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[21] Appl. No. **851,420**

[22] Filed **Aug. 19, 1969**

[45] Patented **Aug. 10, 1971**

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[54] **AUTOMATIC HANDLE-APPLYING MACHINE**
10 Claims, 36 Drawing Figs.

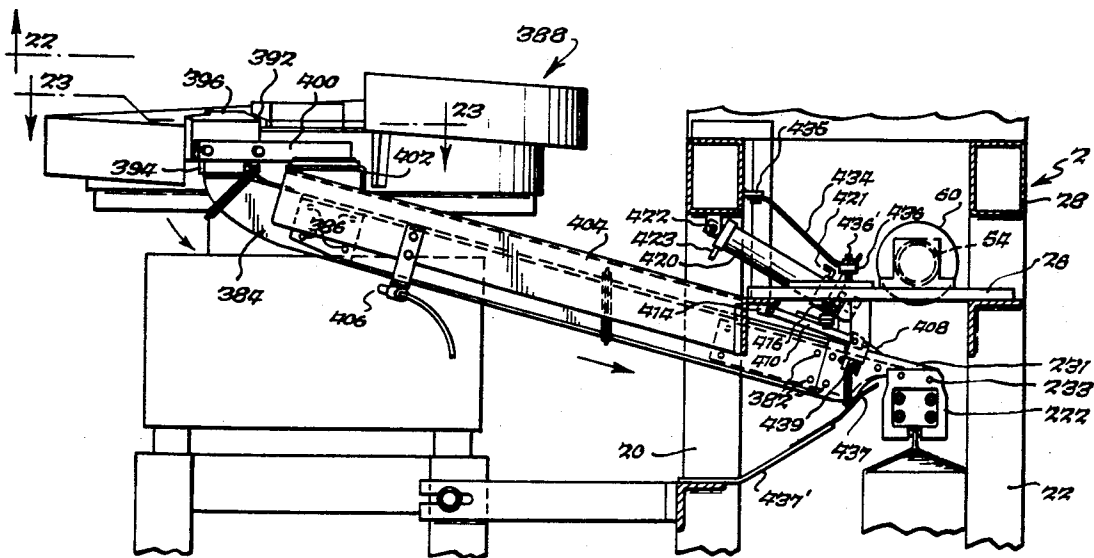
[52] U.S. Cl. **29/208 B,**
29/200 A, 29/211 D, 221/210

[51] Int. Cl. **B23p 19/04**

[50] Field of Search **29/208 B,**
200 A, 200 B, 211 D; 53/134

[56] **References Cited**
UNITED STATES PATENTS
3,525,137 8/1970 Linda et al. 29/208 B

ABSTRACT: An apparatus for feeding and securing a handle to the top of a gable-top container through a hole in the gable. A conveyor feeds each container to a receiving station. The handles, comprising a male member and a female member, are randomly oriented within a vibration hopper. A vibration feeder aligns the handles within the hopper and continuously positions a number of them on a slide beam. An applicator strips the leading handle from the slide beam and feeds it to a mandrel which is located at the receiving station. The mandrel spreads the handle and aligns the male member relative to the hole. The applicator inserts the male member through the hole in the gable of the container. The female member is automatically snapped over the end of the male member which protrudes through the hole to secure the handle to the container.



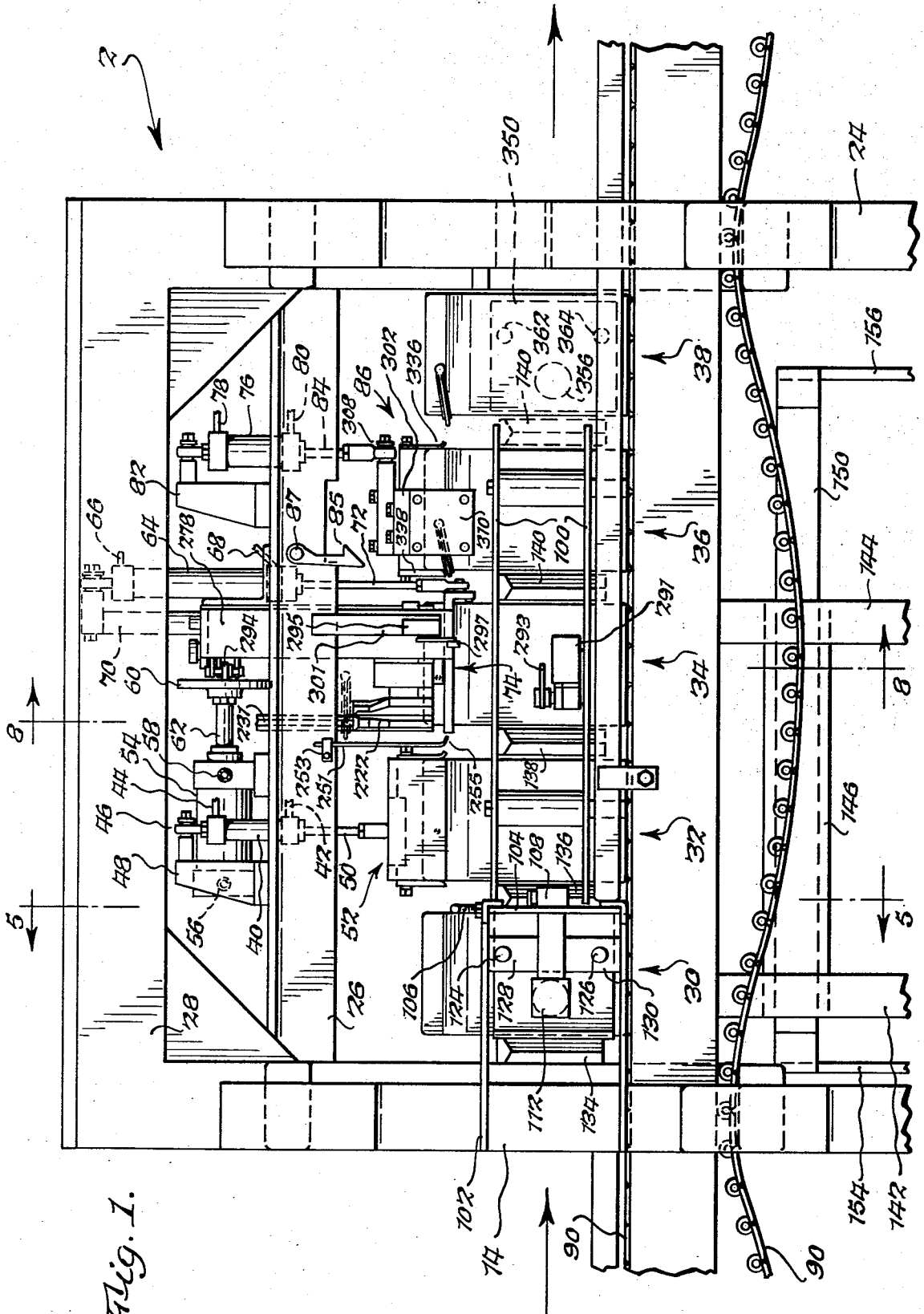


Fig. 1.

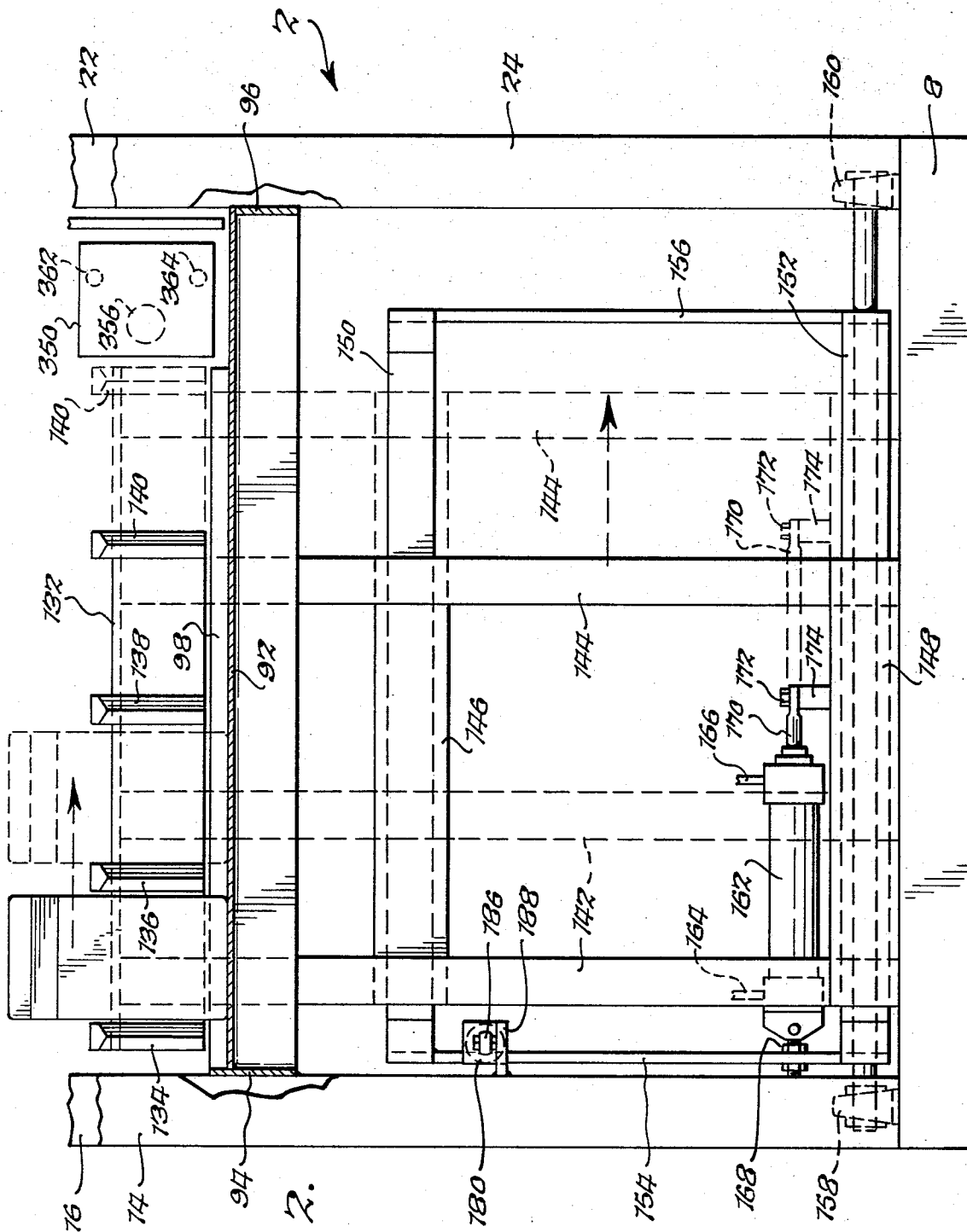
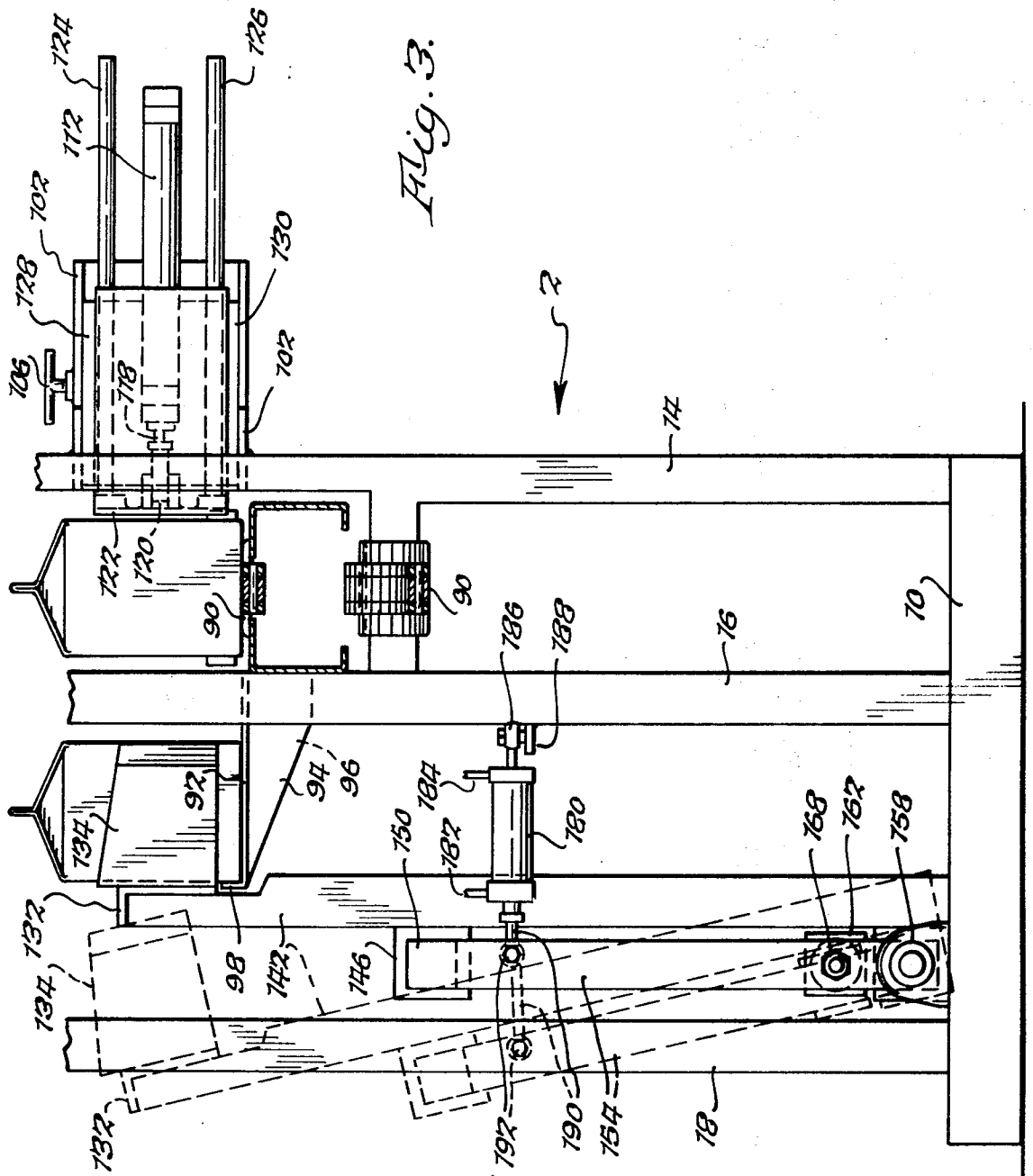


Fig. 2.



