United States Patent

[11] 3,587,209

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Pittsburgh, Pa.

[54] **CASE GLUER AND SEALER**
13 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** **53/374,** 53/284, 53/287
[51] **Int. Cl.** **B65b 7/20**
[50] **Field of Search** ..... 53/374, 124 (A), 287, 284, 170, 173, 169, 76

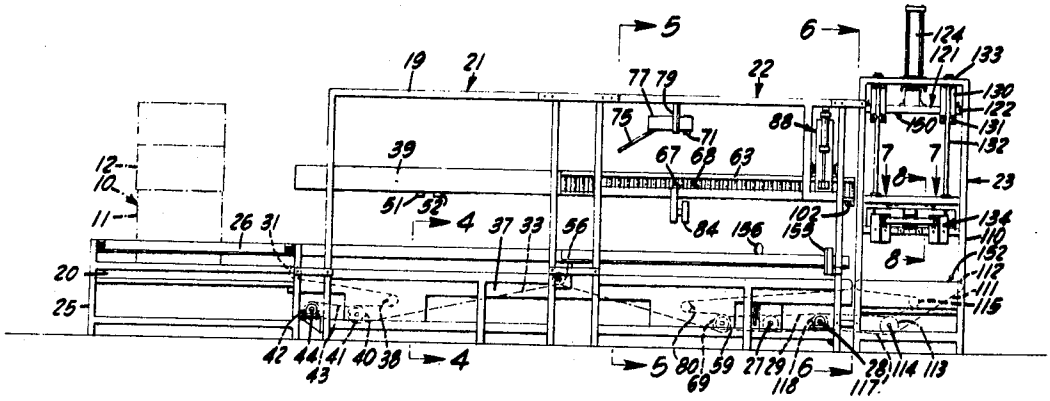
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Primary Examiner—Travis S. McGehee
Attorneys—John R. Bronaugh, Floyd S. Levison and E. Dennis O'Connor

ABSTRACT: A machine for sealing cases having upper and lower telescoped sections with bottom and top closure flaps respectively. The loaded cases partially telescoped to expose normally overlapped portions of the lower section are fed to the machine with the flaps of the lower section closed and the side flaps of the upper section open. As the case enters the machine it is so supported that a first bottom side flap swings downwardly and means are provided to apply adhesive to portions of the thereby exposed bottom end flaps. As movement of the case continues said first side flap is closed and the other bottom side flap swings downwardly and adhesive is applied to thereby exposed portions of the end flaps. Adhesive is also applied to the exposed but normally overlapped sidewall portions of the lower section and adhesive is applied to the inner surfaces of the side flaps of the upper section. The other side flap of the bottom section and both side flaps of the upper section are then closed and the case is subjected to vertical compression to complete the telescoping of the sections and is then subjected to lateral compression the compressive forces being maintained until the adhesive takes an initial set.



