

May 14, 1940.

J. M. HOTHERSALL ET AL

2,200,276

CAN END ASSEMBLING MACHINE

Filed Oct. 31, 1938

17 Sheets-Sheet 1

Fig. 1

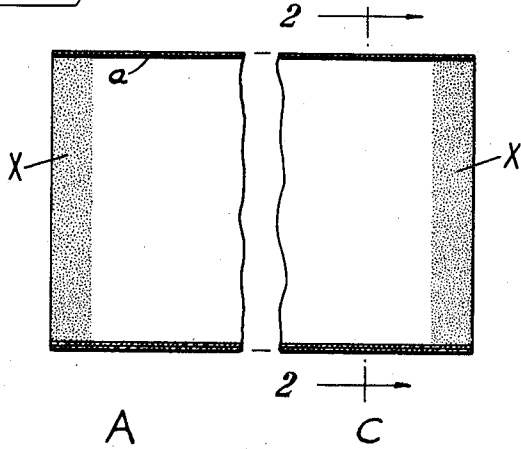


Fig. 2

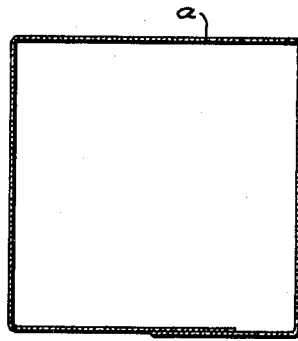


Fig. 3

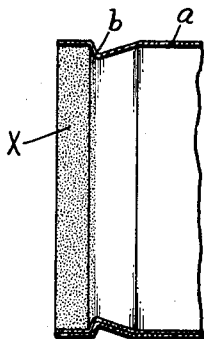


Fig. 4

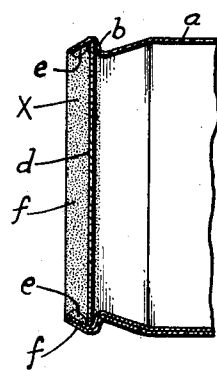


Fig. 5

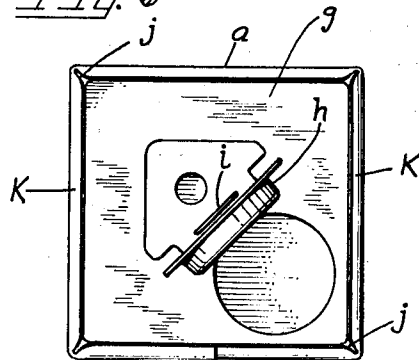


Fig. 6

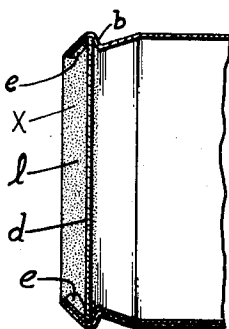
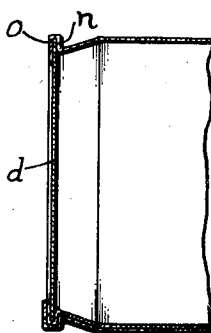


Fig. 7



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Fig. 9

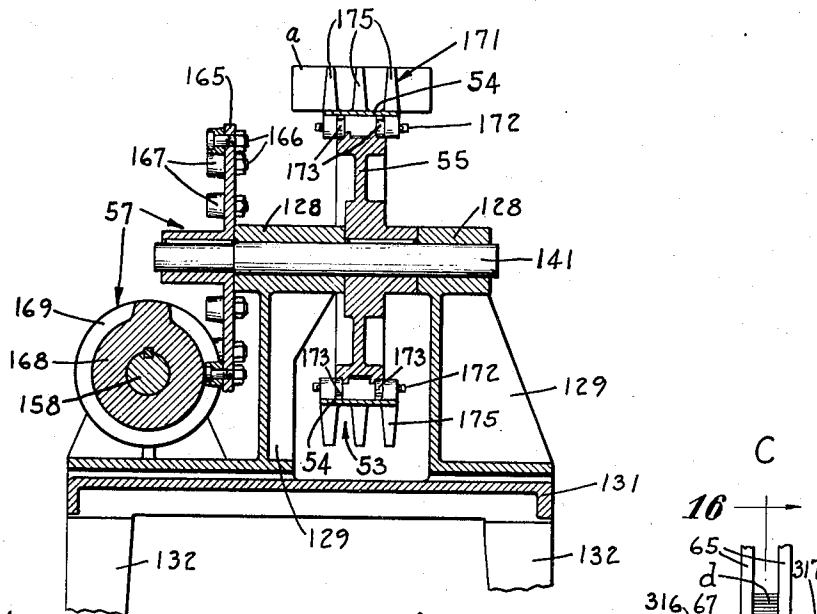
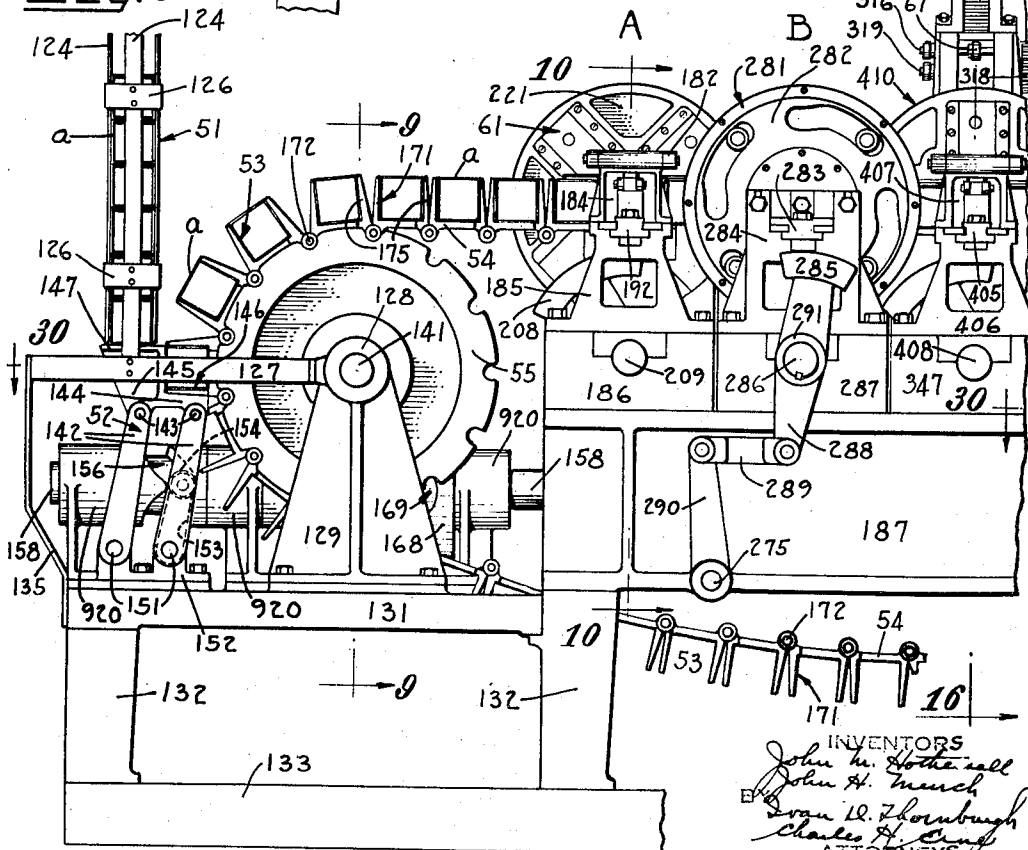


Fig. 8



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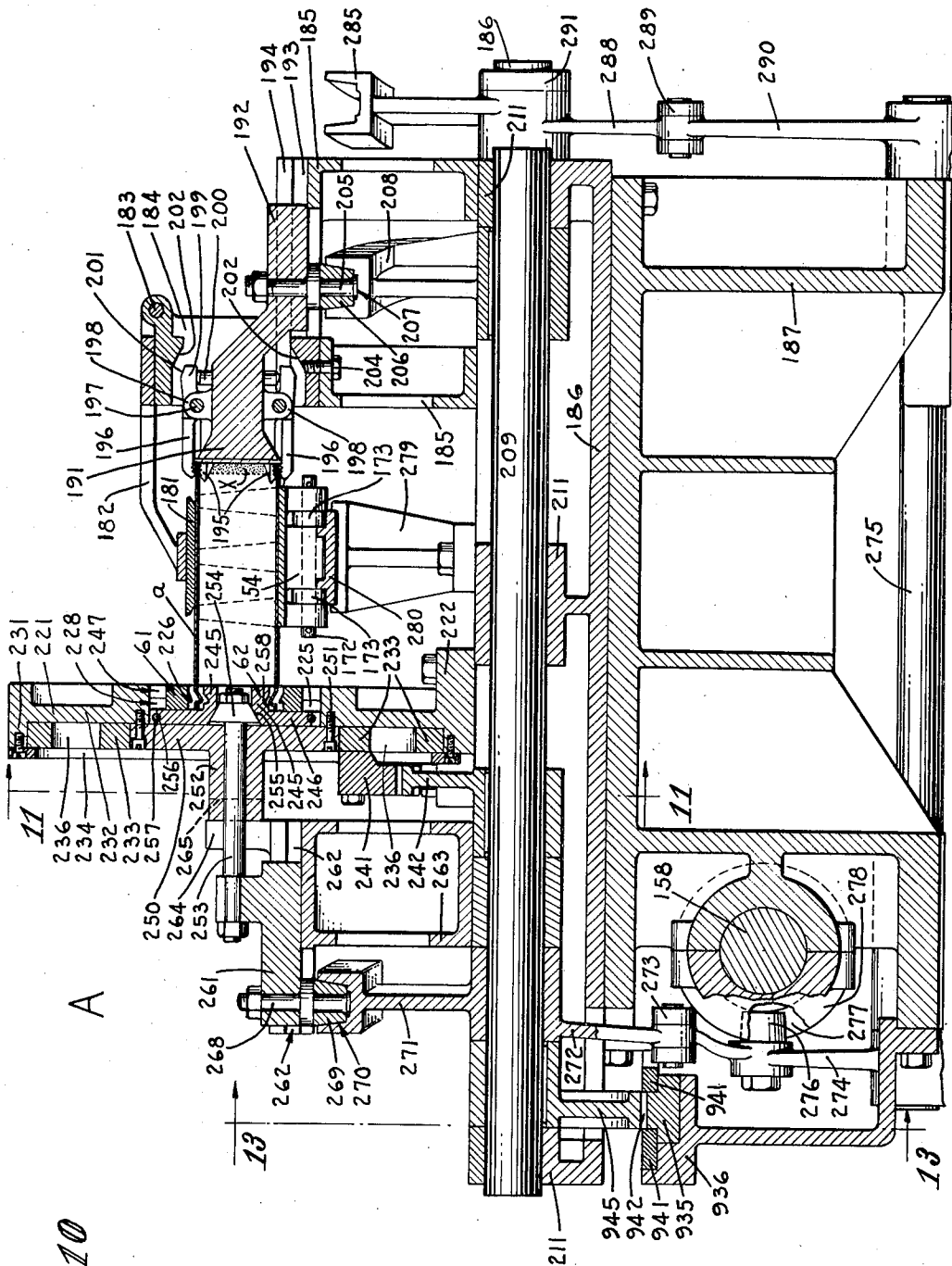


FIG. 10

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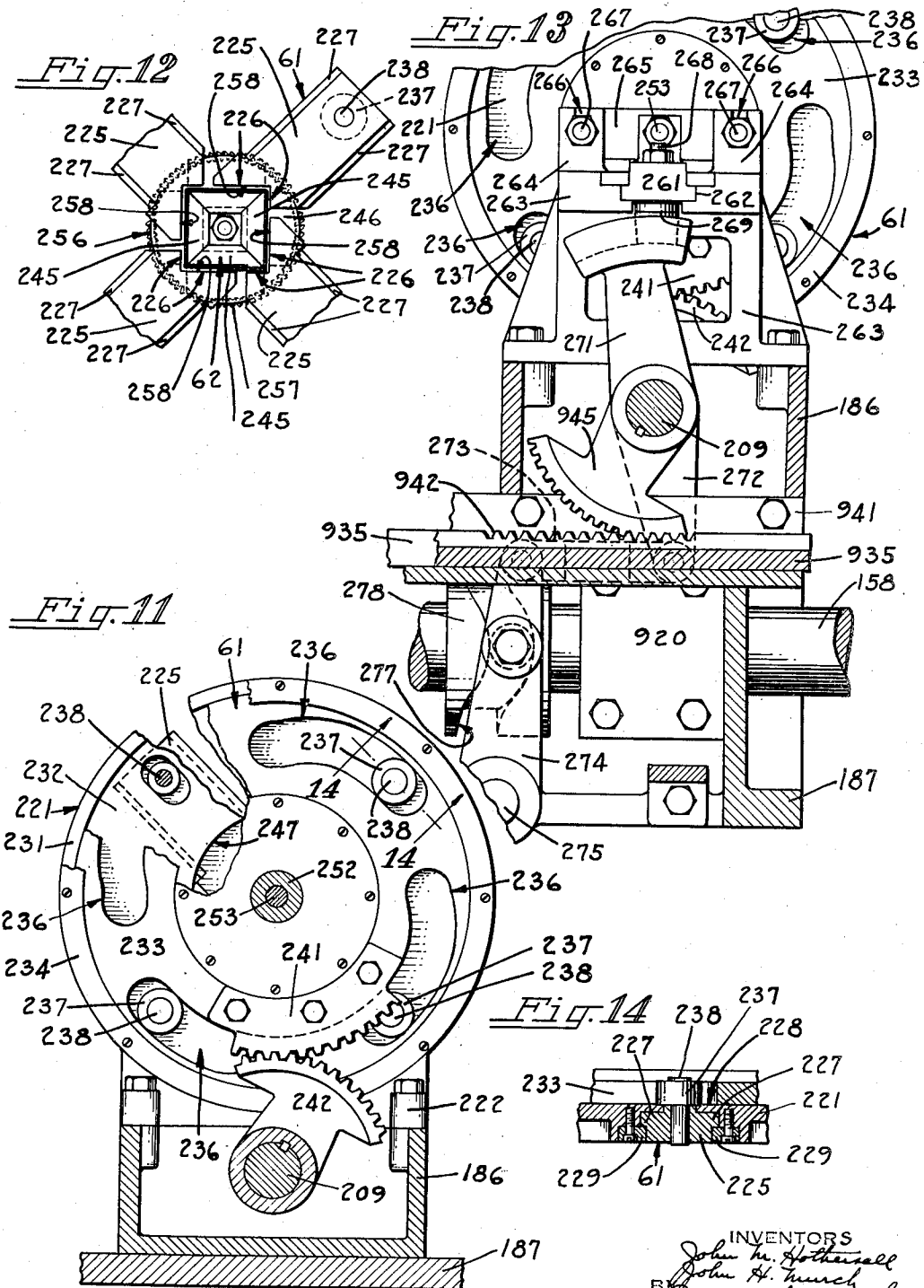
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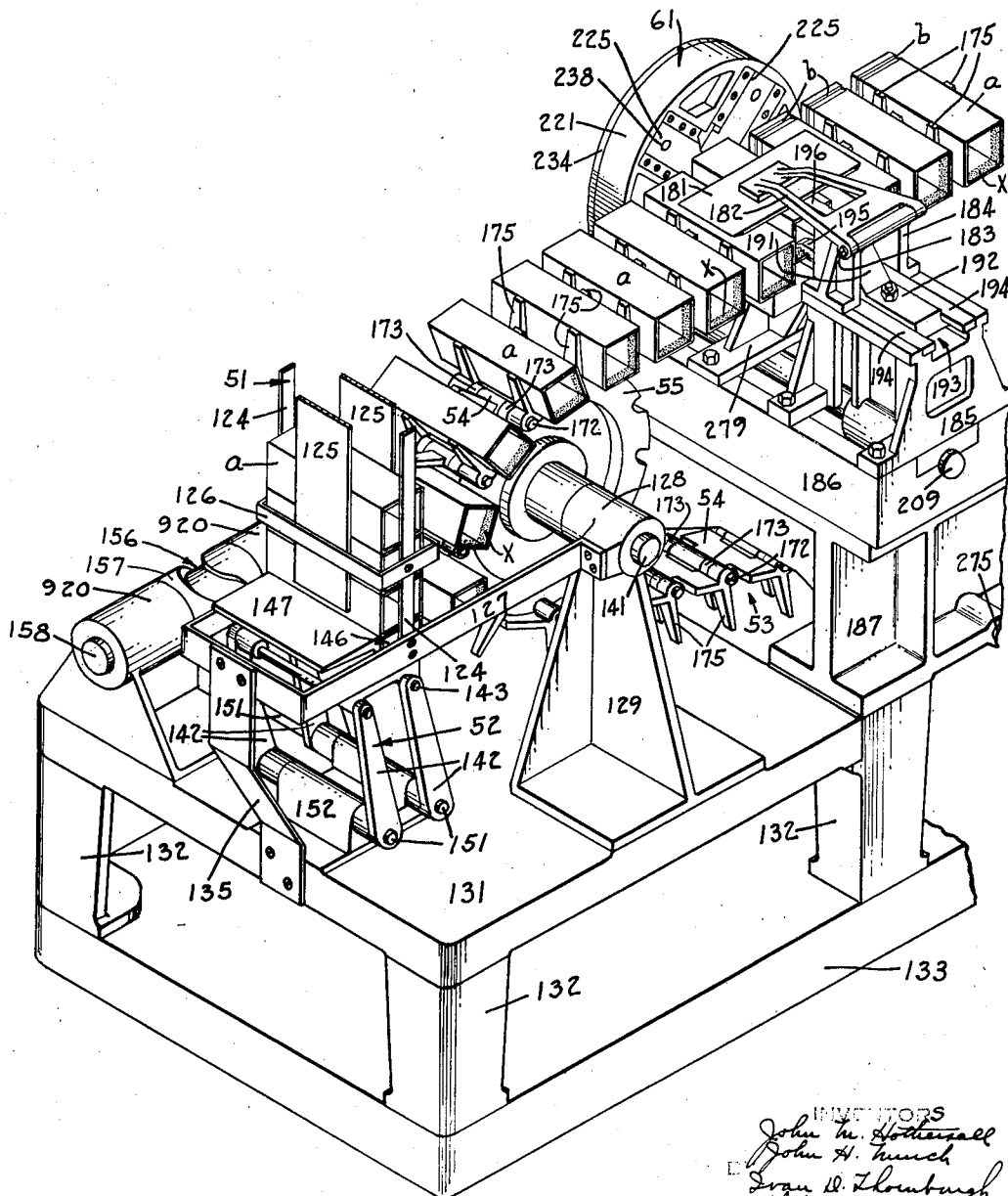
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Fig. 15