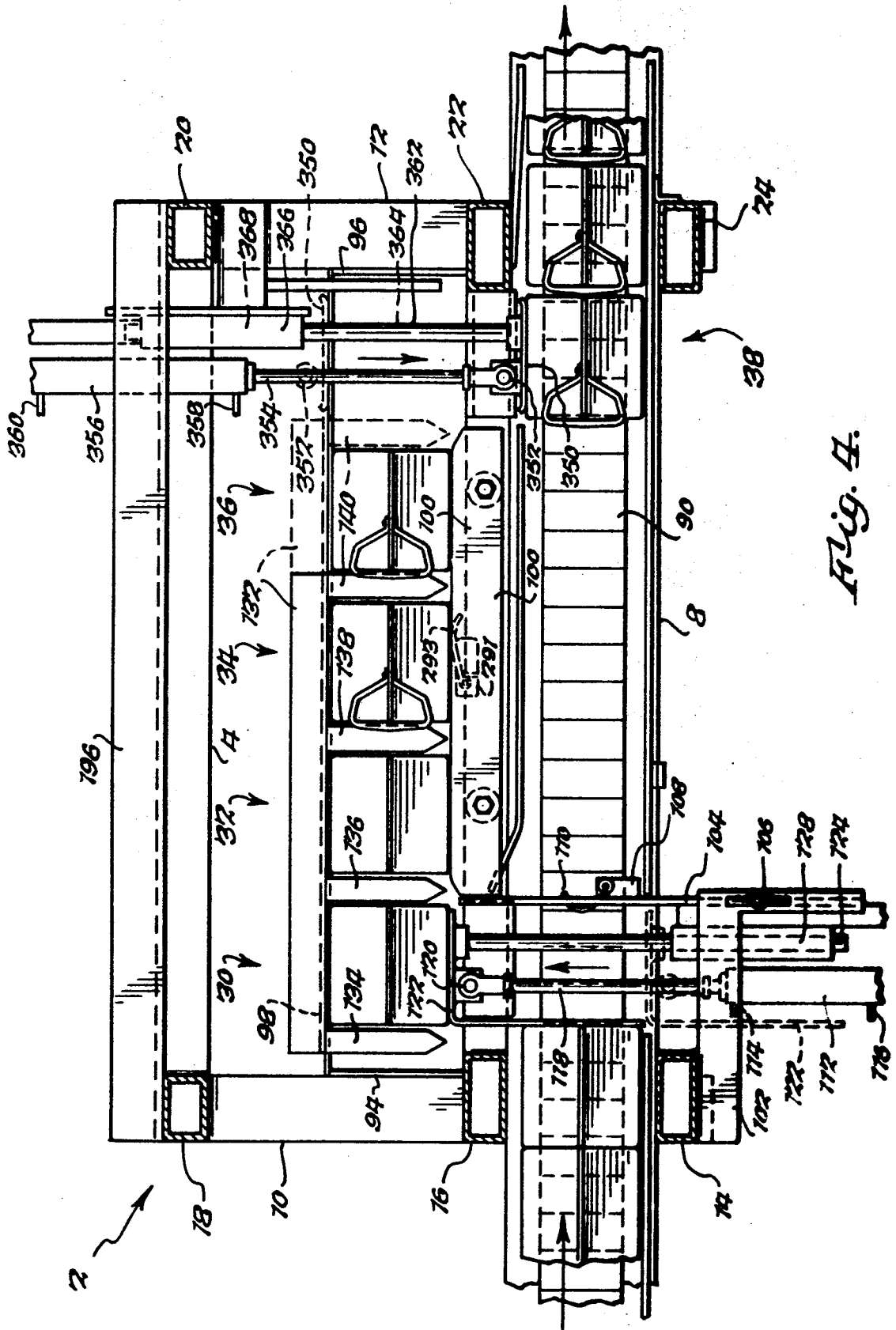


Fig. 4.

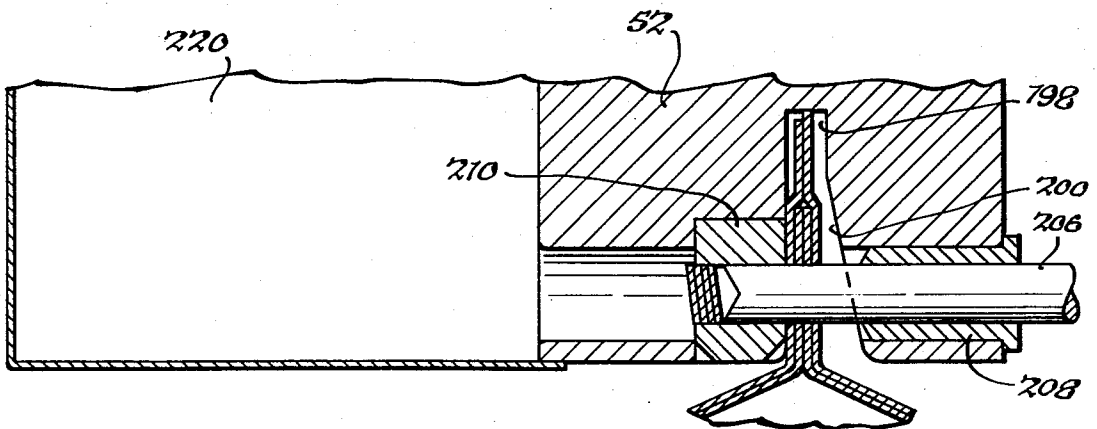
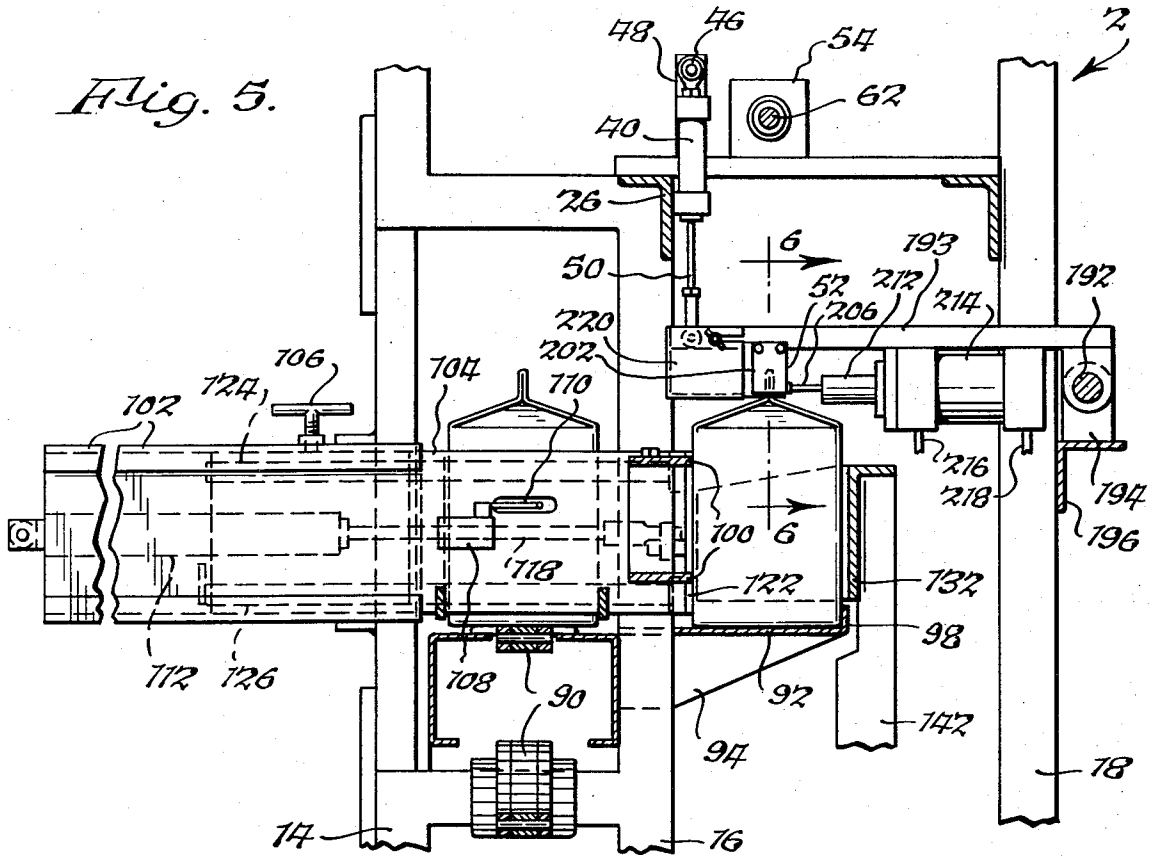


Fig. 7.

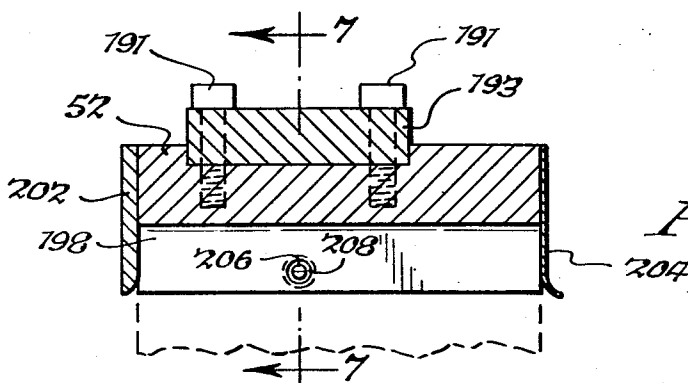


Fig. 6.

