United States Patent [19]

Ullman

[11] **3,728,841**

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[54] **CASE SEALER**

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[52] **U.S. Cl.** **53/376,** 53/387

[51] **Int. Cl.** **B65b 51/10**

[58] **Field of Search** 53/376, 387, 388

[56] **References Cited**

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3,543,469 12/1970 Ullman ..... 53/387 X

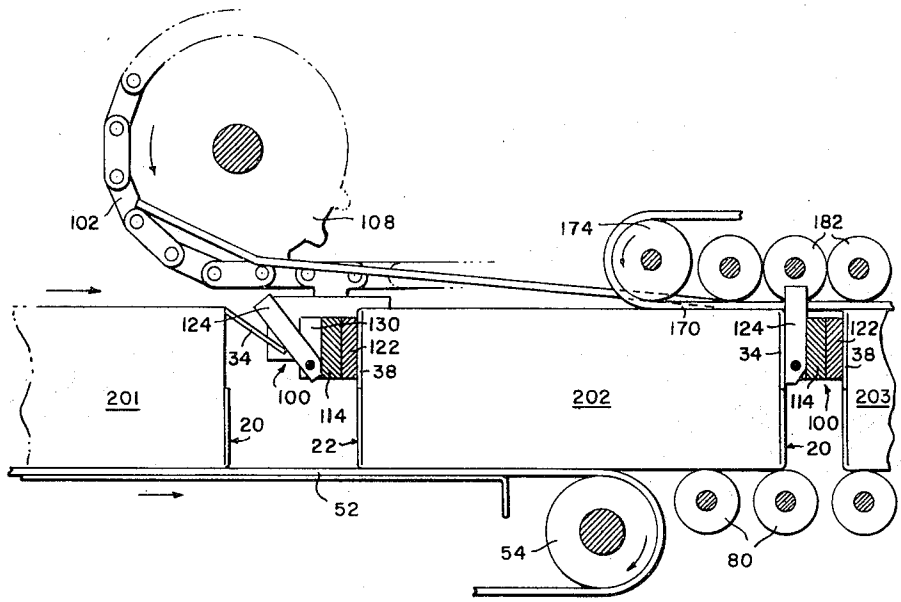
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[57] **ABSTRACT**

A high speed end sealer for cases of the end-closing type in which the cases are fed horizontally into a compression unit and are moved horizontally through the compression unit by pusher bar assemblies carried by an endless chain. The pusher bar assemblies press the end flaps against the end walls of the case providing the necessary gluing pressure therefor. Also, pressure is applied to the top of the case to cause the top manufacturers flap to be glued in position as the case moves through the compression unit.