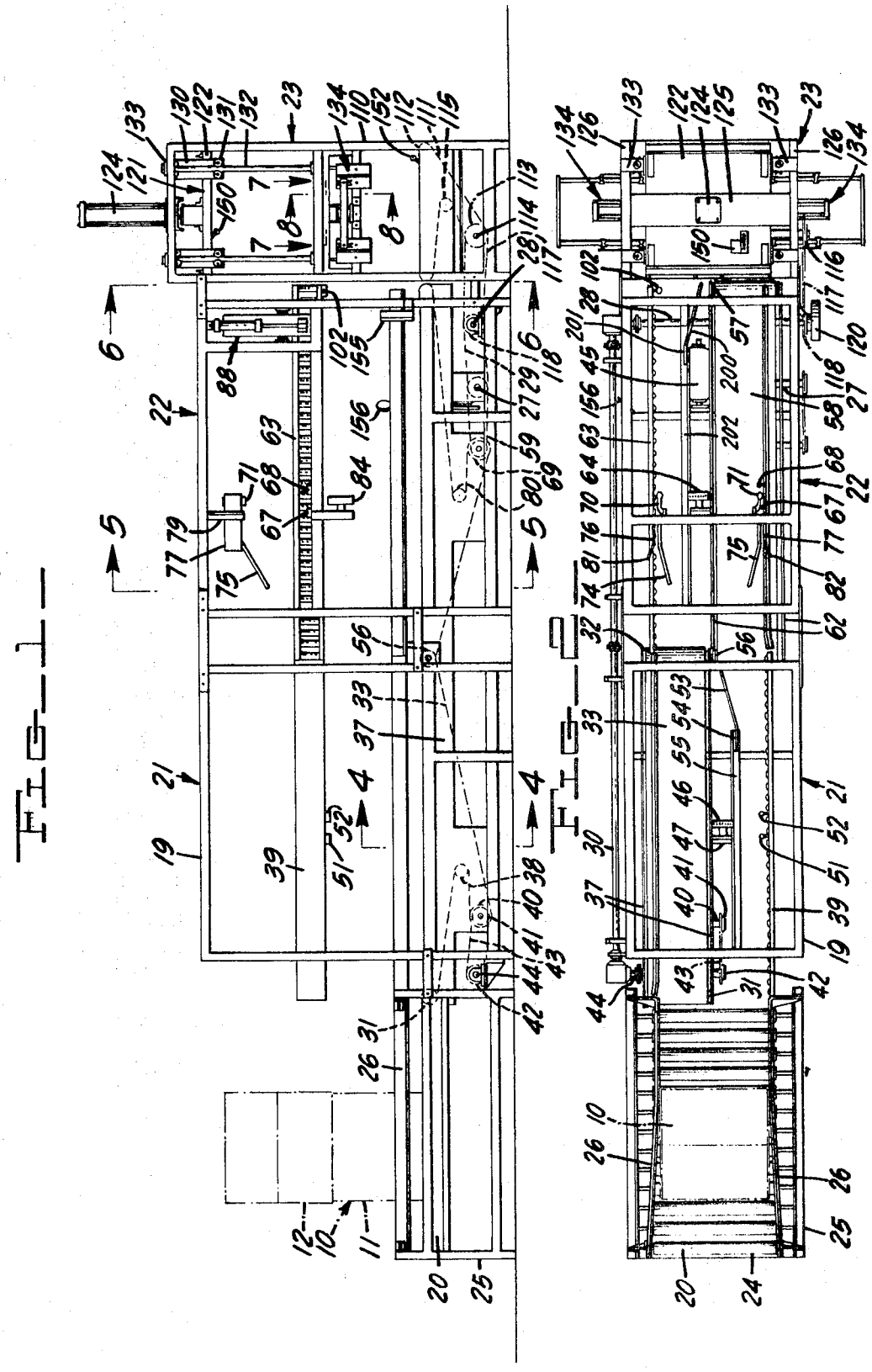


Fig. 3

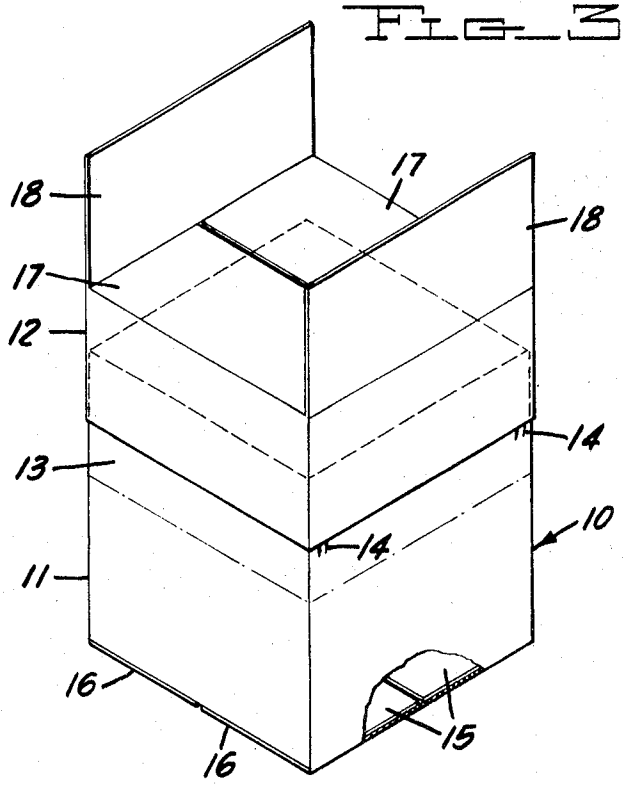

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Fig. 4

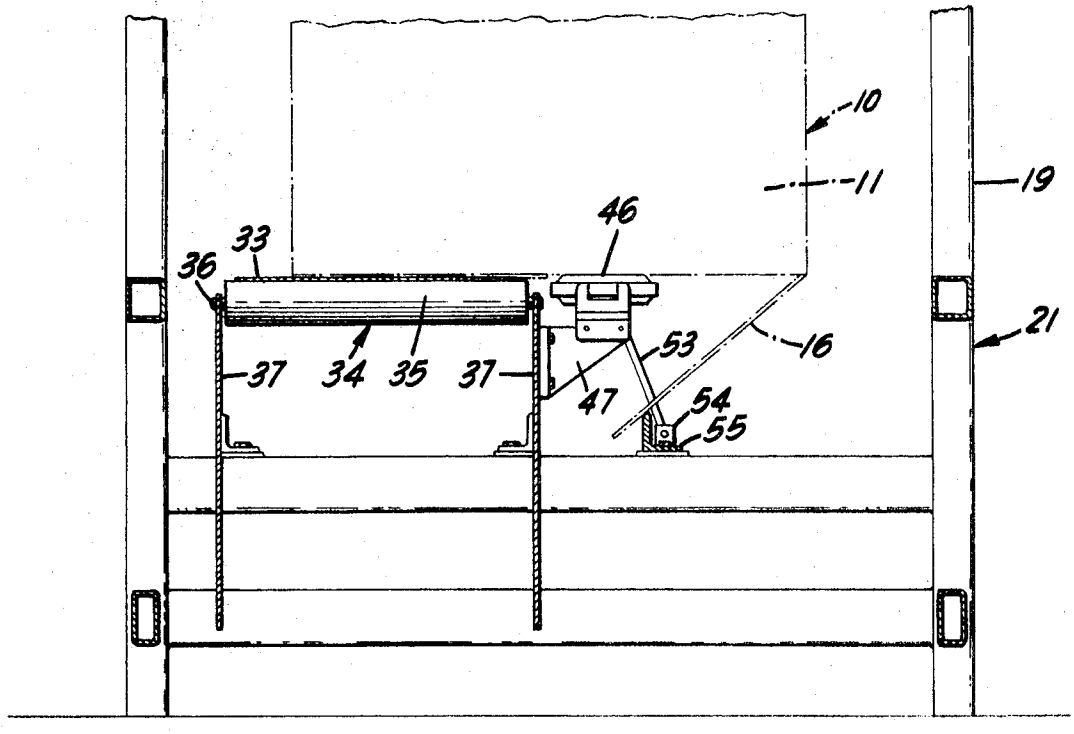

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Fig. 5

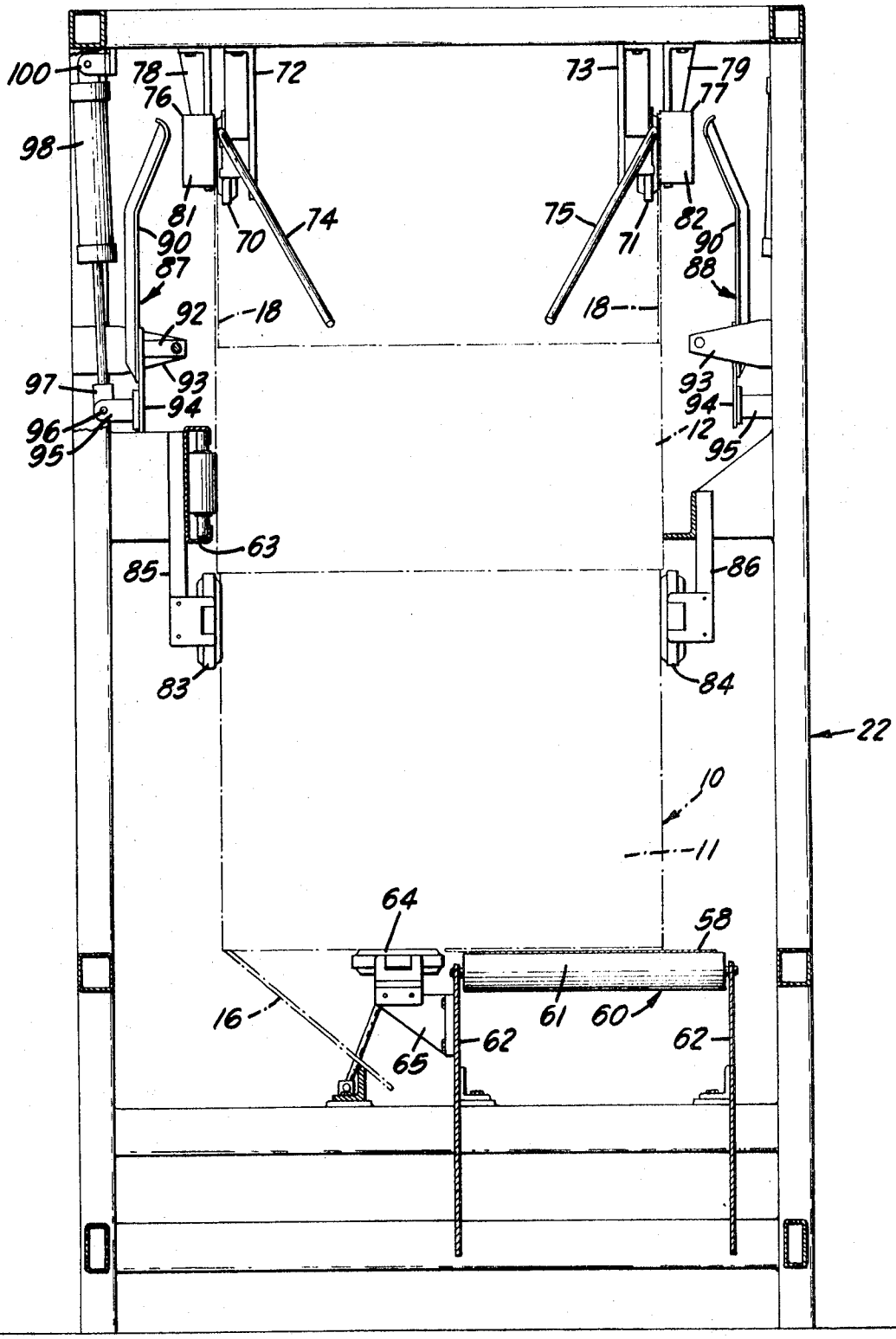

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Fig. 6

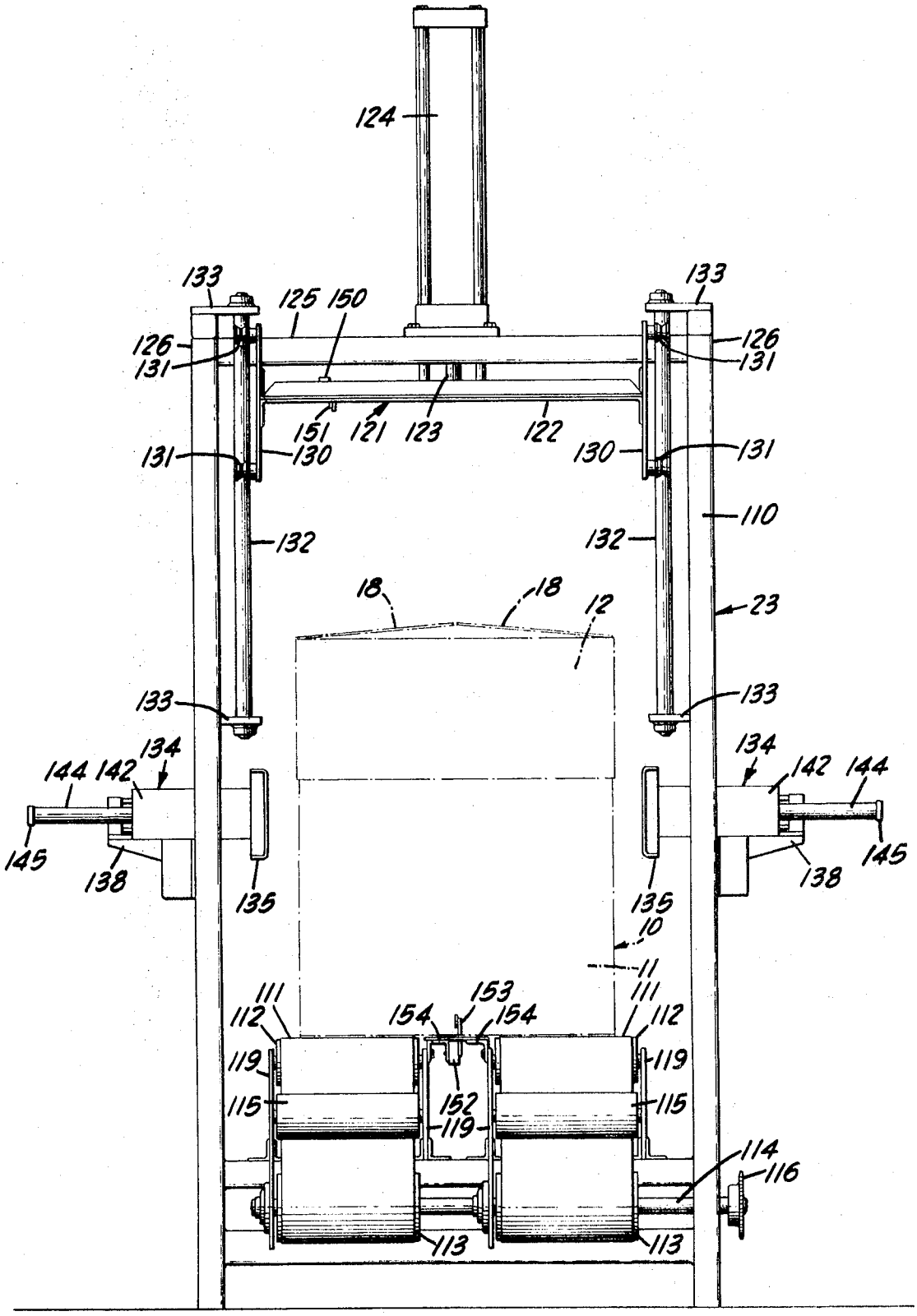

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FIG. 7

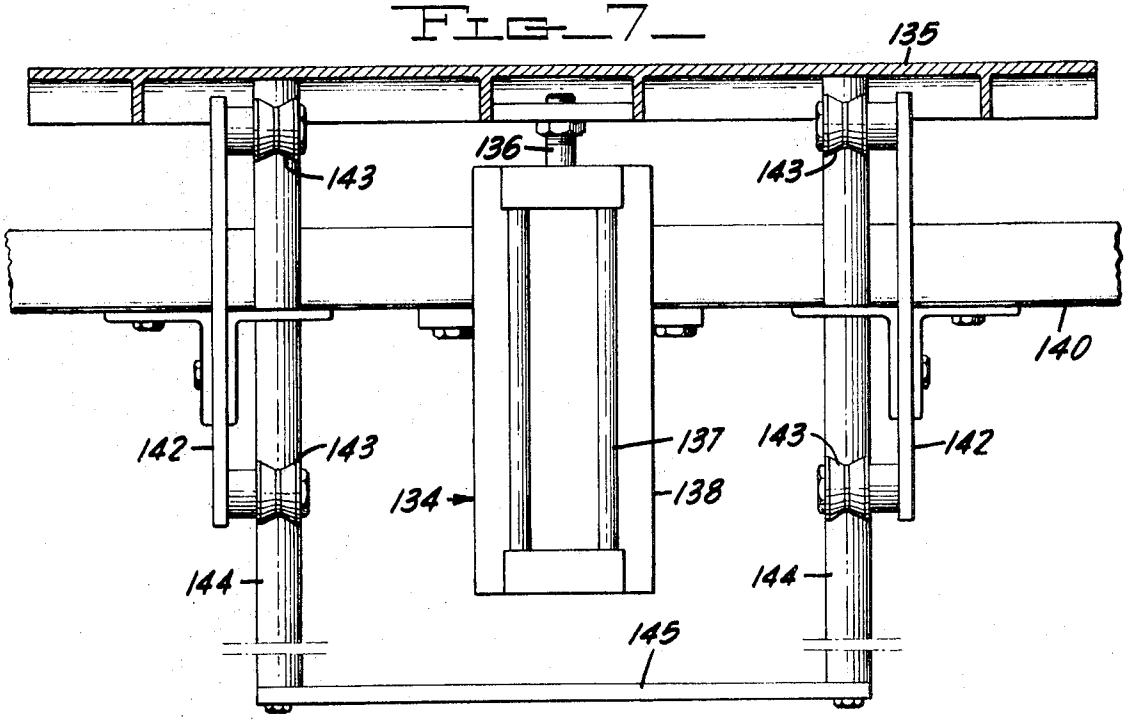


FIG. 8

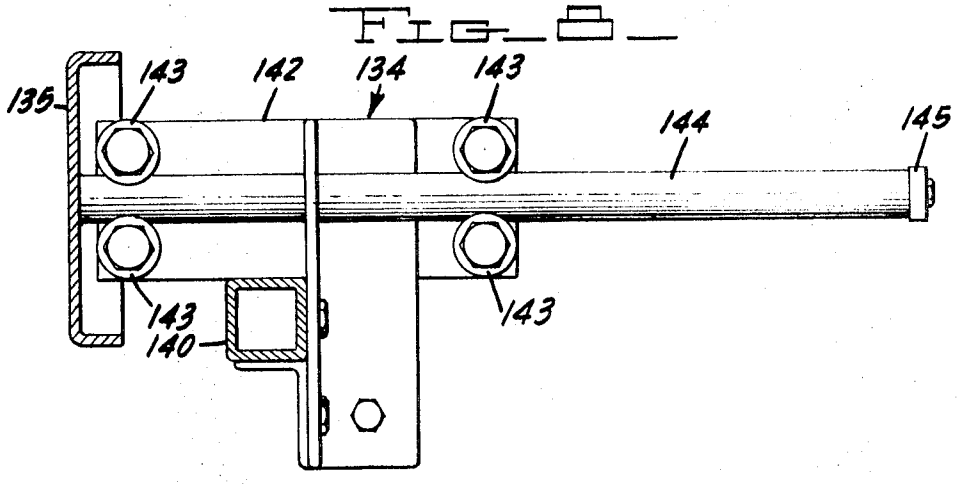


FIG. 9

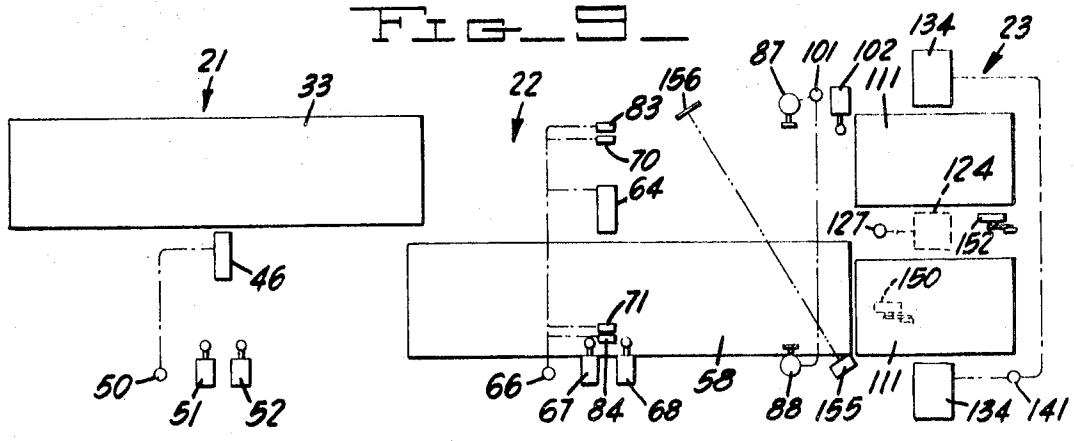
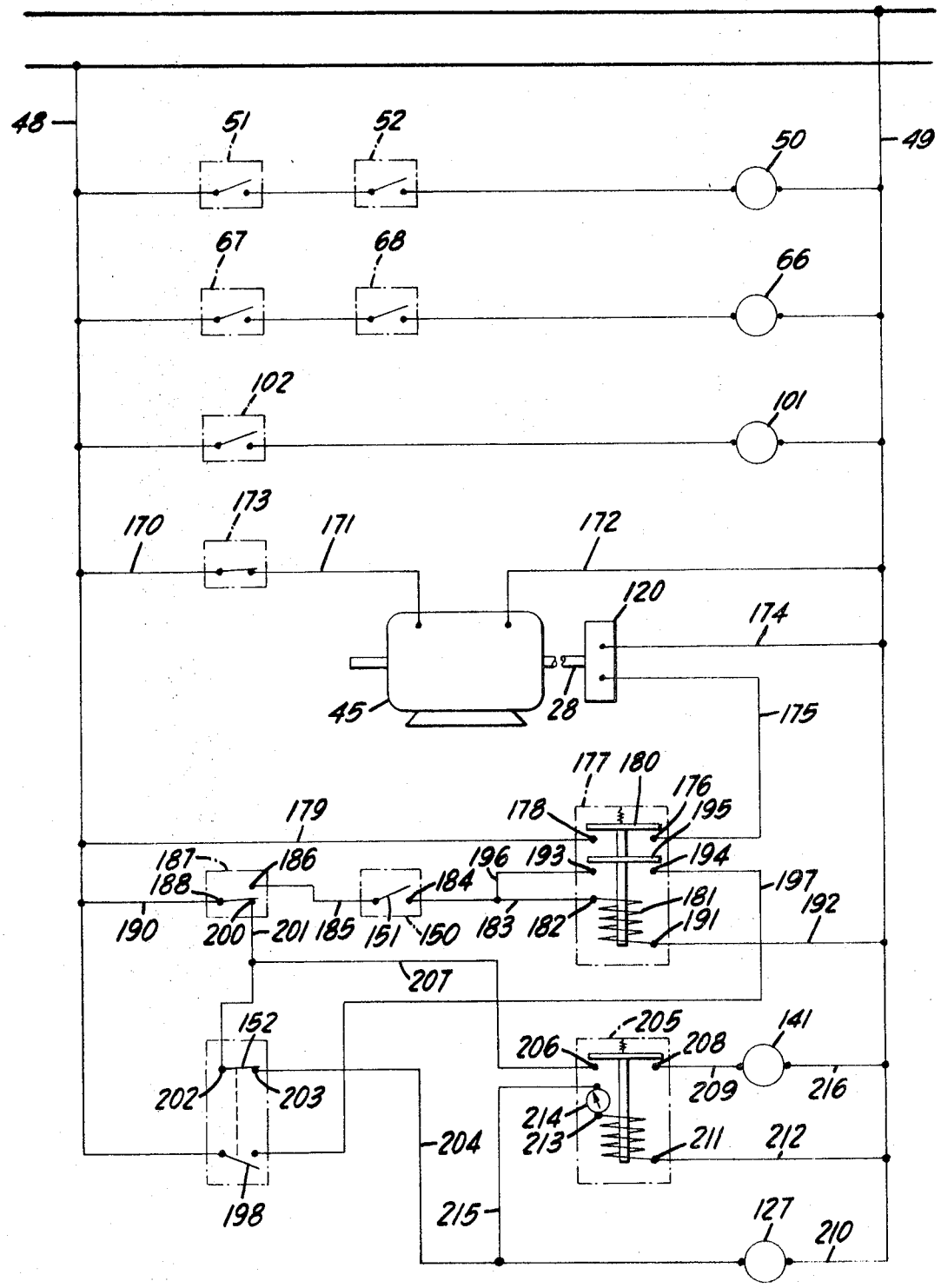


Fig. 10


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CASE GLUER AND SEALER

BACKGROUND OF THE INVENTION

For the encasing of certain commodities, such for example as pirns or cones of artificial yarns for storage and/or transportation, relatively large fiberboard cases are conventionally employed. Such cases are composed of a lower section and an upper section telescopically received on the lower section the latter having usual side and end wall flaps for closing the bottom of the case and the upper section similarly having side and end wall flaps for closing the top of the case. The telescopic feature is employed primarily to permit the contents of the case, which suitably project somewhat above the top of the lower section, to be compressed following the encasing operation to maintain