simplicity and economy, as well as the ease with which it may be adapted to existing equipment, will further become apparent hereinafter and in the drawings, in which:

FIG. 1 is a view in side elevation and partly in section of a vertical case sealer constructed in accordance with this invention;

FIG. 2 is a view in horizontal section taken as indicated by the lines and arrows 2—2 which appear in FIG. 1;

FIG. 3 is an enlarged detail view of the pusher plate mechanism which appears in FIG. 1;

FIG. 4 is an enlarged detail view of the support and adjusting means for the belt frame which appears in FIG. 1;

FIG. 5 is a view in section taken as indicated by the lines and arrows 5—5 which appear in FIG. 4;

FIG. 6 is a view in section taken as indicated by the lines and arrows 6—6 which appear in FIG. 1;

FIG. 7 is a view in section taken as indicated by the lines and arrows 7—7 which appear in FIG. 1;

FIG. 8 is an enlarged detail view of the strip-out mechanism which appears in FIG. 1;

FIGS. 9 and 10 are perspective views of the belt frames which appear in FIG. 1; and

FIGS. 11–17 are views illustrating various steps in the process of the invention.

Although specific terms are used in the following description for clarity, these terms are intended to refer only to the structure shown in the drawings and are not intended to define or limit the scope of the invention.

Turning now to the specific embodiment of the invention selected for illustration in the drawings, there is shown a vertical case sealer for sealing end-closing cases which have been loaded with cans or the like, comprising vertically disposed belts 21–24 arranged to form a sealing chamber 25, means including spring-backed rollers 26 for exerting pressure against belts 23, 24 which are adapted to exert pressure against the sides and ends of a case contacted thereby to maintain the end flaps of the case in closed position until their adhesive sets, and means including pusher plate 27 for inserting a series of cases into sealing chamber 25.

In normal operation, means including pusher plate 27 moves the cases upwardly in sealing chamber 25, each succeeding case pushing the stack of cases above it upwardly. At the top of sealing chamber 25, there is provided means including a take-off conveyor 28 for moving the sealed cases off at the top of their upward travel. The cases are delivered to a delivery roller conveyor 31.

At the end of a run of a particular type case, no more cases are inserted in sealing chamber 25, and the cases in sealing chamber 25 are removed by strip-out mechanism 32 which is connected to move the belts 21, 23 upwardly when desired to clear all cases from sealing chamber 25.

The vertical case sealer includes four upright corner support columns 33–36 which are mounted on bottom frame 37 and are tied together at the top by angle iron frame 38.

Columns 33–36 are connected to belt frames 41–44 by means of a pair of vertically spaced apart U-shaped support members 45, 46 extending horizontally from between each pair of adjacent columns 33–36.

To support belt frames 41–44, each leg of U-shaped support members 46 contains a slot 47 which receives a support roller 48 mounted on each side of the belt frames 41–44.

An adjustnig screw 51 is operatively connected between the base 52 (of each U-shaped member 45, 46) and each of the belt frames 41–44 for the purpose of adjusting the position of the belt frame and the belt in a horizontal sense.

Each adjusting screw 51 is provided at its end with a milled square 53 which has a removable hand crank 54 for moving the belt frames horizontally to accommodate different size cases.

A sprocket chain 55 extends between upper and lower

adjusting screws so that they may be moved in unison when desired. It will be realized that the upper and lower adjusting screws 51 may be moved independently to tilt the belt inwardly or outwardly with respect to sealing chamber 25, or to make any other adjustments as to position between the upper and lower parts of the belt.

Each belt frame 41–44 supports its belt on a head pulley 56 and a bottom pulley 57, and is provided with take-up mechanism 58 for tightening the belt.

To exert horizontal pressure on the belts 21–24 and on the ends and sides of the cases contacted by the belts, there is provided mechanism which includes rollers 61 and spring-backed rollers 26 which are mounted in the belt frames 41–44. The spring-backed rollers 26 are positioned opposite rollers 61, which have no springs. FIGS. 4 and 5 illustrate the structure of the spring-backed roller mechanism which includes channel 62, spring 63 mounted on a shaft 64 having a stop shoulder 65, and plate 66 having a hole 67 which receives shaft 68 of spring-backed roller 26.

The means for inserting a series of cases into sealing chamber 25, referring to FIG. 3, includes pusher plate 27 which is reciprocated vertically by vertical link 71 which is supported by bracket 72 and actuated by cam lever 73.