15 Claims, 11 Drawing Figures



4 Sheets-Sheet 1

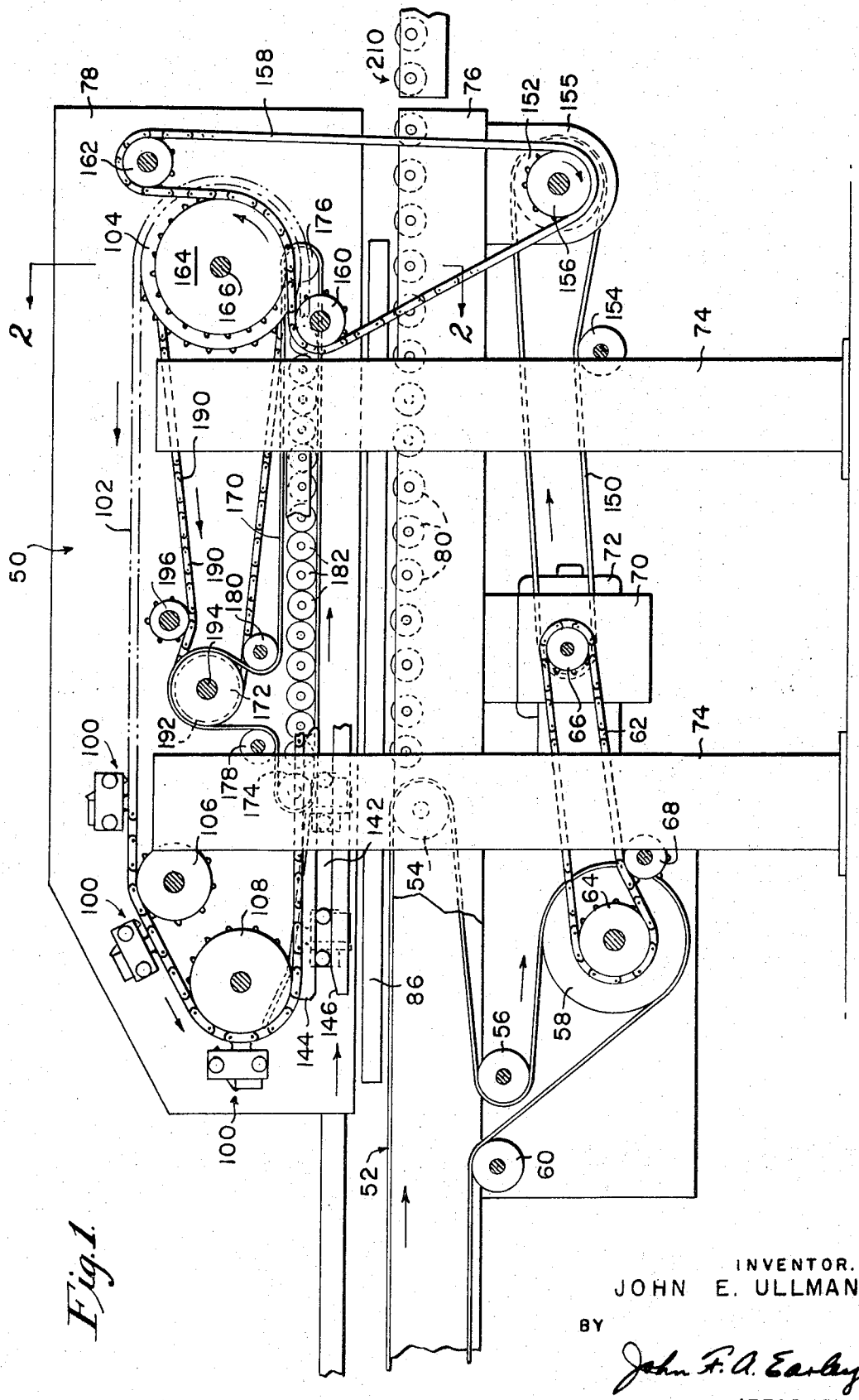


Fig. 1.

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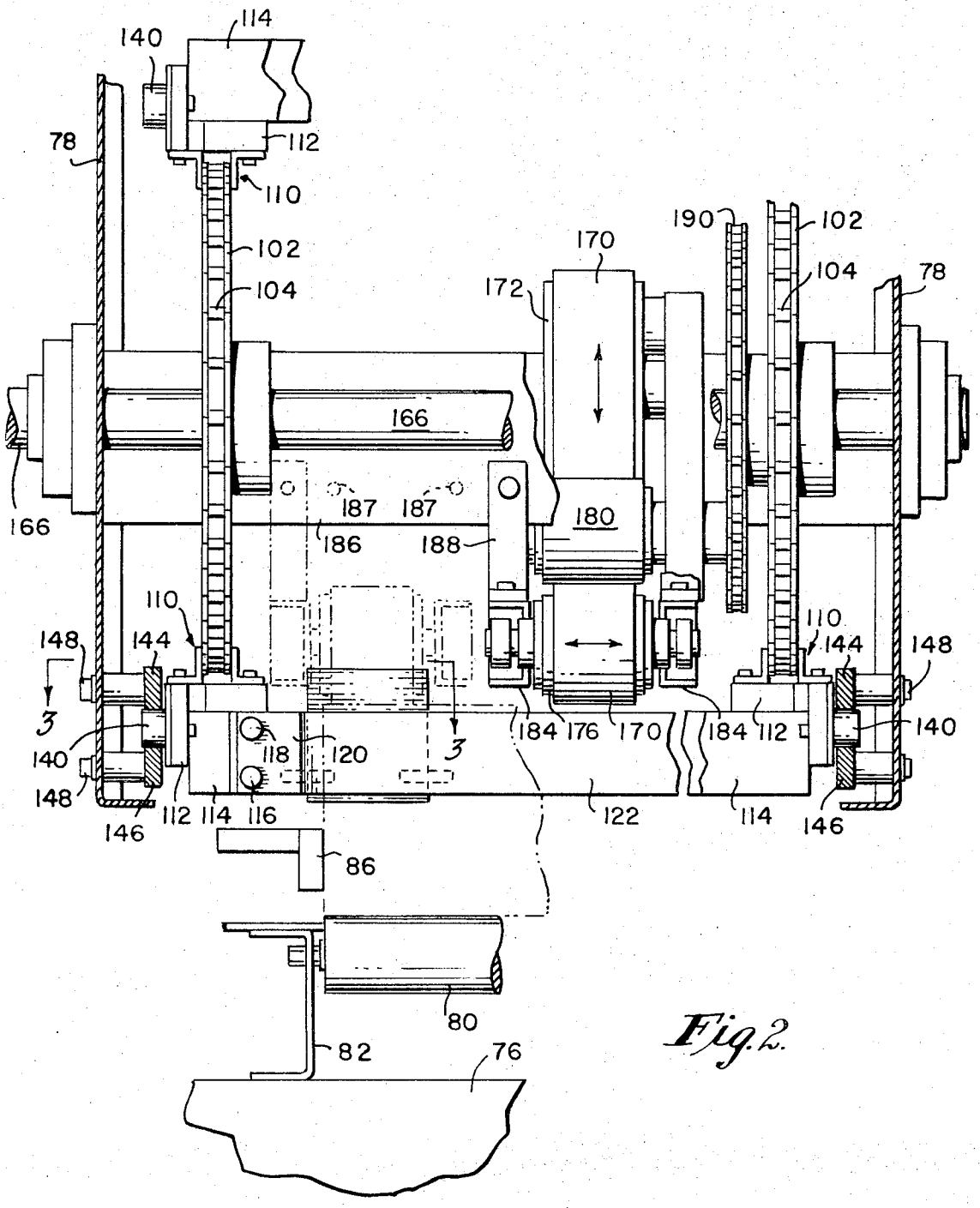


Fig. 2.