them against shifting. During the loading and subsequent movement of the cases and also due to the character of the contents, both the end and sidewall flaps of the lower section, the sidewall flaps underlying the end wall flaps, are in closed position.

Due to the unconventional features of the cases and of their handling conventional case gluing and sealing machines are not applicable and consequently heretofore the case closing and sealing operations have been performed by hand. The principal object of the instant invention is the provision of a case sealing apparatus which will automatically effect the case closing and sealing and further will complete the telescoping of the upper section onto the lower section of the case and adhesively secure the sections together.

SUMMARY OF THE INVENTION

In accordance with the instant invention a machine is provided to close and seal cases of the type referred to which are delivered to the machine with the upper case section partially telescoped onto the lower case section, the side and end flaps of the lower section closed, the side flaps of the upper section in an approximately erect position and the end wall flaps of said section closed. The machine includes a first servicing unit having a conveyor belt positioned to underlie only one of the sidewall flaps of the lower section and a roller bed against which the opposite side of the case rests to prevent the tipping of the case, the other sidewall flap of the lower section being allowed to swing downwardly by gravity to expose first portions of the end flaps in their closed positions. As the case travels through the unit means are provided to apply adhesive to said first portions of the end flaps and thereafter a plow is employed to raise the first side flap to closed position as the case approaches the end of the unit.

The machine includes a second servicing unit to which the case is delivered by the first unit, the second unit having a conveyor belt to underlie the opposite sidewall flap of the lower section and a roller bed against which the first sidewall of the case rests. The first sidewall flap is permitted to swing downwardly by gravity to expose second portions of the end wall flaps and means are provided to apply adhesive thereto. The second unit also includes means operable, as the case is conveyed therepast, to apply adhesive to portions of the sidewalls of the lower section which are overlapped by sidewalls of the upper section when the latter is in fully telescoped position on the lower section. In addition the second unit includes means to apply adhesive to the inner surfaces of the side flaps of the upper case section, means to plow the upper section side flaps to closed position following application of the and means to plow said first side flap of the bottom section to closed position following the application of the adhesive thereto.