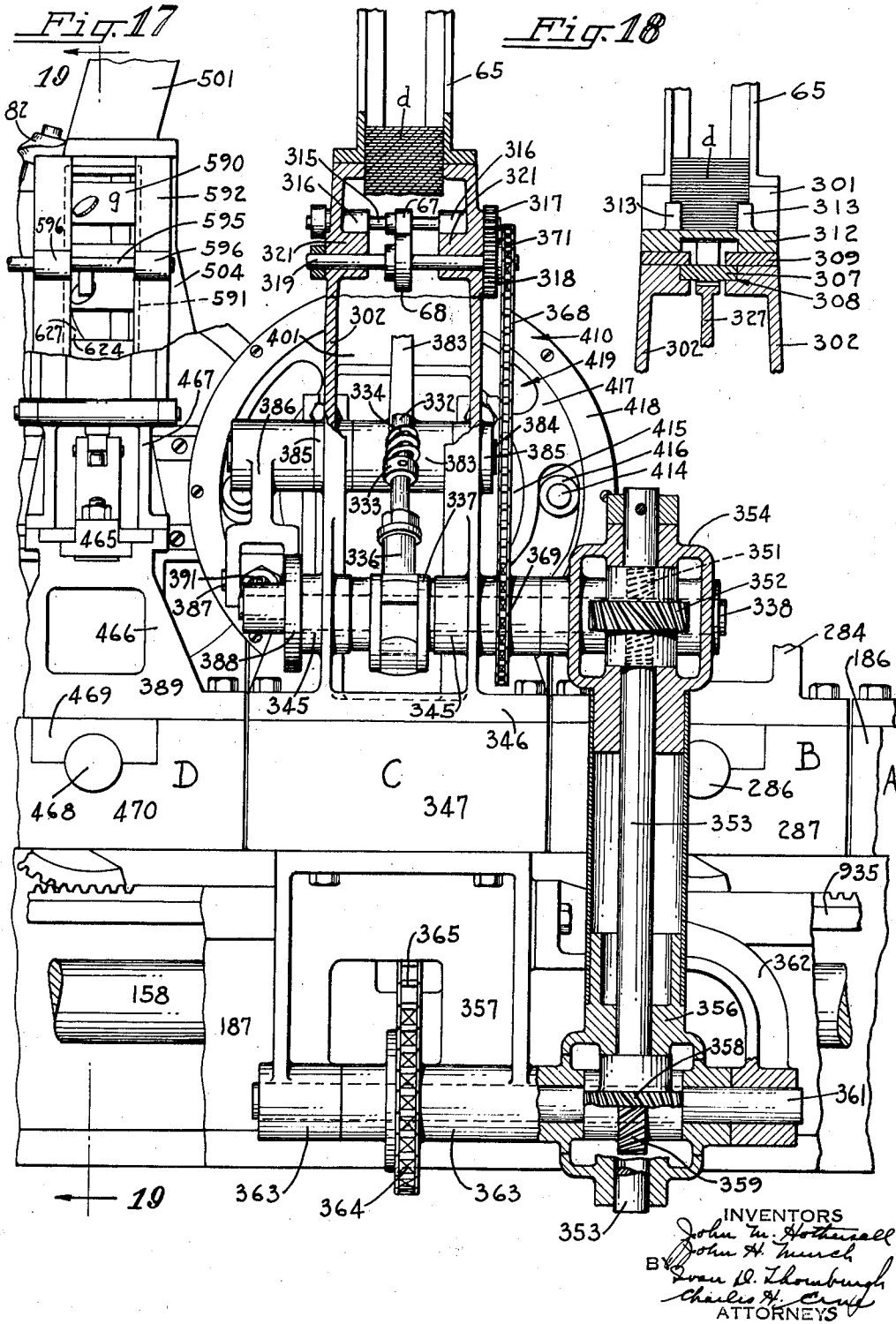
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CAN END ASSEMBLING MACHINE

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17 Sheets-Sheet 8



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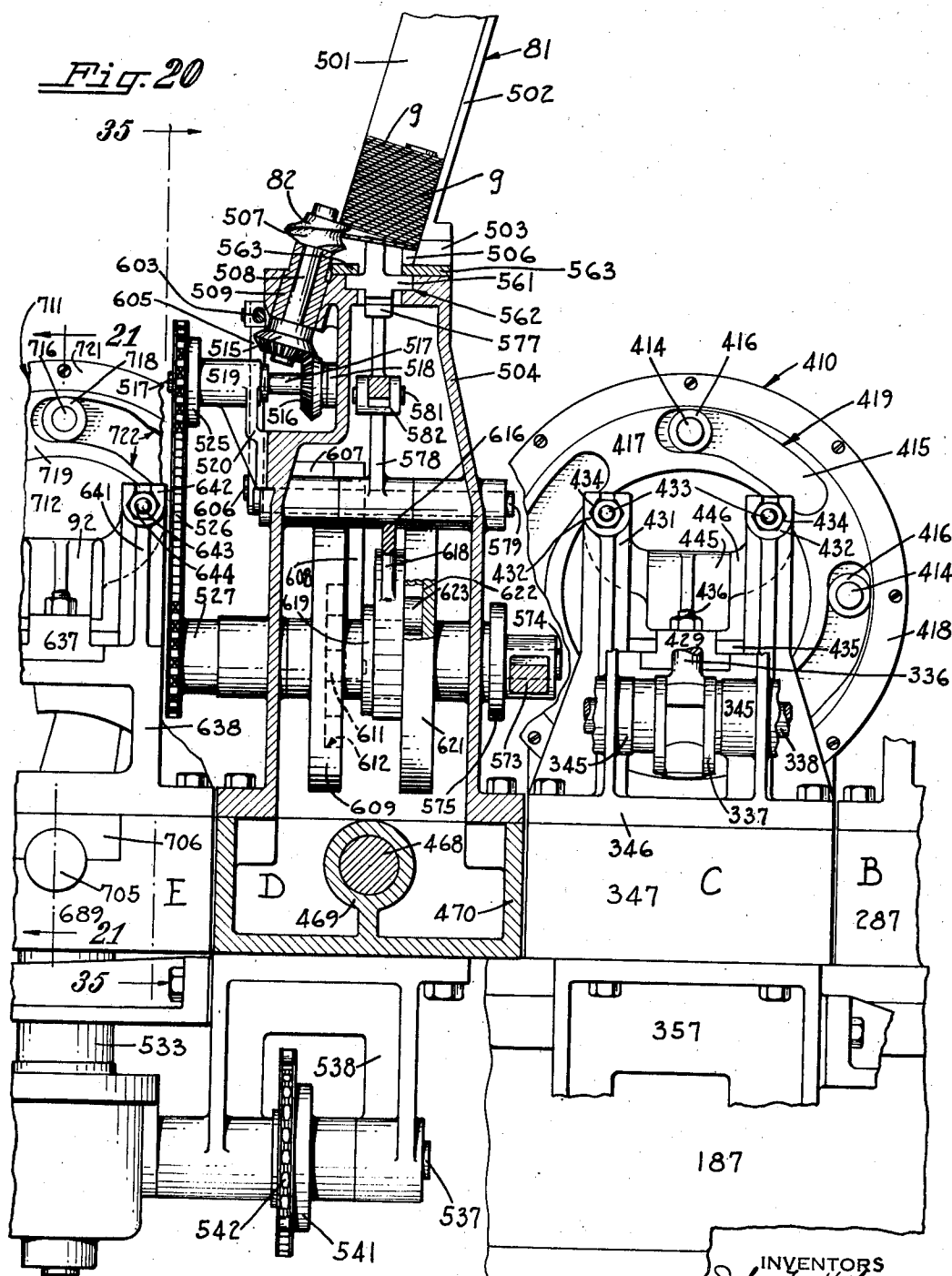
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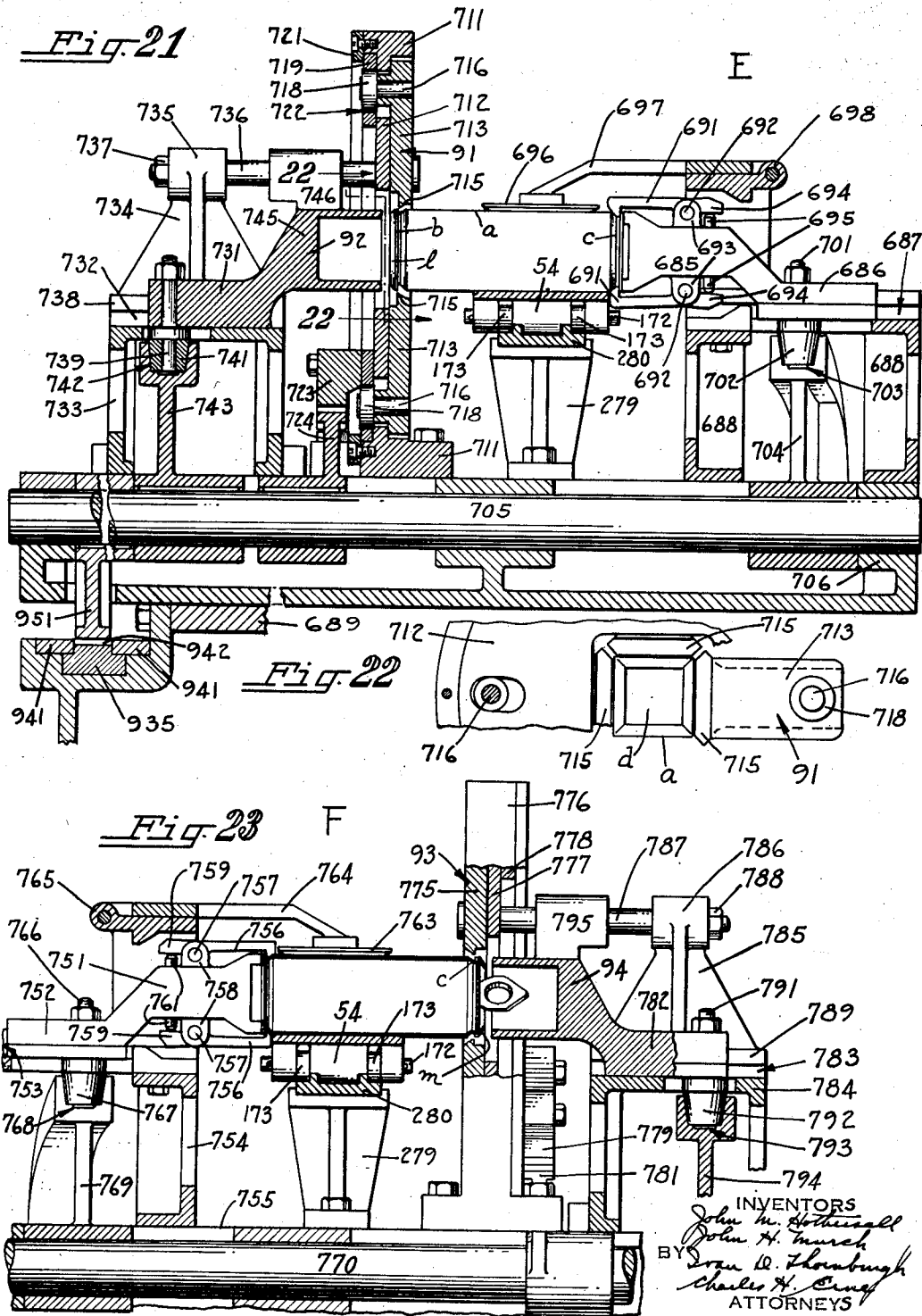
J. M. HOTHERSALL ET AL

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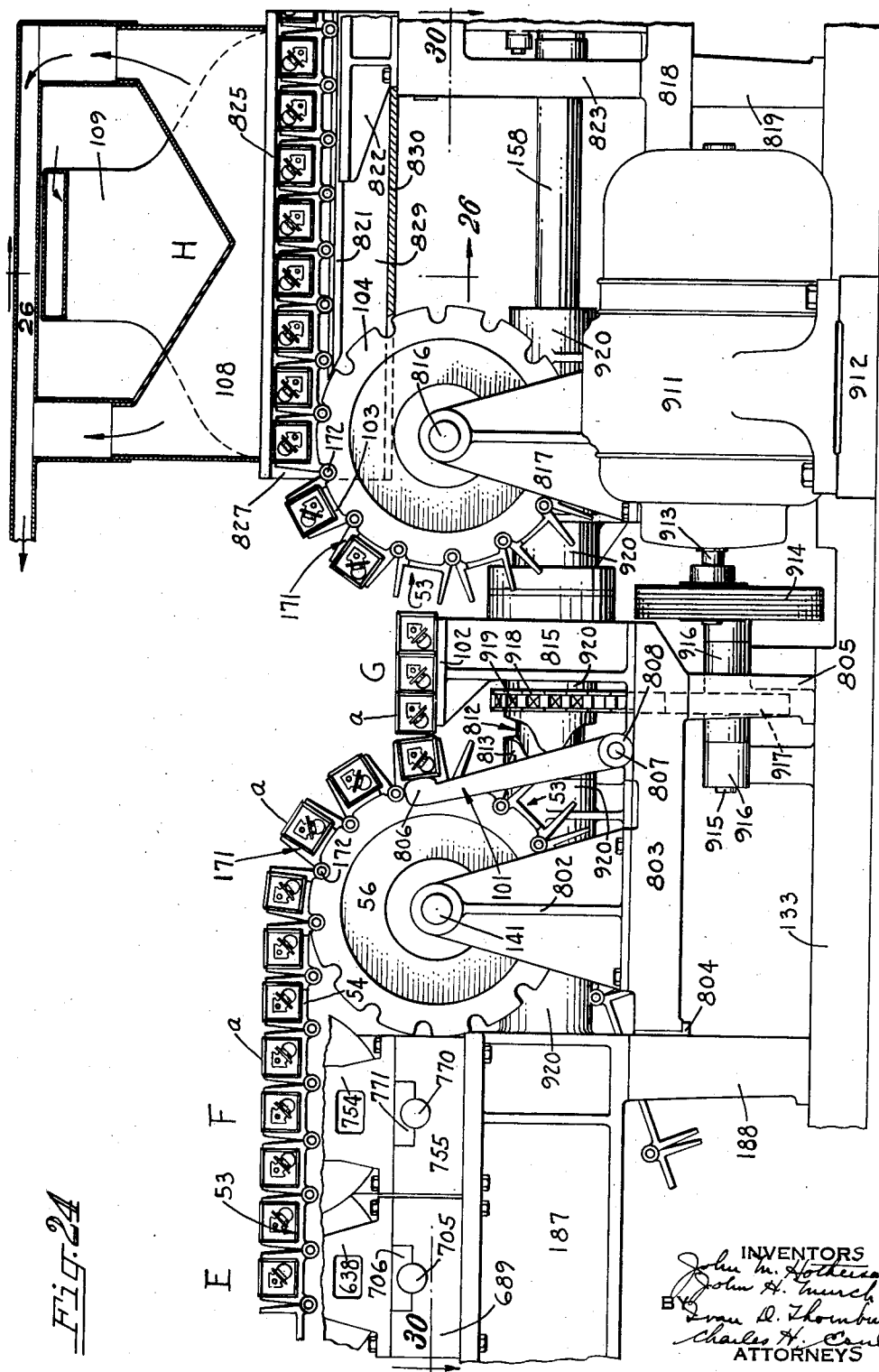
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CAN END ASSEMBLING MACHINE

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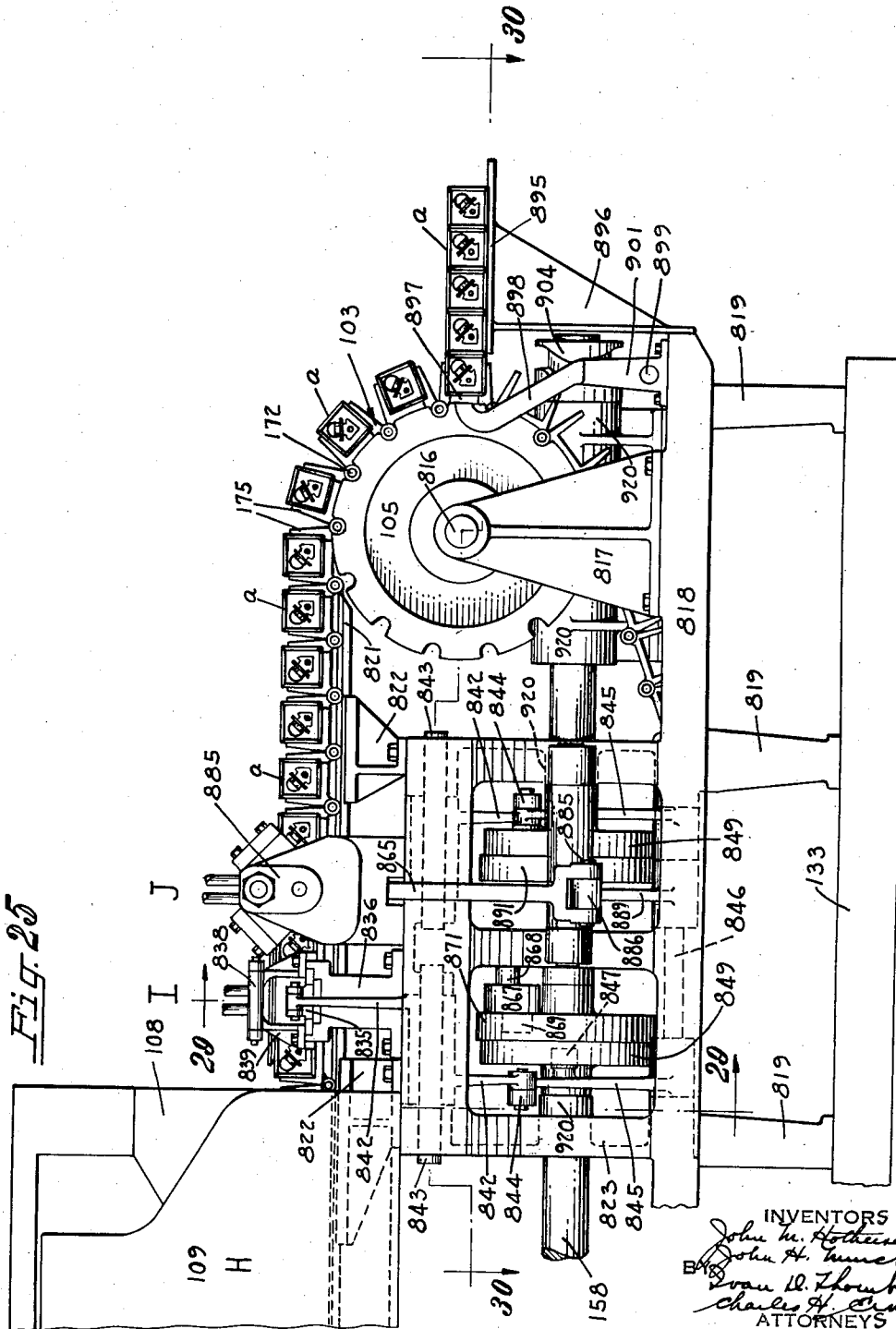
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CAN END ASSEMBLING MACHINE

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CAN END ASSEMBLING MACHINE

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Fig. 26

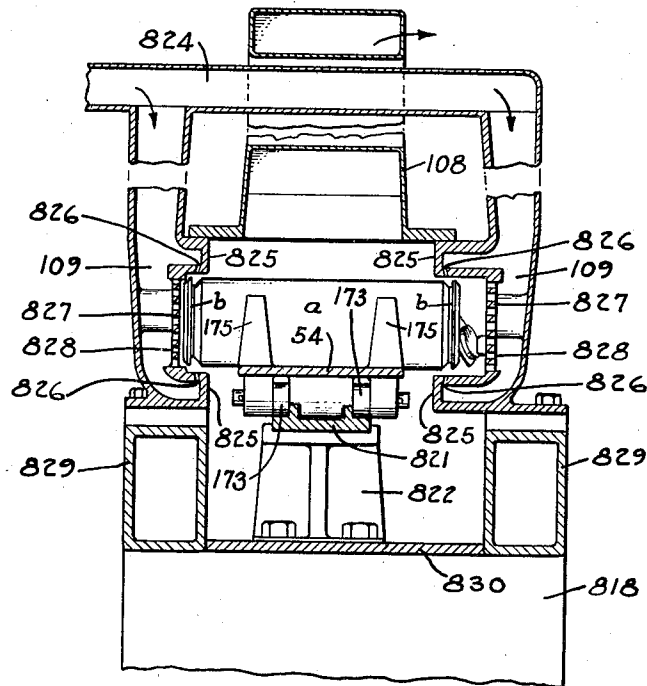


Fig. 27

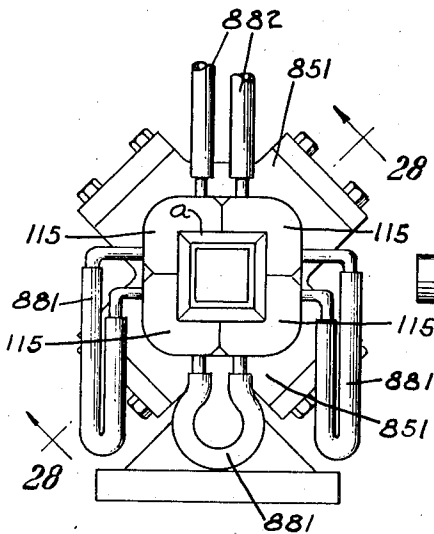
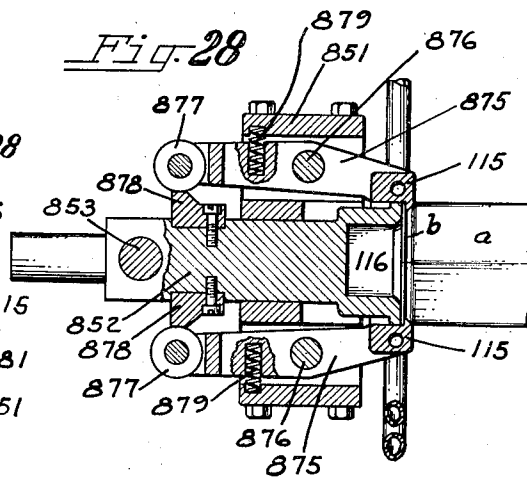