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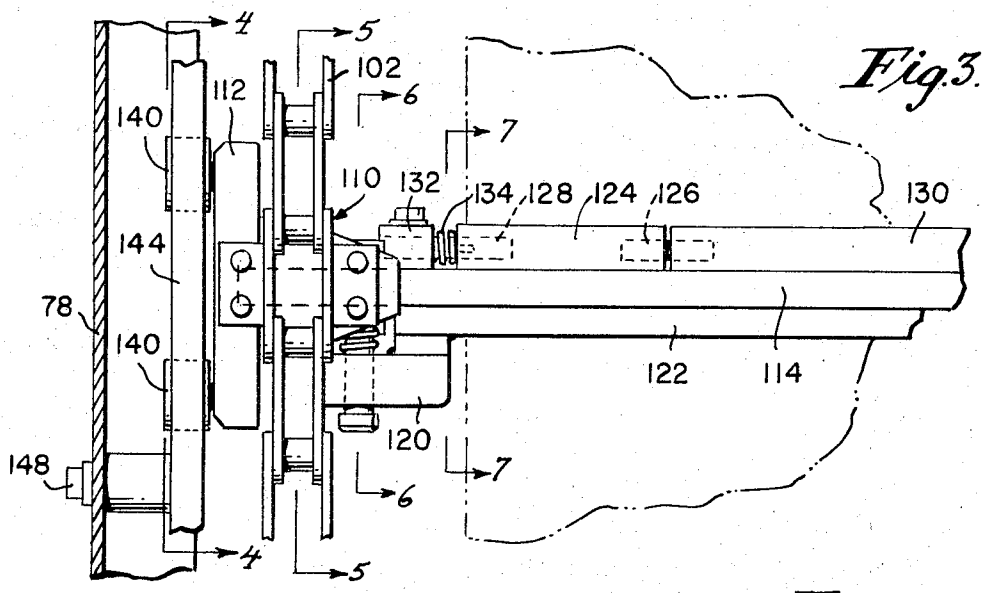


Fig. 3.

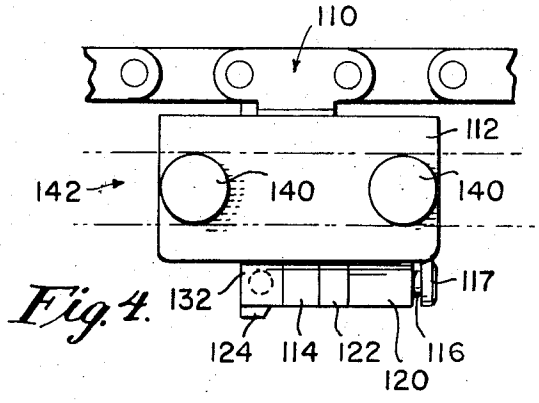


Fig. 4.

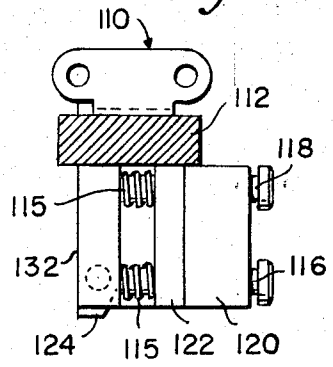


Fig. 5.

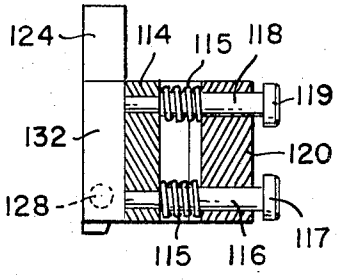


Fig. 6.

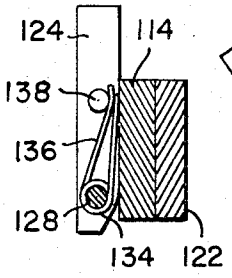


Fig. 7.

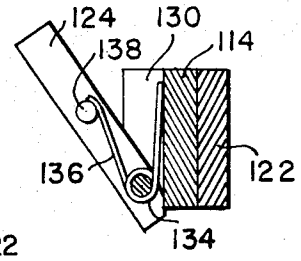


Fig. 8.