The machine also includes a third or compression unit to which the cases are delivered from said second unit. The compression unit has a vertically operating ram adapted to complete the telescoping of the upper case section onto the lower case section and to compress the contents of the case to the extend desired. The third unit also includes horizontal rams operable, following the operation of the vertical ram to apply lateral pressure to the overlapped case sidewall having the adhesive therebetween. Compression is maintained in both the vertical and horizontal directions until a second case approaches the compression unit the case therein then being discharged from the apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an apparatus in accordance with the instant invention;

FIG. 2 is a top plan view of the apparatus of FIG. 1;

FIG. 3 is a perspective view of a case of the type sealed by the apparatus of the invention and in the condition in which it is supplied to the apparatus;

FIG. 4 is a sectional view on an enlarged scale taken on the line and in the direction of the arrows 4–4 of FIG. 1;

FIG. 5 is a sectional view on an enlarged scale taken on the line and in the direction of the arrows 5–5 of FIG. 1;

FIG. 6 is a sectional view on an enlarged scale taken on the line and in the direction of the arrows 6–6 of FIG. 1;

FIG. 7 is a sectional view on an enlarged scale taken on the line and in the direction of the arrows 7–7 of FIG. 1;

FIG. 8 is a detailed sectional view on an enlarged scale of a portion of the apparatus the view being taken on the line and in the direction of the arrows 8–8 of FIG. 1;

FIG. 9 is a diagrammatic view illustrating the relationships of certain control mechanisms; and

FIG. 10 is a wiring diagram for the control means for the several mechanisms involved in the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As a preliminary to a detailed description of the machine of the instant invention, the characteristics of the cases being closed and sealed will first be mentioned reference being made particularly to FIG. 3 where a case of the type with which the machine is concerned and in the condition in which it is delivered to the machine is shown at 10. The case includes a lower section 11 and an upper section 12 partially telescoped onto the lower section to leave an exposed portion 13 of the lower section which, in the final sealed condition of the case, will be overlapped by the upper section. It will be recognized that the case may be square or oblong and, when the latter is true, may be introduced to the machine with the greatest dimension extending longitudinally or transversely. For purposes of convenience in the following description and claims the walls which will extend longitudinally of the machine as the case passes therethrough will be referred to as "sidewalls" and the walls which will extend transversely of the machine will be designated as "end walls," irrespective of their relative lengths. The width of the exposed portion 13 of the lower section is preferably determined by integral tabs 14 defined by slits in the material of the sidewalls of the lower section and bent outwardly to, in the absence of an overriding force, limit the downward movement of the upper section. The lower section includes end wall flaps 15 and sidewall flaps 16 preferably integrally joined to the end and sidewalls, respectively, by fold lines, the sidewall flaps, in the closed position as shown, underlying the end wall flaps. Upper section 12 similarly is provided with end wall flaps 17 and sidewall flaps 18 integrally joined to their respective walls by fold lines the end wall flaps being closed and the sidewall flaps erect or in substantially erect positions. In the closed position of the flaps the sidewall flaps overlie the end wall flaps.

Referring now particularly to FIGS. 1, 2 and 4 the machine incorporating the instant invention includes an infeed conveyor 20, a first servicing unit indicated generally at 21, a second servicing unit indicated generally at 22 and a third or compression unit indicated generally at 23. The infeed conveyor may be any suitable type. As illustrated it comprises a roller conveyor 24 carried by a suitable framework 25 the framework supporting side rails 26 adapted to center each case 10 as it enters the machine. The cases may be manually moved along conveyor 20 to unit 21 or the rollers may be driven in any suitable way and at the required times to automatically advance the cases into the unit.

Servicing unit 21 includes a framework indicated generally at 19 supporting suitable bearings for the shafts of rollers 31 and 32 the rollers carrying a conveyor belt 33. Conveyor belt 33 is dimensioned and positioned to underlie only one of the sidewall flaps 16, hereinafter called the "first sidewall flap" of a case introduced into the unit. The upper run of belt 33 is suitably supported by a roller table indicated generally at 34 and comprising a series of rollers 35 having pintles 36 rotatably mounted in bearing openings in side plates 37 extending longitudinally of the conveyor, the side plates being supported from the framework (see particularly FIG. 4). Conveyor belt 33 is continuously driven by a line shaft 30 through drive means which may take any conventional or desirable form but which suitably includes a drive roll 40, the belt being drawn in a partial bight around the drive roll by an idler roll 38, a sprocket 41 secured to the shaft of drive roll 40, a sprocket 42 carried by a shaft 44 operatively connected to line shaft 30 through suitable bevel gears (not shown) and a sprocket chain 43 (see FIGS. 1 and 2). Line shaft 30 is driven by a motor 45 through a speed reduction unit not shown in detail but having an output shaft 27, a transverse shaft 28 supported in suitable bearings adjacent the forward end of unit 22 and operatively connected to the line shaft through bevel gears (not shown) and sprockets carried by shafts 27 and 28 and operatively connected by a sprocket chain 29.

Framework 19 also supports a roller bed 39 with the rolls thereof extending vertically the roller bed being positioned to be contacted by the sidewall of a case opposite to that which carries said first sidewall flap to prevent tipping of the case as it is carried through the unit. Roller bed 39 is preferably of substantially the same length as and directly opposite to conveyor belt 33 and is vertically located to be contacted by the upper case section. As will be understood the arrangement of belt 33 and roller bed 39, together with the elevation of the upper run of the belt substantially above frame members therebelow, permits the other sidewall flap, hereinafter called the "second sidewall flap" of the lower case section, to swing to at least partially open position by gravity as the case completes its entry into unit 21 (see FIG. 4). As a result portions of the closed end wall flaps, hereinafter referred to as "-first end wall flap portions" of the lower case section, normally covered by said second sidewall flap, are exposed.

Unit 21 additionally includes a gluehead 46 supported by a bracket 47 (see FIG. 4) from one of the plates 37. The positioning of the gluehead is such that the second sidewall flap will be allowed to swing to open position before the case reaches the gluehead and the glue exuding surface of the gluehead will be contacted by said first end wall flap portions as the case passes the gluehead. Gluehead 46 as well as glueheads incorporated in other parts of the machine and later referred to may be of any suitable or conventional construction and operation as for example that disclosed in U.S. Pat. No. 3,190,259, to Craig et al., issued June 22, 1965. Glueheads of such type are, as illustrated in said patent, connected to a suitable source of glue under pressure and are activated to permit the flow of glue through the orifices thereof and deactivated to prevent such flow by pneumatic valve means operated by solenoid valves or other suitable means. Inasmuch as the control system as disclosed in said Pat. No. 3,190,259 is applicable to the instant invention no detailed description thereof is believed required. In the present instance the system includes a solenoid valve 50 (see FIG. 10) which operates the pneumatic means of the gluehead. The solenoid valve is included in an electrical circuit including main conductors 48 and 49 and is under the control of normally open microswitches 51 and 52 connected in series with the valve whereby both microswitches must be closed to operate valve 50 to activate the gluehead. Switches 51 and 52 are mounted on the framework of unit 21 in positions (see particularly FIG. 2) to be contacted first by a corner and then by a sidewall of a case as the cases passes through unit 21 and are spaced short distances from and on opposite sides of the gluehead (see FIG. 9) whereby the glueheads will not be activated until a leading edge of the case is moved beyond the gluehead and the gluehead will be deactivated before the trailing edge of the case reaches the gluehead.

Means 53 are provided for closing said second sidewall flap following the application of glue to the first end wall flap portion (see FIGS. 2 and 4), this means comprises a rod or plow 53 having one end secured as at 54 to a frame member 55, the rod extending forwardly, upwardly and inwardly therefrom to a point substantially at the level of the upper run of conveyor belt 33 and adjacent the forward end of the unit.

Servicing unit 22 the framework of which is in part a continuation of unit 21 and in part individual to unit 22 supports conveyor rollers 56 and 57 the roller 56 being suitably carried by the same shaft that carries the forward roller 32 of conveyor belt 33. Roller 57 is carried by an individual shaft the ends of which are supported in bearings mounted on the framework of unit 22. Rollers 56 and 57 carry a conveyor belt 58 similar to conveyor belt 33 and at the same height thereof and of a width and so positioned as to underlie only the said second sidewall flap, namely the one glued shut at servicing unit 21. The upper run of conveyor belt 58 is supported by a roller table indicated generally at 60 and which comprises a series of rollers 61 having pintles mounted in bearing openings in side plates 62 the latter being supported from the framework of the unit. Conveyor belt 58 is continuously driven at the same speed and in the same direction as belt 33 by an suitable means which in part comprises common shaft supporting rollers 32 and 56 but which primarily comprises a drive roll 69, the belt being drawn in a partial bight around the drive roll by an idler roll 80, and sprockets carried by shaft 27 of the motor speed reduction unit and the shaft of roll 69 and operatively connected by a sprocket chain 59.