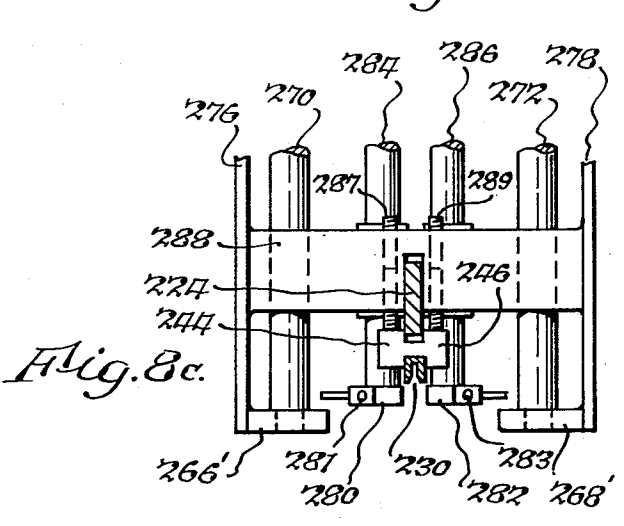
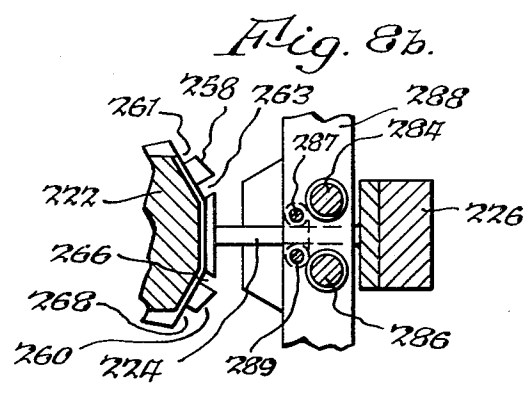
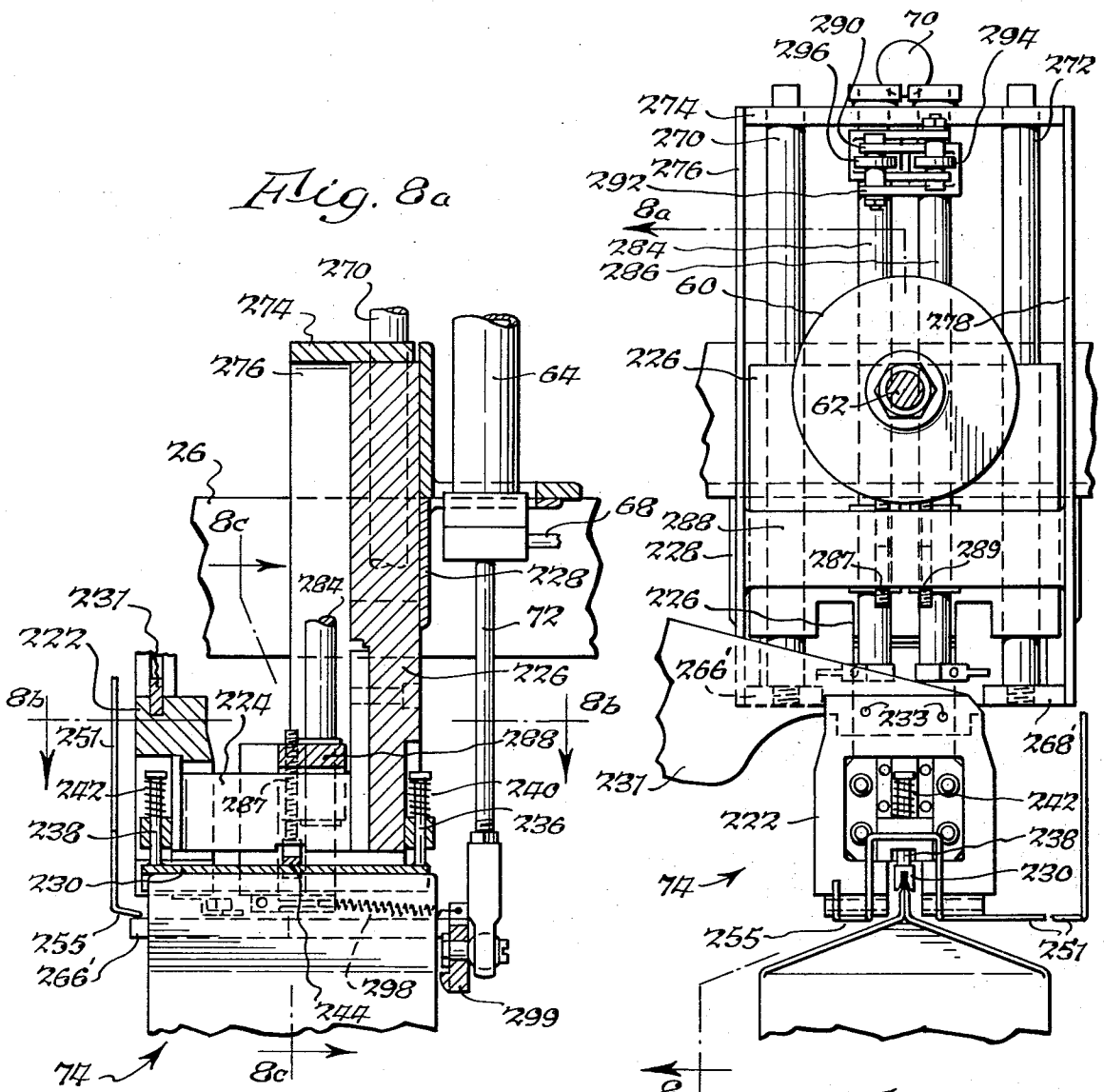
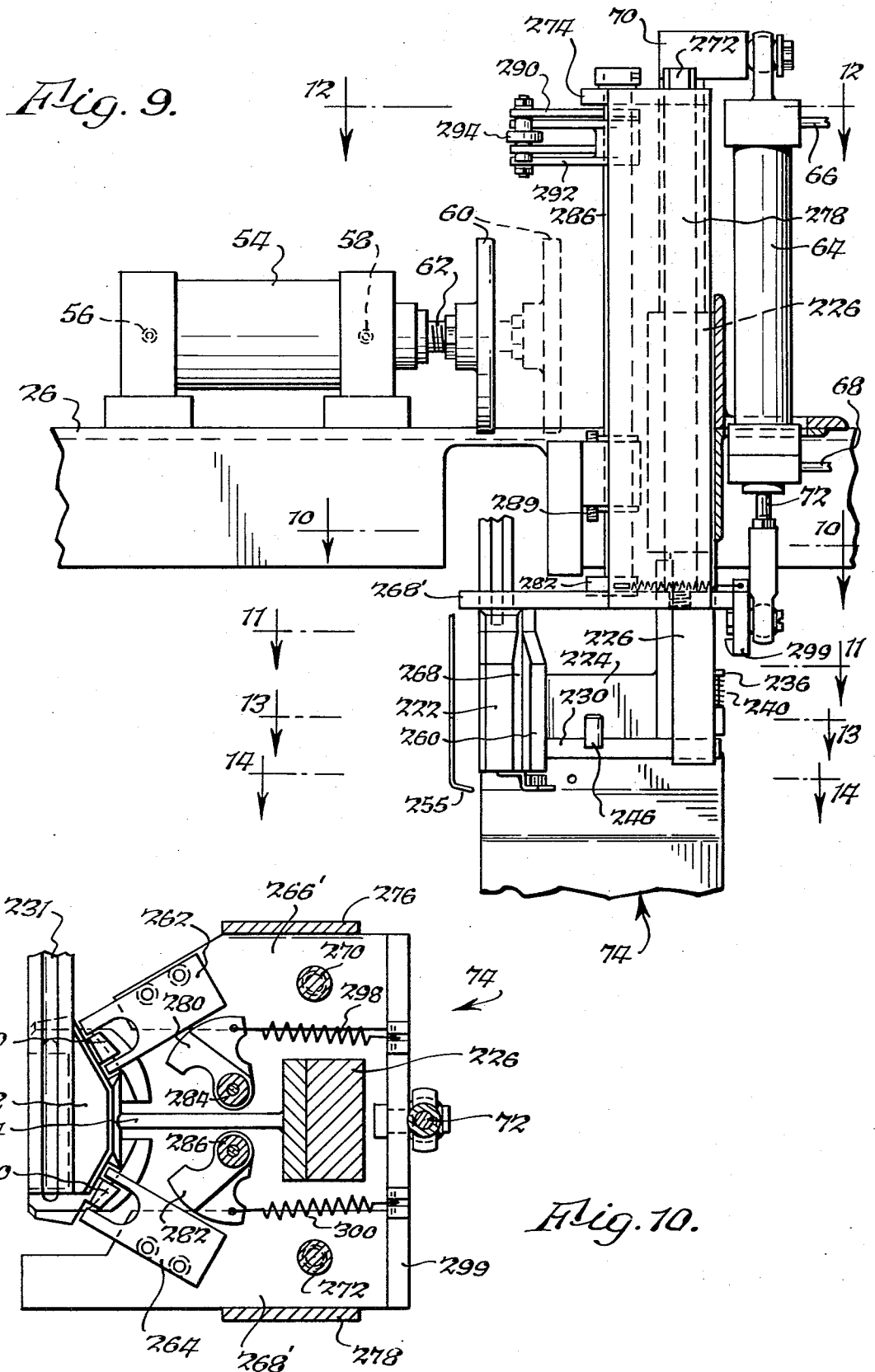


Fig. 8.



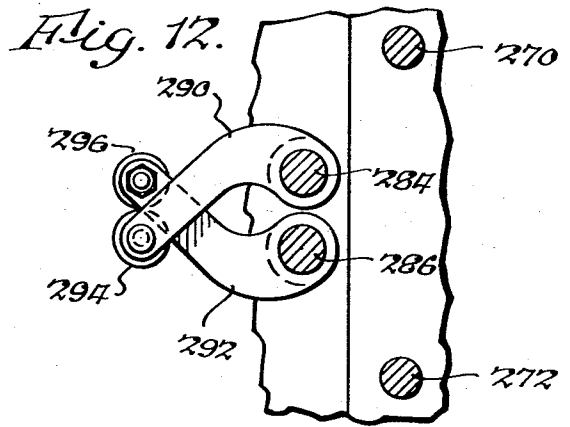
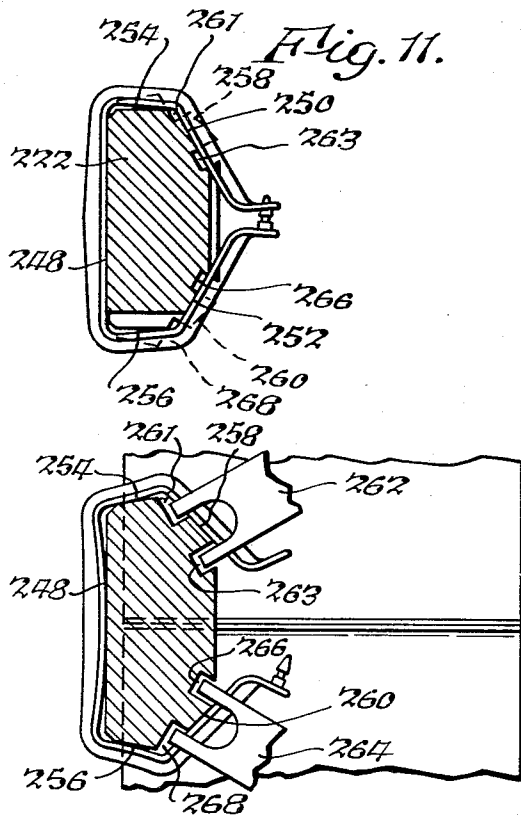


Fig. 13.

Fig. 14.

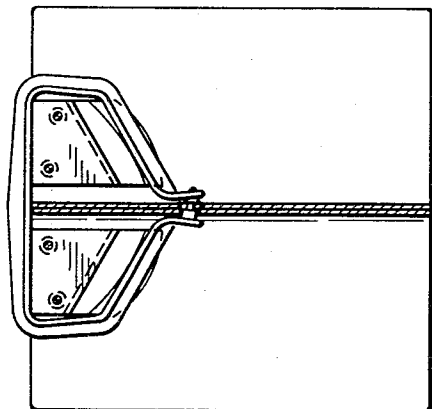


Fig. 15.

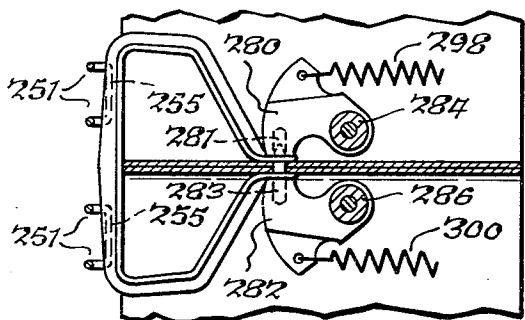
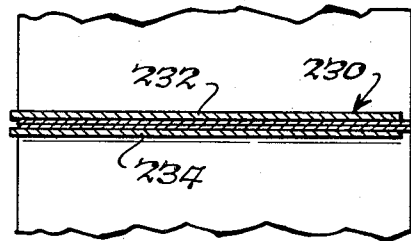
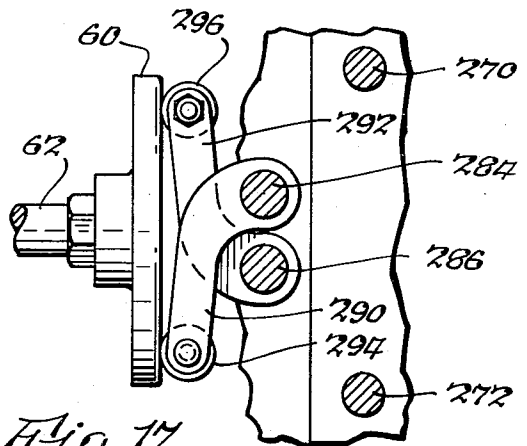


Fig. 17.



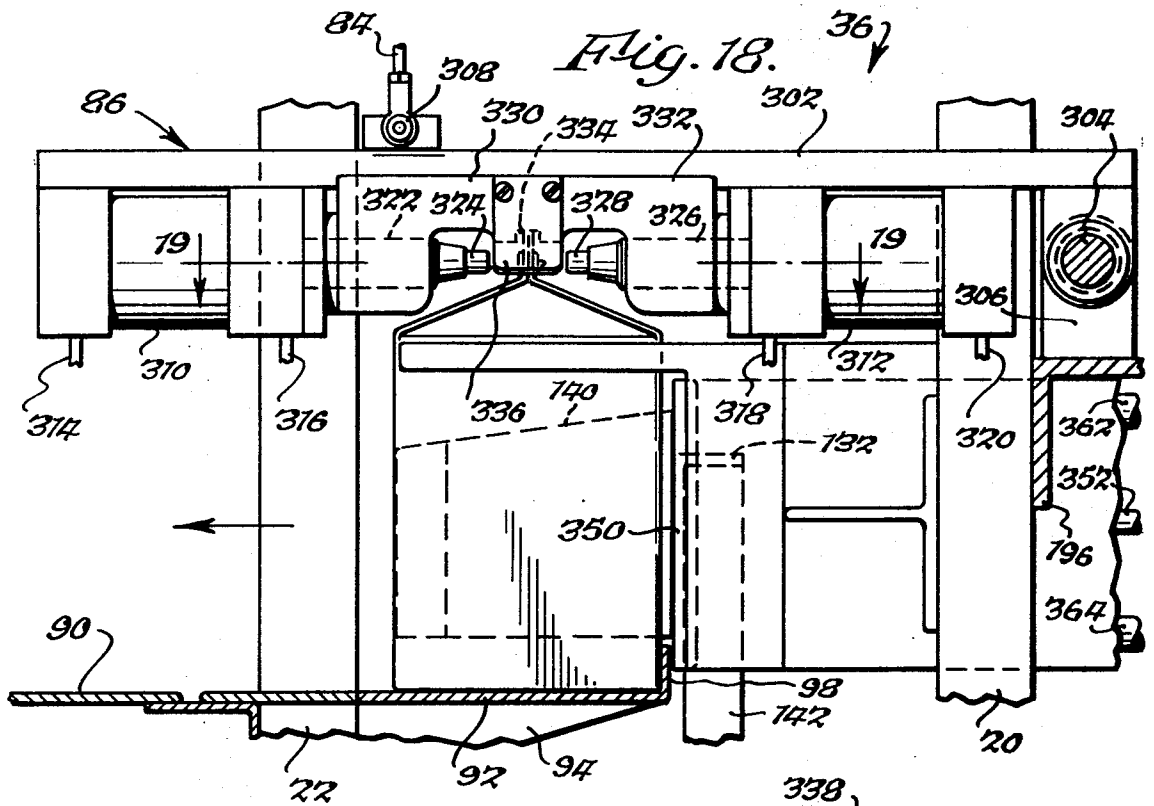


Fig. 20.