The filled cases are transported to pusher plate 27 by feed conveyor 74 and are stopped in proper position by an adjustable stopping plate 75 which is mounted on the ends of screws 76.

At the top of sealing chamber 25 is mounted the take-off mechanism which includes take-off conveyor 28. A sprocket 77 is mounted on a take-up plate 78, which is pivotally mounted by a pin 81 and is provided with a slot 82. Plate 78 may be moved about its pivot pin 81 to move the position of sprocket 77 and thereby tighten chain 83.

Chain 83 follows a path through support guides 84 around sprockets 85, 86 and is provided with flight bars 87 which contact the upper portion of the case and move it off the stack of cases to delivery roller conveyor 31.

Power is delivered to chain 83 through appropriate gearing and shaft 88.

Delivery roller conveyor 31 is mounted to the frame by means of support members 91 which are adjustable as to vertical position.

Strip-out mechanism 32, referring to FIGS. 1, 7 and 8, includes motor 92 connected to the shafts of head pulleys 56 by a gear arrangement which includes shaft 93, sprockets 94, 95 connected by chain 100, shaft 96, gears 97, 98, and shaft 101.

It is to be noted that each head pulley 56 is provided with an overrunning clutch 102, which constitutes a unilateral braking means, so that the belts 21–24 can never move downwardly but must move only in the upward direction in sealing chamber 25.

Power to operate pusher plate 27, take-off conveyor 28, and feed conveyor 74 is provided by motor 103, gear box 104, shaft 105, chain 106, shaft 107, cam 108, cam follower 111, cam lever 73, chain 112, right angle gear box 113, shaft 88, chain 114, and shaft 115.

In operation, an end-closing case which has been filled with cans and is completely set up except that its top flaps and manufacturer's flap extend outwardly from the top panel, is moved by feed conveyor 74 into position on pusher plate 27 against adjustable stopping plate 75. Cam lever 73 moves pusher plate 27 upwardly to insert the case into the bottom of sealing chamber 25 and fold the top and manufacturer's flaps into set-up position, wrapping them around the cans in the case. The bottom case of the stack of cases in the sealing chamber squeezes the top panel of the case down tightly, and the belts wipe the top panel tabs around the pack to give a very tightly packed case.

Cam lever 73 is actuated by cam 108 to lift pusher plate 27 very quickly. While plate 27 is supporting only one case, it is accelerated at a uniform rate and then decelerated at a uniform rate so that the case is moving very slowly when it makes contact with the bottom case of the stack of cases in sealing chamber 25. Then plate 27 assumes the weight of the full stack and is again uniformly accelerated and decelerated so that the bottom case is fully received by sealing chamber 25 and the top case is moving very slowly when delivered to take-off conveyor 28.

Belts 21–24 exert pressure against the ends and sides of the case to hold it in set-up condition and also prevent downward movement, eliminating the use of latches to support the bottom of the case. Succeeding cases inserted into the bottom of sealing chamber 25 move the case upwardly while the belts 21–24 maintain said pressing against the ends and sides of the case to seal it.

At the top of sealing chamber 25, flight bars 87 of take-off conveyor 28 contact the case and move it off to delivery roller conveyor 31.

If it is desired to clear sealing chamber 25 of all cases (for example, at the end of a run of a particular size case), strip-out mechanism 32 is operated to rotate head pulleys 56 and move the belts 21, 23 upwardly in sealing chamber 25 to remove all cases therefrom.

To form a filled end-closing case, the procedure is to (referring to FIGS. 11–17) take a flat blank which has top panel 116, side panels 117 and 118, bottom panel 121, manufacturer's flap 122, top flaps 123, side flaps 124, bottom flaps 125, and side flaps 126. Apply an adhesive to the bottom flaps, and fold the bottom and side flaps 124—126 into set-up position as shown in FIG. 12. Press against the side and bottom flaps 124—126 to seal them together, and then fill the case with cans or the like as shown in FIG. 13. Then apply adhesive to the top flaps 123 and the manufacturer's flap 122, and fold top panel 116 into set-up position with the manufacturer's flap 122 and top flaps 123 extending outwardly therefrom. Then fold the manufacturer's flap 122 and the top flaps 123 into set-up position, and press against the ends and sides of the case. Move the case upwardly while maintaining said pressure in order to seal the case by allowing the adhesive enough time to set.