The framework also supports a roller bed 63 similar to roller bed 39 of the first unit but positioned to be contacted by the first sidewall of the case as it is carried through unit 22. Similarly as roller bed 39, roller bed 63 is of substantially the same length and is directly opposite to its associated conveyor belt and is vertically positioned to be contacted by the upper section of a case passing through the unit. The arrangement, including the elevation of the upper run of belt 58 substantially above underlying frame members, permits the first sidewall flap to swing to at least partially open position by gravity as the case completes its entry into unit 22 (see FIG. 5) whereby portions, hereinafter referred to as "second end wall flap portions " of the closed end wall flaps of the lower case section are exposed.

Unit 22 also includes a gluehead 64 supported by a bracket 65 from a side plate 62 in a position to have its glue exuding surface contacted, following the swinging of the first sidewall flap to open position, by said second portions of the end wall flaps as the case passes the gluehead. As previously explained gluehead 64 is of the same type as gluehead 46 and is activated and deactivated by a solenoid valve 66 (see FIG. 10). Solenoid valve 66 is included in an electrical circuit comprising main conductors 48 and 49 and is under the control of a pair of normally open microswitches 67 and 68 connected in series with the valve between the main conductors. The switches are spaced apart on opposite sides of the gluehead in positions to be closed by contact of the sidewall of a case passing through the unit, whereby, similarly as in the case of unit 21, the gluehead will not be activated until the case has been moved into the unit sufficiently to close both switches and the gluehead will be inactivated as the trailing end of the case passes the rearward one of the two switches.

Unit 22 additionally includes means to apply adhesive to the inner surfaces of the side flaps of the upper case section and to bring said flaps into substantially fully erect position for contact with the adhesive exuding faces of said adhesive applying means. The adhesive applying means referred to comprises glueheads 70 and 71 on opposite sides of the unit, the glueheads being supported by brackets 72 and 73, respectively, projecting downwardly from a frame member of the unit (see FIGS. 1 and 5). The means for bringing the side flaps into positions to contact the glueheads includes rods or guides 74

and 75 carried by brackets 72 and 73, respectively, the rods extending rearwardly, downwardly and inwardly with their free terminal ends positioned to underlie the upper wall flaps in the event they are folded downwardly somewhat from their required erect positions. The means for positioning the upper side flaps also includes rails 76 and 77 extending longitudinally of the unit and lying outwardly of the glueheads 70 and 71 the rails being supported by brackets 78 and 79 from the machine frame. The rear ends of the rails are flared outwardly as indicated at 81 and 82 to cam the side flaps inwardly into erect positions in the event that they have swung outwardly to some extent therefrom. As will be appreciated rails 76 and 77 also serve as backing plates for the glueheads. Glueheads 70 and 71 are of the same type as glueheads 46 and 64, previously mentioned, and are activated and deactivated by solenoid valve 66 under the control of normally open microswitches 67 and 68 similarly as gluehead 64.

Referring particularly to FIG. 5 the second unit additionally includes means for applying adhesive to the exposed portions of the sidewalls of the lower case section which are overlapped, when the case sections are fully telescoped by the upper case section. The adhesive applying means includes glueheads 83 and 84 supported by brackets 85 and 86 respectively on opposite sides of the unit and in positions to have their glue exuding faces contacted by said exposed portions. Glueheads 83 and 84 are preferably of the same type as the glueheads previously mentioned and are similarly activated and deactivated such activation and deactivation in this instance being under the control of solenoid valve 66 and normally open switches 67 and 68 the same as glueheads 64, 70 and 71. Means 200 are provided for closing said first sidewall flap following the application of glue to the second end wall flap portion (see FIG. 2), this means comprises a rod or plow 200 having one end secured as at 201 to a frame member 202, the rod extending forwardly, upwardly and inwardly therefrom to a point substantially at the level of the upper run of the conveyor belt 58 and adjacent the forward end of the unit 22.

Forwardly of glueheads 70 and 71 and in positions to lie approximately opposite the center point of the side flaps of the upper case section as the trailing ends of the latter pass beyond the glueheads are flap closers 87 and 88 (see FIGS. 1 and 5). Each flap closer comprises a tucker arm 90, lying, when inactive in a substantially vertical position, and a lever arm 92 projecting at substantially a right angle to the tucker arm and having its free end pivotally mounted on a bracket 93 projecting inwardly from the frame of the unit. Each tucker arm 90 has an extension 94 supporting an arm 95 pivotally connected as at 96 to the outer end of a piston rod 97 of a conventional pneumatic piston-cylinder unit 98. Each unit 98 is pivotally mounted at its end opposite to pivot 96 on a bracket 100 carried by the machine frame. Units 98 are connected to a source of air under pressure and are operable to rotate the tucker arms in their flap closing directions, clockwise with respect to the tucker arm to the left of FIG. 5 and counterclockwise with respect to the tucker arm to the right of said FIG., such rotation continuing until the sidewall flaps are closed against the end wall flaps. Units 98 are also operable to restore the tucker arms to their vertical positions. The operation of units 98 is under the control of an electrical circuit including main conductors 48 and 49 between which a solenoid valve 101 and a normally open microswitch 102 are connected in series (see FIG. 10). Upon the closing of microswitch 102 the solenoid valve 101 is activated to cause the unit to rotate the arms in the flap closing direction and upon opening of the switch to rotate the arms in the opposite direction. As illustrated microswitch 102 is mounted on the machine frame adjacent the forward end of the unit 22 in a position to be closed by the forward end of the case as it reaches the forward end of the unit and to be permitted to open as the case leaves the unit whereby the flaps will be maintained in closed position during the entry of the case into compression unit 23.

Referring now particularly to FIGS. 1, 2, 6, 7 and 8 compression unit 23 includes a frame structure 110 supporting a pair of conveyor belts 111. The conveyor belts are carried by individual rollers 112 mounted in suitable bearings in frame members 119 and are driven by drive rolls 113 carried by a common shaft 114 mounted in suitable bearings in the frame members 119 the belts being drawn in partial bights around the drive rollers by idler rolls 115 also carried in suitable bearings on members 119. Shaft 114 carries a sprocket 116 the sprocket being connected by a sprocket chain 117 (see FIG. 2) to a sprocket 118 affixed to the output shaft of an electric clutch 120 driven by shaft 28 previously referred to. Electric clutch 120 is of any suitable type which when activated will cause sprocket 118 to rotate with shaft 28 and when deactivated will release the sprocket from such rotation. The upper runs of conveyor belts 111 which are at the same level as the upper runs of conveyor belts 33 and 58 are suitably supported similarly as the latter by roller tables (not shown) but which preferably consist of a series of rollers having their pintles mounted in bearing openings in the frame members 119.

The compression unit includes a vertical compression ram indicated generally at 121 and having a platen 122. The platen is carried by the piston rod 123 of a conventional pneumatic cylinder unit 124 mounted upon a transverse frame member 125 supported by side frame members 126, unit 124 overlying the center point of the platen. Unit 124 is connected by means (not shown) to a suitable source of air under pressure and is operated by a solenoid valve 127, included in an electrical circuit which will later be described in detail, (see FIG. 10) the solenoid valve when energized causing the piston to move the platen downwardly into compressing relationship to a case in the compression unit and when deenergized to cause the piston to return the platen to its upper idle position. Platen 122 is guided during its movement between its idle and operating positions by means suitably comprising vertically extending plate members 130 secured to the edge portions of the platen adjacent the corners thereof the plate members carrying grooved rollers 131 embracing opposite sides of vertically extending rods 132. Rods 132 are supported by brackets 133 projecting inwardly from side frame members 126.