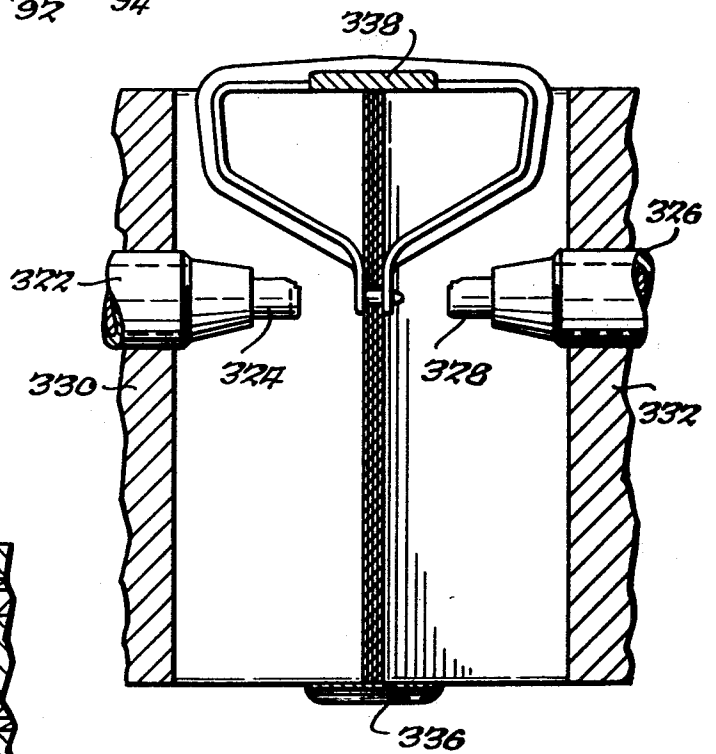
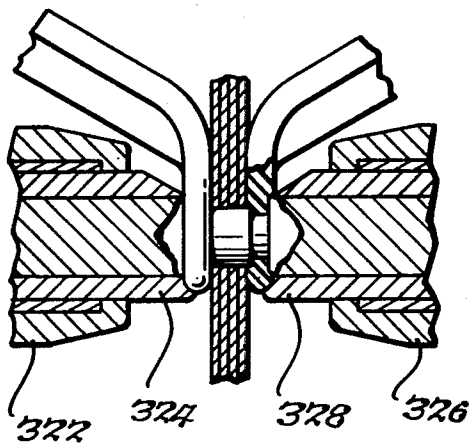
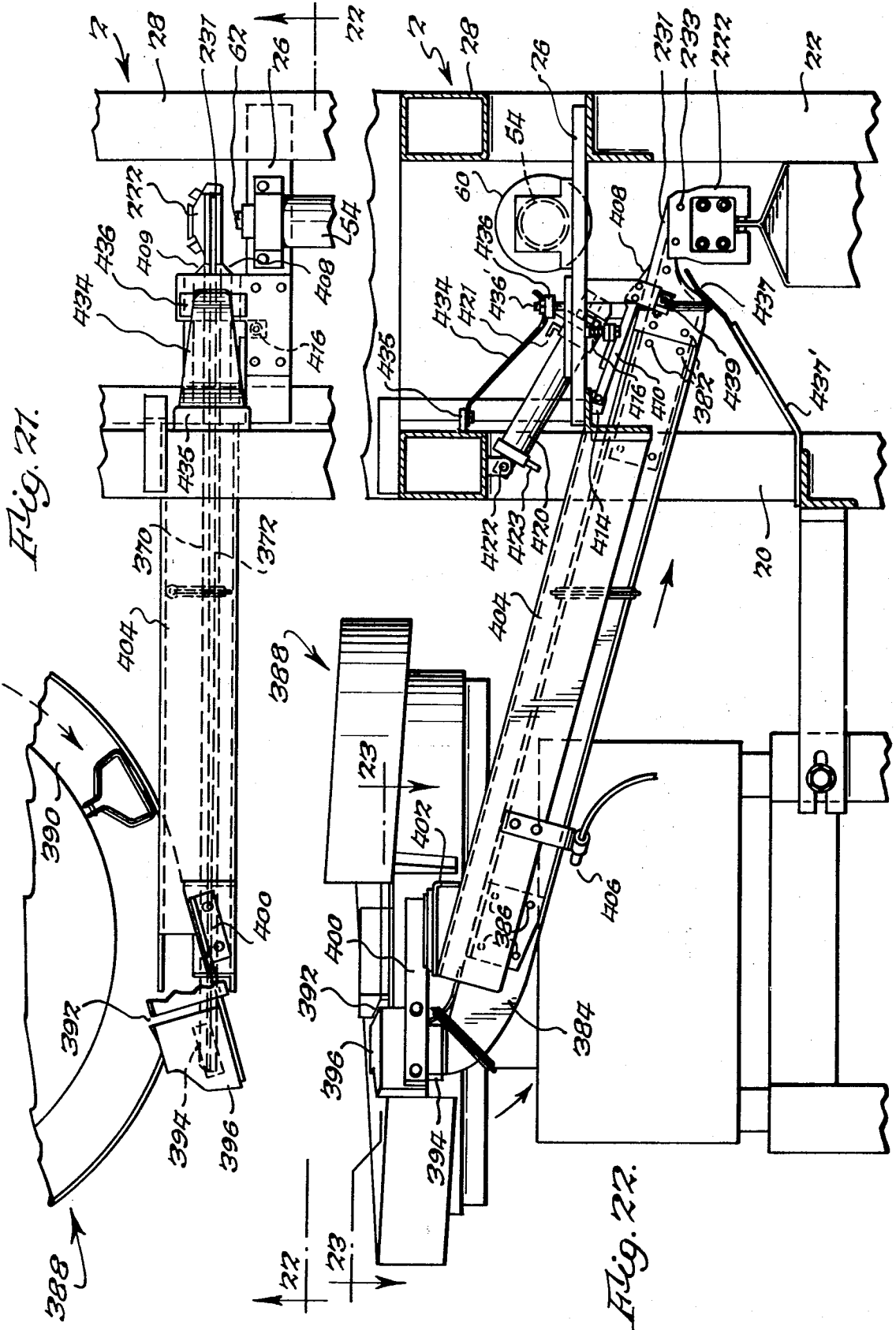
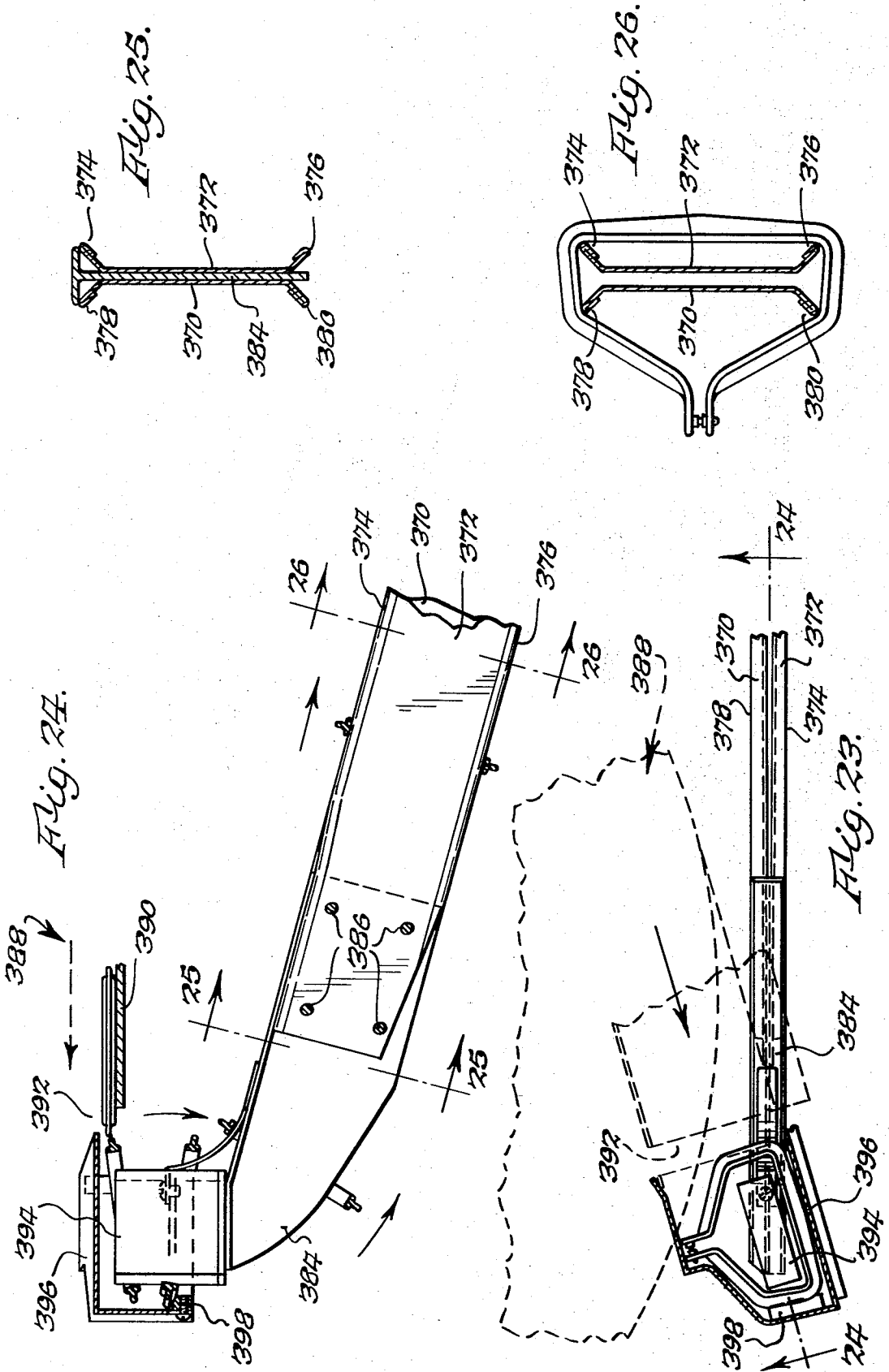


Fig. 19.