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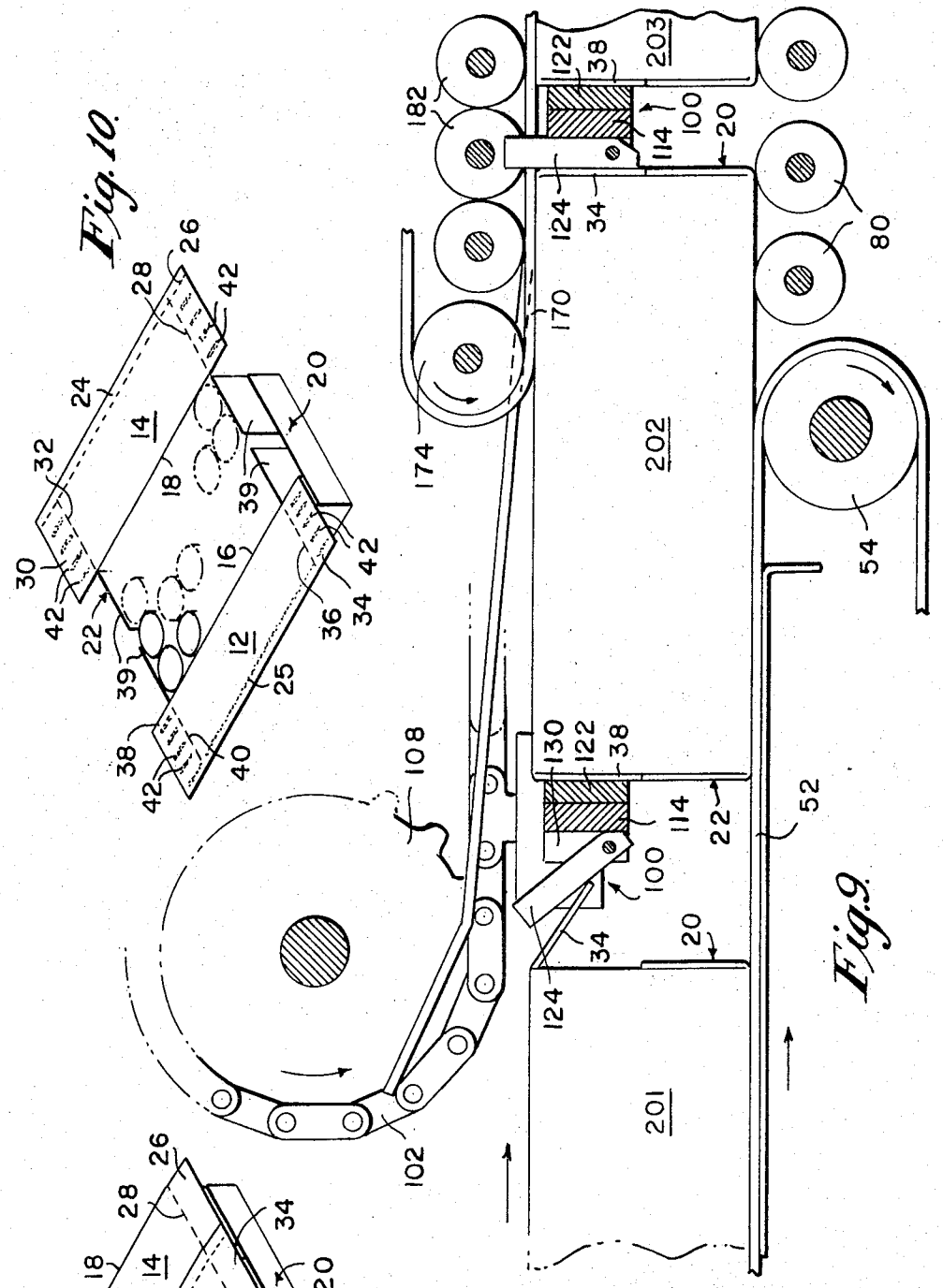


Fig. 9.

Fig. 10.

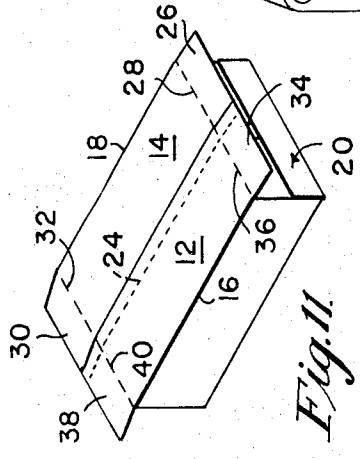


Fig. 11.

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CASE SEALER

BACKGROUND OF THE INVENTION

This invention relates generally to case sealers of the type for sealing and closing cases and more particularly to a compression unit therefor.

Case sealers of the indicated type are shown in U.S. Pat. Nos. 3,105,334 and 3,397,509. These patents describe in detail the economic advantages of end-closing cases. While the case sealers of these patents are quite satisfactory, it is desirable in a number of installations to provide a high speed case sealer which is smaller and less costly. It is also desirable to provide a high speed case sealer which can be used with various packing machines and which can accommodate differences in the size of the cases due to manufacturing variations.

SUMMARY OF THE INVENTION

It is the general object of the invention to provide a high speed sealer for end-closing cases which provides a continuous application of sealing pressure to the cases as they are moved from a gluer end-to-end through a compression unit. Another object of the invention is to provide a case sealer of the indicated type which can be used with various packing machines and which can accommodate minor variations in case size.