Fig. 28



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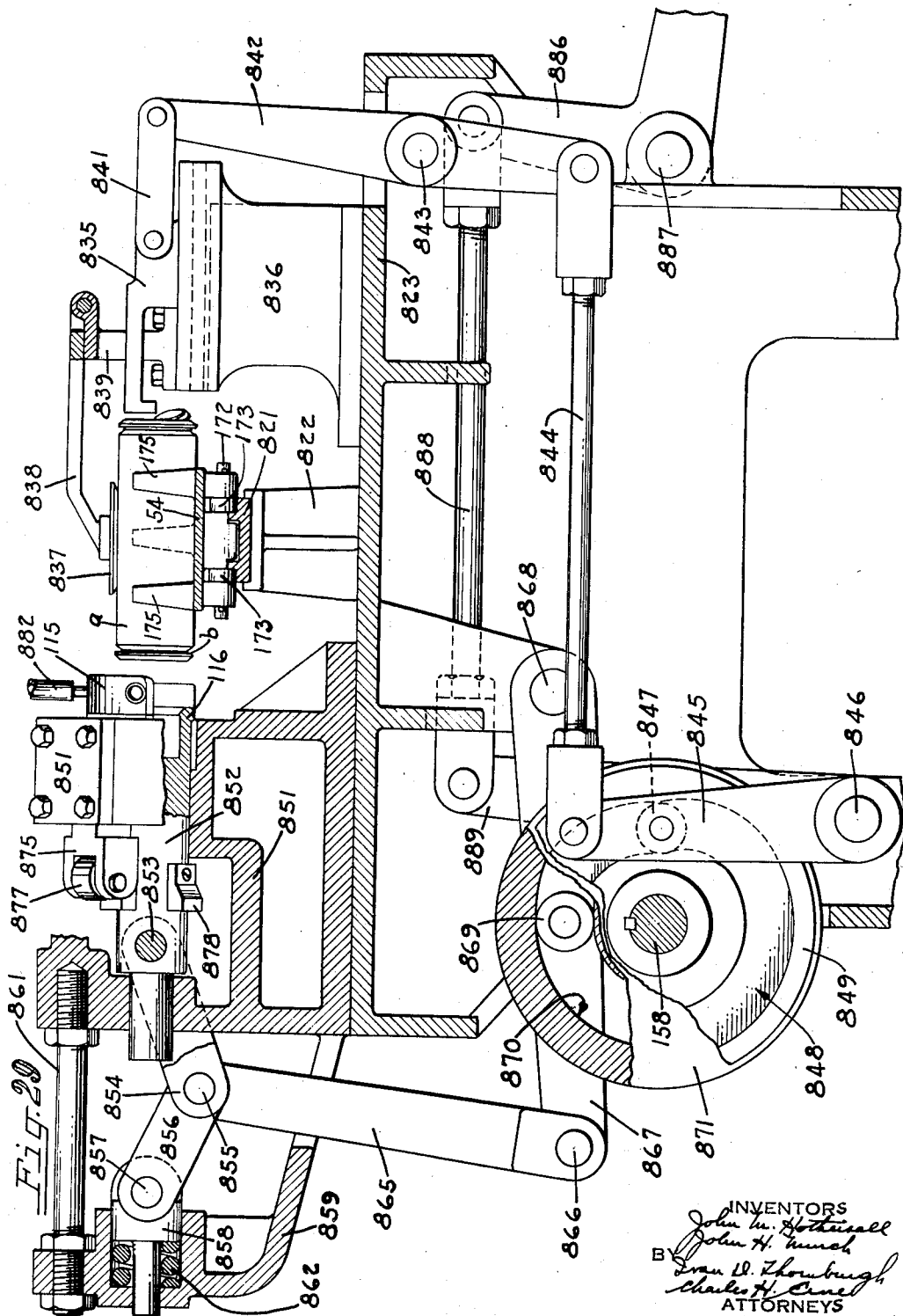
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CAN END ASSEMBLING MACHINE

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17 Sheets-Sheet 14



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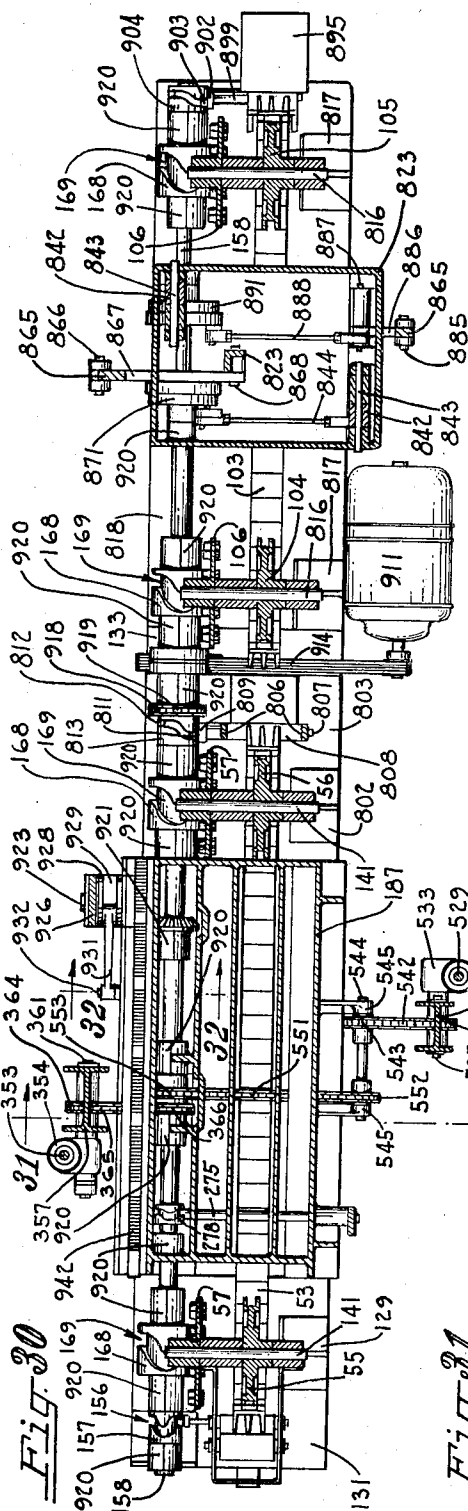


Fig. 31

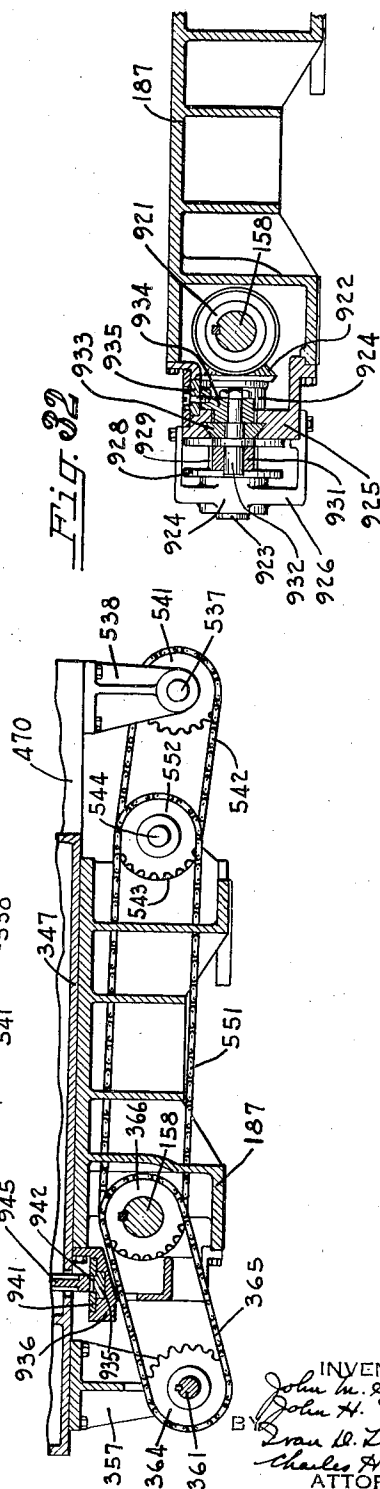


Fig. 32

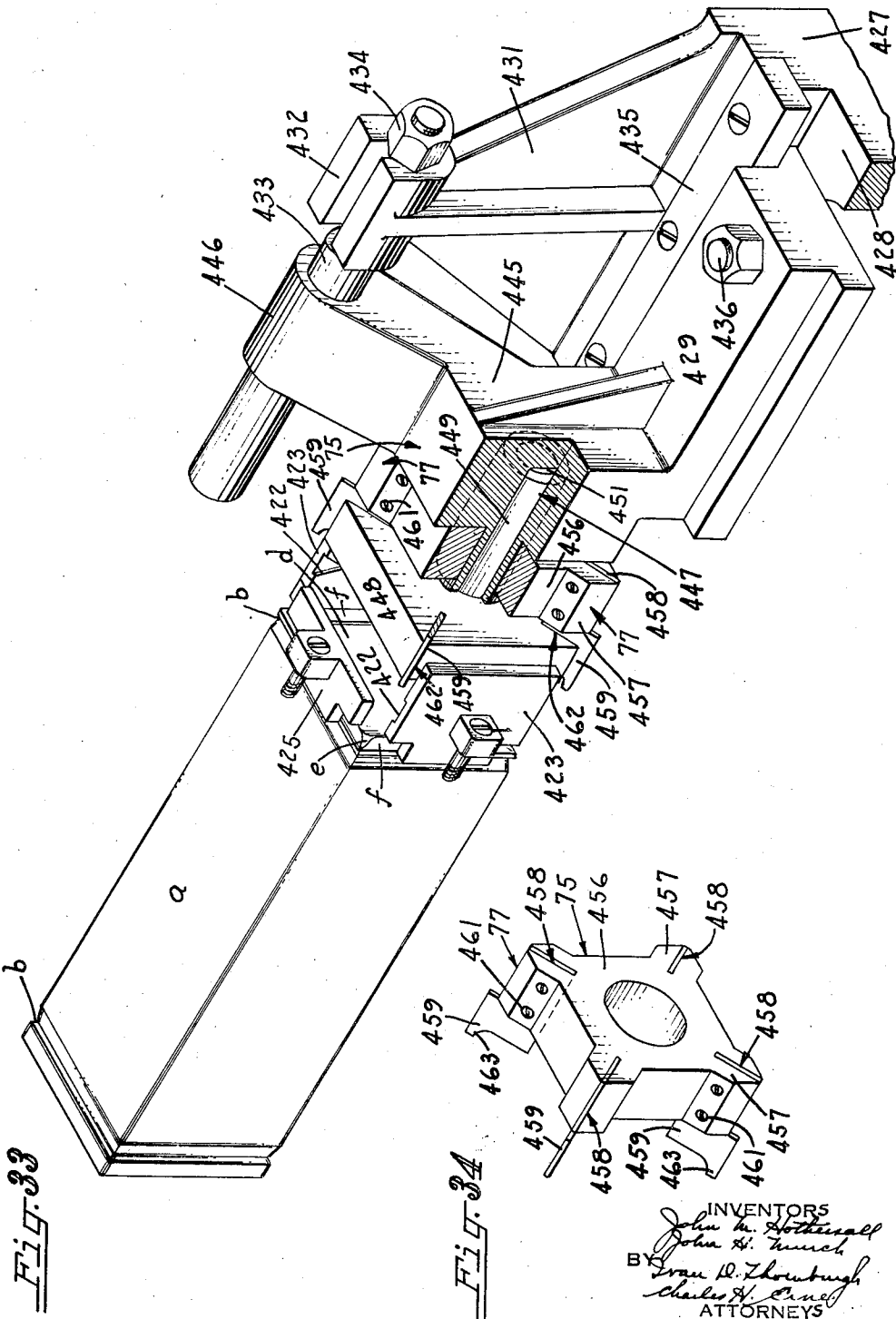
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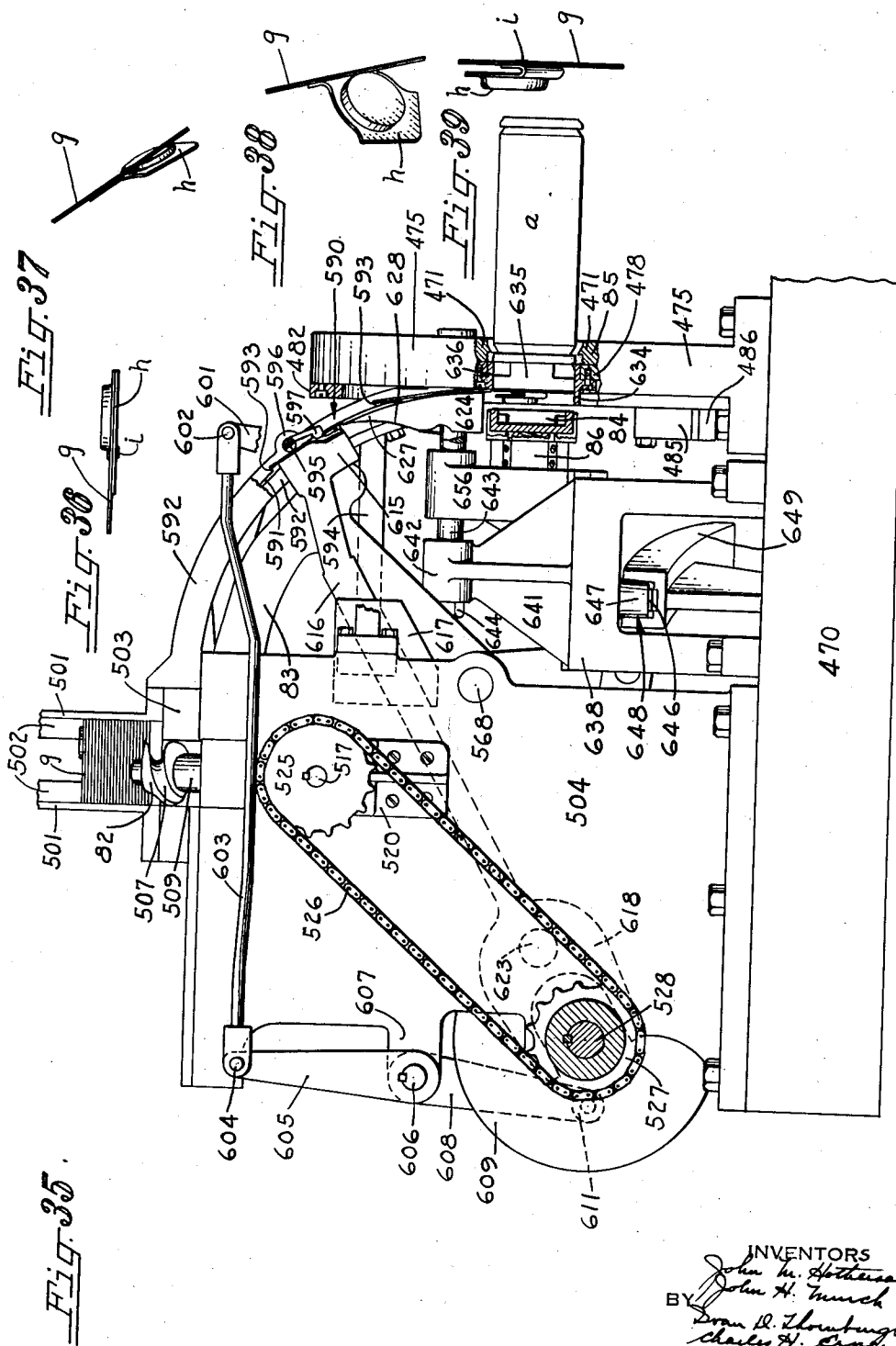
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UNITED STATES PATENT OFFICE

2,200,276

CAN END ASSEMBLING MACHINE

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Application October 31, 1938, Serial No. 238,094

20 Claims. (Cl. 93—55.1)

The present invention relates to an apparatus for making a tubular fibre can by preparing the can body for the reception of the can end members and for securely sealing the end members in place, and has particular reference to an apparatus for beading fibre can bodies adjacent the ends, positioning the end members and then bending the beaded sections over the end members to produce the finished can.

The apparatus disclosed in the drawings and described herein is adapted for use in the manufacture of fibre containers and the container illustrated in the Hothersall Patent 2,085,979, issued by the United States Patent Office on July 6, 1937, has been chosen to exemplify a type of container adapted for treatment.