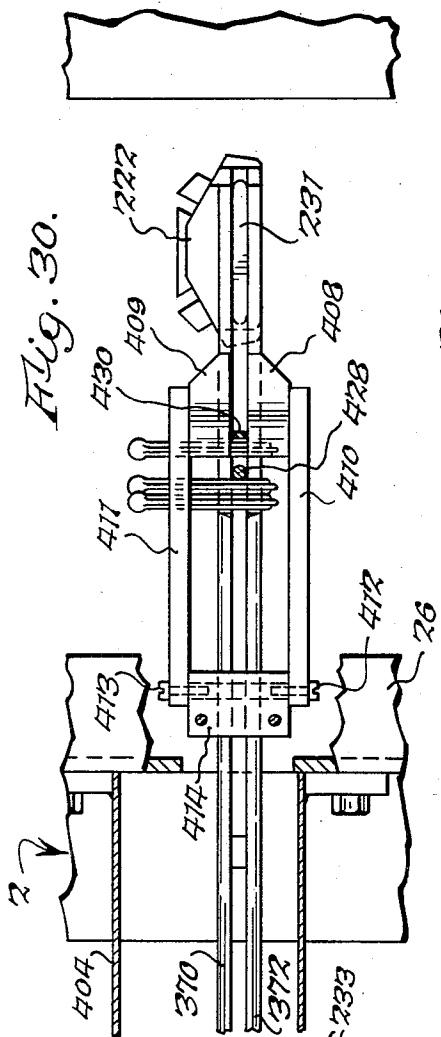


Fig. 26

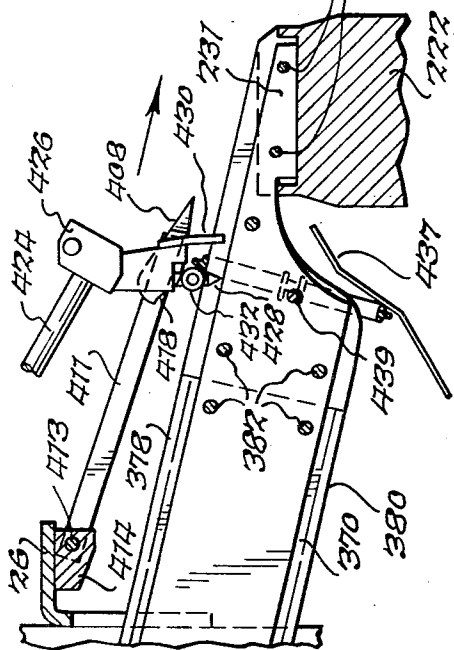


Fig. 27

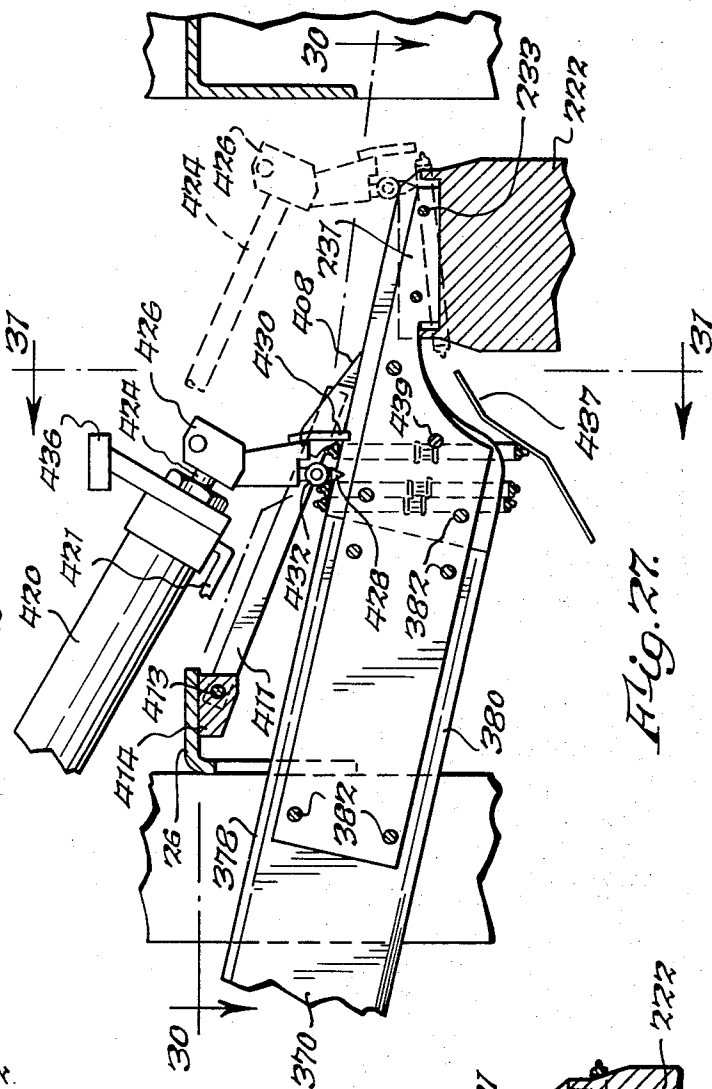


Fig. 28

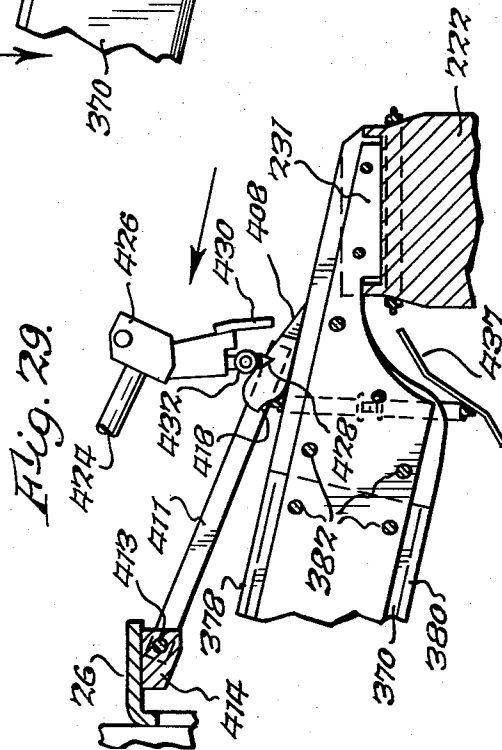


Fig. 29

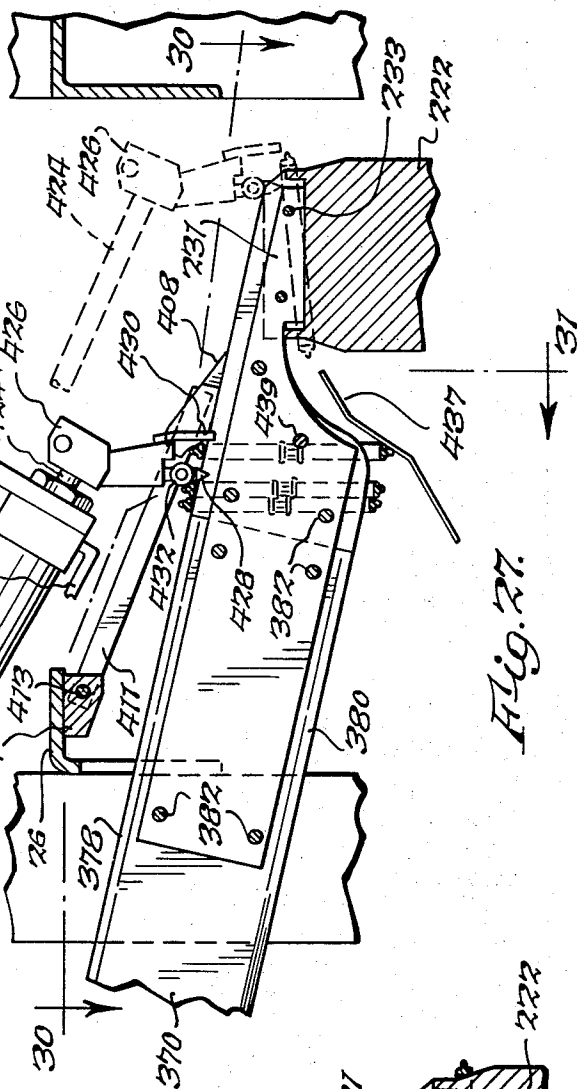


Fig. 30

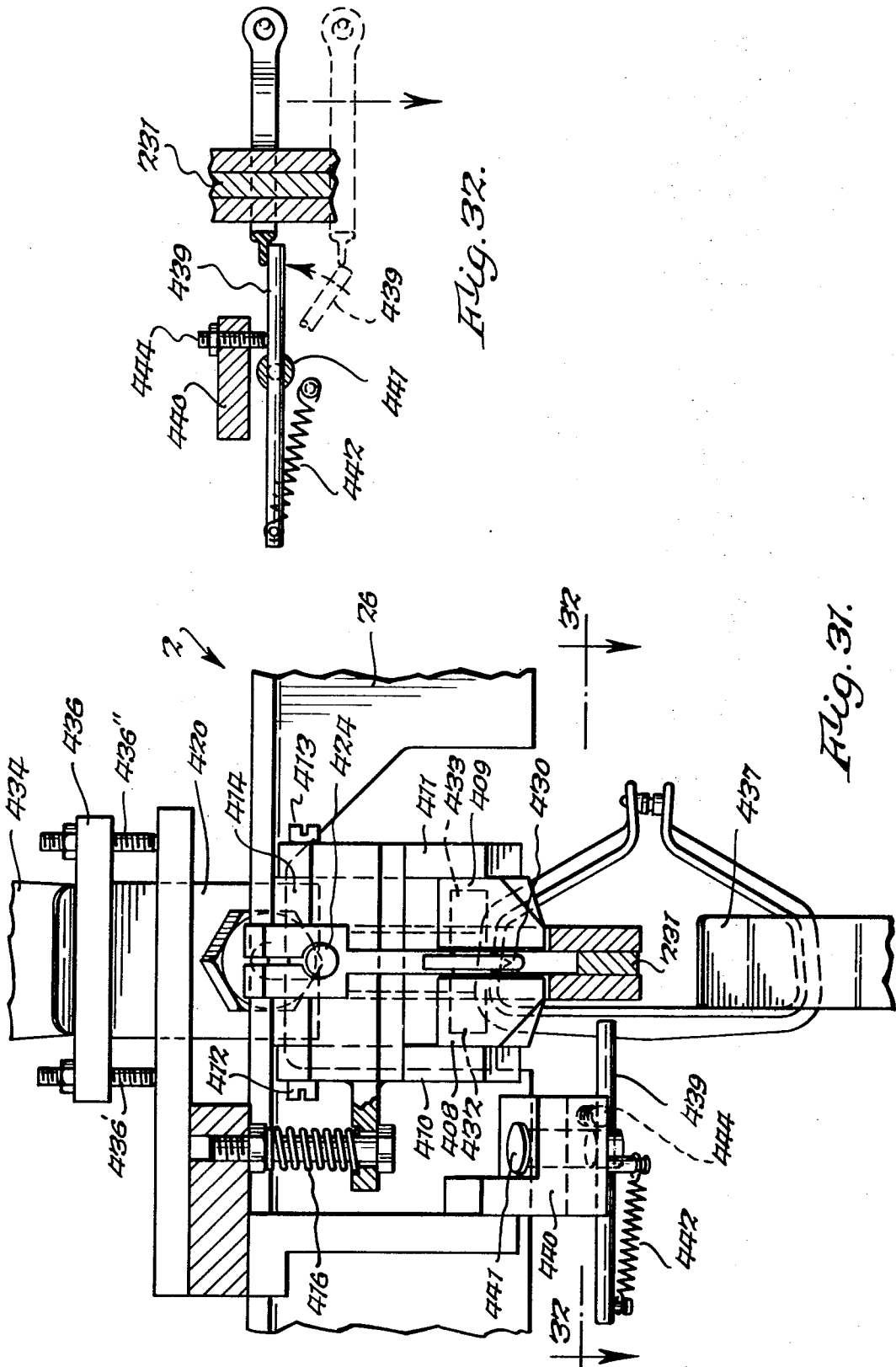
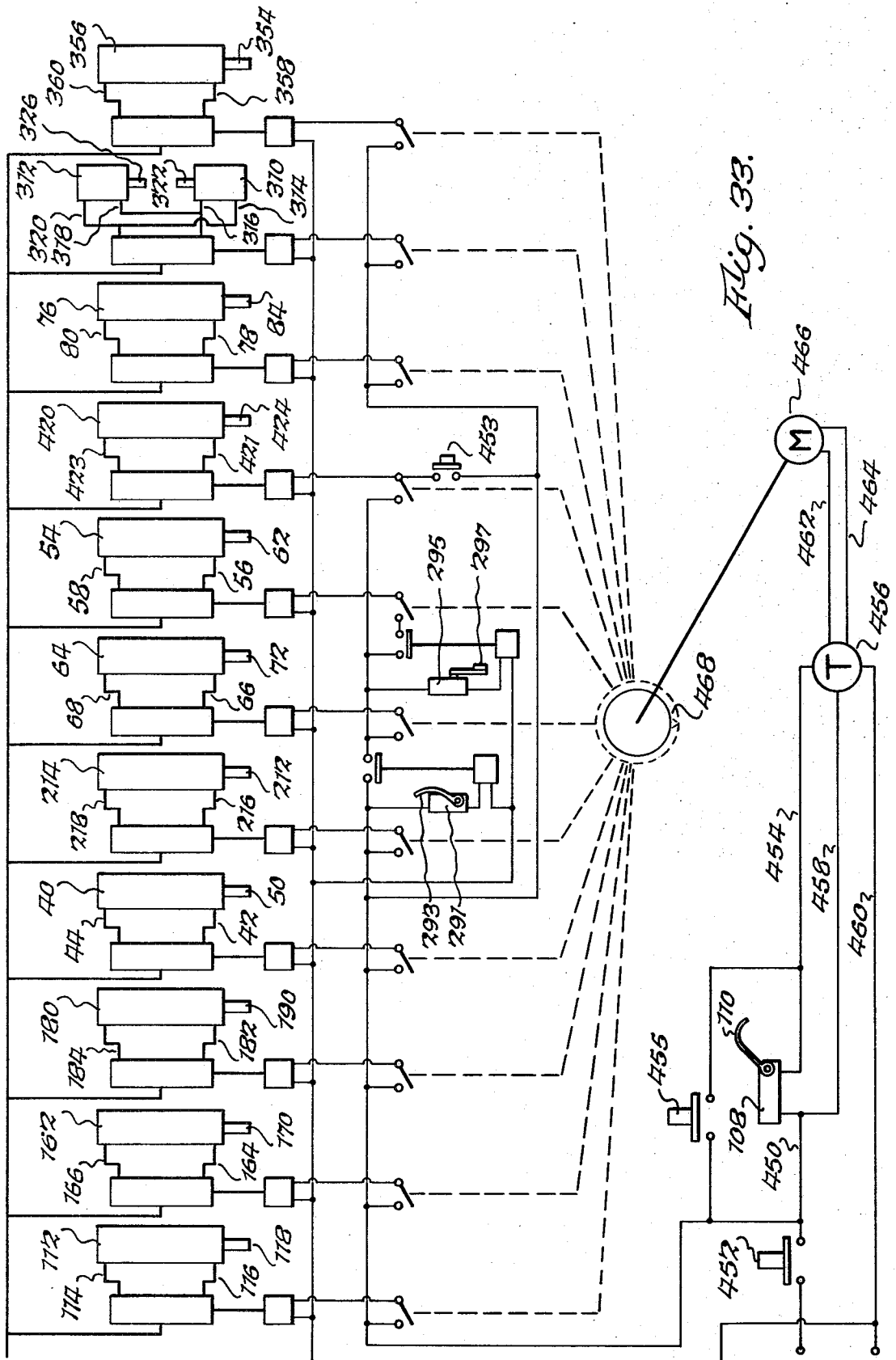


Fig. 32.

Fig. 31.



AUTOMATIC HANDLE-APPLYING MACHINE

This invention relates to a machine for applying handles to containers and, more particularly, to such a machine for automatically applying plastic handles to paperboard containers.

In U.S. Pat. No. 3,525,137, which issued Aug. 25, 1970, there is shown and described a machine for applying plastic handles to paperboard containers for milk, syrup, and other liquids which must be packaged and stored. In such machine, the container gable is punched, the male member of the fastening end of the plastic handle is inserted through the punched hole in the gable, the female member of the fastening end is then snapped over the end of the male member and the end of the male member, projecting beyond the female member, is compressed, locking the plastic handle on the container. Such a handle, locked on the container, makes such container easier to handle, and when the container is opened, makes it easier to pour the contents out of the container.

The handle-applying apparatus of the aforementioned patent is semiautomatic, that is, the container gable is automatically punched and the handle is snapped and locked automatically. However, in such apparatus of the aforementioned patent, the plastic handle is spread and placed on the container and the male member is inserted through the punched hole in the container gable manually. In some operations, for example, where the number of containers to which plastic handles are to be applied is limited or in which the containers, after the handles are applied, are placed in crates or boxes manually, manual placing of the plastic handles on the container is acceptable. Because the number of containers to be filled is limited, and an operator is required to place the containers in the crates or cartons, such operator can, with little difficulty, also manually place the handles on the containers.

In some dairies and container-filling plants, the number of containers filled and process is relatively high. In such plants, the containers, after they are filled, are automatically loaded into crates or cartons. Thus, in such filling plants, an operator is not required to place the containers in crates or cartons and is not otherwise available to put the handles on the containers and insert the male member of the fastener through the punched gable hole. Additionally, the number of containers processed, and the speed required in processing, does not readily lend itself to manual positioning of the handles on the container. Furthermore, because, in most such plants, space is limited, such machine in which the handles are manually placed on the container is too large and not practical.

In the instant invention, the gable of the container is punched, the handles are sorted and fed to the handle-applying station, one-by-one and one after the other, and applied to the container, the male fastening member is inserted through the punched hole in the container gable, and the female member is snapped over the male member. The end of the male member is then compressed and the container, with the handle applied and locked, is fed to the crate or carton loading station. All of this is accomplished in a fully automatic operation.

In the instant apparatus, the plastic handles are shipped to the filling plant, loose and in a box and are dumped into a vibrating feeder hopper from which the handles are fed, one after the other. From the vibrating feeder hopper, the handles fall onto an inclined feeding beam and slide, by gravity, down such beam, to the handle applicator. At such applicator, the leading-most handle on the beam is stripped from the beam, fed onto a mandrel, the male and female handle-attaching members are spread over the container gable, and aligned with the punched hole in the gable. In order that this might be done, the gable is depressed. The male member is inserted through the punched hole in the gable and the female member is snapped over the projecting end of the male member.