An advantage of the present invention is that it provides a tight snug-fitting case, which lessens the chances of can damage during shipping and handling. By wrapping the top panel and its flaps over the top of the cans in accordance with the invention, a very snug fit is obtained.

Moreover, this snug fit is obtained without making the loading operation more difficult. By preforming the bottom portion of the case, it may be loaded without difficulty because easy access is provided through the top. Such top loading permits the use of a funnel, which further expedites the loading operation.

The method of this invention cuts the cost to the packer of the case blank. Conventional methods of packing require that the case manufacturer supply cases to the packer with the manufacturer's flap glued or stapled to the case. Sealing the manufacturer's flap is a precise gluing or stapling operation, since the dimensions of the opened case must be within certain tolerances to receive a load of cans snugly. The method of the present invention eliminates the need for this precise manufacturer's step, and enables the packer to buy the blank from the manufacturer at less cost, since a flap blank is bought without the manufacturer's flap being sealed.

The method of the present invention is adapted for use with existing equipment, and lends itself to automatic or semi-automatic production. For example, semi-automatic production may be obtained by forming the bottom portion of a case, filling it with cans through the top by having an operator hold it against a conventional can packer, applying glue to the top flaps, and sealing the case by delivering it to the vertical case sealer of this invention.

It is to be understood that the form of the invention

herewith shown and described is to be taken as a presently preferred embodiment. Various changes may be made in the shape, size and arrangement of parts. For example, equivalent elements may be substituted for those illustrated and described, parts may be reversed, and certain features of the invention may be utilized independently of the use of other features, all without departing from the spirit or scope of the invention as defined in the subjoined claims.

The claimed invention:

1. A vertical case sealer for sealing filled end-closing cases comprising a plurality of vertically disposed belts arranged to form a vertical sealing chamber, means for pressing the belts against the sides and ends of a stack of cases being sealed to support each case and to maintain its end flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, and means for inserting a series of cases into said sealing chamber from below.

2. A vertical case sealer for sealing filled end-closing cases comprising a plurality of vertically disposed belts arranged to form a vertical sealing chamber, means for pressing the belts against the sides and ends of a stack of cases to support each case and to hold its end flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, and means for pushing a case against the bottom of said stack to move said cases upwardly.

3. A vertical case sealer for sealing filled end-closing cases comprising a plurality of vertically disposed belts arranged to form a sealing chamber, means for pressing the belts against the sides and ends of a stack of cases to support each case in said chamber and maintain its end flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, means for pushing a case against the bottom of said stack to move said stack of cases upwardly, and take-off means at the top of said sealing chamber for moving the sealed cases off at the top of their upward travel.

4. A vertical case sealer for sealing filled end-closing cases comprising a plurality of vertically disposed belts arranged to form a sealing chamber, means pressing the belts against the sides and ends of a stack of cases to support each case and maintain its end flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, means for inserting a series of cases into said sealing chamber from below, and strip-out means connected to said belts for moving them and said cases upwardly when desired to clear all cases from said sealing chamber.

5. A vertical case sealer for sealing filled end-closing cases which have been loaded with cans or the like, comprising a frame including four upright corner support columns, a pair of vertically spaced apart U-shaped support members extending horizontally from between each pair of adjacent columns, each leg of the lower of said U-shaped members containing a slot, four vertically disposed endless belts arranged so as to form a four-sided case sealing chamber, a belt frame supporting each belt on a head pulley and a bottom pulley and provided with take-up means for tightening the belt, a support roller mounted on each belt frame and positioned in said slot in each leg of the lower U-shaped members, an adjusting screw operatively connected between the base of each U-shaped member and one of the belt frames for adjusting the position of the belt frame and belt in a horizontal sense, means for pressing the belts against the sides and ends of a stack of cases to support each case and maintain its end flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, and means for pushing a case against the bottom of said stack to move said cases upwardly.

6. A vertical case sealer for sealing filled end-closing cases which have been loaded with cans or the like, comprising a plurality of vertically disposed belts arranged to form a vertical sealing chamber, a series of rollers mounted behind the belts, a pair of adjacent belts having its rollers provided with springs that press the rollers toward the belts which exert pressure against the sides and ends of a stack of cases passing between the belts to support each case in said sealing chamber, unidirectional braking means connected to the belts for preventing them from moving downwardly, and means for pushing a case against the bottom of said stack to move said cases upwardly.

7. A vertical case sealer for sealing filled end-closing cases which have been loaded with cans or the like, comprising a frame including four upright corner support columns, a pair of vertically spaced apart U-shaped support members extending horizontally from between each pair of adjacent columns, each leg of the lower of said U-shaped members containing a horizontal slot, four vertically disposed endless belts arranged so as to form a four-sided case sealing chamber, a belt frame supporting each belt on a head pulley and a bottom pulley and provided with take-up means for tightening the belt, a support roller mounted on each belt frame and positioned in said slot in each leg of the lower U-shaped members, an adjusting screw operatively connected between the base of each U-shaped member and one of the belt frames for adjusting the position of the belt frame and belt in a horizontal sense, a series of rollers mounted on said belt frames behind the belts, a pair of adjacent belts having its rollers provided with springs that press the rollers toward the belts which exert pressure against the sides and ends of a stack of cases passing between the belts to support each case, unidirectional braking means connected to the belts for preventing them from moving downwardly, pusher plate means mounted below the belts for pushing a filled case against the bottom of said stack and into contact with the belts at the entrance to said sealing chamber to move said stack upwardly in said chamber, a take-off conveyor positioned at the top of said sealing chamber for removing each case at the top of its upward travel, a strip-out means including a motor connected to said head pulleys for moving the belts and said cases upwardly when desired to clear all cases from the sealing chamber, and a delivery roller conveyor mounted on two of said columns and positioned to receive the sealed cases from said take-off conveyor.

8. A method of sealing an end-closing case comprising taking a first end-closing case which is filled with cans and the like and completely set up except that its top flaps and manufacturer's flap extend outwardly from the top panel, placing said case beneath a stack of cases, moving said case upwardly so that its top panel is pressed down by the bottom of said stack, folding said top and manufacturer's flaps into set-up position around the cans by contacting said flaps with vertically movable belts to form a tight pack, pressing against the ends and sides of the case with said belts to support said case and hold it in set-up condition at the bottom of said stack, pressing against the belts with spring-backed rollers, placing a second of said cases beneath the stack of cases, moving said second case upwardly so that the bottom of said first case presses down against the top panel of said second case, folding said top and manufacturer's flaps of said second case into set-up position around the cans by contacting said flaps with said belts to form a tight pack, moving said first case upwardly by moving said second case upwardly, and maintaining sealing and case supporting pressure by said belts on the flaps of said first and second cases, said belts preventing said rollers from crushing any part of said cases by restraining horizontal roller movement.

9. A method of sealing an end-closing case comprising taking an end-closing case which is filled with cans and the like and completely set up except that its top flaps and manufacturer's flap extend outwardly from the top panel, placing said case into position beneath a stack of cases, accelerating said case upwardly quickly and then decelerating so that said case is moving slowly when it makes contact with the bottom case of said stack of cases so as not to damage said stack and case, squeezing down against the top panel of said case, moving the stack of cases upwardly and wiping the top and manufacturer's flaps of said case around the cans into set-up condition to form a tight pack by contacting said flaps with vertically movable belts, pressing said belts against the ends and sides of the case to hold it in set-up condition, supporting said case against downward movement by means of said belts, and moving said case upwardly while maintaining said pressing to seal the case.

10. A method of forming a filled end-closing case comprising taking a flat blank of an end-opening case, applying adhesive on the bottom flaps, folding the bottom and side flaps into set-up position, pressing against said bottom and side flaps to seal them together, filling the case with cans, applying adhesive on the top flaps and manufacturer's flap, folding the top panel into set-up position, placing said case beneath a stack of cases, moving said case upwardly so that the bottom of said stack presses down on said top panel, moving said case upwardly and wiping said top and manufacturer's flaps downwardly into set-up position to form a tight pack around said cans by contacting said flaps with vertically moveable belts, pressing said belts against the ends and sides of the case to seal it, and supporting said case against downward movement by means of said belts.

11. A vertical case sealer for sealing filled end-opening cases comprising four vertically disposed belts with each arranged at right angles to its adjacent belts to form a vertical sealing chamber, means pressing said belts against the sides and ends of a stack of cases being sealed in said chamber to support each case and to hold its flaps in closed position until said flaps are sealed, unidirectional braking means connected to the belts for preventing them from moving downwardly, and means for inserting a series of cases into said sealing chamber from below.

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