An object of the invention is the provision of an apparatus for selectively receiving formed tubular can bodies and for advancing the bodies through a series of operating stations during which travel the body wall adjacent each end is reshaped to provide a seat for a can end and after the ends are placed the edges of the body are finally sealed over the end members.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 illustrates a longitudinal section of a fibre container adapted to be operated on in the apparatus embodied in the present invention, part being broken away;

Fig. 2 is a cross section of the tubular body illustrated in Fig. 1, being taken substantially along the line 2—2 in that figure;

Fig. 3 is a longitudinal fragmentary view of one body wall end illustrating the effect of a beading operation and showing the wall initially beaded;

Fig. 4 is a similar view illustrating a subsequent operation in which the bottom end member has been inserted in position and the beaded section further altered;

Fig. 5 is a plan view of the top of a fibre container with the top end member in position and disclosing the same operation upon the body as is shown in Fig. 4;

Fig. 6 is a view similar to Fig. 4 illustrating a further bending operation of the beaded body wall;

Fig. 7 is a similar view showing the finally clinched joint between the body and the bottom;

Fig. 8 is a side elevation of one end of the

apparatus this end containing the initial operating elements and showing the feeding of can bodies into a conveyor;

Fig. 9 is a transverse section taken substantially along the line 9—9 in Fig. 8 and illustrating one sprocket end of the conveyor;

Fig. 10 is a transverse section on an enlarged scale as taken substantially along the line 10—10 in Fig. 8 parts being broken away and showing mechanism at a first or initial bottom beading station A where beading as shown in Fig. 3 is performed;

Fig. 11 is a transverse section of the apparatus at the first operating station, parts being broken away;

Fig. 12 is a fragmentary view illustrating part of the operating elements of the mechanism illustrated in Fig. 11;

Fig. 13 is a sectional view taken in part along the line 13—13 in Fig. 10, parts being broken away;

Fig. 14 is a sectional detail taken substantially along the line 14—14 in Fig. 11;

Fig. 15 is a perspective view of one end of the apparatus showing substantially the same operating station as shown in Fig. 8;

Fig. 16 is a transverse sectional view taken substantially along the line 16—16 in Fig. 8 drawn to an enlarged scale and illustrating the operating parts at a third bottom end inserting and corner tucking station C where the results shown in Fig. 4 are accomplished;

Fig. 17 is a part end elevation and part sectional view of the apparatus at the third station C being taken substantially along the broken line 17—17 in Fig. 16;

Fig. 18 is a sectional detail taken substantially along the line 18—18 in Fig. 16;

Fig. 19 is a transverse sectional view taken through a fourth or top end inserting and corner tucking station D, the relative location of this section being broadly suggested by the line 19—19 in Fig. 17 where the same results on the top end are obtained as shown in Fig. 4 of the bottom end;

Fig. 20 is a sectional view partly broken away of other mechanism at the station D, being substantially a section taken along the broken line 20—20 in Fig. 19;

Fig. 21 is a transverse section at a fifth or bottom end pressing station E the location of this section being substantially as indicated by the line 21—21 in Fig. 20;

Fig. 22 is a sectional detail partly broken away

and taken substantially along the broken line 22—22 in Fig. 21;

Fig. 23 is a sectional view showing parts of the apparatus located at a sixth or top end pressing station F, some of the mechanism being substantially of the same nature as that shown in Fig. 21 of the fifth station;

Fig. 24 is a side elevation of a middle portion of the apparatus embodying the present invention, this figure illustrating on the same scale a continuation of the parts of the apparatus disclosed in Fig. 8, Fig. 24 showing the location of the operating stations E and F and also other stations G and H;

Fig. 25 is a view similar to Fig. 24 illustrating the discharge end of the apparatus and embodying still other stations I and J, Figs. 8, 24 and 25 showing the complete apparatus when considered collectively;

Fig. 26 is a transverse sectional view of parts located at a container heating station H, the section being substantially as viewed along the line 26—26 in Fig. 24;

Fig. 27 is a fragmentary elevation of a portion of the apparatus located at a bottom and sealing station I and showing cooling pipe connections;

Fig. 28 is a sectional view of parts shown in Fig. 27 as viewed substantially along the line 28—28 in that figure;

Fig. 29 is a transverse sectional view of apparatus parts at the bottom end sealing station I, the location of this section being suggested by the broken line 29—29 in Fig. 25;

Fig. 30 is a plan sectional view showing in part the driving mechanism for the entire machine the plane of section being indicated as to horizontal location by the respective section lines 30—30 in each of the Figures 8, 24 and 25;

Figs. 31 and 32 are transverse sectional views taken substantially on the respective section lines 31—31 and 32—32 in Fig. 30 and showing various details of the driving mechanism on an enlarged scale;

Fig. 33 is a perspective view looking from the back of the machine of parts of the mechanism located at the end inserting and corner tucking station C, parts being broken away;

Fig. 34 is a perspective detail of the corner tucking head as it would appear if removed from the adjoining parts shown in Fig. 33;

Fig. 35 is a transverse sectional view taken through the top end inserting and corner tucking station D being viewed from the opposite side from that of Fig. 19 but showing some of the same parts; and

Figs. 36, 37, 38 and 39 are views showing a top end in the various positions assumed as it passes through station D.

The apparatus embodying the present invention is adapted to receive open ended tubular articles (Figs. 1 and 2) such as fibre can bodies *a* which are shown in the drawings as being of square cross section. Such bodies preferably carry a margin of thermoplastic adhesive *x* (Figs. 1, 3 and 15) on their inner surfaces at both ends of the body. These can bodies are located in stack formation within a magazine 51 (Figs. 8 and 15). The lowermost body *a* is adapted to be slid horizontally from the bottom of the stack by a feeding device 52 the body being inserted into a pocket 53 of a continuously moving endless conveyor 54.

At the feed-in end of the apparatus the conveyor 54, which operates along horizontal runs,

passes over a sprocket 55 (Figs. 8 and 9). At the other end of the first section of the apparatus this being adjacent the center of the entire machine, the endless conveyor 54 passes over a similar sprocket 56 (Figs. 24 and 30). The conveyor is moved so that the can bodies as received in the pockets 53 are first lifted as the conveyor moves over the sprocket 55 and are then moved along the horizontal upper run of the conveyor toward the right as viewed in Figs. 8 and 15.

The conveyor 54 is intermittently operated by Geneva mechanism 57 (Fig. 9) there being provided a separate Geneva drive for each sprocket 55, 56. During the time that the can body *a* is moving in its step by step advancement with the conveyor 54, it is successively brought to rest at operating stations A to F, inclusive, and at each station certain work is performed.

At an initial bottom beading station A, one end of the container body is acted upon by an outer beading mechanism 61 (Figs. 11 to 14, inclusive) and an inner beading mechanism 62. This operation forms a peripheral bead *b* (Fig. 3) around one end of the can body *a*.

When the can body *a* with one end beaded comes to rest at a second or initial top beading station B, the same operation is performed upon the opposite end of the body and a bead *c* results (shown in Fig. 21) and similar in all respects to the bead *b*. The same mechanism may be used at the station B that is used at station A the only difference being that it is turned around so that it operates on the opposite end. This mechanism will be referred to again hereinafter.

At a bottom end inserting and corner tucking station C, a bottom end *d* (Fig. 4) is seated on the bead *b* of the can body *a*. At this station the bottom ends *d* are arranged in stack formation within an end magazine 65 (Figs. 16, 17 and 18). The lowermost end in the stack is cut out or slid off of the stack by an end cut-out device 66 which passes the separated end *d* through continuously rotating rollers 67, 68. A reciprocating feeding device 69 thereupon receives the separated end and advances it in two step movements into an inserting head mechanism 75 (Fig. 16).

The inserting head mechanism operates to position the separated end *d* into the open end of a can body *a* held at the station C which can body has been shifted relative to the conveyor to position its beaded end into outer holding jaws 76 which hold the body while the end is inserted.

Immediately following the time of insertion, a corner tuck-in device 77 operates to tuck in the corners of the bottom terminal edge of the can body *a* these tucked-in corners being designated by the letter *e* in Fig. 4. This tucking-in of the corners alters the intermediate terminal edge of the can body adjacent the bead *b* thereby drawing in or bending the body edge flange sections at an angle, these sections being designated by the letter *f*. This assists in holding the bottom end in place.

At the next station which is a top end inserting and corner tucking station D, substantially the same operation is performed on the opposite beaded end of the can body, this time a top end member *g* (Fig. 5) being inserted into the top end of the can body *a*. A stack of top ends *g* are held in a magazine 81 (Figs. 19 and 20) at the station D and the lowermost top end member *g* is cut out or separated from the stack by a spiral

worm thread formed on a rotating head 82 disposed at one side of the bottom of the magazine 81.

The top end member *g* is provided with a closure tab *h* (Fig. 5) secured thereto by a staple *i* and this adds a double thickness to each end member *g* as it rests in the stack. It is therefore necessary to first separate the lowermost top member from the stack within the magazine prior to feeding and this is the function of the worm thread of the head 82. A part of the closure tab when hinged back on the staple *i* moves from closed position into open position.

The separated top member *g* is moved down in an arcuate path and by a step by step motion being fed forward by a reciprocating feeding device 83 (Fig. 19). Device 83 positions the top member into an inserting head mechanism 84 arranged at the station D. The inserting head operates to force a top member *g* into the open beaded top section of the can body adjacent. The top end of this body has previously been inserted into outer holding jaws 85 which are substantially the same in construction as the jaws 76 at the station C. Jaws 85 hold the body *a* while the end *g* is entering.

The inserting head mechanism 84 also carries a corner tuck-in device 86 (Figs 33 and 34) which operates in a manner identical to device 77 at the station C. After the top end inserting and corner tucking operations, the top terminal flange of the body *a* adjacent the bead *c* is tucked in at the corners, as at *j* (Fig. 5), and the side wall flange sections of the body intermediate are drawn in or bent slightly as at *k* to hold the top member *g* in place.

The can body *a* with its bottom and top ends thus attached is next advanced into a bottom end pressing station E where the slightly bent terminal body edge *f* is creased and pressed against the bottom end *d*. The pressed down body flange springs back, however, as soon as released and there is then the angular bent flange sections *l* (Figs. 6 and 21). After this operation on the bottom end of the body the opposite or top end is subjected to the same kind of operation at a top end pressing station F. Fig. 23 shows at *m* this sprung back body flange.

The principal parts of the mechanism at station E are disclosed in Figs. 21 and 22 wherein is shown the bottom end *d* of the can body *a* being inserted into an outer jaw holding device 91. This device cooperates with a movable pressing head 92 which presses against the terminal edges *f* adjacent the bottom end *d* of the can body to produce the final bent flanges *l* illustrated in Fig. 6.

The same operation is performed at station F upon the top end of the can body there being provided in this instance an outer jaw holding device 93 (Fig. 23) which cooperates with a pressing head 94 which is constructed and operated in the same manner as the head 92 at the station D.

All of the preceding operations have been performed upon the can body *a* while it is being advanced along the upper run of the conveyor 54. After leaving station F the can body continues in its horizontal movement until arriving at the sprocket 56. Passing over the sprocket it comes to a position of transfer in a transfer station G, as illustrated in Fig. 24. This is at the end of the first section of the machine. A transfer mechanism 101 thereupon engages the can body *a* and removes it from its pocket 53 of the

conveyor 54 and places it upon a shelf 102 at the transfer station. The can is moved over the shelf by the action of the transfer mechanism which operates on successively discharged can bodies. These accumulate in a single row on the shelf.

A second intermittently movable endless conveyor 103 is used at a second section of the apparatus. This conveyor is identical in construction to the conveyor 54 and it also operates in a similar manner along horizontal runs. Adjacent the shelf 102 the conveyor 103 passes over a sprocket 104 and then moves up and toward the right on its upper run to the discharge end of the machine where it passes over a similar sprocket 105 (Figs. 25 and 30). The sprockets 104, 105 are preferably positively driven by a Geneva mechanism 106 which is identical in construction to the Geneva drive 57 used for the conveyor chain 54.

The endless conveyor 103 is also provided with a series of cradles or pockets and as one of these pockets comes to rest adjacent the shelf 102, the foremost can body *a* resting in the line of bodies upon the shelf is moved into the pocket by the transfer device 101. The can body thereupon passes upwardly over the sprocket 104 and in a series of step movements is brought to rest successively at a heating station H, a bottom end sealing station I and a top end sealing station J.

The heating station H is quite extensive and the can body passing into this station is brought under a hot air hood 108 (Figs. 24, 25 and 26) and hot air is brought into the station through ducts 109 and is directed against the two ends of the can body, the air escaping by way of the hood 108. This heating of the can at the ends and adjacent the bottom and top end members is utilized to prepare the end joints for the final sealing of the cans preparatory to bringing each end of the can body into the final shape shown in Fig. 7.

The terminal edges *l* and *m* of the can body *a* carry a thermoplastic cement *x*. In some cases even the bottom and top end members *d* and *g* also have a thermoplastic adhesive on their marginal edges. Heat renders the adhesive tacky and conditions the can body parts so that when the can body is finally passed into the sealing stations I and J these adhesive coated sections will properly respond to a squeezing action to provide a proper joint.

The final squeezing or joint closing operation which is performed on the can bottom at the station I is illustrated in Figs. 27 and 28. Outer squeezing jaws 115 are used for engaging in the bead *d* of the can body and for holding the body securely and these cooperate with a reciprocating squeezing head 116 to again press down the terminal edges *l* of the can body so that they will be flat against the end member *d* as illustrated in Fig. 7. This is practically the same pressing and creasing operation performed at station E.

At this time the bead *b* undergoes a slight transformation and takes the form indicated by the letter *n* (Fig. 7), and the terminal flange sections *m* of the body are again pressed down into flat bottom edge parts *o*. These jaws 115 are water cooled so that at the moment of squeezing the adhesive is immediately set to hold the proper joint and prevent opening up as at station E.

At the station J the top end of the can body is treated in the same manner and by mechanism constructed and operated the same as at

station I. Here again the same pressing and creasing operation performed at station F is repeated but this time the parts stay in their pressed condition being held by the adhesive which sets before the can parts are released.

Referring more in detail to the apparatus reference should be made to Figs. 8 and 15. The magazine 51 comprises vertically disposed narrow or end rails 124 and wider side rails 125. These rails are held together in spaced position on four sides of the magazine by connecting bands 126. The end rails 124 may be mounted upon a U-shaped bracket 127 each leg of which is secured to a bearing 128 formed on the upper end of a bracket 129 which is mounted upon a main table 131 on each side of the machine.

The table 131 is carried upon legs 132 which in turn are supported upon a main foundation frame 133 which extends the entire length of the machine. The U-shaped bracket 127 at its center may also be supported by a strap 135 which is screwed to the table 131. The bearings 128 (Figs. 8, 9 and 15) of the two brackets 129 carry a horizontally disposed drive shaft 141 which carries the sprocket 55 of the endless conveyor 54. There is also another drive shaft 141 for the sprocket 56 and both shafts 141 are driven in the same manner.

The feeding device 52 comprises two sets of operating levers 142 there being two of these levers on each side of the magazine. Each pair of levers 142 at their upper ends support a cross rod 143 which provides for pivotal connections with a feeding carriage 144. The carriage 144 is formed with a forward pocket 146 and with an adjacent top shelf section 147.

Each set of levers 142 is secured at their bottom ends to a rock shaft 151 there being two of these shafts arranged in parallel relation. Both shafts 151 have rocking movement within a bracket 152 which is mounted upon the table 131.

The forward or inner lever shaft 151 on one side, this being in the back as viewed in Fig. 15, extends further beyond the associated back lever 142 and carries a short lever 153 (dotted lines in Fig. 8) on which is rotatably mounted a cam roller 154. Cam roller 154 operates in a cam groove 156 of a barrel cam 157. The cam 157 is secured to one end of a horizontally disposed power shaft 158 which extends along one side of the conveyor 54 and which passes through or adjacent all of the operating stations. It provides for a continuous rotation shaft from which various operating parts receive their power. This will be referred to from time to time as the description proceeds.

The shape of the cam groove 156 is such as to cause the feed carriage 145 to assume a rear position prior to removing a can body *a* from the magazine 51, Fig. 15 showing this rear position. When in this position the lowermost can body in the magazine rests in the pocket 146 of the carriage and the other can bodies in the stack extend up and are carried on top of this body. When the conveyor 54 is on one of its rest positions, a conveyor pocket 53 is in horizontal alignment with the pocket 146 of the carriage.

The can body is thereupon pushed into the conveyor pocket by the feeding device when its carriage 144 moves forward for a cut-out operation. Fig. 8 illustrates the completion of the cut-out or feeding stroke, the can body being then in the aligned pocket of the conveyor. In this forward position, the shelf 147 is beneath the stack of bodies *a* remaining in the magazine.

The sprocket shaft 141 extends to one side of the apparatus at the rear of the machine and carries one of the Geneva drives 57 (Fig. 9). This drive comprises a Geneva wheel 165 which carries a series of spaced pins 166 on each of which is mounted a Geneva roller 167.

A Geneva drive worm wheel 168 is mounted upon and secured to the shaft 158 and a spiral thread 169 operates against each roller 167 successively to intermittently move the conveyor 54 forward and also to hold it in fixed position during a period of rest. The Geneva drive details for the shaft 141 at the center of the apparatus, that is for the sprocket 56 are shown in Fig. 30 and these are an exact duplication of the parts shown in Fig. 9. The same Geneva drive is also used for rotating the sprockets 104, 105 for the conveyor 103 of the second section. This will be again referred to in its proper place.

The endless conveyor 54 comprises a series of U-shaped cradles 171 which are pivotally connected together by pins 172. Rollers 173 are carried on the pins 172 and provide for the proper engagement within the teeth of the sprockets 55, 56. Each cradle 171 is formed with three outwardly projecting prongs 175, two on the rear and one on the back of each cradle and these prongs provide front and rear walls for the conveyor pockets 53 in which the can bodies *a* are carried.

This construction of prongs for each cradle permits free movement of the pocket units of the conveyor when passing over the sprockets 55, 56 and insures proper holding of the can bodies on the straight portions of the conveyors so that a maximum number of bodies may be carried in a minimum length of the conveyor.

At the initial bottom beading station A where one end of the container body is acted upon by the outer and inner beading mechanisms 61, 62 the can body to be operated upon comes to rest beneath a horizontally disposed hold down plate 181 (Figs. 10 and 15). This plate is carried upon the forward end of an arm 182 which is hinged on a pin 183 supported in an auxiliary bracket 184.

The auxiliary bracket 184 is mounted upon the top part of a slide bracket 185 which in turn is carried at the forward side of the apparatus where it rests upon a transverse table 186 which supports some of the mechanism at station A. Table 186 is carried upon a housing frame 187 which also provides the principal support for mechanism at stations B, C, D, E and F. This housing in its turn is mounted at one end upon the table legs 132 and further along upon legs 188 which are supported by the foundation frame 133.

The forward end of the can body *a* which will later become the top end is engaged at station A by a slide head 191 (Figs. 10 and 15) which is an integral part of a slide 192. The slide 192 operates in a guideway 193 which is cut in the slide bracket 185. To provide for an easy sliding action the slide 192 is formed with side projections and slide gibs 194 retain the slide in sliding position upon the bracket 185.

The head 191 carries a plurality of inner fingers 195 and corresponding outer fingers 196. The inner fingers are preferably fixed to the head 191 and are adapted to move inside of the top open end of the body *a* as it rests at station A. Each outer finger 196 is pivotally mounted upon a pin 197 which is carried in an extending

lug 198 formed preferably as an integral part of the head 191.

A tail part 199 of each outer finger 196 is engaged by an outwardly spring pressed barrel 200 which tends to force the forward end of each outer finger 196 down on the outside of the end of the can body when the head is moved to engage the body. These fingers press on the body at points opposite the points of engagement by the inner fingers 195. Two outer and two inner fingers are shown. These fingers 195, 196 thus provide for a spring engagement with one open end of the can body. After coming in position in and on the can body, the head 191 continues to move forward sliding the can body laterally of its conveyor pocket 53. Its opposite or bottom end is thereby inserted into the outer and inner beading jaws 61, 62 of the beading mechanism at this station.

When the head 191 is moved back after a beading operation, the outer fingers 196 near the completion of their backward travel are moved into open position to release the can body. Each tail part 199 is beveled off at the corner, indicated at 201, and this strikes against a cam surface 202. The cam surface for the top finger is formed in the inner wall of the auxiliary bracket 184 and at the bottom a cam surface 202 is formed in a cam block 203 resting upon the top of the slide bracket 185 and bolted at 204. The cam block 203 controls the lower finger 196.

This movement of the slide 192 is cam operated. The slide carries a vertically depending stud 205 (Fig. 10) which at its bottom end and directly beneath the slide rotatably supports a tapered roller 206. Roller 206 is located within a cam groove 207 of a cam segment 208 which is keyed to one end of a transverse horizontally disposed station rock shaft 209.

Shaft 209 is journaled in bearings 211 formed in the table 186 and extends across the apparatus at station A and is below the upper run of the conveyor 54. This shaft moves in one direction of its oscillation to advance the slide 192 so that the fingers 195, 196 engage the end of the can body and slide it laterally. This takes place just as soon as the can body is brought to rest in alignment with the beading members 61, 62.

The beading mechanism which operates upon the rear or bottom end of the inserted container *a* is contained within a circular housing 221 (Figs. 10, 11 and 13) which is formed with supporting feet 222 which rest upon and are carried by the table 186. The active elements of the outer beading device 61 comprise four radially disposed slide jaws 225 (see also Fig. 12) these jaws being arranged in quadrant position around the center of the inner beading elements 62. This center is also the same as the longitudinal center of the can body *a* which has been inserted in the beading mechanism as just described.

Each slide jaw 225 is formed at its inner end with a right angled beading edge 226 and these jaws are adapted to be moved in simultaneously and engage and force inwardly a restricted part of the body wall to provide the bead *b*. When in closed position the beading edge 226 of the four slide jaws presents a continuous peripheral engagement with the can body.

Each jaw 225 is also formed with side projections 227 (Figs. 12 and 14) which move in slide-ways 228 cut radially of the circular housing 221. Slide gibs 229 disposed on opposite sides of each slide jaw 225 retain the latter in sliding position.

The slide jaws are cam actuated by means of mechanism located in part within the circular housing.