While the machine of the instant application is in operation, a supply of handles is maintained on the slide beam. Thus, interrupted feed of handles from the vibrating feeding hopper,

which feed is not uniform and, from time to time, might be jammed by handles accumulating at the hopper discharge, does not interfere with, or interrupt, the automatic operation of the instant handle-applying apparatus. This is of substantial importance because, once a hole has been punched in a gable of the container, a handle must be applied because, if it is not, such container may leak.

The handles applied to the container by the apparatus of the instant invention are plastic and because they are plastic, such handles are not always uniform. The handles may be twisted or warped, the male and female attaching members may be misaligned, the handles may not be flat and such handles may vary, one from the other, in a variety of ways. Such variations can, of course, adversely affect sorting, feed and application of the handles. For example, in the vibration sorting and feeding hopper, a warped or distorted handle can, and often does, block the sorting and feed of the handles, one after the other, from the vibration feeder hopper. In the instant invention, and for reasons more apparent hereinafter, distortion of the handle and misaligning of the male and female attaching members, once the handle has been fed out of the vibration feeder hopper, does not jam, or interfere with, the feed, positioning or attachment of the handle to the container gable. The availability of a number of handles on the feed beam in the instant apparatus, between the vibration feeder hopper and handle application, is of substantial importance to the overall operation of the instant automatic machine. This supply of handles, on the feed beam, permits continued operation of the handle applicator when a jam does occur in the vibrating feeder hopper and permits the filling machine operator, or other operator normally required to oversee other operations in the vicinity of the instant machine, to clear the jam in the vibration feeder hopper without interruption of the feed of containers to the handle applicator and without punched containers passing through the handle applicator and not receiving a handle.

The instant invention will be more fully understood from the following description and attached drawings in which:

FIG. 1 is an elevational view taken from the front, or conveyor side of the instant apparatus;

FIG. 2 is an elevational view, taken from the front of the apparatus, of the lower part of the apparatus of FIG. 1, with parts omitted, to show the carton feed mechanism;

FIG. 3 is a side elevational view, taken at 3-3, FIG. 1, and showing, in full and broken line, certain parts of the carton feed mechanism of FIG. 2;

FIG. 4 is a top plan view, with certain parts omitted, to show the container feed at various stations;

FIG. 5 is a view, partly in section, taken at the punching station in the direction of the machine toward the infeed end;

FIG. 6 is a sectional view of the punch head taken at 6-6, FIG. 5;

FIG. 7 is a sectional view transverse the punch head taken at 7-7, FIG. 6;

FIG. 8 is a view, partly in section, taken at the handle feed and attaching station in the direction of carton feed, i.e., toward the outfeed end of the apparatus;

FIG. 8a is an enlarged sectional view taken at 8a-8a, FIG. 8;

FIG. 8b is a sectional view taken at 8b-8b, FIG. 8a;

FIG. 8c is a sectional view taken at 8c-8c, FIG. 8a;

FIG. 9 is a side view, partly in section, of the handle feed and attaching station of FIG. 8;

FIG. 10 is an enlarged view, partly in section, taken at 10-10, FIG. 9;

FIG. 11 is an enlarged view, partly in section, taken at 11-11, FIG. 9;

FIG. 12 is an enlarged view, partly broken away and partly in section, taken at 12-12, FIG. 9;

FIG. 13 is an enlarged view, similar to FIG. 11, but taken at 13-13, FIG. 9;

FIG. 14 is an enlarged view taken at 14-14, FIG. 9;

FIG. 15 is an enlarged view of the carton top showing the carton gable in the gable depressor;

FIG 16 is an enlarged view but showing the handle-snapping jaws, with the handle attachment snapped;

FIG. 17 is an enlarged view, similar to FIG. 12 but showing the snap applicator actuator in the closed position;

FIG. 18 is a view, partly in section, taken at the cold heading station in the direction of the machine toward the infeed end;

FIG. 19 is an enlarged view, partly in section, taken at 19-19, FIG. 18;

FIG. 20 is a view, partly broken away and enlarged, of a portion of the cold heading apparatus of FIG. 19 but showing the cold heading heads in engagement with the handle attachment on the carton gable;

FIG. 21 is a top plan view of the handle slide beam feeder;

FIG. 22 is a side elevational view of the slide beam feeder, taken at 22-22, FIG. 21;

FIG. 23 is a sectional view, taken at 23-23, FIG. 22;

FIG. 24 is a sectional view, taken at 24-24, FIG. 23;

FIGS. 25 and 26 are sectional views, taken at 25-25 and 26-26, FIG. 24, respectively;

FIG. 27 is an enlarged side elevational view of the feed end of the handle slide beam feeder of FIG. 21;

FIG. 28 is a view similar to FIG. 27 but showing the feed operation of the handle;

FIG. 29 is a view similar to FIG. 28 but showing a further feed operation;

FIG. 30 is a view taken at 30-30, FIG. 27;

FIG. 31 is a view taken at 31-31, FIG. 27;

FIG. 32 is a view taken at 32-32, FIG. 31; and

FIG. 33 is a schematic diagram of the electrical and fluid control circuitry of the instant apparatus.

Referring to the drawings, particularly FIGS. 1 to 4 thereof, the apparatus of the present invention includes a frame, generally designated 2, having bottom frame members 4, 6, 8, 10, 12, FIG. 4, vertical members 14, 16, 18, 20, 22, 24, intermediate member 26 and upper frame member 28, FIG. 1. The apparatus includes an infeed station, generally designated 30, a punching station, generally designated 34, a cold heading station, generally designated 36, and an outfeed station, generally designated 38. Double acting punching station actuating cylinder 40, having fluid inlets-outlets 42, 44, is pivotally mounted, at 46, to support 48 mounted intermediate member 26. Piston rod 50 of the piston of double-acting cylinder 40 is connected to punching head, generally designated 52. Snap lock double-acting cylinder 54, having fluid inlets-outlets 56, 58, is mounted on intermediate member 26. Snap lock actuating disc 60 is attached to the end of piston rod 62 of piston in double-acting cylinder 54, for purposes later described.

Handle feed head double-acting cylinder 64, having fluid inlets-outlets 66, 68, is mounted on support 70. Piston rod 72 of piston of double-acting cylinder 64 is connected to the handle applicator, generally designated 74. Double-acting cylinder 76 having fluid inlets-outlets 78, 80 is mounted on support 82 attached to intermediate member 26. Piston rod 84 of the piston of double-acting cylinder is connected to the cold header, generally designated 86. For purposes later described hook 85 is pivotally attached, at 87, to intermediate frame member 26.

As best shown in FIGS. 3 and 4, endless conveyor 90, driven from a source, not shown, passes between vertical frame members 14, 16 and 22, 24, delivering filled containers to the infeed end of the automatic handle-applying apparatus of the instant invention and conveying containers from the outfeed end of the apparatus, as will be more fully described herein. With particular reference to FIGS. 2 and 3, apparatus container support shelf 92 is mounted behind vertical supports 16, 22 and is connected thereto by angle braces 94, 96. Shelf 92 has extending, along its back edge, lip 98. Container guide 100, FIG. 4, extends along the front of the apparatus, between infeed station 30 and outfeed station 38. Shelf lip 98 and container guide 100 guide the containers between infeed and outfeed stations in the manner as later described herein.

Referring to FIGS. 3 and 4, pusher support 102 is mounted on vertical frame member 14, such as by welding, and con-

tainer stop plate 104 is slidably mounted thereon and locked in its advanced position across conveyor 90, or in its retracted position, by locking screws 106. Switch 108 is mounted on the back of stop plate 104, with switch-actuating arm 110 of switch 108 projecting through plate 104, for purposes hereinafter described. Pusher double acting cylinder 112, having fluid inlets-outlets 114, 116, is mounted on pusher support 102. Piston rod 118 of the piston of double-acting cylinder 112 is pivotally connected, at 120, to L-shaped pusher plate 122. The bottom of L-shaped pusher plate 122, when double-acting cylinder 112 is actuating, pushes a carton from conveyor 90 onto shelf 92 and the leg portion of L-shaped pusher plate 122 stops the following container, for purposes more apparent in the following description. Guide bars 124, 126 are connected, at their end, to the foot of L-shaped pusher plate 122 and are guided in guide blocks 128, 130, fixed to pusher support 102.

As best shown in FIGS. 2 and 3, carton feeder plate 132, having carton-engaging shoes 134, 136, 138, 140 affixed thereto, is mounted at the ends of feeder plate arms 142, 144. Feeder plate arms 142, 144 are interconnected, by feeder plate arm sleeves 146, 148, slidably mounted on transverse rocker arm members 150, 152, fixed at their ends to vertical rocker arms 154, 156. Vertical rocker arms 154, 156 which, together with transverse members 150, 152 form a rigid rocker frame, are mounted in bearings 158, 160, the rigid rocker frame, along with carton feeder plate 132, shoes 134, 136, 138, 140, feeder plate arms 142, 144 and feeder plate arm sleeves 146, 148, slidably mounted on transverse rocker arm members 150, 152, pivot about bearings 158, 160 between the full and phantom line positions, FIG. 3, all for purposes more apparent hereinafter.

Referring to FIG. 2, double acting cylinder 162, having fluid inlets-outlets 164, 166, is pivotally connected, at 168, to vertical rocker arm 154. Piston rod 170 of the piston of double-acting cylinder 162 is pivotally connected, at 172, to support 174 fixed to feeder plate arm sleeve 148.

Double-acting cylinder 180, FIG. 3, having fluid inlets-outlets 182, 184, is pivoted at 186, to bracket 188, fastened, as by welding, to vertical frame member 16. Piston rod 190 of the piston of cylinder 180 is pivotally connected, at 192, to vertical rocker arm 154. As shown in full and phantom lines, FIGS. 2 and 3, double-acting cylinder 162 moves carton feed plate 132 with shoes 134, 136, 138, 140 longitudinal along rocker arm members 150, 152 and cylinder moves the feed plate and shoes through an arc.

Punching head 52, FIG. 5, is fastened, by capscrews 191, to arm 193, FIG. 6, pivotally mounted, at 192, on support 194 fastened, as by welding, to angle member 196 in turn fastened, as by welding, at one of its ends to vertical frame member 18 and, at its other end, FIG. 18, to vertical frame member 20. Punching head 52, FIGS. 5, 6 and 7, has a longitudinally extending slot 198, tapered at 200 and closed at one of its ends by plate 202 and, at its other end, by leaf spring 204, FIG. 6. As best shown in FIG. 7, punch 206, guided in bushing 208 in punch head 52 at one side of slot 198 and by die 210, at the other side of the slot, is fixed to the end of piston rod 212 of double acting cylinder 214, having fluid inlets-outlets 216, 218. Double-acting cylinder 214 is mounted on arm 193. Slug collection box 220 snaps onto the end of head 52 and arm 193 to receive the slug punched from the gable of the container but, if desired, may be omitted.

Handle applying mandrel 222, FIGS. 8, 9 and 10, is fastened to the end of mandrel support 224 attached, as by for example, screws, not shown, to the bottom of block 226, in turn attached, as by for example, screws, not shown, to frame cross-member 228. Lower handle slide beam plate 231 is attached, as by for example, pins 233, to mandrel 222. Gable depressor 230, having sidewalls 232, 234, FIG. 15, flared outwardly at their entrance end for receiving the carton gable, is attached to the end of mandrel support 224 by pins 236, 238 and compression springs 240, 242. Pins 236, 238 and compression springs 240, 242 normally hold gable depressor 230 upward,

in engagement with the lower end of mandrel support 224. Pins 244, 246, at the opposite sides of gable depressor 230, in cooperation with elements to be described, move gable depressor 230 downwardly, away from the end of mandrel support 224, to depress the carton gable, for reasons more apparent hereinafter.

As best shown in FIGS. 11 and 13, the grip portion of the handle engages one surface 248, of mandrel 222 and the angular portions of the handle, connecting the grip portion and sides of the handle with the snap and locking handle fastener, engage angular sides 250, 252 of the mandrel, respectively. Spring guide 251, FIGS. 1, 8 and 11, is fastened at 253 intermediate frame member 26, extends down the face of mandrel 222 and at its bottom end, at 255 extends inwardly toward mandrel 222 to guide and support the handle as the handle is being applied and snap locked on the carton. The opposite ends 254, 256 of mandrel 222 taper, downwardly, from the top, or handle-receiving end of the mandrel, to the bottom, or handle opening end. Angular sides 250, 252 of mandrel 222, each have an outwardly and downwardly tapering extension 258, 260, with grooves 261, 263 and 266, 268 extending downwardly along the opposite sides of tapering extensions 258, 260, respectively. As shown in FIGS. 10 and 13, handle engaging fingers 262, 264 are cut out, at their ends, to project into the mandrel grooves and straddle extensions 258, 260, respectively.

Fingers 262, 264 are a part of handle applicator 74 which includes plates 266, 268 to which such fingers are bolted, rods 270, 272 which are threaded, at their lower ends, FIGS. 8 and 10, to plates 266, 268, upper transverse plate 274 bolted to the top of rods 270, 272, FIG. 8, and side plates 276, 278 attached, as by for example, welding, at their upper ends to the ends of plate 274 and, at their lower ends, FIG. 10, to plates 270, 272, respectively. Rods 270, 272 pass through block 226 and are guided therein as handle applicator 74 is moved up and down by double-acting cylinder 64, as hereinafter described.