Briefly stated, the objects of the invention are achieved by the provision of a compression unit for a case sealer of the indicated type in which the filled cases are conveyed in spaced-apart, end-to-end relation horizontally into the entrance end of the compression unit with top closed and the top end flaps having adhesive thereon and projecting outwardly from the front and rear ends of the case. There is also provided means for conveying the cases from the entrance end of the compression unit along a horizontal path to the discharge end thereof, such conveying means comprising a plurality of pusher means which are moved along a path horizontally through the compression unit in spaced relation so that each pusher means engages the top rear end flaps of a case to press it against the rear end of the case and to urge the top front end flaps of this case against an adjacent pusher means so that the top front flaps are pressed against the front end of the case whereby the top end flaps are pressed against the case to aid in the setting of the adhesive, said flap pressing condition being maintained as the cases are moved through the compression unit. There is also provided means for supporting the cases on the bottoms thereof as they are moved horizontally through the compression unit.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation, partly diagrammatic, of the case sealer in accordance with the invention;

FIG. 2 is a section taken on line 2—2 of FIG. 1;

FIG. 3 is a section taken on line 3—3 of FIG. 2;

FIG. 4 is a section taken on line 4—4 of FIG. 3;

FIG. 5 is a section taken on line 5—5 of FIG. 3;

FIG. 6 is a section taken on line 6—6 of FIG. 3;

FIG. 7 is a section taken on line 7—7 of FIG. 3;

FIG. 8 is a view similar to FIG. 7 showing the parts in an alternate position;

FIG. 9 is a diagrammatic, fragmentary side elevation of the case sealer shown in FIG. 1; and

FIGS. 10 and 11 are perspective views of end-closing cases in different stages of completion.

DESCRIPTION OF THE PREFERRED EMBODIMENT

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 sealer compression unit for cases of the end-closing type. While the invention is applicable to various types of end-closing cases, it will be described particularly with respect to the case shown in FIGS. 10 and 11 which is known in the art as a five-panel case with a top manufacturer's flap. The formation and construction of this type of case is shown in U.S. Pat. No. 3,397,509, FIGS. 1–5, and it includes a pair of top panels 12 and 14 connected to the side panels of the case along creased lines 16 and 18. The front end wall of the case is indicated generally at 20 and is formed by five end flaps as is described in said patent. The rear end wall of the case is indicated generally at 22 and is similarly formed of five flaps. The case includes a top sealing manufacturer's flap 24 extending from top panel 14 and adapted to be overlapped by top panel 12 so that the top panels 12 and 14 may be connected together by a layer of adhesive 25 applied to the bottom of panel 12 so as to be located between panel 12 and flap 24 when panel 12 is folded over to overlap panel 14 as shown in FIG. 11. A front end top flap 26 is connected to top panel 14 at a crease line 28 and a rear end top flap 30 is connected to the rear of top flap 14 along a crease line 32. Top panel 12 is provided with a front end top flap 34 connected to the top panel 12 at a crease line 36 and a rear end top flap 38 connected thereto at a crease line 40.

As is shown in FIG. 10, strips of adhesive 42 have been applied to the inner surfaces of flaps 26, 30, 34 and 38 and these flaps are adapted to be fastened to the outer surfaces of the side panel end flaps 39, as is described more fully in U.S. Pat. No. 3,397,509.

The invention is also applicable to four panel end-closing cases with a manufacturer's flap extending from the top of a side panel, as shown in FIGS. 9–13 of U.S. Pat. No. 3,397,509.

The compression unit in accordance with the invention is adapted to be incorporated in a packaging apparatus for forming, filling and sealing a case. This apparatus may incorporate conventional apparatus such as a case former which forms the bottom and side panels and flaps into a setup condition with the bottom flaps adhesively connected to the side flaps, and a conventional packer or loader which is adapted to fill the cases with articles, such as cans, through the top of the case. After the case has been filled with cans or other material, it is passed to a gluer and top folder which applies an adhesive (as shown at 25 and 42 in FIG. 10) to the top flaps and to a top panel if the case includes a manufacturer's flap which is to be adhesively connected to the top panel. This apparatus also folds over the top panel or panels to the position shown in FIG. 11. The case former, the packer and the gluer form no part of the present invention.

The compression unit in accordance with the invention receives the case in the condition shown in FIG. 11 with the end flaps having adhesive thereon and being turned down to project outwardly from the front and rear ends of the case such as is shown in FIG. 11. Accordingly, means are provided for conveying the cases in end-to-end relation from the gluer into the entrance end of compression unit 50. The cases are normally fed through the gluer in a spaced relationship and this spaced relationship is maintained, as the cases are delivered to the entrance end of the compression unit 50, by an endless belt type conveyor 52 having a horizontal feed portion, the delivery end of which extends into the entrance end of the compression unit 50 as is best shown in FIG. 1. The cases are supported on this horizontal portion of the conveyor 52 as they are fed to the compression unit. The belt 52 is guided around rollers 54, 56 and a drive pulley 58, and is engaged by an idler roller 60. Pulley 58 is driven by a drive chain 62 which engages sprockets 64, 66 and a take up sprocket 68, the drive sprocket 66 for chain 62 being driven from the output shaft of a reducer 70 driven by a motor 72.

The supporting framework for the compression unit comprises vertically extending legs 74 which support a lower frame means 76 and an upper frame means 78. The various parts of the compression unit 50 are mounted on this framework.

Means are provided for supporting the bottom of cases as they are discharged from the belt 52 and as they are moved from the belt 52 through the compression unit 50 to the discharge end. Such supporting means comprises a plurality of horizontal rollers 80 which are rotatably mounted at the ends in U-shaped frame members 82 supported on the lower frame portion 76 of compression unit 50. The rollers 80 are spaced longitudinally along the compression unit and extend transversely thereacross. By means of this arrangement, the cases discharged from the belt 52 are received on rollers 80 which rotatably support their bottoms as their movement is continued through compression unit 50. A pair of longitudinally extending guide members 86 are arranged to contact the side walls of the cases to guide them as they move through the compression unit.

Means are provided for conveying the cases from the entrance end of the compression unit 50 along a horizontal path to the discharge end. This conveying means, in accordance with one aspect of the invention, includes pusher means for engaging the top end flaps of the cases to press them against the case end walls during movement of the case through compression unit 50, such compression serving to aid in the setting of the adhesive on the flap members. Such means comprises a plurality of pusher bar assemblies, indicated generally at 100, each of which extends transversely across the compression unit 50 to be supported at their lateral ends on a pair of chain type endless conveyors 102. The pusher bar assemblies 100 are supported at equally spaced intervals on the chains 102 as is best shown in FIG. 1. Although only a few pusher bar assemblies are shown in FIG. 1 for clarity of illustration, it is apparent that they are provided at equally spaced intervals around the chains 102. Each chain 102 rides on a drive sprocket 104 at one end and a pair of idler sprockets 106 and 108 at the other end.

Since all the pusher bar assemblies 100 are identical, only one will be described in detail. Each pusher bar assembly 100 is connected to the chains 102 by means of a connecting link attachment 110 which, in effect, forms a link in the conveyor chain as is shown in FIG. 3. Mounted on each of the link attachments 110, by means of bolts, is an angle plate 112. Supported from the horizontal leg of each angle plate 112, as viewed in FIG. 2, by means of bolts, is a pusher plate 114 which extends transversely across the compression unit 50. As is best shown in FIG. 6, at each end of the pusher plate 114 there is mounted a pair of guide pins 116 and 118 which project perpendicularly therefrom. Slideably mounted on the guide pins 116 and 118 is a bracket arm 120 which supports a compression plate 122 at its lateral ends. The compression plate 122 is supported on the brackets 120 so as to extend parallel to the pusher plate 114. Each of the pins 116 has a spring 115 mounted thereon in compression between pusher plate 114 and bracket 120 to thereby bias the brackets 120 and the compression plate 122 carried thereby away from the pusher plate 114. By means of this arrangement, the compression plate 122 is movable relative to the pusher plate 114 to accommodate slight variations in size of the cases and still be able to provide sealing compression on the ends of the cases.

Flap closing plates 124 are mounted on the pusher plate 114 on the side thereof opposite to the side facing the compression plate 122. Plates 124 are adapted to engage the front flaps of the case as will be described hereafter and are pivotally mounted on a pair of axially aligned pins 126 and 128 (FIG. 3). The pin 126 is supported in a butt plate 130 which is mounted on the pusher plate 114 adjacent plate 124 and extends across the central region of the compression unit so as to contact the front end of the case. The pin 128 is supported in a hinge 132 mounted on the pusher plate 114. A hinge spring 134 is mounted on pin 128, and, as is best shown in FIGS. 7 and 8, has an end leg portion 136 which engages a pin 138 mounted in the outer edge of plate 124. By this arrangement, the spring 136 biases the plate 124 to the inclined position shown in FIG. 8 from the vertical position shown in FIG. 7. Accordingly, the flap closing plates 124 are normally in the position shown in FIG. 8, but, as will be described hereafter, are moved to the position shown in FIG. 7 against the bias of the spring 134.

Each of the angle plates 112 (FIG. 2) has a pair of guide rollers 140 rotatably mounted in the vertical leg thereof, which ride in horizontally extending guide tracks 142 extending along the lateral edges of the compression unit 50 from the entrance end to the discharge end. Each guide track 142 is formed by an upper guide member 144 spaced above a lower guide member 146, the guide members being mounted on the upper frame 78 by suitable means such as mounting bolts 148 as is shown in FIG. 2. As shown in FIG. 1, when the pusher bar assemblies move in the direction of the arrows, the rollers 140 move into the track 142 at the entrance end of the compression unit 50. Once the rollers 140 are in the guide tracks 142, they serve to keep the pusher bar assemblies 100 stable and determine the vertical position of the pusher bar assemblies 100 as they are moved through the compression unit 50 to the discharge end thereof by chains 102.

The drive for the chains **102** is from the output shaft of the motor driven reducer **70** by way of a chain **150** which rides on a sprocket **152** and is engaged by a take up sprocket **154**. The sprocket **152** is part of a clutch brake mechanism **155** which has an output shaft carrying a sprocket **156** that drives a chain **158**. The chain **158** rides on an idler sprocket **160** and a take up sprocket **162** and engages a sprocket **164** mounted on a shaft **166** which also carries the drive sprockets **104** for the chains **102**. The various elements of the drive mechanism are well known in the art.

Means are provided for applying pressure to the top of the case as it is moved through the compression unit **50**, which means is positioned to apply pressure to the top manufacturer's flap of the case. Such means comprises an endless belt **170** which rides on a drive pulley **172** and a pair of idler pulleys **174** and **176**, and is engaged by a pair of take up pulleys **178** and **180**. Mounted above the case-engaging horizontally-extending portion of the belt **170** are a plurality of spring-loaded compression rollers **182** biased downwardly by the springs. The rollers **182** are rotatably mounted at their ends on a pair of channel-like members **184** and **186** (FIG. 2) mounted on a transversely extending frame member **186** by means of mounting brackets **188**. Frame member **186** is supported at its ends on upper frame **78**. The entire assembly of parts supporting the belt **170** and the rollers **182** are designed to be moved to various lateral positions and may be moved to the dotted line position shown in FIG. 2 from the solid line position in this figure. To this end, there may be provided a plurality of holes **187** in the frame **186** into which the brackets **188** may be positioned so as to provide for full lid manufacturer's flap.

The drive means for the belt **170** comprises a chain **190** which is driven by a sprocket carried on the shaft **166**. The chain **190** also rides about a sprocket **192** which drives the shaft **194** on which the drive pulley **172** is mounted. Chain **190** is also engaged by a take up sprocket **196**.

The operation of the apparatus in accordance with the invention will be described with particular reference to FIGS. **1** and **9**. In FIG. **9**, there is shown three cases **201**, **202** and **203** at various stages of completion as they are moved into and through the compression unit **50** in accordance with the invention. Case **201** is shown in a position in which it is just entering the compression unit with its front flaps **34** and **26** coming into contact with the flap closing plates **124** of the pusher bar assembly **100** located at the entrance end of the compression unit. Case **202** is shown in a position held between the pusher bar assembly **100** at the entrance end of the compression unit **50** and the next preceding pusher bar assembly **100** on the chain conveyors **102**. Case **203** is the next case ahead of the case **202** as it is moving through the compression unit. FIG. **9** also shows the spacing of the pusher bar assemblies **100**, which is such that they accommodate a case, such as case **202**, between the adjacent compression plate **122** on one pusher bar assembly and the flap closing plates **124** and butt plate **130** of the preceding pusher bar assembly.

The pusher bar assemblies **100** are adapted to accommodate minor variations in case length from end-to-end due to minor variations in manufacturing. This is achieved by the compression of the springs **115** on the guide pins **116**, **118** as shown in FIG. **6**. These springs **115** permit the movement of the compression plate **122** relative to the pusher plate **114** to accommodate minor variations in case size. As shown in FIGS. **6** and **7**, compression plate **122** is in contact with pusher plate **114**, which is the position of the parts accommodating the largest possible case. However, the plate **122** may move away from plate **114** until block **120** contacts the heads **117** and **119** of guide pins **116** and **118** to accommodate smaller case sizes within the tolerances of manufacturing variations.

The cases are normally fed by the conveyor belt **52** into the compression unit **50** in timed relation so that when a pusher bar assembly **100** reaches the position beneath sprocket **108**, such as is shown in FIG. **9**, a case, such as case **201**, is delivered into the entrance end of the compression unit **50**. This timed relation is maintained by reason of the common drive means for the various elements of the compression unit as is shown in FIG. **1**. This drive is also coordinated with the means for delivering the cases onto the belt **52**.

The cases delivered on belt **52** come from a gluer which has applied adhesive to the areas **25** and **42** shown in FIG. **10** and has placed the cases in the position shown in FIG. **11** with the top panels **12** and **14** folded down on top of the case. The case is thus in condition to have the end flaps **26**, **34** and **30**, **38** pressed against the side flaps **39** of the case and the manufacturer's flap **24** pressed against the top panel **12**. It is the function of the compression unit in accordance with the invention to press these flaps against the body of the case and to maintain this condition so as to assist the setting of the adhesive. Moreover, it is important to maintain this pressed condition for a sufficient length of time to achieve an effective adhering action.

As the case **201** enters the compression unit **50** its front flaps **34** and **26** move into contact with the flap closing plates **124** of a pusher bar assembly located at the entrance of the unit. It will be noted that as the pusher bar assemblies **100** are moved through the cam tracks **142**, the plates **114**, **122** and **130** extend vertically. However, at the entrance end of the compression unit, the plates **124** are inclined to the vertical when contacted by flaps **34** and **26**, as is shown in FIG. **9**. This contact causes the flaps **34**, **26** to be turned downwardly toward the front end of case **201**. The next succeeding pusher folds the trailing flaps downwardly as the pusher moves downwardly around sprocket **108** and assumes its vertical position. It is noted that the feed of the belt **52** is at a rate faster than the feed of the pusher assemblies **100** by chains **102**. Accordingly, the case **201** is urged against the plate **124** by means of the feed of the belt **52**. Subsequently the case assumes a position such as the case **202** in FIG. **9**, which is caused by the next succeeding pusher bar assembly engaging the rear flaps **30**, **38** with its compression plate **122** to flatten them against the trailing side flaps **39** of the case and at the same time urge the forward end of the case against flap closing plates **124** and butt plate **130** on the next preceding pusher bar assembly, as is shown in FIG. **9**. This causes flap closing plates **124** to be moved to the vertical position aligned with plate **130** and places the flaps **34** and **26** in compressed relation against the front side flaps **39** of the case by reason of their contact

with plates **124** and **130**. Case **202** is now in a condition with the front and rear flaps being pressed against the front and rear end walls by the associated compression plate **122** and plates **124** and **130**.