The compression unit also includes side or lateral rams 134 on opposite sides of the unit and vertically positioned to lie opposite the portions of the sidewalls of the lower case section to which adhesive was applied by the glueheads 83 and 84 and which are overlapped by the upper case section when the telescoping of the case sections is completed. Each of the rams comprises a platen 135 carried by the piston rod 136 of a conventional pneumatic cylinder unit 137 mounted on a bracket 138 which in turn is supported by a longitudinally extending frame member 140. Each unit 137 is connected by means (not shown) to a source of air under pressure under the control of a solenoid valve 141, forming part of the electrical circuitry later to be explained, (see FIG. 10) the valve when energized causing the platens to move inwardly to compress the sidewalls of the case therebetween and when deenergized to withdraw the platens to the rest positions shown in FIG. 6. The platens are guided during their inward and outward movements by means comprising spaced plate members 142 carried by the machine frame and supporting grooved rollers 143 embracing opposite sides of rods 144. The rods are connected to platen 135 and projecting rearwardly therefrom adjacent opposite ends of the platens. The rear ends of the rods 144 may be connected as by members 145.

A normally closed microswitch 150, (see FIGS. 6 and 10) is mounted on platen 122 the switch having an actuating arm 151 projecting through an opening in the platen in a position to be contacted, and moved to its switch opening position, by the top of a case when the platen is lowered into compressing relationship with the case. A normally open microswitch 152 having an actuating arm 153 (see FIGS. 1, 6 and 10) is mounted on brackets 154 between conveyor belts 111 adjacent the forward end of the compression unit with its actuat-

ing arm 153 positioned to be contacted to close the switch upon the entry of a case completely into the compression unit. Switches 150 and 152 are included in the electrical operating circuit of the compression unit to be later described.

Referring now particularly to FIGS. 1, 9 and 10 the electrical control system for the compression unit includes, in addition to the switches previously referred to, a photoelectric cell 155 mounted on a side frame member of servicing unit 22 adjacent the forward end thereof in registry with a light source element 156 carried by a frame member on the opposite side of unit 22 and rearwardly of photoelectric cell 155. As will be appreciated the arrangement of the photoelectric cell and light source is such that the beam of light from the light source will be interrupted by a case as it approaches the end of its travel through servicing unit 22 and will be restored as the case moves out of the unit. The function of the photoelectric cell will be hereinafter explained.

Reference is now made to FIG. 10 disclosing in addition to features of the circuitry previously described the circuits for the several switches and other electrical components of the compression unit as well as the control circuit for motor 45 and electric clutch 120. The circuits are shown with the several switches and other elements in the condition assumed when the compression unit is operative with conveyor belts 111 stationary, rams 121 and 134 in case compressing positions and motor 45 in operation.

Motor 45 is connected to main conductors 48 and 49 through leads 170, 171 and 172 and a manually operable main switch 173. One side of the electrically operated mechanism of clutch 120 is connected to main conductor 49 by a lead 174, the other side of the mechanism being connected by a lead 175 to one contact 176 of a relay 177. A second contact 178 of relay 177, associated with contact 176, is connected by a lead 179 with main conductor 48. Contacts 176 and 178 of relay 177 are adapted to be closed by contactor 180 of the relay upon the energization of coil thereof. Coil 181 has a terminal 182 connected by lead 183 to one terminal 184 of normally closed microswitch 150. The other terminal of microswitch 150 is connected by a lead 185 to one terminal 186 of a normally open side of a three way switch 187 controlled by photoelectric cell 155. A second terminal 188 of switch 187 is connected by a lead 190 to main conductor 48. The other terminal 191 of the coil of relay 177 is connected by a lead 192 to main conductor 49. Relay 177 includes a second set of contacts 193 and 194 adapted to be closed when the relay is energized by a contactor 195. Contact 93 is connected by a lead 196 to lead 183. The other contact 194 is connected by a lead 197 to one terminal of a microswitch 198. The blade of microswitch 198 is connected to the blade of microswitch 152 in such manner that switch 198 is opened when switch 152 is closed and vice versa. The other terminal of microswitch 198 is connected to main conductor 48. A third terminal 200 of switch 187 is connected by a lead 201 to one terminal 202 of microswitch 152 the other terminal 203 of the switch being connected by a lead 204 to one terminal of the solenoid valve 127 operating the ram 121. The other terminal of solenoid valve 137 is connected by a lead 210 to main conductor 49.

The circuitry includes a time delay relay 205 having a contact 206 connected by a lead 207 to lead 201. A second contact 208 of the relay is connected by lead 209 to one terminal of solenoid valve 141 which controls the operation of the lateral rams 134. The other terminal of solenoid valve 141 is connected by a lead 216 to main conductor 49. The coil of time delay relay 205 has one terminal 211 connected by a lead 212 to main conductor 49. The other terminal 213 of the coil of relay 205 is connected to a terminal of the presettable time delay mechanism 214 of the relay, the other terminal of the latter being connected by a lead 215 to lead 204.

The operation of a machine incorporating the instant invention will now be described. It will be assumed that manually operated main switch 173 is closed and the motor 45 is energized with conveyor belts 33 and 58 in operation. Further that there is a case in the compression unit and that the vertical and lateral rams are in case compression positions. Under such circumstances and as previously pointed out the several microswitches and other electrical elements will be in the condition illustrated in FIG. 10. A case 10 is now introduced into servicing unit 21 from infeed conveyor 20, either manually or automatically as may be desired, with the first side flap of the lower case section riding conveyor belt 33. Upon completion of the transfer of the case from the infeed conveyor 20 to conveyor belt 33 the case is entirely supported by conveyor belt 33 with its opposite sidewall resting against roller bed 39. The second sidewall flap of the lower section being unsupported swings down by gravity to expose the first end wall flap portions. When the leading edge of the case has closed both microswitches 51 and 52 solenoid valve 50 is energized and glue is applied by gluehead 46 to the first end wall flap portions.

As the case proceeds through the unit and following the application of the glue, plow 53 closes the second sidewall flap and upon further movement the case is transferred into the second servicing unit 22 with the second wall flap riding on conveyor belt 58 and the opposite side of the case resting against roller bed 63. When the case is entirely supported by belt 58 and roller bed 63 the first sidewall flap swings downwardly by gravity and, following the closing of both switches 67 and 68 by the sidewall of the case, glue is applied to the second portion of the end flaps. Simultaneously glue is applied by glue heads 70 and 71 to the inner surfaces of the sidewall flaps of the upper case section which have been moved if necessary into erect positions by rods 74 and 75 and/or rails 76 and 77. Also simultaneously glue is applied by glueheads 83 and 84 to exposed portions of the sidewalls of the lower case section normally overlapped by the upper case section. As the case is carried beyond the glueheads a forward edge thereof closes switch 102 to actuate flap closers 87 and 88 whereby the side flaps of the upper section with the glue applied thereto are swung into, and held in contact with the end flaps of the upper case section.

Also as the case continues its movement through the second servicing unit the forward end thereof breaks the beam of light between light source element 156 and photoelectric cell 155 thereby causing the actuating arm of switch 187 to open between contacts 188 and 200 and to close between contacts 188 and 186. The opening of switch 187 between contacts 188 and 200 opens the circuit to solenoid valve 127 controlling the movement of the vertical ram 121 and also opens the circuit to the coil of relay 205 deenergizing the relay and thereby opening the circuit to solenoid valve 141 controlling the operation of the side or lateral rams whereby the vertical and lateral rams start their respective upward and outward movements. As ram 121 moves upwardly switch 150, which has been held open through contact of its actuating arm with the top of the case, closes thereby closing the circuit to the coil of relay 177 and also closing the circuit to contact 193 of the relay. Energization of the coil 181 causes contactor 180 to close the circuit between contacts 178 and 176 thereby energizing electric clutch 120 to initiate movement of conveyor belts 111 to remove the case from the compression unit.

By the time the case within the second servicing unit starts its entry into the compression unit the vertical and lateral rams are fully retracted and the case which was in the compression unit is well on its way out of the unit. As the latter case completes its departure from the compression unit switch 152 is permitted to open but as the opening of switch 152 simultaneously closes switch 198 the coil 181 of relay 177 remains energized and hence the circuit to clutch 120 remains closed and travel of the conveyor belts 111 continues. Upon the entry of the new case completely into the compression unit switch 152 is closed by the forward end of the case. Also the light beam from light source element 156 to the photoelectric cell 155 is restored and consequently switch 187 is opened between contacts 186 and 188 and closed between contacts 200 and 188. As a result the coil 181 of relay 177 is deener-

gized and contactor **180** moves upwardly breaking the circuit to clutch **120** whereby the conveyor belts **111** come to a stop and the circuits to the solenoid valves **127** and **141** controlling the operation of rams **121** and **134** are closed. The platen **122** of ram **121** then starts its downward movement but due to the time delay feature of relay **205** the lateral rams remain inoperative. As the platen **122** of the vertical ram in its downward movement contacts the top of the upper case section switch **150** is opened but as the circuit in which the switch is included was previously deenergized by the shifting of the actuating arm from contact **186** no change in operation results. Further downward movement of the platen forces the upper case section further onto the lower case section to complete the telescoping of the case sections and to compress the contents of the case to the desired extent. By the time the downward movement of platen **122** has been completed the time delay of relay **205**, which was preset for the required time interval, has become exhausted whereby the circuit to solenoid valve **141** controlling the operation of the lateral rams **134** is energized. The platens of rams **134** then move into compressing relationship to the sidewalls of the case. The several elements of the compression unit will then remain in a static condition until an additional case traverses the machine into position to break the light beam between light source **156** and photoelectric cell **155**.

Having thus described the invention in rather complete detail it will be understood that these details need not be strictly adhered to and that various changes and modifications may be made all falling within the scope of the invention as defined by the following claims.

I claim:

1. In an apparatus for sealing cases comprising upper and lower telescoping sections wherein said lower section has end and sidewalls with bottom closing flaps hingedly secured thereto with the flaps of said end walls lying inwardly of said flaps of said sidewalls when said flaps are in closing position said cases being delivered to said apparatus with said flaps closed and with said upper section partially elevated to expose a normally overlapped portion of the sidewalls of the lower section, the improvement comprising means for, upon the advance of said case, first supporting said case, said last named means comprising means underlying only the flap carried by a first sidewall of said lower section and means against which an opposite sidewall of the case rests whereby the flap of the opposite sidewall of the lower section is unsupported and permitted to swing downwardly to expose first portions of the flaps of said end walls of said lower section, means for applying adhesive to said first portions, means operative upon the further advance of said case to first close said flap of said opposite sidewall of the lower section and to thereafter support said case by means including means underlying said flap of the opposite sidewall of the lower section and means against which the first sidewall of said case rests to permit the flap carried by said first wall of said lower section to swing downwardly to expose second portions of said flaps of said end walls, means for applying adhesive to said second portions, means for closing said flap of said first sidewall of said lower section, means for advancing a case with said upper section so partially elevated, means upon the advance of said case to apply adhesive to said normally overlapped portions of said sidewalls of the lower section, and means for bringing the sidewalls of said upper section into contact with the adhesive applied to the sidewalls of the lower section to complete the telescoping of said upper section on said lower section.

2. In an apparatus for sealing cases comprising upper and lower telescoping sections and wherein said cases are delivered to said apparatus with said upper section partially elevated to expose a normally overlapped portion of the sidewalls of the lower section, the improvement comprising means for advancing a case with said upper section so partially elevated, means upon the advance of said case to apply adhesive to said normally overlapped portions of said sidewalls of the lower section and means for bringing the sidewalls of said upper section into contact with the adhesive applied to the sidewalls of the lower section to complete the telescoping of said upper section on said lower section.

3. In an apparatus for sealing cases comprising upper and lower telescoping case sections wherein said upper case section has end and sidewalls with top closing flaps hingedly secured thereto with the flaps of said end walls underlying the flaps of said sidewalls when the flaps are in closed position, and wherein said cases are delivered to said apparatus with the flaps of said end walls closed and the flaps of said sidewalls in approximately erect position and with said upper section partially elevated to expose a normally overlapped portion of the sidewalls of the lower section, the improvement comprising means for advancing a case with said upper section so partially elevated, means operable upon the advance of said case for applying adhesive to portions of the inner surfaces of the flaps of said sidewalls and to said normally overlapped portions of said sidewalls of the lower section, means to thereafter pivot said last mentioned flaps into closed positions and means to complete the telescoping of said upper section on said lower section.

4. In an apparatus as defined in claim **3** wherein there is means for applying compressive forces against the opposite sidewalls of said case following completion of said telescoping operation.

5. In an apparatus for sealing cases having end and sidewalls with bottom closing flaps hingedly secured thereto and with the flaps of said end walls lying inwardly of the flaps of said sidewalls when the flaps are in bottom closing position said cases being delivered to said apparatus with said bottom flaps closed, the improvement comprising means for advancing a case, means upon the advancement of said case for supporting the same, said supporting means including means underlying only the bottom flap carried by a first sidewall thereof and means against which the opposite side of the case rests whereby the flap of the opposite sidewall is unsupported and permitted to swing downwardly to expose first portions of the flaps of said end walls, means for applying adhesive to said first portions, means upon the further advance of said case to close said flap of said opposite sidewall and to thereafter support said case by means including means underlying only said flap of said opposite sidewall and means against which said first sidewall rests to permit said flap of said first sidewall to swing downwardly to expose second portions of said flaps of said end walls, means for applying adhesive to said second portions, and means for closing said flap of said first sidewall.

6. In an apparatus as defined in claim **1** wherein there is means for subjecting said case to vertical compression following the closing of said flap of said first sidewall.

7. In an apparatus as defined in claim **2** wherein there is means for applying compressive forces against the opposite sidewalls of said case following completion of said telescoping operation.

8. In an apparatus as defined in claim **1** wherein said upper case section has end and sidewalls with top closing flaps hingedly secured thereto with the flaps of said end walls underlying the flaps of said sidewalls when the flaps are in closed position, and wherein said cases are delivered to said apparatus with the flaps of said end walls closed and the flaps of said sidewalls in approximately erect positions, the further improvement comprising means operable upon the advance of said case for applying adhesive to portions of the inner surfaces of the flaps of said last mentioned sidewalls and means to thereafter rotate said last mentioned flaps into closed positions.

9. In an apparatus as defined in claim **5** wherein said means against which said first and opposite sidewalls rest comprises roller beds.

10. In an apparatus as defined in claim **5** wherein said means for applying adhesive to said first and second portions of said end wall flaps comprises a gluehead for each of said portions and means controlling the same to cause each gluehead to first apply adhesive to its associated portion after the leading end

of a case has passed the gluehead and to cease supplying glue to said portion before the trailing end of the case reaches said gluehead.

11. In an apparatus as defined in claim **10** wherein said controlling means comprises an electrical circuit including normally open switches connected in series and spaced longitudinally in the direction of travel of said case and in positions to be closed by the case during the travel thereof.

12. In an apparatus as defined by claim **1** wherein said means to complete the telescoping of the upper section onto the lower section comprises a vertically acting compression device and means to actuate said device following said application of adhesive to said normally overlapped portion of said sidewalls and the closing of said flap of said first sidewall.

13. In an apparatus as defined in claim **12** wherein there is a horizontally acting compression device positioned to apply compressive forces to opposite sidewalls of said case and there is means to operate said last mentioned compression device following the actuation of said first mentioned compression device.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,587,209 Dated June 28, 1971

Inventor(s) John C. Arentz

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 65, after "of the" (first occurrence) add ---adhesive---

Column 7, line 47, Change "Contact 93" to read "Contact 193"

line 58, Change "valve 137" to read "valve 127"

Column 10, line 48, Change "Claim 1" to read "Claim 5"

Signed and sealed this 16th day of November 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Acting Commissioner of Patents