The housing 221 is formed with a peripheral rim 231 (Figs. 10 and 11) which extends to the rear of the housing and a central web part 232 merges into this rim section. This construction provides a circular seat for a cam ring 233 which is adapted to oscillate concentrically within the housing 221. An outer ring 234 is secured to the rear edge of the rim 231 and this rim extends inwardly of the edge of the cam ring 233 and holds the latter in movable position within the housing.

The cam ring 233 contains four equally spaced cam slots 236, one for each slide jaw 225 and a cam roller 237 operates within each slot and is mounted on a pin 238 carried by each slide jaw near its outer end. The four cam slots 236 are all uniform as to shape and each slot has one end farther away from the center of the cam ring 233 so that when the latter is in a position where the four cam rollers are in the outer spaced ends of the slots (as in Fig. 11) the slide jaws are out or open (Fig. 12).

By partially rotating the cam ring 233 within its seat in the housing 221, the opposite or nearer the center ends of the cam slots simultaneously force the cam rollers in, squeezing the slide jaws inwardly and thus contracting the outer beading mechanism 61. This action presses the beading edges 226 into the can body wall and thus assists in producing the bead *b*.

In order to obtain the proper back and forth movement of the cam ring 233 a rack connection is made with the station rock shaft 209. A rack segment 241 (Figs. 10 and 11) is bolted to the back of the cam ring and its teeth mesh with the teeth of a rack segment arm 242 which is keyed to the shaft 209. Oscillation of the shaft is thus transmitted to the cam ring and from it to the outer beading mechanism.

The inner beading mechanism 62 cooperates with the squeezing action of the outer beading mechanism and when the slide jaws 225 move in, four inner jaws 245 (Figs. 10 and 12) of the inner mechanism 62 move out. Each jaw 245 is formed with a radially disposed slide back 246 and the four jaws are located at and centered around the center of the housing 221 and are within a circular opening 247 cut in the web 232.

The jaw slide backs 246 are kept in working position by being confined between the rear surface of the outer jaws 225, which it will be recalled are held in slideway 228 formed in the housing 221, and the front face of a fixed disc 250 bolted to the housing web 232 as at 251. The disc 250 extends rearwardly at its center for the most part as a circular hub 252 which is centrally apertured to provide a sliding support for a horizontally disposed wedge shaft 253.

At its forward or inner end, the shaft 253 carries a pyramidal wedge block 254 which is disposed inside of the four inner jaws 245. Each jaw 245 is cut away at the center of the beading mechanism so that the surface engaging the wedge block is correspondingly wedge shaped as at 255. The outer edge of each jaw slide back 246, which is formed as the arc of a circle to correspond with the opening 247, is grooved as at 256 (Figs. 10 and 12). This provides a seat for a spring 257 which is wrapped around the outside of all of the inner beading members 62. This spring tends to keep the inner jaws 245 in collapsed condition (Fig. 12) and holds the jaws at all times against the wedge block 254.

When the wedge block is pushed forward its pyramidal surfaces pressing against the engaging inside inclined surfaces 255 of the inner jaws 245 force the jaws outwardly against the action of the spring 257. This movement presses straight grooved surfaces 258 of the inner jaws against the body wall at that end and thus cooperates with the beading edges 226 of the outer jaws 225 to produce the head *b* in the can body *a* (Fig. 3).

To effect the inner and outer movement of the shaft 253 and wedge block 254 to expand and collapse the inner beading mechanism 62, the shaft at its rear end is secured to a slide 261 (Figs. 10 and 13). Slide 261 is operatively disposed in slideways 262 which are formed in the top of a box like bracket 263 mounted upon and bolted to the table 186. Upward spaced extensions 264 at the forward end of bracket 263 rest against and are secured to the disc 250.

For this purpose the circular hub 252 at its rear end is laterally extended in a rectangular tie head 265 (Fig. 13) and this head backs up against the spaced extensions 264 of the bracket 263. Each bracket extension 264 is slotted at 266 and bolts 267 having nuts threadedly secured thereon, extend through the slots. This provides for clamping tightly together the bracket and the housing parts and makes a more rigid construction.

The slide 261 (see also Fig. 10) at its rear end carries a vertically disposed roller pin 268 which extends down below the slide. A tapered cam roller 269 is rotatably mounted thereon. This cam roller operates in a cam groove 270 formed in a cam segment 271 which is loosely mounted on the station rock shaft 209 but is operated from another source as will be pointed out. The shape of the cam groove 270 is such as to translate rocking movement of the segment as a lateral shifting force against the slide roller 269. This moves the slide 261 and parts carried thereby.

The cam segment 271 extends below the shaft 209 as an arm 272 and this arm is connected to one end of a short link 273. The other end of the link is pivotally connected to the upper end of a rock lever 274 which is secured to one end of a rock shaft 275. Shaft 275 is journaled in suitable bearings in the housing frame 187. This rock shaft is common to both stations A and B and actuates corresponding parts. The parts affected at station B will be further explained at the proper place.

The rock shaft 275 and the parts connected therewith receive actuation from the power shaft 158. For this purpose the rock lever 274 intermediate its length carries a cam roller 276 which operates in a cam groove 277 of a barrel cam 278 which is keyed to the power shaft. The shape of the cam is such as to provide for the proper rocking movement of the cam segment as the power shaft continuously rotates. It also rocks the shaft 275 for actuation of parts at station B as will be later described.

The upper run of the endless conveyor 54 is held in a horizontal plane as it passes through stations A to F, inclusive, and for this purpose brackets 279 (Fig. 10) are provided. At station A there is one of these brackets which is carried on and bolted to the table 186. These brackets carry a track plate 280 which is grooved on its upper surface to provide race ways for the conveyor rollers 173 thus guiding the various conveyor cradles 171 in their proper line of travel.

This insures that the can body *a* is always in a proper horizontal position for insertion into the various operating parts at the stations A to F, inclusive.

At station B the opposite end of the can body *a* is subjected to other outer and inner beading mechanism. These devices and associated actuating parts are identical in construction to the parts already described in connection with station A. The parts, however, have been turned around and are located on the opposite or front side of the apparatus.

As illustrated in part in Fig. 8 there are thus provided certain elements at station B for holding the operating beading mechanisms of that station. Broadly considered this may include a housing 281 which corresponds in all respects to the housing 221 at station A. The housing 281 also contains a cam ring 282 which is the same in construction and functions in the same manner as the cam ring 233. In like manner, a slide 283 is carried in a box-like bracket 284 and this slide functions to expand and contract the beading jaws at the station B.

A cam segment 285 (Figs. 8 and 10) provides for the proper actuation of the slide 283 and this cam segment is loosely mounted on a station rock shaft 286 which like the station shaft 209 at station A, provides rocking energy for certain movable parts. Shaft 286 is suitably journaled in bearings in a table 287, which corresponds to the table 186 at station A.

The cam segment 285 receives its actuation from the rock shaft 275 which as already mentioned is common to both stations A and B. Cam segment 285 extends below the shaft 209 in an arm 288 and this arm is connected to one end of a short link 289. The other end of the link is pivotally connected to the upper end of a rock lever 290 which is keyed to the common rock shaft 275. A collar 291 secured to the end of the shaft 286 holds the cam segment 285 against displacement.

It is believed that further description of station B is unnecessary since a full understanding of the operations at station A already had can be equally applied to the identical and corresponding parts of this later station.

Reference should be had to Figs. 16, 17 and 18 for a further understanding of the mechanism at the bottom end inserting and corner tucking station C. The magazine 65 which is largely made up of spaced bars is mounted to extend at a slight angle off of the vertical so that the bottom ends *d* pass uninterruptedly into the mechanism at this station. Magazine 65 rests upon an apertured bracket 301 which is carried on the upper end of a housing frame 302.

The bracket 301 is open at the upper side of its incline and the stack of ends pass from the magazine into this bracket by way of a continuous channel 303. The bracket 301 is provided with a slot 304 which is cut in the lower or right-hand wall of the bracket and this slot extends at right angles to the enter of the stack of ends *d*.

Adjacent the slot the stack of ends at the lower side rests on an insert 305 carried in the bracket 301 and opposite the slot the stack is normally supported upon a spacer block 306 which constitutes a part of the end cut-out device 66. This block 306 is carried upon a slide 307, of the cut-out device, which operates within slideways 308 formed on the housing frame 302. Gib spacer plates 309 (Figs. 16 and 18) are carried on the

frame housing and extend over the slide and keep it in its slideways.

The lowermost end *d* in the stack as it rests against the supporting parts 305, 306 is thus directly in line with the discharge slot 304 and is in position to be slid laterally off of the bottom of the stack. The block 306 of the cut-out device carries a separator blade or finger 311 which is located in a slot formed in the block 306 and this blade is substantially the thickness of an end *d*.

The slide 307 and its separator blade move beneath and are covered by a cover plate 312 mounted upon the spacer plates 309. During the separation of an end *d* from the stack the blade 311 engages the edge of the lowermost end and, as the slide 307 moves forward or toward the right as viewed in Fig. 16, the lowermost end is pushed through the discharge slot 304 and into the rotating rollers 67, 68.

The cover plate 312 adjacent the magazine is formed with two spaced up-right extensions 313 and these provide guides on the open side of the magazine for the stack of covers passing down through the bracket 301. This also prevents inadvertent disarrangement of the ends *d* as they leave the magazine.

The upper roller 67 is mounted upon a transverse shaft 315 which is suitably mounted in bearings 316 (Fig. 17) formed in the housing frame 302. Shaft 315 is continuously rotated and for this purpose carries a spur gear 317 which meshes with a drive gear 318 carried on a lower shaft 319 on which the roller 68 is mounted. Shaft 319 is journaled in bearings 321 formed in frame 302. The manner of continuously driving these rollers 66, 68 and their corresponding shafts 315, 319 will be more fully described hereinafter.

The slide 307 is moved back and forth to effect the proper feeding and cut-out of the lowermost end *d* in the following manner. Rack teeth 325 (Fig. 16) are formed in the lower side of the slide and these teeth engage with teeth of a rack segment head 326 of a bell crank lever 327 which oscillates on a horizontal shaft 328 carried in the housing frame 302. The end of the bell crank lever arm opposite to that which carries the segment rack head 306 is pivoted at 329 to a sleeve member 331.

Connecting rod 332 (see also Fig. 17) at its upper end extends through the sleeve and a collar 333 is pinned to the connecting rod. The collar engages the lower end of a coil spring 334 the upper end of which engages the sleeve 331. Spring 334 is mounted on the connecting rod 332. A nut 335 is threadedly secured to the top of the connecting rod where it extends beyond the sleeve 331. This construction provides a yielding element for the connecting rod 332 and permits sliding of the rod within the sleeve 31 if for any reason the slide 307 is prevented from freely moving in its slideways 308.

The lower end of the connecting rod 332 is fastened to an eccentric strap 336 which is mounted on an eccentric 337 which is formed in a horizontal shaft 338. Continuous operation of the shaft which is indirectly driven from the power shaft 158 results in a raising and lowering of the connecting rod 332 and through its described connections the rod effects an oscillation of the bell crank lever 327 for operating the slide 307 to cut-out and discharge the can end. Driving of the shaft 338 will be now considered after which further consideration of the progress

of the operations at station C will be resumed.

Shaft 338 (Figs. 16 and 17) is journaled in bearings 345 formed in the housing frame 302. This frame is joined into a bottom web 346 which rests upon a table 347. Table 347 like the tables 186, 287 is also carried on the housing frame 187. At one end the shaft 338 carries a spiral gear 351 which meshes with a similar gear 352 which is keyed to a vertical shaft 353.

These spiral gears 351, 352 are contained in a gear housing 354 which also provides suitable bearings for the upper end of the shaft 353. The gear housing 354 is carried on the slide housing 284 of station B. The lower end of the shaft 353 is journaled in bearings formed in a gear housing 356 and this housing is a part of a bracket 357 which is bolted to the table 347.

Shaft 353 at its lower end and within the gear housing 356 carries a spiral gear 358 which meshes with a similar gear 359 also contained in the gear housing. A horizontal shaft 361 carries the gear 359 and extends beyond the gear housing and into a bearing formed in a bracket 362 which in turn is bolted to the bracket 357.

Bracket 357 also provides bearings 363 for the shaft 361 and in between these bearings a sprocket 264 (see also Fig. 31) is keyed to the shaft. The sprocket is operated by a chain 365 which also takes over a sprocket 366 keyed to the power shaft 158. In this manner is the shaft 338 continuously rotated to operate the end cut-out device 66. Rotation of the shaft 338 is also primarily responsible for rotation of the separation rollers 67, 68. For this purpose a sprocket chain 268 (Fig. 17) operates over a drive sprocket 369, keyed to the shaft 338, and a driven sprocket 371 keyed to the roller shaft 319.

The reciprocating feeding device 69 at this station C is just beginning its forward movement when the bottom *d* leaves the rollers 67, 68. This feeding device comprises a rock bar 381 (Fig. 16) which is mounted on a pin 382 carried by a lever arm 383 (see also Fig. 17) which is keyed to a rock shaft 384. Shaft 384 is mounted in bearings 385 formed in the housing frame 302.

Rock shaft 384 receives its actuation from the continuously rotating shaft 338 in the following manner. The shaft 384 projects quite a distance at one end beyond the housing frame 302 and it is on this projecting end that a lever arm 386 is mounted. The lower end of the arm 386 carries a pin 387. A crank disc 388 is secured to one end of the shaft 338 and this crank disc also carries a pin 389 which is off center of the disc and the shaft 338. A connecting rod 391 pivotally connects at its ends with the two pins 387, 389. Thus the crank action imparted to one end of the connecting rod provides for the reciprocal movement of the feeding device 69.

The upper end of the lever arm 383 is slotted as at 392 to provide for a seat for the rock bar 381 and the pivot pin 382 spans this slot. Two spring pressed pins 393 are slidably mounted in the lever arm one on each side of the pivot pin and these hold the rock bar with a slight yielding action so that the latter properly engages or disengages the fed bottom end *d*. A forward end engaging finger 395 and a rear finger 396 are formed at the respective front and rear ends of the rock bar 381.

When the bottom end *d* leaves the rollers 67, 68 the rock bar is in the position shown in Fig. 16. The lever arm 383 thereupon starts its forward movement and the rear end engaging finger 396 striking against the bottom end moves it

down along an arcuate track designated generally by the numeral 397. Such a track is preferably formed by spaced grooves 398 cut in opposed edges of a pair of segment frames 399 mounted on a web 401 of the housing frame 302.

One forward reciprocation of the rock bar moves the bottom end *d* only half way to the inserting head mechanism 75. The grooves track is curved and this slightly bows the bottom end while it is moving. When it stops, however, it comes opposite two niches 402 cut in the outer wall of the grooves 398 and this allows the end to straighten out and its rear edge snaps into the niches 402.

The end *d* remains within its track 397 while the rock bar moves back being prevented from returning back along its path by the niches 402. During such movement the forward finger 395 of the bar strikes against and passes under the end *d*. This engagement of the end causes the rock bar to pivot on its pivot pin 382 and permits the finger to move back to the rear of the end *d*. When it clears the end rock bar again snaps back to normal position and this places the finger 395 behind the bottom end as shown at the center of the trackway 397 (Fig. 16).

On the next forward movement the next bottom end from the magazine 65 is advanced by the rear finger 396. At the same time the previously advanced bottom end *d* engaged by the forward fingers 395 is moved into the inserting head mechanism 75.

The manner of shifting a beaded end of a can body into the inserting head mechanism 75 at station C is identical with the lateral movement already described of a body into the beading head at stations A and B. Some of such lateral shifting elements at station C is indicated in Fig. 8, this being at the front of the machine. There is a slide 405 which carries the can body engaging slide head and fingers corresponding to the parts 192, 191 and 196 of station A.

The slide moves in a slide bracket 406 and an auxiliary bracket 407 is mounted on the slide bracket. A station rock shaft 408 (see Fig. 16) journaled in bearings 409 formed in the table 347, provides for the actuation of the slide 405 in the same manner as slide 192 at station A is actuated. It is thought unnecessary to further detail this action.

The general supporting frame as well as many of the moving elements of the inserting head mechanism 75 and the holding jaws 76 are patterned along similar lines to corresponding parts at station A. For example, these parts 75 and 76 operate within a circular housing 410 (Figs. 16 and 17) formed with supporting feet which rest upon and are carried by the table 347. It is into the jaws 76 within this housing 410 that the can body *a* is inserted by movement of the slide 405.

The holding jaws 76, like the outer beading mechanism 61 of station A, are slidable within the supporting housing and are cam actuated. When the can body is moved into the jaws they contract and squeeze against or hold the beaded end *d* of the can body. There are four individual holding jaws which operate at right angles to each side of the can body *a*.

Each outer holding jaw includes a grooved bead steel 411 (Fig. 16) and when the jaws are in closed position the grooved inner faces of the steels next to the cam body, provide a continuous peripheral engagement in the bead *b* of the body *a*.

Each steel 411 is slidably mounted in a radially disposed slide 412 which in turn is suitably positioned and retained for sliding movement in the circular housing 410. A yielding mounting is made for the steels 411 by springs 413 carried in the slides 412, there being a spring for each steel. When these steels close on the can body the resulting yielding squeezing action is such as to accommodate itself to the particular shape of body in the station.

These slides 412 at this station C are moved in and out in the same manner as the slides 225 are moved at station A. Each slide 412 carries a pin 414 which extends back through a clearance hole cut in a central web 415 of the housing 410. A cam roller 416 is mounted upon each pin 414, the cam rollers being back of the web but inside the housing.

A cam ring 417 (Figs. 16, 17 and 20) is seated within the circular housing 410 and is adapted to be oscillated concentrically within its housing seat, being retained within the housing by an outer ring 418 which is secured to the housing rim. Cam slots 419 are cut in the cam ring 417 and these correspond in shape and relative position to the cam slots 236 of the cam ring 233 of station A. There are thus four cam slots, one for each cam roller 416 and the shape of the slots is such that the slot walls acting on the rollers when the cam ring shifts, move the slides 412 in unison and with them the outer holding jaws.

The proper back and forth movement of the cam ring 417 is obtained through a rack connection with the station rock shaft 408. A rack segment 420 is bolted to the back of the cam ring and its teeth mesh with the teeth of a rack segment arm 421 which is keyed to the station rock shaft. Oscillation of the shaft is thus transmitted to the cam ring and from it to the outer holding mechanism.

It has been said that the bottom end *d* under the downward feeding action of the forward finger 395 is moved into the inserting head mechanism. This will now be considered in reference to Fig. 33. The end *d* enters from above into vertical slots 422 cut in the inner faces of two spaced side insert blocks 423 screwed on to the housing web 415 (see also Fig. 16). The top of the slots may be flared as shown to allow for free passage of the end member *d*.

A bottom insert 424 is also secured to the housing web 415 and the inserted end member comes to rest on this insert. It is thus centered in respect to the held can body *a* in the holding jaw steels 411. There is also a top insert 425 which is secured to the housing web but this insert is narrower than the other inserts leaving free the entrance of the bottom end *d* from above as already described. The inserts 423, 424 and 425 provide a mouth through which the end member *d* is now pushed by the inserting head 75.

A slide bracket 427 is mounted on the table 347 to the rear of the housing 415 and provides a guideway 428 for a slide 429 which carries the inserting head 75 and the corner tuck-in device 77. The slide bracket is formed with two upwardly projecting web sections 431, one on each side of the guideway 428 and each web section at its top terminates in a boss 432. A guide rod 433 is held at its rear end in each boss 432 by means of a clamp nut 434 threaded on the end of the rod, and is held at the forward end in the housing 410.

The slide 429 is slidably retained within its

guideway by slide gibs 435 screwed down to the bracket 427. It carries a vertical roller pin 436 on the lower end of which is rotatably mounted a cam roller 437. Roller 437 operates in a cam groove 438 formed in a cam segment 439 which is keyed to the station rock shaft 408. This is the manner of moving the slide.

There is some weight to the operating parts carried by the slide 429 and the slide at its forward end is enlarged into an upstanding head 445 which is further extended at the top and sides into a pair of lugs 446. Each lug is perforated longitudinally to provide a sliding connection with a guide rod 433 and as the slide moves back and forth, the lugs 446 also move back and forth on the guide rods. This keeps the slide in a true horizontal path of travel to effect the proper bottom end inserting and corner tucking operations.

The head 445 is formed with a horizontal bore 447 which extends in a short distance from the front face. An inserting pad 448 is formed with a hollow stem 449 and this stem is carried in the bore 447 of the head. A coil spring 451 is located in the center of the stem, one end pressing against the pad 448 and the opposite end engaging the bottom of the bore 447. This provides a yielding support for the inserting pad. The center of the pad 448 is on the center of the can body *a* which is held by the jaws 76 and also on the same center as the bottom end *d* resting in the inserts 423, 424.

A forward movement of the slide 429, toward the right as in Fig. 16 and toward the left as in Fig. 33, therefore first brings the inserting pad 448 against the bottom *d* and as movement continues the bottom is pushed through the inserts 423, 424, 425 and into the end of the held can body *a*. The beaded end of the can body at such a time is still in the shape of Fig. 3 and the spring 451 of the inserting device allows for gentle pressure of the bottom *d* against the seat formed by the bead *b*. While so held the corner tucking action takes place.

The corner tuck-in device 77 is carried on and secured to a reduced forward end 455 of the head 445 (Figs. 16 and 33), and therefore moves back and forth with the inserting pad 448. The only relative movement between the corner tuck-in device and the inserting head is when the latter moves back the slight distance afforded by yielding of the spring 451.

The tuck-in device 77 comprises a block 456 (see also Fig. 34) which is substantially square having angularly disposed projections 457 extending out from the corners. Each corner projection is slotted as at 458 and in each slot is mounted a tucker blade 459. Screws 461 threaded in the projection at one side of each slot holds the blade in place. Each blade 459 extends forward of the block 456 and into a slot 462 cut in each corner of the inserting pad 448.

Each blade 459 is formed with a small projecting front corner edge 463 and when the inserting pad first moves forward with the moving slide 429 this forward edge is back of the front face of the inserting pad as shown in Fig. 33. The bottom end *d* is thus moved forward into the beaded end of the can body *a* by the inserting pad. It will be obvious by referring to Fig. 33 that the corner tucking blades 459 have a free passage at the corners between the inserts 423, 424 and 425.

As soon as the bottom *d* is in place and while the slide 429 is still moving forward, the pad

448 comes to rest, this being when the bottom end strikes and is held against movement by the bead *b*. The yielding of the spring 451 permits this. The tucker blades 459, however, continue to advance with the slide and their front edges 463 thereupon press against the body flange outside of the bead *b*. This tucks in the four corners of the body thus producing the tucked in corners *e* (Fig. 4) and this also pulls in the flange sections *f*.

The beaded can body *a* with its bottom end *d* inserted and with the adjacent body flange corners tucked in is advanced from stations C to D by the conveyor 54. At the latter station the open end of the body is inserted into the outer holding jaws 85 by a lateral shifting of the body. This is done by the same type of mechanism as was used in station C.

Briefly a few of the lateral shifting elements are shown in Fig. 17. For example there is a slide 465 which carries the can body engaging slide head and fingers. Slide 465 moves in a slide bracket 466 and an auxiliary bracket 467 is mounted on the slide bracket. A station rock shaft 468 (see also Figs. 19 and 20) is journaled in bearings 469 formed in a table 470 and this shaft provides for the actuation of the slide 465 in the same manner as the other rock shafts 209, 286 and 408 at the respective stations A, B and C.

As soon as the can body *a* is inserted into the holding jaws 85 the jaws move inwardly and squeeze against and hold the beaded end of the body. These holding jaws are the same in construction and have the same movement as the corresponding holding jaws 76 at station C. They are also actuated in the same manner and only a brief mention need be made of some of the principal parts relating to this feature.

Each holding jaw 85 includes a grooved bead steel 471 (Figs. 19 and 35). When the jaws are in closed position the grooved inner faces of the steels next to the can body provide a continuous peripheral engagement in the groove *c*. Like the corresponding steels 411 of the holding jaws 76 at station C a cross section of the engaged groove face is such as to hold the shape of the body groove *b* during the insertion of the top end *g*.

Each steel 471 is slidably mounted in a radially disposed slide 472 which in turn is suitably positioned and retained for sliding movement in a circular housing 475 which corresponds to the housing 410 at station C. Housing 475 is supported upon and bolted to the table 470. A yielding mounting is made for the steels 471 by springs 476 carried in the slides 472 there being one spring for each steel. When these steels close on the can body the resulting yielding squeezing action prevents damage to the steels or parts of the can body.

The slides 472 at station D are moved in and out in the same manner as the slides 412 at station C. For this purpose each slide 472 carries a pin 477 which extends back through a clearance opening cut in a housing web 478 of the circular housing 475. A cam roller 479 is mounted upon each pin 477, the cam rollers being back of the web but inside of the housing.

A cam ring 481 is seated within the circular housing 475 and is adapted to oscillate concentrically within its housing seat, being retained within the housing by an outer ring 482 which is secured to the housing. It will be recalled that this is the same construction as the cam actuating elements for certain jaws at the preceding

stations A, B and C. Suitable cam slots are cut in the cam ring and the shape of the slots is such that the walls, acting on the cam rollers 479 when the cam ring shifts, move the slides 472 in unison and with them the outer holding jaws 85.

The proper back and forth movement for the cam ring 481 is obtained through rack connection with the station rock shaft 468. A rack segment 485 is bolted to the back of the cam ring and its teeth mesh with the teeth of a rack segment arm 486 which is keyed to the station rock shaft. Oscillation of the shaft is thus transmitted to the cam ring and from it to the outer holding mechanism to clamp the can body rigidly while the top end member *g* is being inserted.

The positioning of the top end *g* into the beaded end of the held can body *a* and the tucking of the corners as at *j* (Fig. 5) at station D is performed in the same manner as that previously described for the bottom end. The same kind of mechanism is used, only in station D some additional operating devices function to open up the closure tab *h* by hinging it back on its staple *i*. Such operation will be included in the proper place as the top inserting and tucking steps are considered.

The magazine 81 holds the top ends *g* within a stack with each end upside down, i. e., with the closure tab *h* below. The magazine is made up of two spaced bars 501 (Figs. 19, 20 and 35) which extend at a slight angle off the perpendicular, as best shown in Fig. 20. The two bars 501 form side walls for the stack and along the back these bars are extended in right angled support strips 502.

The magazine bars are suitably supported upon a top extension 503 of a housing frame 504 which in its turn is carried on the table 470. This table like tables 186, 287 and 347 is also carried on the housing frame 187. The magazine is open on the side opposite to the bar sections 502 and on this side the stack rests upon the rotating cut-out head 82. On the opposite side or back of the magazine the weight of the stack of tops *g* is supported on a ledge 506 formed in the frame extension 503.

The cut-out head 82 is formed with a spiral worm thread 507 which is cut in its periphery and the head is secured to the upper end of an inclined shaft 508. Shaft 508 is journaled in a sleeve 509 which is held fast in the housing frame 504.

Rotation of the shaft 508 carries the upper open end of the worm thread past the stack of tops *g* in the magazine and the front of the lowermost top is engaged in the thread. The continued rotation of the head thereupon causes the lowermost top end to separate on its engaged side from the next adjacent top *g* in the stack. In other words while the back of the lowermost top member *g* still rests on the supporting ledge 506, its front moves down in the thread, thus separating it from the adjacent top member still in the stack. The cut-out top *g* is then in position for removal by the feeding device 83.

The shaft 508 is driven indirectly by the power shaft 158 and this feature will first be considered before proceeding with the course of the separated top end *g* through station D. A bevel gear 515 (Fig. 20) is keyed to the lower end of the shaft 508 and meshes with a gear 516 secured to a short horizontal shaft 517 (see also Fig. 35). Shaft 517 is journaled in a bearing 518 formed in the housing 504 and in a bearing 519 formed

in a bracket 520 which is bolted to the side of the housing.

A sprocket 525 is keyed to the end of the shaft 517 and a chain 526 operates over the sprocket 525 and also over a sprocket 527 keyed to the end of a lower horizontal shaft 528, see also Fig. 19. Shaft 528 is driven from a vertical shaft 529 by means of spiral gears 531, 532 keyed respectively to these shafts. The gears are contained within a gear housing 533 carried by the table 470 and the vertical shaft 529 is also bearinged within this gear housing.

A second pair of spiral gears 535, 536 provides a driving connection between the shaft 529 on which gear 535 is mounted and a still lower horizontal shaft 537 (Figs. 19, 30 and 31) carrying the gear 536. Shaft 537 is journaled in bearings formed in a bracket 538 bolted to the table 470. The shaft 537 carries a sprocket 541 over which operates a chain 542. On the inside of the apparatus, the chain passes over a sprocket 543 carried by a short horizontal shaft 544.

The shaft 544 is journaled in bearings 545 formed in bracket extensions of the housing frame 187. This shaft 544 is on the side of the apparatus opposite to the power shaft 158, that is, the front side and receives driving rotation from the latter. A chain 551 provides for the driving connection and operates over sprockets 552 and 553 mounted on the respective shafts 544 and 158.

Description of the course of travel of the cut-out lowermost top *g* will now be resumed. While this top *g* is resting partly on the ledge 506 and partly in the thread groove 507 of the cut-out head 82, the reciprocating feeding device 83 comes into action. Prior to the arcuate descent of the top member cut-out members of the feeding device first slide it out from the bottom of the magazine 81.

A slide 561 (Figs. 19 and 20) is mounted in slideways 562 formed in the upper part of the housing frames 504 and is held in sliding position therein by slide gibs 563 secured to the frame 504 within the frame extension 503. The inner end of the slide is extended upwardly into an engaging finger 564 which when the slide is in one position (Fig. 19) is located in line with, but just back of, the bottom of the magazine.

When the slide moves forward this finger 564 engages the separated top member *g* and slides it laterally (toward the left in Fig. 19) thus cutting out the same from the stack. This action places the top in position for engagement of the first of four feed fingers 565 which advance the top down its arcuate path in four stages of movement.

The fingers 565 are secured to pivot pins 566 carried by a frame segment 567 which is keyed to a horizontal shaft 568 journaled in suitable bearings formed in the housing frame 504. By means of a rocking movement of the frame segment the feed fingers 565 successively engage and advance the top end *g* along its arcuate path.

The shaft 568 also carries an arm 571 which is pivoted at 572 to one end of a connecting rod 573. The opposite end of this rod is pivoted on a wrist pin 574 which projects out from the face of a crank disc 575 carried on one end of the continuously rotating shaft 528. In this manner a rocking movement is had for the reciprocating feeding device 83.

It is this same driving force which moves the cut-out slide 561. For this purpose the slide carries a rack bar section 576 the teeth of which mesh with teeth of a segment rack 577 which is

formed on the upper end of an arm 578. Arm 578 is mounted on a horizontal shaft 579 carried in the frame housing 504. Intermediate its ends the arm 578 carries a pin 581 which provides a pivotal connection for a connecting rod 582, the other end of which is pivotally connected to the frame segment 567 by means of a pin 583. This construction insures simultaneous sliding of the slide and rocking of the frame segment.

Each feed finger 565 is spring held, normally in a raised position, this being the position assumed when engaging and advancing a top end *g*. Each pivot pin also carries a tail part 585 which extends at right angles to the finger and is located in a recess 586 cut in the outer edge of the frame segment 567. A spring barrel 587 extends into an angularly disposed bore 588 and a spring 589, pressing against the spring barrel, holds the latter against the tail part 585 of the finger. This normally keeps the fingers in the position shown in Fig. 19, one side of the recess 586 forming a stop for the tail part at such time. The other side of the recess limits the travel of the tail part in the other direction.

When the separated top end *g* passes from the magazine 81 it enters into an arcuate guideway 590 (Figs. 17, 19 and 35) formed by grooves 591 cut in spaced edges of oppositely disposed curved rails 592. The opposite edges of a top end member *g*, when moving along the guideway 590, are so confined within the grooves 591 as to be slightly bowed. In other words, the outer surface of the end *g* is slightly convex. Each time the end comes to rest, however, which is after advancement by a finger 565, the end straightens out and its back edge snaps into notches 593 cut in the outer walls of the grooves 591.

The curved rails 592 at their upper ends are mounted upon the frame housing 504. These upper ends about the upper extension 503 of the housing, as best shown in Fig. 35. At the bottom the rails engage the circular housing 475 and the lower parts of the rails are supported on horizontal posts 594 which are bolted to the frame housing 504, see also Fig. 19.

Immediately after the top end *g* has come to rest in the entrance of the guideway 590, the cut-out finger 564 moves back and with it also the fingers 565. The upper or first one of the fingers 565 is thereupon moved beneath the cut-out top end *g*, which remains stationary in its guideway grooves 591 being prevented from returning by the groove notches 593. In so doing the finger, striking against the top end *g* is rocked into lowered position the yielding spring 589 permitting this action.

When free of the top member *g*, the finger snaps back into normal position with its forward end back of the top end *g* and in position to engage and move the top member forward for one step when the feeding device 83 next moves forward. This passage of a finger beneath the top end *g* and its subsequent engagement and advancement takes place for each successive finger 565 thus moving the end *g* after four advancements and a corresponding number of pauses into position for inserting into a held can body *a*.

During this step advance of the top end member *g* along the circular path 590 the closure tab *h* is undergoing a change in position. At the time the end member is in the magazine 81 and before it starts its travel through station D, its tab *h* is in closing position and filling the dispensing opening in the top. Fig. 36 shows the top end *g* fully closed. This position of the tab

also holds for the first two positions of the top *g* in the guideway 590.

In the third position in the guideway the top end member *g* is subjected to a partial opening operation, this taking place just before the third feed finger 565 engages and moves the end member on its third feeding step. Fig. 37 illustrates the results of such a partial opening operation and by referring to that figure, which shows the top end parts in the relative positions they assume within the guideway, it will be observed that the closure tab *h* has been partially hinged on the staple *i* and that the closure element of the tab is partly out of the dispensing opening. The mechanism for producing this partial opening will first be considered.

A horizontal rock shaft 595 (Figs. 17, 19 and 35) is journaled for oscillation in bearings 596 formed in the guide rails 593. This shaft carries a finger 597 which, when the shaft is rocked in one direction, strikes against and lifts the closure *h* of the top end member *g* resting in the guideway 590. This is sufficient to partially open the closure and put it into the condition shown in Fig. 37. A cam control is used to effect this rocking movement of the shaft 595.

An arm 601 (Figs. 19 and 35) is mounted on one end of the shaft 595 and this arm is pivotally connected at 602 to one end of a connecting rod 603. The other end of the rod is pivotally connected at 604 to the upper end of a lever arm 605 which is keyed to a rock shaft 606. This shaft is mounted in a bearing 607 formed in the housing frame 504.

On the inside of the bearing 607, the shaft 606 has a lever arm 608 keyed to its end and this lever arm extends down alongside of a face cam 609 (Figs. 20 and 35) carried on the shaft 528. Lever arm 608 rotatably supports a cam roller 611 which operates in a cam groove 612 formed in the inner face of the cam 609. This constitutes the cam control for the opening finger 597.

At the time the finger 597 is pushing down against the closure tab *h* as just described the top member *g* is being supported from the opposite side by a pusher head 615 which is formed at the upper end of a slide bar 616. This slide bar is mounted for slide movement in a support bracket 617 secured to one wall of the housing frame 504.

The opposite end of the slide bar may be formed as a yoke section 618 (Figs. 20 and 35) and the arms of the yoke straddle and are supported by a shouldered spacer collar 619 located on the shaft 528. This yoke section is adjacent one face of a cam 621 also mounted on and rotated with the shaft 528. A cam groove 622 formed in the cam face operates on a cam roller 623 carried by the yoke section. The shape of the cam groove is such as to push the slide bar 616 up within its support bracket 617 at the moment the closure tab *h* is pushed open by the finger 597 and this positions the pusher head 615 in backing-up position.

Before the partially opened top *g* is again engaged and moved by the next succeeding feed finger 565 in its next step advancement, the finger 597 lifts up and the pusher head 615 falls back to disengage the top member *g*. It is thereupon advanced on its third step.

During this third step and while the top end *g* is moving, the partially opened tab *h* is further opened so that when the top end comes to rest at the end of this step advancement, the top elements are in the position shown in Fig.

38. After the feed fingers 565 have returned to their upper position the fourth or last feed finger is just above the partially opened top member *g* as shown in Fig. 19.

- 5 This partially opened top end *g* is at that time only in an intermediate condition, as far as the end parts are concerned and when the top end *g* again advances on its succeeding fourth step, it is further and finally opened. The final position of parts with the closure tab section fully hinged back and in full open position is shown in Fig. 39.

- 10 The same device produces both of these continuing opening actions and comprises a stationary opening wedge plate 624 (Figs. 17, 19 and 35) which is secured to the circular housing 475.

- The wedge plate 624 is formed with a sharp upper prong 627 which is just below the pusher head 615 and this prong lies in the path of the newly opened closure tab section *h* as it moves down under the action of the third feed finger 565. A cam surface 628 extends back from the prong 627 along one side of the wedge plate and engages the inner face while lifting the closure tab section *h*, first into the intermediate position of Fig. 38 and then into the final position of Fig. 39.

- At the end of the feeding action of the feeding fingers 565 the top end member *g* with its turned back closure element is positioned in axial alignment with the central axis of the positioned can body *a* at station D. In this position the top member rests upon an extension of a bottom insert 634 (Figs. 19 and 35) which is carried in and bolted to the web 478 of the circular housing 475. Side and top inserts 635, 636 are also secured within the circular housing and these provide a mouth through which the top end will pass when coming into position within the open beaded end of the can body *a*. The inserts 634, 635 and 636 correspond to the inserts 424, 423 and 425 at station C.

- The inserting head mechanism 84 is immediately brought into action, following the alignment of the top end *g* and forces the latter through the inserts into the held can body *a*. This inserting mechanism comprises a slide 637 (see also Fig. 20) which carries both the insert head mechanism 84 and the corner tucking device 86. A slide bracket 638 is mounted on the table 470 to the rear of the housing 475 and provides a guideway for the slide 637. The slide bracket is formed with two upwardly projecting web sections 641 one on each side and each web section terminates in a boss 642. A guide rod 643 is held at this rear end in each boss 642 by means of a clamp nut 644 threaded on the end of the rod and is held at its opposite end in the housing 475.

- Movement for slide 637 is effected by a cam connection with the station rock shaft 468. The slide 637 carries a vertical roller pin 646 which extends down below the slide and on the lower end of which is rotatably mounted a cam roller 647. Roller 647 operates in a cam groove 648 formed in a cam segment 649 which is keyed to the station rock shaft 468. It will be understood that the shape of the cam groove 648 is such as to translate the rocking movement of the shaft into a lateral shifting force for the slide.

There is some weight to the operating parts carried by the slide 637 and this slide, like the corresponding slide 429 at station C, is supported at the sides and front on the guide rods 643 and the slide is enlarged at its forward end into a

head 655 which is further extended laterally into a pair of lugs 656. Each lug 656 is perforated longitudinally to provide the sliding connection with its corresponding guide rod 643. This keeps the slide in a true horizontal path of travel to effect the proper top end inserting and corner tucking operations.

The head 655 is provided with a central horizontally disposed opening 657 (Fig. 19) in which a hollow stem 658 of an inserting pad 659 is located. The inserting pad 659 is substantially a duplicate in construction of the inserting pad 448 at station C and is also yieldingly mounted within the opening 657 of the slide head 655. A spring 661 located in large part within the hollow stem, provides the yielding element for the inserting pad 659.

The corner tucking device 86 is also of the same construction as previously described for the corner tucking device 77 of station C and is mounted in the same manner. Further detailed description of this feature is therefore considered unnecessary. It will be understood that as the inserting pad 659 engages the top end *g*, it moves the same through the insert elements 634, 635, 636 until the top end is fully seated on the beaded shoulder of the tightly held can body *a*.

The continued movement of the slide 637 and the inserting pad 659 brings the corner tucking device 86 into operation so that the tucked-in corners *j* are formed, as best illustrated in Fig. 5. It will be understood that the forward face of the inserting pad 659 is hollow so as to accommodate the turned back closure tab section *h* and so that the inserting pad will bear directly upon the top member *g*. The tucking blades of the corner tucking device 86 will therefore strike directly on the flange sections *k* of the can body *a*. This concludes the operations performed upon the can body at station D.

The can body *a* now with both ends *d* and *g* partially crimped in place is slid back into central position within its conveyor cradle 171 by the return movement of the slide 465. A succeeding step movement of the conveyor 54 brings the can body to rest at station E. It is at station E that the pulled back flange sections *f*, adjacent the bottom end of the can body *a*, are pressed-in and further squeezed. This puts a definite crease in the body flange but after the parts are released the flange sections in between the corners *e* spring back and the joint then takes the shape shown in Fig. 6 having the corner tucks *c* and the flange sections *l*.

At station E the can body *a* is again engaged by its top end and is again pushed laterally in the conveyor cradle 171, its bottom end coming into the outer jaw holding device 91. The laterally shifting mechanism at station E is identical to that employed at stations A, B, C and D. As shown in Fig. 21, this includes a sliding head 685 which is an integral part of a slide 686. The slide 686 operates in a guideway 687 which is cut in a slide bracket 688 in its turn mounted upon a table 689 (see also Fig. 24) supported on the housing frame 187.

The head 685 carries a plurality of outer fingers 691. Each outer finger 691 is pivotally mounted upon a pin 692 which is carried in a lug 693 formed preferably as an integral part of the head 685. A tail part 694 of each outer finger is engaged by an outwardly pressed spring barrel 695 which tends to force the forward end of each outer finger down on the outside of the end

of the can body, this being the same construction as previously described for the preceding stations. In this manner the can body *a* has its bottom end inserted into the outer jaw holding device 91.

A horizontally disposed hold down plate 696 is also provided and carried upon the forward end of an arm 697 which is hinged in an auxiliary bracket 698. The auxiliary bracket is mounted upon the slide bracket 688. At this station E the conveyor cam track 280 rests upon the bracket 279 shown in Fig. 21 and this bracket is mounted upon the table 689.

The slide 686 is cam operated and for this purpose carries a vertically depending stud 701 which at its bottom end and directly beneath the slide rotatably supports a tapered cam roller 702. Roller 702 operates within a cam groove 703 of a cam segment 704 which is keyed to one end of a transverse horizontally disposed station rock shaft 705 (see also Fig. 24). This shaft oscillates in proper times to effect the necessary sliding movement for the slide 686 and the slide head 685. Shaft 705 is journaled in bearings 706 formed in the table 689.

The outer jaw holding device 91 is contained within a circular housing 711 which is mounted upon and bolted to the table 689. This housing is similar in construction to the various housings at the preceding stations and includes a web 712. The holding devices 91 at this station also function in the capacity of an anvil in cooperation with the pressing head 92. The holding device comprises four slides 713 (Figs. 21 and 22) which are solid and not yielding as in the holding jaws of stations C and D. These slides 713 are cam actuated in the same manner as the other sliding members at the other stations.

Each slide 713 is formed with a bead engaging face 715 (Fig. 22). The slides 713 operate in suitable slideways formed in the circular housing web 712 and each carries a pin 716 (see also Fig. 20) which extends transversely of an opening cut through the web 712. On the rear end of the pin a cam roller 718 is mounted. Inward and outward sliding movement of the slides 713 is effected by a cam ring 719 which is located within a seat formed at the rear of the circular housing 711. An outer ring 721 bolted to the rear face of the circular housing retains the cam ring in operating position adjacent the housing web 712.

The cam ring 719 contains four equally spaced cam slots 722 one for each slide 713 and these slots are so shaped as to operate through the cam rollers 718 to move the jaw holding slides 713 into closed and holding position on the outside beaded section of the can body when the cam ring is shifted.

The proper back and forth shifting of the cam ring 719 is provided by rack connection with the station rock shaft 705. A rack segment 723 is bolted to the back of the cam ring and its teeth mesh with the teeth of a rack segment arm 724 which is keyed to the rock shaft. It is while the can body is held between the closed jaws of the slides 713 that the pressing head 92 operates to momentarily press in the body flange sections *f* to crease the same after which these flange sections will assume the angular shape *l* as illustrated in Fig. 6. The pressing head 92 will now be further considered.

The pressing head 92 is carried on a slide 731 (Fig. 21) which operates in guideways 732 formed in a slide bracket 733. Bracket 733 is mounted

upon and carried by the table 689. Slide bracket 733 is also formed with two upwardly projecting web sections 734, one on each side of the guideway 732, and each web section at its top terminates in a boss 735. A guide rod 736 is held at its rear end in each boss 735 by means of a clamp nut 737 threaded on the end of the rod and the rod is further held at its forward end in the web 712 of the housing 711.

The slide 731 is slidably retained within its guideway by slide gibs 738 secured to the slide bracket and carries a vertically disposed roller pin 739 which extends down below the slide and carries on its lower end a rotatable cam roller 741. Roller 741 operates in a cam groove 742 formed in a cam segment 743 which is keyed to the station rock shaft 705. This is the manner of moving the slide with the pressing head.

The pressing head 92 is hollow and is formed on an upwardly projecting forward section 745 which is preferably an integral part of the slide 731 and this section has extending side lugs 746. Each lug is perforated longitudinally to provide a sliding connection with a guide rod 736 and as the slide moves back and forth the lugs 746 slide along the guide rods. This keeps the slide in a true horizontal path of travel to more accurately effect the proper pressing of the flange parts *f* to crease the edges of the body.

It is the annular section of the hollow pressing head which engages the flange sections *f* when the slide is moved toward the right (as viewed in Fig. 21). It will be recalled that at this time of pressing, the slides 713 are in their closed holding position on the inserted bottom end of the can body *a*.

The faces 715 of the jaw slides at such time provide a continuous peripheral engagement within the groove *b* of the can body. By reason of the shape of the slide faces, this groove *b* is slightly changed during the moment of pressure and it will thus be obvious that these holding jaws also function as anvils in cooperation with the pressing head 92. When the flange parts open up after this creasing operation they assume the flange shape *l* (Fig. 6).

Following this pressure of the bottom flange sections *l* of the can body *a* the holding jaws are separated and the slide 686 is again moved to withdraw the can body from its inserted position at station E. Thereupon the conveyor 54 advances the body into the next station F. The same operation on the opposite or top end of the can body now takes place, Fig. 23 illustrating the principal working parts of the apparatus at this station. Fig. 24 shows the relative position of the station in the apparatus.

At station F the can body *a* is again engaged, this time at its bottom end, and is again pushed laterally so that the top end enters into the outer jaw holding device 93. The laterally shifting parts for the body at station F are identical in size, shape and function to the corresponding parts at the previously described stations A to E, inclusive.

These parts include a sliding head 751 (Fig. 23) which is an integral part of a slide 752. The slide 752 operates in a guideway 753 formed in a slide bracket 754 (see also Fig. 24) mounted upon a table 755 supported on the housing frame 187. Head 751 carries a plurality of outer fingers 756. Each outer finger is pivotally mounted upon a pin 757 which is carried in a lug 758 formed preferably as an integral part of the head. A tail part 759 of each outer finger is engaged by an out-

wardly pressed spring barrel 761 which tends to force the forward end of each outer finger down on the outside of the end of the can body. In this manner the can body *a* has its top end inserted within the outer jaw holding device 93.

A horizontally disposed hold-down plate 763 is also provided at this station and is carried upon the forward end of an arm 764 which is hinged in an auxiliary bracket 765. The auxiliary bracket is mounted upon the slide bracket 754. At this station the conveyor cam track 280 rests upon one of the brackets 279 and as shown in Fig. 23, this bracket is mounted upon the table 755.

The slide 752 is cam operated and for this purpose carries a vertically depending stud 766 which, at its bottom end and directly beneath the slide, rotatably supports a tapered cam roller 767. Roller 767 operates within a cam groove 768 of a cam segment 769 which is keyed to one end of a transverse horizontally disposed station rock shaft 770 (see also Fig. 24). Shaft 770 is journaled in bearings 771 formed in the table 755.

Like the four jaw slides 713 at station E the holding device 93 consists of four jaw slides 775 which are contained within a circular housing 776 mounted upon and bolted to the table 755. This housing is identical in construction to the housing 711 at station E and includes a web 777. The four slides 775 are formed in the same shape and operate in the same manner as slides 713 at station E. In other words, when the slides are closed they function both as holding and as anvil members. The slides are cam actuated and for this purpose a cam ring 778 is used. This cam ring is seated in the housing 776 and is actuated from the station rock shaft 770.

Cam ring 778 carries a rack segment 779 and its teeth mesh with the teeth of a rack segment arm 781 which is keyed to the shaft 770. It is while the can body is held between the closed jaws of the slides 775, that the pressing head 94 operates to momentarily press in the body flange sections *k* (Fig. 5) to crease the same, after which these flange sections will assume the angular shape *m* disclosed in Figs. 21 and 23.

The pressing head 94 is hollow and this permits the closure tab *h* on the top *g* of the can body to remain back and extend outwardly as illustrated in Fig. 23. This pressure head is mounted upon the forward end of a slide 782 which operates in a slideway 783 formed in a slide bracket 784 mounted upon and carried by the table 755.

Slide bracket 784 is formed with two upwardly projecting web sections 785 one on each side of the guideway 783, and each web section at its top terminates in a boss 786. A guide rod 787 is held at its rear end in each boss 786 by means of a clamp nut 788 threaded on the end of the rod. Each rod 787 at its forward end is retained in the web 777 of the circular housing 776.

The slide 782 is slidably retained within its slideway 783 by slide gibs 789 which are screwed down on the bracket 784. The slide also carries a vertically disposed roller pin 791 on the lower end of which is rotatably mounted a cam roller 792. This cam roller operates in a cam groove 793 formed in a cam segment 794 which is keyed to the station rock shafts 770.

The pressing head 94, carried on its slide 782, is further mounted for more positive sliding movement by sliding connection with the guide rods 787. For this purpose slide 782 at its forward end is enlarged into upstanding lugs 795

one on each side of the slide. Each lug is perforated longitudinally to provide the sliding connection with its associated guide rod 787. This concludes consideration of the operations at station F which is the last station in the first section of the apparatus.

After the can body with its ends has been again centered in its cradle 171 of the conveyor chain 54 it is intermittently advanced toward the discharge end of the conveyor as shown in Fig. 24. Considering the conveyor for the moment, the shaft 141 which supports the sprocket 56 is carried on a bracket 802 which in turn is mounted upon a transverse table 803. At one side the table 803 is supported on bracket sections 804 secured to the outer frame legs 188 and on the opposite side the table is carried on legs 805 mounted on the foundation frame 133.

The can upon moving around the sprocket 56 arrives at a position of transfer and its cradle 171 is then opposite the end of the shelf 102 at station G. The active element of the transfer mechanism comprises a pair of levers 806 (see also Fig. 30) which are mounted upon a rock shaft 807 which is journaled in bearings 808 carried on the table 803. The rock shaft 807 also carries an arm 809 on which is pivotally mounted a cam roller 811. This roller operates in a cam groove 812 of a barrel cam 813 which is mounted upon and secured to the power shaft 158.

The cam groove 812 is such as to cause oscillation of the rock shaft 807 which swings the levers 806 clockwise as viewed in Fig. 24. The upper ends of the two levers 806 engage the projecting ends of the can *a* as it rests in its conveyor cradle 171 and slide the can onto the transfer shelf 102.

The transfer shelf 102 is carried on the upper end of a bracket 815 which in turn is supported on the table 803. As has been previously described, a can passing from the cradle 171 onto the shelf pushes against a row of previously ejected cans resting on the shelf 102. This movement is just the width of the can so that the can on the shelf which is at the forward end of the row passes into the second conveyor 103. In doing this the can enters into the second section of the apparatus which includes the stations H, I and J.

The conveyor 103 is of the same construction as the conveyor 54 and further description would only be an unnecessary repetition. It may be mentioned that this second conveyor 103 lifts each can upwardly as it is received and as it passes over the sprocket 104. Sprockets 104, 105 are mounted upon horizontal shafts 816 (Figs. 24 and 25) which are journaled in brackets 817, there being two brackets for each shaft. The brackets in turn are supported on a housing frame or table 818 which rests upon legs 819 mounted directly upon the foundation frame 133. The same Geneva drive as shown in Fig. 9 is used for intermittently rotating the shafts 816, there being four worm wheels 168 on the power shaft 158.

In order to keep the upper run of the conveyor 103 in a straight horizontal plane during its passage through the various operating stations in the second section of the apparatus a track plate 821 is provided. This plate corresponds to the track plate 280 of conveyor 54 and is of the same construction. The plate may be carried upon brackets 822 (Figs. 24 and 25) which in turn rest upon a station frame or housing 823 supported directly on the table 818.

As the row of cans in the upper run of conveyor 103 passes through station H and under the hood 108 hot air or other heating medium is brought in through the ducts 109 and is directed against the two ends of the can body. Fig. 26 shows this in detail.

At the top each air duct 109 joins a hot air supply manifold 824 and at the bottom leads into a rectangular hollow longitudinally extending head 825. The two heads are disposed along the path of the cans at both ends and a front wall of each housing is located in a vertical plane which is inside of the end beads *b* of the can body. The hollow or recessed central walls of the heads are spaced above and below the cans and perforations 826 are cut into the walls along the inner front walls in a manner to direct the hot air against the bead sections of the cans. This head 825 is long enough to accommodate about eight cans at one time and the perforations 826 are close enough together to insure the hot air striking against the bead sections of the eight cans both while moving and while at rest in the heating station H.

The recessed vertical wall of each head at the ends of the cans, designated by the numeral 827, is cut through in a series of perforations 828 which direct the hot air against the ends of the body and particularly against its flange sections *l* and *m*. This center part 827 is extensive enough to insure that the air strikes against all of the eight cans within the heating station at the same time.

The result of the hot air treatment is to render tacky the thermoplastic cement, which is inside of the flange section *l* and *m*. This is preparatory to subjecting the cans to a squeezing action at the sealing stations I and J which will finally seal the joint as indicated in Fig. 7. The heated air has already been described as having been ejected out of station H by way of the hood 108.

The ducts 109 are contained within suitable frame members which are mounted upon side housing sections 829 which in turn are carried by the table 818. A baffle plate 830 (Figs. 24 and 26) is preferably disposed beneath the conveyor 103 and this closes off the lower part of the heating station. This prevents the hot air from escaping from below the conveyor.

The same operation is performed at each station I and J, station I providing for the final sealing of the bottom end of the can while station J effects the same sealing of the top end.

As the can comes to rest at station I the top end is engaged by a slide head 835 (Fig. 29) which is mounted for sliding movement within a bracket 836 carried on the station housing 823. At this station a hold down plate 837 also rests lightly on the top of the can body, this plate being carried on an arm 838 pivotally connected to an extension 839 of the slide bracket 836. This is substantially the same part and functions in the same manner as the hold-down plate 182 at station A.

The slide head 835 is moved forward under cam action originating at the shaft 158 and for this purpose the head is pivotally connected to a link 841 which also connects with the upper end of a lever arm 842. Arm 842 is pivoted on a shaft 843 carried in the station housing 823.

The lower end of the lever arm is connected by a connecting rod 844, the opposite end of which engages a lever 845 pivotally mounted on a shaft 846 carried by the frame part 823. The arm 845 also carries a cam roller 847 which operates with-

in a cam groove 848 formed in the face of a cam 849 carried on the shaft 158. It is by means of the slide head 835 that the can is shifted laterally in its cradle 171 to insert its bottom end into the outer squeezing jaws 115 and adjacent the squeezing head 116.

The squeezing parts 115, 116 are carried in a squeezer housing 851 (Figs. 27, 28 and 29) which in turn is carried on the frame part 823. The reciprocating squeezing head 116 is formed to match the shape of the can end and is carried on the forward end of a slide body 852 which has sliding movement within the housing 851. This slide body 852 is moved back and forth under a combination cam and toggle action. The body carries a pivot pin 853 which provides an attachment for a pair of links 854, the opposite ends of which connect with a pin 855 in the center of the toggle unit. A link 856 also connected to the pin 855 constitutes another element of the toggle.

Link 856 is pivotally anchored at 857 on a plunger 858 which has slight sliding movement within a bracket 859 formed preferably as an integral part of the housing 851. This bracket at the upper end and above the toggle is tied to the housing 851 by a stay rod 861. The plunger 858 is backed up by a spring 862 which provides a yielding mounting for this end of the toggle unit. When the toggle is straightened out, the squeezing head 116 is brought against the end of the inserted can and at the same time the squeezer jaws 115 are brought into closed position.

The straightening and releasing of the toggle is effected by a cam action from the drive shaft 158. For this purpose one end of a link 865 is pivotally connected to the pin 855 and the other end to a pin 866. Pin 866 is carried by a rock arm 867 which is pivoted at 868 on the housing 823. Rock arm 867 carries a cam roller 869 which operates in a cam groove 870 formed in a cam 871 which is keyed to the shaft 158.

When the head 116 is moved forward the squeezing jaws 115 are brought into and engage the bead *b* of the can body, the squeezing action of the jaws corresponding with the squeezing movement of the head. Each squeezing jaw 115 (Fig. 28) is carried on the forward end of a lever 875 which is pivoted at 876 in the housing 851. The opposite end of the lever 875 carries a roller 877 and as the body 852 of the squeezing head 116 moves in (toward the right, Fig. 28), cam blocks 878 carried on the body engage inside of and spread the rollers 877, thus causing the levers 875 to move in at their squeezing jaw sections 115 and provide a continuous peripheral engagement around the bottom beaded end of the can.

This rocking movement of the levers 875 is done against the resistance of compression springs 879, one spring being interposed between each lever 875 and a part of the housing 851. These springs when the cam wedge blocks 878 are not engaging the rollers 877, hold the squeezing jaws open. Fig. 28 discloses the final squeezing position of the parts 115, 116.

As previously described, the squeezing jaws 115 are water cooled and for this purpose are made hollow. Each jaw is connected with an adjacent jaw by means of a flexible tubing 881 (Fig. 27) forming a continuous pass for a water or other type of cooling medium through the jaws. Inlet and outlet pipes 882 may be connected with two adjacent jaws so that the water passes into one jaw and discharges from an adjacent jaw after its circulation through all of the jaws.

This completes the operation at station I and the sealed bottom end of the can then has the flat flange part *o* and the reshaped bead *n*, see also Fig. 7.

After the can with the final sealed bottom end has been removed from station I and brought to position in station J, the top end of the can is inserted into outer squeezing jaws which are associated with a corresponding reciprocating squeezing head. The only difference between the mechanism at station I and J relates to the position of the parts in the apparatus, those of one station being on one side while corresponding parts of the other station are on the opposite side.

Briefly, there is a housing 885 which corresponds to the housing 851 at station I. The same actuating parts are used at station J with the exception of the actuation of the toggle unit. The unit itself includes the same parts 854, 856 and 865. At station J, however, the toggle unit being on the front of the machine instead of at the rear as at station I, the toggle part 865 is moved in a slightly different manner.

This connecting link 865 at station J is pivotally connected at 885 (Fig. 25) to a bell crank lever 886 (Fig. 29) which is pivoted on a rock shaft 887 carried on the front of the frame 823. The upper arm of the bell crank lever 886 is connected by a connecting link 888 to the upper end of a lever arm 889 (Figs. 25 and 29) which is loosely mounted upon the shaft 846. The lever arm 889 is cam actuated by a cam 891 secured to the power shaft 158, this cam corresponding to cam 871 at station I. The other parts of the mechanism at station J being the same as the parts already described for station I and having the same performance of operation, it is thought further description is unnecessary.