The front end of the case **202** shown in FIG. **9** is positioned underneath belt **170** which is aligned with its manufacturer's flap **24**. The belt **170**, in conjunction with rollers **182**, applies a downward pressure on top of the case **202** to apply pressure to the manufacturer's flap **24** to assist the adhering function of the glue.

The above-described condition of the case **202** is maintained throughout its movement through the compression unit. When the case is discharged from the compression unit, it is received on a suitable delivery conveyor **210** (FIG. **1**).

As the case moves horizontally through the compression unit **50**, it is guided on its sides by the guide members **86** and it is supported on its bottom by the rollers **80**.

It will be noted that the compression unit **50** in accordance with the invention provides an "in-line" unit for receiving a horizontally moving case and maintaining this movement of the case through the compression unit to the delivery conveyor **210**. There is no changing direction of case movement. If cases are delivered continuously, there is no stopping. However, if cases are delivered intermittently, the compression unit **50** waits for the cases and operates intermittently. Accordingly, a very simple and high speed case sealing operation is achieved.

It is to be understood that the form of the invention shown and described herein is to be taken as a presently preferred embodiment. Various changes may be made in the shape, arrangement and size 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 following claims.

I claim:

1. A compression unit for sealing end-closing cases having adhesive bearing end flaps extending outwardly from the front and rear ends of the case, comprising pusher means for conveying said cases from the entrance end of the compression unit along a horizontal path to the discharge end of the compression unit, means for moving said pusher means horizontally through the compression unit in spaced relation along a path so that each pusher means engages the rear end flap of a case to press said flap against the rear end of the case and to urge the front end flap of the case against an adjacent pusher means so that the front flap of said case is pressed against the front end of the case, whereby said end flaps are pressed against the case to aid in the setting of the adhesive thereon, said moving means for said pusher means being constructed and arranged to maintain said flap pressing condition of said end flaps as the cases are moved through the compression unit, and means for supporting said cases on the bottoms thereof as they are moved through said compression unit.

2. A compression unit according to claim **1** including means for conveying said cases in end-to-end relation horizontally into the entrance end of the compression unit.

3. A compression unit according to claim **1** wherein said pusher moving means comprises an endless conveyor, said pusher means being carried by said endless conveyor at spaced locations therealong.

4. A compression unit according to claim **3** wherein each of said pusher means includes a first plate extending transversely of said compression unit and adapted to contact the rear end flaps of a case, and a second plate extending transversely of said compression unit and adapted to contact the front end flaps of a case.

5. A compression unit according to claim **4** including a pusher plate supported on said endless conveyor and extending transversely of said compression unit, said first and second plates being mounted on opposite sides of said transversely extending pusher plate, said pusher plate being arranged to support said first and second plates vertically during said case contacting movement thereof.

6. A compression unit according to claim **5** including a flap closing plate mounted on said pusher plate adjacent said second plate, means supporting said flap closing plate for movement from a position extending at an angle to said second plate to a position aligned therewith, said flap closing plate being arranged to engage the front end flap of said case as it is moved into the entrance end of said compression unit to move the front end flap downwardly toward the front end of the case.

7. A compression unit according to claim **6** including means for biasing said flap closing plate to said inclined position, said flap closing plate being movable against said bias to said position aligned with said second plate in response to the movement of said case toward said pusher plate.

8. A compression unit according to claim **1** wherein said end-closing cases have an overlapping manufacturer's flap on the top thereof, said manufacturer's flap extending between the front and rear ends of the case, and including means for applying pressure to the top of said case along said manufacturer's flap as the case is moved through the compression unit.

9. A compression unit according to claim **8** wherein said means for applying pressure to the top of the case includes an endless conveyor belt having a horizontal portion adapted to engage the top of the case and moving in the direction of movement of the case through the compression unit, and a plurality of rollers extending transversely to said horizontal portion of said belt and urging the same into contact with the top of the case.

10. A compression unit according to claim **5** wherein said means for mounting said first plate on said support member included means permitting relative movement of said first plate toward and away from said pusher plate, whereby said pusher assemblies are adapted to accommodate cases of different end-to-end sizes.

11. A compression unit according to claim **10** wherein said mounting means for said first plate includes means for biasing the first plate away from said pusher plate, said biasing means being adapted to permit movement of said first plate against the bias thereof.

12. A compression unit according to claim **3** wherein said pusher means conveyor comprises a pair of endless chain conveyors, and said means mounting said pusher bar assemblies on said chain conveyors includes link members connected in said chains.

13. A compression unit according to claim 3 wherein each of said pusher means carries a roller at each of the lateral ends thereof, and including a horizontally extending guide track extending through said compression unit at each lateral side thereof, said rollers being adapted to move through said horizontal guide track as the pusher means is moved through said compression unit.

14. A compression unit according to claim 5 wherein said end closing cases have an overlapping manufacturer's flap on the top thereof, said manufacturer's flap extending between the front and rear ends of the case, and including means for applying pressure to the top of said case along said manufacturer's flap as the case is moved through the compression unit.

15. A compression unit according to claim 14 wherein said means for applying pressure to the top of the case includes an endless conveyor belt having a horizontal portion adapted to engage the top of the case and moving in the direction of movement of the case through the compression unit, and a plurality of rollers extending transversely to said horizontal portion of said belt and urging the same into contact with the top of the case.

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