Referring still to FIGS. 8, 9, 10 and, additionally, to FIGS. 12, 16 and 17, snap lock jaws 280, 282, having female recesses 281, 283, FIG. 16, respectively, are fastened to the lower ends of snap lock shafts 284, 286. Shafts 284, 286 pass through, and are rotatable in, support 288, fixed, as by for example, welding, to sideplates 276, 278, FIG. 8. Snap lock jaw operators 290, 292 are fixed to the upper ends of shafts 284, 286, respectively. Roller 294 is mounted, for rotation, at the end of operator 290 and roller 296 is similarly mounted at the end of operator 292. Spring 298 is connected, at one end to jaw 280 and, at its opposite end, to plate 299 fixed, as by for example, welding, to the ends of plates 266, 268 and spring 300 is similarly connected to jaw 282. As will be described in further detail in the operation of the apparatus, springs 298, 300 hold jaws 280, 282 open and the jaws are closed by engagement of actuating disc 60 with rollers 294, 296.

Pins 287, 289 are threaded in support 288 and are adjusted therein so that, as the handle is stripped from mandrel 222, pins 287, 289 engage pins 244, 246, on gable depressor 230, to depress the gable to receive the male member of the handle attachment Switch 291, FIGS. 1 and 4, having switch arm 293 is mounted on guide 100 and switch 295 having switch arm 297 is mounted on support 301 fastened to intermediate frame member 26.

Referring to FIGS. 18, 19 and 20, cold heading station 36 includes beam 302, pivotally mounted, at 304, on support 306 fixed, as by for example, welding, to angle member 196. Piston rod 84 of double-acting cylinder 76 is pivotally connected, at 308, to beam 302 for pivoting beam 302 about pivot 304, as later described.

Cold heater die-actuating cylinders 310, 312, are mounted on beam 302. Double acting cylinder 310 has fluid inlets-outlets 314, 316 and, cylinder 312, fluid inlets-outlets 318, 320. Piston rod 322 of the piston of double-acting cylinder 310 is connected to cold heading die 324 and piston rod 326 is connected to cold heading die 328. Piston rod 322, with its die

324, is mounted for reciprocal movement in support 330 fixed to beam 302 and piston rod 326, with its die 328, is similarly mounted in support 332 fixed to beam 302. Supports 330, 332 may be one piece or two pieces butted together. In either event, intermediate dies 324, 328, supports 330, 332 are recessed at 334, to receive, in such recess, the gable of a container for purposes later more apparent. At its forward end, recess 334 is closed by leaf spring 336 and, at its rear end, by plate 338.

When the automatic handle-applying machine in the instant invention is not in use and filled containers are to be conveyed, by conveyor 90, past the machine without being fed therethrough, cold header beam 302, with the associated elements attached thereto, is lifted, and locked in lifted position by hook 85, FIG. 1, pivotally mounted, at 87, on intermediate frame member 26. Lifting and locking of beam 302 permits the filled containers, on conveyor 90, to pass beam 302 without interference with the projecting end of such beam. Before the handle-applying machine of the instant invention is restarted, however, beam 302 is manually released from hook 85.

As best shown in FIGS. 1, 4 and 18, outfeed station 38 includes pusher plate 350 connected, by pivot 352, to piston rod 354 of the piston of double-acting cylinder 356 having fluid inlets-outlets 358, 360. Guide rods 362, 364 are connected, at one of their ends, to pusher plate 350 and extend from the back of the pusher plate through guide blocks 366, 368 fastened to machine frame 2.

Referring to FIGS. 21 to 31, the slide beam handle feeder of the instant apparatus is attached by lower slide beam plate 231 to mandrel 222 by pins 233, as hereinabove described. The balance of such slide beam is fastened to plate 231, as will be described, and is supported therefrom, as a cantilever. Thus, slide beam intermediate plates 370, 372, having outwardly projecting edges 374, 376, and 378, 380, FIGS. 25 and 26, are fastened, as by for example, rivets 382 and upper slide beam plate 384 is fastened as by for example, rivets 386 to the opposite ends of plates 370, 372. Vibration feed hopper, generally designated 388, of standard design and construction, and commercially available, having an upwardly inclined feeder ramp 390 with a discharge at 392 is positioned above the handle-receiving end 394 of upper slide beam plate 384. As best shown in FIGS. 21, 23, handle-receiving end 394 is angularly disposed relative to plate 384 and is in alignment with discharge 392 of feeder ramp 390, the main body of plate 384 being in alignment with intermediate plates 370, 372 and lower plate 231. Handle receiving end cover 396, having a ledge 398, FIG. 23, is mounted, by bracket 400 to support 402 on feed hopper 388. Slide beam cover 404 is connected, at one end, to support 402 and, at its opposite end, to intermediate frame member 26. Electric eye 406 is mounted on cover 404 for purposes later described.

The handles to be applied to containers by the apparatus of the instant invention are shipped to the container-filling plant in boxes and loose. From such boxes, the handles are dumped into the vibrating bowl of vibration feed hopper 388 and, as the hopper bowl vibrates, are fed, one after the other, up ramp 390 with the hand-engaging portion of the handle against the outer wall of the bowl, as shown in FIG. 21. The ramp is designed so that, if the handle is turned around, i.e., with the hand-engaging portion at the ramp edge, the handle will fall off of ramp 390 and back into the bowl. If one handle is above the other on ramp 390, the top handle falls back into the bowl. Thus, when discharged from ramp 390, at 392, the hand-engaging portion of all of the handles are in the same position or orientation. As will be later described the male and female attachment portions of the handles may be facing in either direction.

The handle, as it is discharged at 392, falls by gravity onto handle-receiving end 392 of upper plate 384, the leading most end of the handle-striking ledge 398. Ledge 398 prevents the handle from catching on the top of end 392 or from falling out of the end of cover 396. The handles falling onto receiving end

392 fall, by gravity onto the lower portion of upper plate 384 and slide down intermediate plate 370, 372 to lower plate 231 from which the handles are individually fed onto mandrel 222 in the manner hereinafter described.

The discharge of handles from hopper 388 to upper plate 384 is at a higher handle feed rate than the feed of handles onto mandrel 222. Thus, should the feed of handles from vibration feed hopper 388 to the slide beam feeder be interrupted by the hopper running out of handles, a jam up of the handles in the bowl, or for any other reason, the automatic handle-attaching apparatus of the instant invention may continue to operate until the supply of handles on the slide beam is exhausted. To prevent overfeed of handles to the slide beam, electric eye 406 is connected to the vibrator of vibration feed hopper 388 to stop the vibrator and the feed of handles from hopper 388 to the slide beam if the electric eye beam is interrupted for a preset time interval by handles stacked up on the slide beam between the lower end of the slide beam and electric eye 406. Electric eye 406 may also sound an alarm, if the supply of handles on the slide beam falls below a predetermined level.

Referring to FIGS. 21, 22 and 27 to 31, cam stops 408, 409 are fixed to the end of arms 410, 411 pivotally attached, at 412, 413, to bracket 414 fixed, as by for example welding, to frame 2 of the apparatus. The bottom surface of cam stops 408, 409 are flat and urged into engagement with the top surface of lower slide beam plate 231, for purposes more apparent hereinafter, by compression spring 416 mounted under intermediate frame member 26. The top surface of cam stops 408, 409 are sloped, sloping upwardly from mandrel 222 end of cam stops 408, 409, and the opposite end of cam stops 408, 409 are rounded, having notches 418, 419, therein, FIGS. 27, 28 and 29, to receive a handle.

Double acting handle feed cylinder 420, having fluid inlets-outlets 421, 423 is pivotally connected, at 422, to frame 2 of the apparatus. Piston rod 424, connected to the piston of cylinder 420, is attached to the handle selector 426, having selector pin 428 and handle stops 430, 431. Cam followers 432, 433 extend outwardly transverse to selector pin 428, FIGS. 27, 31, for purposes more apparent hereinafter. Leaf spring 434, FIG. 22, is connected, at one of its ends, by bracket 435, to frame 2, and, through adjusting screw 436 bears against the free end of cylinder 420 to old cam followers 432, 433 in engagement with cam stops 408, 409 for purposes more apparent hereinafter.

Guide spring 436 is fastened at one of its ends to bracket 437 fixed to frame 2. The leading or free end of guide spring 436 projects under slide beam plate 231 and engages the lower portion of the handle as the handle is transferred from the slide beam to mandrel 222.

Referring, now, to FIGS. 31, 32, handle stop rod 439 is pivotally mounted by pin 441 on support 440 fixed to intermediate member 26, FIG. 22 and is held, by compression spring 442 against set screw 444 adjustable in support 440.

Handle feed cylinder 420, through selector pin 428, cam stops 408, 409 and cam followers 432, 433, selectively feeds the leading or lowermost handle off of the slide beam and feeds and positions the handle on mandrel 222. As best shown in FIG. 27, the handles on the slide beam hand vertically and, when fed onto mandrel 222, are horizontal.

When actuated, as hereinafter described, handle feed cylinder 420 is in the position shown in FIG. 27 with the leading handle on the feed side of pin 428, between pin 428 and mandrel 222, and the remaining handles on the slide beam are on the opposite side of pin 428. Activation of cylinder 420 advances handle selector 426 to the right, in FIG. 27, toward mandrel 222. As selector 426 advances, cam followers 432, 433 engage notches 418, 419 in cam stops 408, 409, lifting the cam stops, FIG. 28 and feed the handle down slide beam plate 231. As the handle moves down slide beam plate 231, the lowermost portion of the handle engages guide spring 436. Guide spring 436 retards the bottom portion causing the handle to tip from its vertical position toward a horizontal posi-

tion. As this is taking place, stop rod 439 is pivoted on pin 441 against the tension of spring 442 and snaps back, FIG. 32, when the handle being fed clears the end of rod 439. In snapping back, the end of rod 439 catches and retains following handles that might tend to slide down the beam behind pin 428. Thus, rod 439 acts as a gate, allowing the first handle being fed to pass but retaining the following handles in position on the slide beam.

After cam followers 432, 433 pass under cam stops 408, 409, lifting the cam stops, cam stops 408, 409 are pushed downward by spring 416 and back into engagement with slide beam plate 231. With cam stops 408, 409 in engagement with plate 231, the next following handle slides into notches 418, 419. Cylinder 420 continues to advance until it reaches the phantom line position in FIG. 27 and the handle, now in horizontal position, drops off of the end of plate 231 onto mandrel 222.

After cylinder 420 has reached its fully extended position and the handle being fed has dropped off of the end of plate 231 onto mandrel 222, cylinder 420 is automatically reversed and retracts selector pin 428. As best shown in FIG. 29, in retracting cam followers 432, 433 ride up the sloping top of cam stops 408, 409. Thus, the end of cylinder 420 and pin 428 are lifted. When cam followers 432, 433 reach the downwardly sloping back end of cam stops 408, 409, leaf spring 434 pushes cylinder 420 and selector pin 428 downward. Thus, selector pin 428 falls behind the handle in notches 418, 419 and is in position to again feed the leading-most handle, then on the slide beam, during the next operating cycle of handle feed cylinder 420.

The apparatus of the instant invention, including the slide beam handle feed, is operated and controlled, automatically, through an electrical and fluid pressure control system. Because in most dairies where the handle-applying apparatus of the instant invention is most commonly employed and compressed air is available, in the embodiment illustrated in the accompanying drawings and description herein, air is employed as the fluid medium. It is to be understood, however, that the apparatus of the instant invention may be operated hydraulically by the addition of a hydraulic pump, reservoir and pressure accumulator.

The electrical and fluid pressure control system of the apparatus is shown schematically in FIG. 33. Referring to FIG. 33, switch 108 is connected, at one side by electrical lead 450, through switch 452, to a source of electrical power, not shown, and at its other side, by lead 454 to timer 456. Timer 456 is connected, by electrical lead 458, to lead 450 and, by electrical lead 460, to the other pole of the power source, not shown. Timer 456 is connected, by electrical leads 462, 464, to motor 466. Motor 466 drives cam 468. Manual switch 452 is closed by the operator when the apparatus of the instant invention is started up.

When a filled carton, on endless conveyor 90, strikes switch arm 110 switch 108 is closed and timer 456 is energized, energizing motor 466 which, in turn, rotates cam 468 through a full cycle. The closing of switch 108, by arm 110, initiates the cycle but, as well be more apparent from the following description, as the apparatus operates through the cycle, the carton initially engaging arm 110 is moved out of engagement with the arm, and switch 108 is reopened. Thus, the closing of switch 108 to energize timer 456, initiates the operating cycle which continues until the cycle is completed.

Each of the double-acting cylinders in the apparatus is mechanically connected, through a switch, solenoid and double-acting valve, to cam 468. Cam 468 may be single cam or a plurality of cams each operating one or more of the switches, solenoids and valves. In FIG. 33, the switches mechanically actuated by cam 468, double-acting valves and double-acting cylinders are, for convenience, arranged in the sequence in which such switches, solenoids, valves and double-acting cylinders are operated in the normal operating cycle of the machine and, in the following description, will be described in such sequence certain of the operations, because a plurality of

containers are in the apparatus, all at the same time, may be performed concurrently.

As shown, diagrammatically, in FIG. 33, each of the double-acting cylinders 112, 162, 180, 40, 214, 64, 54, 420, 76, 310, 312 and 356 is normally in one of its double-acting positions and, when actuated by cam 468 and switch and solenoid connected to such cam, is actuated by the valve into the other of its double-acting positions. After the operation to be performed has been completed and the switch connected to the solenoid valve control for each double-acting cylinder is reopened, the double-acting cylinder returns to its normal position. Certain of the double-acting cylinders such as cylinders 40, 64 and 76, in normal position, hold punching head 52, handle applicator 74 and cold header 86, respectively, elevated and, when actuated by cam 468 and the switch solenoid and valve connected, respectively, thereto actuate the units in the opposite directions. When the apparatus is shut down and the air to cylinders 40, 64 and 76 is turned off, the weight of punching head 52, handle applicator 74 and cold header 86 cause these units to drop down, by gravity. When the apparatus is being started up, the air is turned on and double-acting cylinders 40, 64 and 76, when sufficient air pressure to operate the apparatus builds up in such cylinders, returns such units to their normal, elevated positions. The dropping down and return of punching head 52 and cold header 86, by the turning off and turning on of the air, does not adversely affect subsequent automatic operation of the apparatus. However, the dropping down of handle applicator 74, when the air is turned off, feed the handle on mandrel 222 down and off of the mandrel. Thus, after the air is turned back on to put the automatic handle-applicating machine of the instant application into operation and handle applicator 74 returns to its elevated position, a handle must be fed to mandrel 222. In order that this might be done, the operator, when he starts the machine and after he has manually closed switch 452 and turned on the air, momentarily closes and reopens switch 453. The momentary closing of switch 453 actuates handle feed cylinder 420 in the manner hereinabove described and feeds a handle from the slide beam onto mandrel 222.