The can now having both ends finally sealed, is moved by the conveyor 103 to its discharge. This is illustrated in Fig. 25. As the can passes over the sprocket 105 it comes to rest adjacent a discharge shelf 895 which is formed as a part of a bracket 896 carried by the table frame 818. A discharge head 897 is carried upon the upper end of a lever 898 which is secured to a rock shaft 899 mounted in a bracket 901 carried on the frame 818.

Rock shaft 899 carries an arm 902 (Fig. 30) which in turn carries a cam roller 903. The arm 902 is disposed adjacent a cam 904, located on the end of the power shaft 158, and the cam roller 903 operates in a groove formed in the cam 904. This construction provides for a rocking of the shaft 899 and with it a corresponding movement of the lever 898 so that when the discharge head 897 moves toward the right (as viewed in Fig. 25) the can is discharged from the conveyor.

A brief consideration will now be had of the manner of providing some of the movements which have not yet been completely discussed. Figs. 24 and 30 of the drawings disclose the actuation of various shafts of the apparatus already mentioned from one prime mover. An electric motor 911 exemplifies a suitable driving force. Motor 911 may be mounted upon an auxiliary base 912 formed as a part of or associated directly with the foundation frame 133.

A motor shaft 913 of the motor carries a sprocket and chain connection 914 to an intermediate drive shaft 915 located directly beneath the power shaft 158. Shaft 915 is journaled in bearings 916 mounted upon or formed as an integral part of the foundation frame 133. Shaft 915 carries a sprocket 917 which has driving con-

nection by means of a chain 918, with a sprocket 919 mounted upon the power drive shaft 158.

Sprocket 919 is positioned substantially in the center of the power drive shaft 158 and thus provides for a minimum of distortion for that shaft. Shaft 158 is suitably journaled in bearings formed in various sections of the framework. These bearings take various forms but each bearing irrespective of its shape is herein designated by the numeral 920. Fig. 30 shows all of the bearings in their respective relationship.

These bearings will be further pointed out as they appear in figures other than in Fig. 30 in sequence beginning at one end of the shaft (adjacent the magazine 51) and advancing to the discharge end adjacent the discharge shelf 895. At the entrance end and also spaced on both sides of the cam 157 and the worm wheel 168 for sprocket 55, the shaft bearings (three in number) are in brackets which are mounted on the table 131 (Figs. 8 and 15). The next bearing is at the rear end of the frame 187 in a bearing box (Fig. 13). Two centrally disposed bearings formed in the frame 187 are located as illustrated in Fig. 16 and further on another bearing is provided at the far or opposite end of the frame 187 (Fig. 24). Next in order are two bearings in brackets carried by the table 803 (Figs. 24 and 30).

The power shaft is next supported in bearings located on each side of the Geneva worm wheel 168, of the center shaft 816 for the sprocket 104 which are carried by the table 818 (Fig. 24). Two bearings are disposed on each side of the housing 823 (Fig. 25). Finally there are two bearings formed in brackets which are mounted on the table 818, these being on either side of the Geneva worm wheel 168 of the end shaft 816 for the sprocket 105 (Fig. 25).

Reference has been made from time to time to various station rock shafts there being such a shaft at each of the stations A, B, C, D, E and F. The manner of actuating these various shafts will now be considered, each rock shaft having the same type of rack connection with one single slide unit. The power shaft 158 carries a bevel gear 921 (Figs. 30 and 32) which meshes with a corresponding gear 922 mounted on the inner end of a short horizontal shaft 923 which is journaled in bearings 924, one bearing being formed in a bracket 925 secured to the housing frame 187, and the other to an auxiliary bracket 926 secured to the bracket 925.

The shaft 923 is formed with an eccentric 928 intermediate the bearings 924 and an eccentric strap 929 operates on the eccentric and is extended forward in an arm 931. Arm 931 is pivotally connected to a pin 932 which is carried in a horizontally disposed slide 933, the latter having movement within slideways formed in the bracket 925. The pin 932 extends inwardly through the guideways of the bracket 925 and is mounted on a depending block 934 carried on the lower end of a horizontally disposed slide bar 935 (see also Fig. 32).

The slide bar 935 has sliding movement within a channel frame 936 which is bolted to the rear side of the housing frame 187. This slide bar extends through the stations A to F, inclusive, and is held down within its slideways by slide gibs 941 secured to the channel member 936. The slide bar 935 is formed on its upper surface with rack sections 942 there being a rack section at each of the stations A to F, inclusive. It is the slide bar 935 that provides a constant reciprocating or back and forth movement under the action of the

eccentric motion imparted by the shaft 923. This forms a driving power for rocking the various station rock shafts.

The station rock shaft 209 is the shaft that receives such oscillation at station A. As illustrated in Figs. 10 and 13, the shaft 209 carries a rack segment 945 the teeth of which mesh with the rack section 942 of the slide bar 935. At the station B its rock shaft 286 is controlled in the same manner but this is not shown in detail, see the parts associated with shaft 209.

At station C the station rock shaft 408 is actuated as illustrated in Fig. 16, where it will be observed that a rack segment 947 is keyed to the shaft 408 adjacent the cam segment 439. The teeth of the rack segment 947 mesh with the corresponding rack section 942 of the slide bar 935. The same construction holds for station rock shaft 468 at station D, and here again no details are shown.

At station E the station rock shaft 705 is moved in the same way. As illustrated in Fig. 21 shaft 705 carries a rack segment 951 the teeth of which mesh with the corresponding rack section 942 of the slide bar 935. The same construction holds for station rock shaft 770 at station F and further details need not be given.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. In an apparatus for assembling and joining parts of fibre containers, the combination of a fibre can body holding element, beading devices for beading an end of said held body to provide an inner shoulder in said body wall, instrumentalities for inserting a fibre can end in the end of said beaded can body and seating the same on said beaded shoulder, and means for joining said inserted can end and said beaded can body by folding inwardly the end of said beaded body wall adjacent said shoulder to lie flat against the peripheral portion of said can end.

2. In an apparatus for assembling and joining parts of fibre containers, the combination of a fibre can body holding element, beading devices for beading an end of said held body to provide an inner shoulder in said body wall, instrumentalities for inserting a fibre can end in the end of said beaded can body and seating the same on said beaded shoulder so that an annular flange end of the body projects beyond said inserted can end, tucking devices for tucking in the corners of said projecting body flange to hold said can end in inserted position, and means for joining said inserted can end and said beaded can body by squeezing the tucked-in body flange and the shouldered section of said beaded body wall onto the edges of said can end.

3. In an apparatus for assembling and joining parts of fibre containers, the combination of a fibre can body holding element, beading devices for beading an end of said held body to provide an inner shoulder in said body wall, instrumentalities for inserting a fibre can end in the end of said beaded can body and seating the same on said beaded shoulder so that an annular flange end of the body projects beyond said inserted can end, tucking devices for tucking in the corners of

said projecting body flange and for drawing in the intermediate body flange wall at an angle to hold said can end in inserted position, a pressing head for pressing together the body wall on both sides of the inserted can end thereby creasing said projecting body flange, and means for joining said inserted can end and said beaded can body by squeezing the tucked-in body flange and the shouldered section of said beaded body wall onto the edges of said can end while reforming the shape of said body bead so that an adhesive interposed in the joined parts finally seals the two parts together.

4. In an apparatus for assembling and joining parts of fibre containers, the combination of a fibre can body holding element, beading devices for beading the end of said held body to provide an inner shoulder adjacent each end in said body wall, instrumentalities for inserting fibre can ends in the ends of said beaded can body and seating the same on said beaded shoulders, and means for joining said inserted can ends and said beaded can body by folding inwardly the opposite ends of said beaded body wall adjacent said shoulders to lie flat against the respective peripheral portions of said can ends.

5. In an apparatus for assembling and joining parts of fibre containers, the combination of a series of operating stations, a conveyor for carrying fibre can bodies from station to station, beading devices at a said station for beading the end of a can body to provide an inner shoulder, end feeding devices at another of said stations for delivering a can end adjacent the beaded end of said can body, inserting instrumentalities at said station for inserting said can end into the end of said body while seating the end on said inner beaded shoulder, and means at still another station for folding inwardly the end of said can body adjacent said shoulder to lie flat against the outer peripheral portion of said inserted can end, whereby to join said can end and body together.

6. In an apparatus for assembling and joining parts of fibre containers, the combination of a series of operating stations, a conveyor for carrying fibre can bodies from station to station, beading devices at a said station for beading the end of a can body to provide an inner shoulder, end feeding devices at another of said stations for delivering a can end adjacent the beaded end of said can body, inserting instrumentalities at said station for inserting said can end into the end of said body while seating the end on said inner beaded shoulder, tucking devices for tucking-in the corners of the can body outside of said inserted end to hold the latter in its seated position, and squeezing means at still another station for joining together said can end and body, said can body remaining in said conveyor during all of the aforesaid operations.

7. In an apparatus for assembling and joining parts of fibre containers, the combination of a magazine for holding tubular fibre bodies in stack formation, conveying means for presenting said bodies to a series of operating stations, feeding devices for removing individual can bodies from said magazine and for feeding them to said conveying means, beading devices at a said station for beading each fed can body adjacent an end thereof, an end magazine for holding fibre can ends in stack formation, end feeding devices for removing individual can ends from said end magazine, inserting instrumentalities at a said station for receiving a can end from said end feeding devices and for inserting it into an end of said

beaded can body and for seating it against the bead thereof, and means for folding inwardly the end of said can body adjacent said shoulder to lie flat against the outer peripheral portion of said inserted can end, whereby to join said inserted can end and said beaded can body together.

8. In an apparatus for assembling and joining parts of fibre containers, the combination of a magazine for holding tubular fibre bodies in stack formation, conveying means for presenting said bodies to a series of operating stations, feeding devices for removing individual can bodies from said magazine and for feeding them to said conveying means, beading devices at a said station for beading one end of a fed can body, other beading devices at another of said stations for beading the opposite end of said body, an end magazine for holding fibre bottom ends in stack formation, a second end magazine for holding fibre top ends, end feeding devices for removing individual bottom ends from said bottom end magazine and for removing top ends from said top end magazine, inserting instrumentalities at two of said stations for receiving bottom and top ends from said end feeding devices and for inserting the bottom end into one end of said beaded can body and the top end in the opposite end of said body, said bottom and top ends being seated against their respective body beads, and means for joining together said inserted can ends and said beaded can body.

9. In an apparatus for assembling and joining parts of fibre containers, the combination of conveying means for presenting open ended can bodies to a series of operating stations, feeding devices for feeding said can bodies to said conveying means, beading devices at certain of said stations for beading each fed can body adjacent its ends, end feeding devices for presenting can ends to both beaded ends of each can body in said conveying means, inserting instrumentalities at certain of said stations for receiving can ends from said end feeding devices and for inserting an end into each beaded end of said can body while seating each end against a said body bead, and means for folding inwardly the opposite ends of said beaded can body adjacent said beads to lie flat against the respective outer peripheral portions of said inserted can ends, whereby to join the latter and said beaded can body together.

10. In an apparatus for assembling and joining parts of fibre containers, the combination of a conveyor for holding and carrying fibre can bodies, a can beading station, a can end inserting station and a sealing station located along the line of travel of said conveyed can bodies, a beading head at said can beading station, a can end inserting instrumentality at said inserting station and a squeezer head at said sealing station, means for moving said can bodies laterally of said conveyor for successively positioning an end of each can body into the several stations and for withdrawing the same after an operation the while said can bodies remain in said conveyor, actuating means applied to said beading head for forming an inside bead extending around said body adjacent its positioned end and leaving a projecting body flange, actuating means applied to said instrumentalities for inserting a can end into said body while seating it on said bead, and actuating means applied to said squeezer head for pressing down the body flange and sealing both flange and bead on said inserted can end.

11. In an apparatus for assembling and joining parts of fibre containers, the combination of a

conveyor for holding and carrying fibre can bodies, a pair of can beading stations, a pair of can end inserting stations and a pair of sealing stations all located along the line of travel of said conveyed can bodies, beading heads at said can beading stations, can end inserting instrumentalities at said inserting stations, and squeezer heads at said sealing stations, means for moving said can bodies laterally of said conveyor first to one side and then to the other for successively positioning alternate ends of each can body into the several stations and for withdrawing the same after an operation the while said can bodies remain in said conveyor, actuating means applied to said beading heads for forming inside beads extending around said body adjacent its positioned ends and leaving a projecting body flange at each end of the body, actuating means applied to said instrumentalities for inserting can ends into each end of said body while seating each end on its said bead, and actuating means applied to said squeezer heads for pressing down the body flanges and sealing both flange and bead on each inserted can end.

12. In an apparatus for assembling and joining parts of fibre containers having a zone of adhesive, the combination of beading devices for beading an end of a can body to provide an inner shoulder in the body wall at said zone of adhesive, instrumentalities for inserting a fibre can end in the body and seating the same on said beaded shoulder, means for heating said body at its inserted end to render said adhesive tacky, means for joining said inserted can end and said beaded can body by squeezing the beaded body wall onto the edges of said can end with the zone of tacky adhesive interposed between the surfaces of the joint, and means for cooling the seam parts of the can to set said adhesive.

13. In an apparatus for assembling and joining parts of fibre containers having a zone of adhesive, the combination of beading devices for beading the ends of a can body to provide an inner shoulder at each end in the body wall at said zone of adhesive, instrumentalities for inserting a fibre can end in each end of the body and seating the same on said beaded shoulder, means for heating said body at its inserted ends to render said adhesive tacky, means for joining each inserted can end and said beaded can body by squeezing the beaded body wall onto the edges of said can end with the zone of tacky adhesive interposed between the surfaces of the joint, and means for cooling the seam parts of the can to set said adhesive and to rigidly hold both ends in permanent position.

14. In an apparatus for assembling and joining parts of fibre containers having a zone of adhesive at an end thereof, the combination of beading devices for beading an end of a can body to provide an inner shoulder in the body wall at said zone of adhesive, instrumentalities for inserting a fibre can end in the body and seating the same on said beaded shoulder so that an annular flange end of the body projects beyond said inserted can end, the inner surface of said flange being coated with said adhesive, tucking devices for tucking in the corners of said projecting body flange to hold said can end in inserted position, a pressing head for pressing together the body wall on both sides of the inserted can end with the adhesive therebetween thereby creasing said projecting body flange, means for heating said body at its inserted end to render said adhesive tacky, means for joining said inserted can end

and said beaded can body by squeezing the creased beaded body wall onto the edges of said can end with the zone of tacky adhesive interposed between the surfaces of the joint, and means for cooling the seam parts of the can to set said adhesive and to rigidly hold the said end in permanent position.

15. In an apparatus for reshaping fibre can bodies, the combination of a magazine for holding tubular fibre bodies in stack formation, an endless conveyor having a plurality of can body holding cradles, means for advancing said conveyor in a step by step movement, feeding devices for removing individual can bodies from said magazine and for placing a can body in a cradle of said conveyor while it is at rest, a beading head located in a beading station adjacent one side of said conveyor for beading the can bodies, a hold down plate for engaging a can body and for holding it down in its conveyor cradle when the body is brought to rest by said conveyor in alignment with said beading head, and slide means for laterally shifting the aligned can body to insert its adjacent end into said beading head while the body is still retained in its cradle and is still held by said hold down plate, said shifting means also withdrawing the beaded can body after its wall has been beaded.

16. In an apparatus for reshaping fibre can bodies, the combination of a magazine for holding tubular fibre bodies in stack formation, an endless conveyor having a plurality of can body holding cradles, means for advancing said conveyor in a step by step movement, feeding devices for removing individual can bodies from said magazine and for placing a can body in a cradle of said conveyor while it is at rest, a plurality of beading heads located on opposite sides of said conveyor and contained within beading stations for beading the can bodies, a hold down plate located adjacent each of said stations for engaging a can body and for holding it down in its conveyor cradle when the body is brought to rest by said conveyor in alignment with the beading head at that station, and slide means located in alignment with each beading head and on the other side of said conveyor for laterally shifting the aligned can body to insert its adjacent end into said beading head while the body is still retained in its cradle and is still held by said hold down plate, said shifting means also withdrawing the beaded can body after its wall has been beaded, the location of adjacent beading heads on opposite sides of said conveyor insuring beading of the can body at both ends.

17. In an apparatus for assembling parts of fibre containers, the combination of an endless conveyor for presenting can bodies to stations for successive operations, said stations being arranged along the path of travel of said conveyor, track means effective on said conveyor for providing proper alignment of the can body at each station, a beading head at a first operating station for beading a wall of said can body when presented thereto, slide means at said beading station for shifting a can body laterally of said conveyor when said body is in proper alignment to position an end of the body in said beading head, and to withdraw the same after the body has been beaded, inserting instrumentalities at a second operating station for inserting a can end into said beaded can body when presented thereto and for seating the can end against said bead, and slide means at said inserting station for

again shifting the beaded can body laterally of said conveyor when said body is in proper alignment with said inserting instrumentalities to position the beaded end of the can body to receive its can end.

18. In an apparatus for assembling can ends with can bodies to produce fibre containers, the combination of an endless conveyor for carrying fibre can bodies, a plurality of operating stations arranged along the path of travel of said can bodies in said conveyor, said stations including duplicate beading stations one on each side of said conveyor and duplicate can end inserting stations also located on opposite sides of the conveyor, slide means opposite each of said stations for alternately positioning first one end and then the other of said can body first into the beading stations and then into the inserting stations while the said body is still held by said conveyor, duplicate beading devices at the two beading stations for successively beading a can body as positioned therein to provide beads at both ends of the body wall, and duplicate can end inserting instrumentalities at the two inserting stations for inserting first a bottom end on the bottom bead of the body and then a top end on the top bead of the body thereby producing a container having both bottom and top ends.

19. In an apparatus for assembling and joining can ends with can bodies to produce fibre containers, the combination of an endless conveyor for carrying fibre can bodies, a plurality of operating stations arranged along the path of travel of said can bodies in said conveyor, said stations including duplicate beading stations one on each side of said conveyor, duplicate can end inserting stations also located on opposite sides of the conveyor, and duplicate sealing stations located in similar manner, slide means opposite each of said stations for alternately positioning first one end and then the other of said can body successively into the several stations while the said body is still held by said conveyor, duplicate beading devices at the two beading stations for successively beading a can body as positioned therein to provide beads at both ends of the body wall, duplicate can end inserting instrumentalities at the two inserting stations for inserting first a bottom end on the bottom bead of the body and then a top end on the top bead of the body the while tucking in the corners of the body wall outside of said inserted bottom and top ends, and duplicate squeezing devices at the two sealing stations for squeezing together and joining the body and end parts thereby producing a container having both bottom and top ends.

20. In an apparatus for assembling and joining can ends with can bodies with a zone of adhesive securing the parts together to produce fibre containers, the combination of an endless conveyor for carrying fibre can bodies, a plurality of operating stations arranged along the path of travel of said can bodies in said conveyor, said stations including duplicate beading stations one on each side of said conveyor, duplicate can end inserting stations also located on opposite sides of the conveyor and duplicate sealing stations located in a similar manner, slide means opposite each of said stations for alternately positioning first one end and then the other of said can bodies successively into the several stations while the said body is still held by said conveyor, duplicate beading devices at the two beading stations

for successively beading a can body as positioned therein to provide beads adjacent two adhesive zones on the inside of the body at either end of the body wall, duplicate can end inserting instrumentalities at the two inserting stations for inserting first a bottom end on the bottom bead of the body and then a top end on the top bead of the body the while tucking in the corners of the body wall at said adhesive zones and outside of said inserted bottom and top ends, a heating chamber through which said conveyor and the

cans carried thereby pass, means for heating the adhesive zones of said can to render the adhesive tacky, and duplicate squeezing devices at the two sealing stations for squeezing together and joining the body and end parts with the zone of tacky adhesive interposed therebetween thereby producing containers having both bottom and top ends securely fastened in place.

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