When switch 452 is closed, the air is turned on, a handle has been fed onto mandrel 222, and the apparatus of the instant invention is in operation, conveyor 90 is in operation and feeding containers, which have been closed and sealed, from the filling machine, not shown, but to the left in FIG. 1. Such containers are fed to, and discharged from, the machine in the direction of the arrows, FIG. 1, container stop plate is, of course, in its advanced position across conveyor 90 and locked with locking screw 106.

The container, being fed by conveyor 90, contacts plate 104, depresses switch arm 110 and closes switch 108 to energize timer 456 which, in turn, energizes motor 466 to rotate cam 468 through a full cycle. Cam 468 closes the switch connected to the solenoid of the valve of pusher cylinder 112, activating cylinder 112. When activated, cylinder 112 pushes plate 122 forward, in the direction of the arrow, FIG. 4, and pushes the container into infeed station 30. The switch connected to the solenoid of the valve of cylinder 112 then reopens, deactivating cylinder 112. Pusher plate 122 is retracted and in position to receive the next following filled container. With the first container in infeed station 30, cam 468 closes the switch connected to the solenoid of the valves of cylinder 162, activating cylinder 162 and advancing feed plate 132, with its shoes 134, 136, 138, 140, in the direction of the arrow, FIG. 2, from the full line to the phantom line position. The switch actuators on cam 468 are so positioned and timed that, when feed plate 132, with shoes 134, 136, 138, 140 reaches the phantom line position, FIG. 2, thereby advancing the first container from infeed station to punching station 32 on container support shelf 92, and switch of the solenoid of the valve of double-acting cylinder 180 is closed and pivots arms 154, 156, feeder plate arms 142, 144, feed plate 132 and shoes 134, 136, 138, 140 about bearings 158, 160 from the full to the phantom line position, FIG. 3. With feed

plate 132 and shoes 134, 136, 138, 140 in the phantom line position, the switch to the solenoid-valve control of cylinder 162 is opened, deactivating cylinder 162, returning plate 132 and shoes 134, 136, 138, 140 from the full to the phantom line position, FIG. 2. With plate 132 and shoes 134, 136, 138, 140 returned to the full line position, FIG. 2, the switch to the solenoid-valve control of cylinder 180 is opened, deactivating cylinder 180, returning plate 132 and shoes 134, 136, 138, 140 to the full line position, FIG. 3.

The feeding of the filled container from infeed station 30 to punching station 32 by the activating of double-acting cylinders 162, 180 takes place while cylinder 112 is retracting plate 122. Thus, when plate 132 and shoes 134, 136, 138, 140 return to the full line position, FIGS. 2 and 3, the next following container on conveyor 90 contacts arm 110 of switch 108 and the following container is pushed into infeed station 30 and advanced into punching station 32 in the manner aforescribed. The cycle is repeated by each following container. Thus, each container contacting arm 110 and closing switch 108, as it is pushed into infeed station 30 and advanced into punching station 32, advances each preceding container, then in the apparatus one station. The switch actuators on cam 468 are so positioned and timed that, as plate 132 and shoes 134, 136, 138, 140 are returning back from the phantom line to the full line position, FIGS. 2 and 3, double-acting cylinder 40 in punching station 32, double-acting cylinder 76 in cold heading station 36 are double acting cylinder 356 in outfeed station 38 are all activated. After the switch actuators on cam 468 actuates cylinders 40 and 76 and while punching head 52 and cold header 86 are in their full down position, the switch actuators on cam 468 activates double-acting cylinder 214 and punches the gable of the container in the punching station and double-acting cylinders 310, 312 in the cold heading station and cold heads the handle on the container in that station. For obvious reasons, cylinders 214, 310, 312 are deactivated, retracting punch 212 and cold header 324, 328 before cylinders 40, 76 are deactivated.

All of the stations, with the exception of handle applying station 34, are operated automatically, in timed sequence, by the container-contacting arm 110 and closing switch 108 which, in turn, energizes timer 456 and motor 466 to rotate cam 468 and actuate the switches connected, mechanically, to cam 468. Handle-applying station 34 is operated by the container in the station.

When a container, with a handle-receiving hole punched in the gable thereof, is fed by plate 132 and shoes 134, 136, 138, 140 from punching station 32 into handle-applying station 34, the container contacts switch arm 293 and the closes switch 291. As best shown schematically in FIG. 33, when closed, switch 291 energizes the solenoid-valve control of double-acting cylinder 64, activating the cylinder which pushes handle applicator 74. As handle applicator 74 advances downwardly fingers 262, 264 engage the handle on mandrel 222 and slide the handle down along the mandrel. Angular ends 254, 256 and tapered extensions 258, 260 of mandrel 222, as the handle is advanced downwardly thereon by fingers 262, 264 opens up the attaching end of the handle to pass over the container gable. Before fingers 262, 264 advance the handle over the lower end of mandrel 222 and insert the male member of the handle fastener through the hole punched in the gable, pins 287, 289 in support 288 contact 244, 246 on gable depressor 230 and depress the gable on the container. This is important because the height of the filled and sealed container may vary, from container to container, as much as one-quarter of an inch. With shorter containers, little or no depression of the gable will occur while, with taller containers, the depression is increased. By depressing the taller containers, alignment of the male attaching member of the handle with the hole punched in the container gable in the punching station is assured.

The handle, as it is advanced over the lower end of mandrel 222 by fingers 262, 264 is aligned with the container so that the male attaching member of the handle is inserted into the

punched hole in the gable and the female handle-attaching member is aligned with the end of the male member. As this occurs and the handle-applying head is at its lowermost position the head engages switch arm 297, closes switch 295, energizing the solenoid-valve control of double acting cylinder 64, actuating cylinder 54. Snap lock disc 60 engages rollers 294, 296, rotates snap lock shafts 284, 286, engages snap lock jaws 280, 282, with the male and female handle-attaching members and snap locks the handle on the container. First double-acting cylinder 54 and then double-acting cylinder 64 are deactivated, in timed sequence. Snap lock jaws 280, 282 are reopened, by springs 298, 300, and the handle-applying head is returned to its up position by double-acting cylinder 64. While this is taking place, the switch connected to the solenoid-valve control of double-acting handle feed cylinder 420 is closed, to feed the next handle on the handle slide beam onto mandrel 222 for application to the next container in the next cycle. Although initiated by the container in handle-applying station 34, double-acting cylinders 54, 64 and 420 all operated during the time interval that the container is in the station and the handle-applying operation is completed before the container is advanced out of such station by the following operation of feed plate 132 and shoes 134, 136, 138 140.

Once the apparatus of the instant invention is started up by closing manual switch 452, turning on the air and feeding the first handle to mandrel 222 by closing and releasing manual switch 453, the apparatus operates automatically, each container contacting switch arm 110 and closing switch 108 is pushed into infeed station 30 and advances each preceding container in the apparatus one station. The preceding container in outfeed station 38 is, of course, pushed out of such station onto conveyor 90. When the last container, to which a handle is to be applied, is fed into the apparatus there are, of course, containers in the preceding stations. In order that the containers in the apparatus, including the last container, might be processed through the machine, the handle-applying operation on each container might be completed and the apparatus cleared of containers, manual switch 455, FIG. 33, is provided. The closing of manual switch 455, by an operator, simulates a container entering the machine. Thus, by pressing switch 455 until the last remaining container in the apparatus has been discharged from outfeed station 38 onto conveyor 90, handle application to containers in the apparatus can be completed and the apparatus can be cleared of containers.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible.

What I claim is:

1. An automatic machine for applying handles to the gable top of containers on which container the handle is applied by inserting a male handle-attaching member through a hole punched in the gable and locked on the container by a female handle-attaching member snapped over the projecting end of the male member, said machine comprising, a conveyor, container-receiving means, means on said conveyor for transferring containers from said conveyor to said container-receiving means, a punching station on said container-receiving means, a power-operated punch in said punching station, means for operating said power-operated punch for punching a handle-receiving hole through the gable of said container in said punching station, a handle-applying station on said container-receiving means, means for transferring said container from said punching station to said handle-applying station, means for aligning and feeding handles, one after the other, from a supply of loose handles, to said handle-applying station, means on said handle-applying station for receiving handles from said aligning and feeding means, means on said aligning and feeding means for transferring said handles, one at a time, from said aligning and feeding means to said handle-receiving means, means on said handle-receiving means for spreading

and separating the male and female handle-attaching members on a handle on said handle-receiving means for spreading and separating the male and female handle-attaching members on a handle on said handle-receiving means and for aligning and inserting the male attachment member with and through a handle-receiving hole punched in the gable of said container, said means for spreading, separating and aligning including means for aligning the female attachment member of said handle with the male attachment member after said male member has been inserted through said hole in said gable, means for snapping said aligned female attachment member over the projecting end of said male attachment member, a colder header station on said container receiving means, means for transferring said container with a handle thereon from said handle-applying station to said cold header station, means on said cold header station for cold heading the end of the male attachment member of the handle projecting beyond the snap-locked female and means for transferring containers, with handles attached and cold headed thereon, from said container-receiving means to said conveyor.

2. An automatic machine for applying handles, as recited in claim 1, including means on said conveyor for engagement by said container being conveyed thereon toward said container-receiving means for actuating said means for transferring containers from said conveyor to said container-receiving means.

3. An automatic machine, as recited in claim 2, in which said means on said conveyor for engagement by said container includes means for actuating said means for transferring a container from said punching station to said handle-applying station, said means for transferring a container from said handle-applying station to said cold header station and said means for transferring said containers from said container receiving means to said conveyor.

4. An automatic machine, as recited in claim 3, in which said means on said conveyor for engagement by said container includes means for actuating said power operated punch.

5. An automatic machine, as recited in claim 4, in which said means on said conveyor for engagement by said container includes means for actuating said means on said aligning and feeding means for transferring said handles, one at a time, to said handle-receiving means.

6. An automatic machine, as recited in claim 5, in which said handle-receiving means includes a mandrel having outwardly extending, downwardly sloping sidewalls and an angularly disposed end wall, said end wall having outwardly extending, downwardly sloping extensions, said means for spreading and separating the male and female handle-attaching member including fingers, means on said fingers for engaging a handle on said mandrel and means for moving said fingers down, from above said mandrel to the bottom of said mandrel, for spreading, separating and aligning said handle engaged by said fingers with the hole punched in the gable of said container and for inserting said male attachment member of said handle through said punched hole, and means for returning said fingers from the bottom of said mandrel to above said mandrel.

7. An automatic machine, as recited in claim 6, in which said means for aligning and feeding handles includes a vibrating feeder hopper, discharge means on said feeder hopper for discharging handles, one after the other, from a supply of handles in said feeder hopper, a slide beam, means at one end of said slide beam for transferring said handles on said slide beam, one at a time, from said slide beam to said mandrel.

8. An automatic machine, as recited in claim 7, in which said means for transferring said handles from said slide beam to said mandrel includes handle stop means, means for engaging the handle in engagement with said stop means and for sliding said handle so engaged off of said slide beam and onto said mandrel, said means for engaging the handle including means for lifting said handle stop means and releasing said handle so engaged and means for returning said handle stop means to its initial position to stop and hold the handle on said slide beam following said handle so engaged.

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9. An automatic machine, as recited in claim 8, in which said means for lifting said handle stop means includes a first camming surface on said stop means, a cam follower on said means for engaging the handle, means for engaging said cam follower with said first camming surface and for lifting said handle stop means and releasing said handle so engaged thereby, a second camming surface on said stop means and means on said means for engaging the handle for engaging said second camming surface for lifting said means for engaging the handle over said handle stop means and for engaging said means for engaging the handle with the handle on said slide beam following the handle transferred to said mandrel.

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10. An automatic machine, as recited in claim 9, in which said means for engaging the handle and for sliding said handle so engaged off of said slide beam onto said mandrel includes a fluid actuated cylinder, means for actuating said cylinder in a first direction for lifting said handle stop means and releasing and feeding said handle engaged by said stop means and transferring said handle to said mandrel and means for actuating said cylinder in a reverse direction for lifting said means for engaging the handle over said handle stop means for engaging said means for engaging the handle with the handle on said slide beam following the handle transferred to said mandrel.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,597,827 Dated August 10, 1971

Inventor(s) Fries et al.

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

- Col. 1, line 37, "process" should read -- processed --;
line 61, "lose" should read -- loose --;
- col. 2, line 5, "a" (second occurrence) should read -- the --;
- col. 3, line 38, after "designated", insert -- 32, a handle
applying station, generally designated --;
line 72, after "between" insert -- the --;
- col. 4, line 3, "screws" should read -- screw --;
- col. 7, line 44, "old" should read -- hold --;
line 61, "hand" should read -- hang --;
line 67, after "428." insert -- Cam stops 408, 409
are holding the leading handle. --;
- col. 8, line 59, "well" should read -- will --;
- col. 9, line 63, "valves" should read -- valve --;
- col. 10, line 23, after "apparatus" insert comma;
line 28, "are" should read -- and --;
line 49, delete "the" (second occurrence);
- col. 11, line 24, insert comma after "138";
line 52, "I" should read -- we --;
- col. 12, lines 2-4, delete "for spreading and separating
the male and female handle-attaching members
on a handle on said handle-receiving means --;
line 52, "seperating" should read -- separating --;
line 64, after "for" insert -- receiving said handles
discharged from said feeder hopper and means
at the other end of said slide beam for --.

Signed and sealed this 25th day of January 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents