Fig. 22

Fig. 23

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Pouring Spout Can Cover Machine
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POURING SPOUT CAN COVER MACHINE

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The present invention relates to machines for producing can covers having hinged pouring spouts and has particular reference to apparatus embodying automatic can cover feeding, conditioning of the covers for the reception of pouring spouts which are automatically assembled with the can covers and which are hinged secured to rivets which in turn are automatically formed from wire fed into the machine, the formed rivets being positioned in and clinched to the can covers prior to receiving the pouring spouts.

An important object of the invention is the provision of an apparatus having cooperating inter-connected devices for feeding a fibre can cover individually to a piercing station where an opening is cut in the cover wall, the cover so prepared being then provided with a staple cut off from a piece of wire and formed and assembled in the cover adjacent the opening, after which a formed metallic pouring spout is assembled to the cover within its opening and is hinged secured to the staple.

A further object of the invention is the provision of an apparatus of the character described having a series of operating stations at which testing control devices are located and these controls insure normal, smooth flow of the elements composing the hinge spout can cover elements through the various stations so that all can covers are complete after passing through the apparatus.

An object of the invention is the provision of improved wire staple forming devices in a machine of the character described which cut a staple blank from a wire and simultaneously sharpen the ends of the cut piece so that when a staple is formed therefrom it may be easily forced in proper position through a can cover.

Yet another object of the invention is the provision of spout feeding and clinching devices for a pouring spout cover forming machine wherein a hinge part of a pouring spout is hinged secured to a staple fastened in a can cover so that the spout may be hinged moved within the cover and on the staple.

The invention in one embodiment contemplates the use of a turret for a hinged pouring spout cover apparatus which receives a formed cover and presents it successively to a piercing station where an opening is cut in the cover, to a staple inserting station where a formed staple is assembled in the cover adjacent the opening, to a spout inserting station where a formed spout is inserted into the opening and assembled with the staple, to a clinching station where the spout is hinged secured to the staple, and finally to a discharge station where the fully formed hinged pouring spout cover is removed from the machine.

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

Referring to the drawings:

Figure 1 is a perspective view of an apparatus embodying the present invention;

Figs. 2 to 12, inclusive, are perspective and sectional graphic representations of the can cover parts at their different stages of formation, beginning at Fig. 2 with the cover as it looks when received in the machine and ending with the finally clinched and hinged-pouring spout can cover of Fig. 12; Fig. 3 showing the cover pierced or cut out in an opening for the spout; Fig. 4 showing the inserted hinge staple adjacent the opening, and Fig. 5 showing it clinched in place; Fig. 6 indicating the alignment of the pouring spout and the cover opening with Figs. 7, 8, and 9 showing other intermediate positions relating to the inserting of the spout, and Figs. 10 and 11 showing, respectively by perspective and section, an initial clinching of the spout on the rivet which is completely clinched in the sectional view of Fig. 12;

Figs. 13 and 14 are enlarged transverse sectional views of the central part of the apparatus, these figures including, respectively, the left and right hand sides of the complete section as taken substantially along the line 13, 14 in Fig. 1;

Fig. 15 is an end elevation of the apparatus partly broken away as viewed from the pouring spout entrance end of the machine, this point of view being indicated by the dot-and-dash line 15 in Fig. 13;

Fig. 16 is a similar kind of elevation of the opposite or cover feed end of the machine, the point of view being indicated by the broken section line 16 in Fig. 14.
Fig. 17 is a rear elevation of the upper part of the apparatus partly broken away; Fig. 18 is a sectional plan of the apparatus as viewed along the broken section lines 18—18 in the combined Figures 13, 14; Fig. 19 is a plan, sectional view taken substantially along the broken line 19—19 in the combined Figures 13, 14, and Fig. 20 is a similar view taken at a higher place in the same figures as along the broken sectional line 20—20; Fig. 21 is a top plan view of the machine; Fig. 22 is a sectional detail of the crank shaft of the apparatus and associated parts as viewed at the broken line 22—22 in Fig. 17; Fig. 23 is an end elevation of the crank shaft and the upper part of the apparatus as viewed from a position indicated by the line 23—23 in Fig. 17; Fig. 24 is an enlarged sectional detail of mechanism at the cutting station, viewed along the lines 24—24 in Fig. 19; Fig. 25 is a plan sectional detail taken substantially along the line 25—25 in Fig. 24; Fig. 26 is a fragmentary plan sectional view taken substantially along the line 26—26 in Fig. 16; Fig. 27 is an enlarged sectional view showing mechanism at the wire feeding and stapling station as viewed substantially along the line 27—27 in Fig. 18; Fig. 28 is a sectional detail taken substantially along the line 28—28 in Fig. 27; Fig. 29 is a plan sectional view of the wire feeding mechanism as viewed substantially along the line 29—29 in Fig. 27; Fig. 30 is a transverse sectional view taken through the spout inserting station and viewed substantially along the line 30—30 in Fig. 27; Fig. 31 is a sectional detail taken substantially along the line 31—31 in Fig. 30; Figs. 32 and 33 are views similar to Fig. 30 and illustrating the stapling inserting mechanism in different positions; Fig. 34 is a fragmentary perspective view of the lower part of the staple inserting mechanism; Figs. 35, 36, and 37 are sectional details of the stapling forming mechanism at the staple inserting station, the views showing different stages of staple development, the movable parts of the mechanism in Fig. 35 (which is taken on line 35—35 of Fig. 39) being in the same position as in Figs. 30 and 32—32; that of Fig. 36 the same as in Figs. 32 and 37 being substantially the same as in Fig. 33; Fig. 38 is a sectional detail taken substantially along the line 38—38 in Fig. 30; Fig. 39 is a sectional plan detail viewed along the line 39—39 in Fig. 38; Fig. 40 is a transverse sectional view of a portion of the wire feeding mechanism of Fig. 39 as viewed along the line 40—40; Fig. 41 is a plan sectional detail taken substantially along the line 41—41 in Fig. 40; Fig. 42 is an enlarged plan section as viewed along the line 42—42 in Fig. 13; Fig. 43 is a transverse sectional detail taken substantially along the broken line 43—43 in Fig. 42; Fig. 44 is a sectional detail as viewed along the line 44—44 in Fig. 43; Fig. 45 is an enlarged sectional view taken through the spout inserting station as viewed along the line 45—45 in Fig. 18; Fig. 46 is a broken sectional view taken substantially along the broken line 46—46 in Fig. 45; Fig. 47 is a plan sectional view as viewed along the broken line 47—47 in Fig. 45 and turned around through 90°; Fig. 48 is a plan sectional detail taken substantially along the broken section line 48—48 in Fig. 45; Fig. 49 is a transverse section viewed along the line 49—49 in Fig. 45; Fig. 50 is an enlarged sectional view of the spout and cover discharge station taken substantially along the broken line 50—50 in Fig. 18; and Fig. 51 is a wiring diagram of the electrical control devices and their circuits. The apparatus illustrated in the drawings as an embodiment of the present invention comprises a horizontal turret having a series of spaced covers receiving pockets, the turret being rotated with an intermittent or stop movement. During each rest period a formed fibre can cover a (shown in detail in Fig. 2) is received in the machine on a cover feeding and is inserted in a positioned turret pocket at a station A (Fig. 18). This cover has a cylindrical wall b which is a bit smaller in diameter than the turret pocket. Upon the next step movement of the turret this cover is brought into a punching or cutting station B. At this station and during the rest period of the turret which follows, the cover 30 being still in the turret pocket is subjected to cutting dies which form an opening c in the cover a which then looks as illustrated in Fig. 3. At the next step rotation of the turret this cover is advanced into a stapling forming and inserting station C (Fig. 18). Here the forward end of a wire is presented, the wire being intermittently moved and while at rest its end is cut off in a predetermined length forming a staple blank, the cutting being done at an angle so that the staple blank ends are sharpened. Immediately following both ends of the wire piece or staple blank are bent into a staple d, this action taking place below the cover held in the turret pocket. Without any interruption the staple is pushed up and its sharpened ends e (Fig. 4) punch through the wall of the cover. The central part of the staple is now located across one end of the cover opening c. While cover and staple still remain at this station the staple ends are bent down and the staple is securely fastened in the cover wall as shown in Fig. 5. At the next step movement of the turret this staple provided cover is moved from station C into a spout inserting station D (Fig. 18). In the meantime formed metallic pouring spouts f (Fig. 6) having flexible side walls or wings g have been brought into the apparatus and a spout is positioned in alignment with and directly below the opening c of the cover, this relative position of spout and cover being graphically shown in Fig. 6. The spout f also has side wing ears h projecting outwardly on both sides of a hinge tab k extending up from one wall, this wall projecting beyond the side wings g in a lift tongue l. With the cover in the turret pocket at station D instrumentalities operate to partially squeeze the side wings g of the spout together at point m so held the spout is lifted and its side wings are inserted into the opening c of the cover as illustrated in Figs. 7, 8, 9, and 10. This squeezing of the spout walls permits passage of the ears h through the cover opening. In Fig. 10 the spout
is fully inserted and its hinge tab k is hooked under the central part of the staple. The lift tongue l now moves against the under side of the cover prevents it passing further through the cover opening.

During this inserting operation the cover is held down from above and immediately following this assembly of spout and cover and while they are still at the inserting station, other devices operate to partially bend the hinge tab k over the staple as shown in Fig. 11. This is sufficient to prevent the spout coming out of the cover as they are next moved by the turret.

Upon the next step rotation of the turret the cover can cover with its hinged spout is moved from station D into a clinching station E (Fig. 18) where the hinge tab k is finally clinched in holding position by being laid down against the spout wall as shown in Fig. 12. This completes the forming operation upon spout and cover. Upon the next step rotation of the turret the cover is move...
the cover feed table 14. The shaft 127 is continuously rotated in any suitable manner, one suitable form being illustrated in part as a sheave 129 secured to the shaft for this purpose. A belt 5 or cord drive 131 may be used for driving the sheave.

The can covers are retained in a straight line of travel while carried forward on the belt 125 by being advanced over an auxiliary feed table 132 which is secured to the end of the table 74. This brings the covers as far as the feed table 14. The auxiliary table is formed with suitable suited side walls 133 for guiding the covers in their desired line of travel.

The can covers line up on the feed table 74 as the belt 125 forces each cover as far forward as it is free to move and these covers are crowded along and lined up in a row on a runway plate 136 (Figs. 14, 16, and 18) which is mounted upon and secured to the table 74. This plate is formed with a longitudinal channel 138 which provides a guide or runway and along this the row of covers moves.

Cross bars 141 are bolted to and rest on top of the plate 135, these bars being located above the line of travel of the covers. Two parallel guide rods 142 are carried by the cross bars and extend at one end from a position directly over the belt pocket 125 forward to a position over a turret pocket at station A. These rods prevent upward displacement of the covers while in the runway 136.

The floor of the plate 135 terminates at a position directly above the turret pocket and provision is made for engaging and advancing each can cover as it comes adjacent the end of the floor and just back of the pocket of the turret. Each cover when it reaches this position is then positively moved forward into alignment with the turret pocket 82 at rest at station A. This advance cover movement will next be considered.

A slide block 145 (Figs. 14 and 16) has longitudinal movement within grooves 146 cut in the upper side walls of the feed table 74 directly below the plate 135 on which the rows of can covers rest. This slide has a forward movement slightly in excess of the diameter of the cover and is sufficient to advance the foremost cover in the row to the turret pocket.

The slide 145 is formed with a depending block section 147 and a U-shaped strap 148 is secured to its lower surface. The central part of the strap 148 is in a horizontal plane which is below the edges of the feed table 74 and legs 151 of the U-strap extend up outside of the table. This construction permits free forward and rearward movement of the slide, and the strap 148 without interference with the stationary feed table.

The strap legs 151 also extend forward, as best illustrated in Figs. 14 and 18, and carry a transverse shaft 152 (see also Fig. 16) between their forward ends. This shaft extends across and above the line of travel of the can covers.

A compound lever 161 having a hub 162 is mounted on and pinned to the shaft 152, one end of the lever hub abutting one of the strap legs 151. A similar compound lever 163 having a hub 164 is also mounted on and pinned to the shaft 152, its hub being mounted adjacent the opposite strap leg.

The inner ends of the hubs 162, 164 are spaced a slight distance apart and a slide finger 165 is interposed between the hubs. Arms 166, 167 are formed as integral parts of the respective hubs 162, 164 and these extend forward and down and are connected at their forward ends by a pin 168. Slide finger 165 is mounted on the shaft 152 and on the pin 168 and is formed with a forward cover engaging end 171. Its rear end is slotted at 172, this slot providing a sliding clearance for the shaft 152 and the pin 168. The finger 165 is urged forward and downward in its mounting by a spring device which yields when the end 171 of the finger meets with abnormal resistance during the feeding operation.

The lever 161 (Fig. 18) is formed with a rearward extending arm 175 which is an integral part of its hub 162 and in a similar manner the lever 163 is provided with an arm 176 which is an integral part of its hub 164. A transverse pin 177 connects the outer ends of the lever arms 175, 176. A roller 178 is rotatably mounted on the pin.

It is directly below the roller 178 and located between the lever arms that the spring device for the finger 165 is located. This device comprises a spring barrel 181 (Fig. 14) which slides in a bore 182 formed in a block 183 projecting outwardly from the lever arm 175. A spring 184 is confined within the bore 183 and engages end 171 against the end of the spring barrel 181 and forces its forward end against the finger 165.

The slide 145 with the finger 165 and the associated parts just described is moved back and forth in regular timed order with the turret movement so that the slide is moved forward and the finger end 171 engages within a cover a immediately upon beginning of a rest period of the turret. Depending lugs 181 (Figs. 14 and 16) are formed on the rear end of the slide 145 and carry a pin 192 which provides a pivotal mounting for a link 193.

The link 193 is reduced in size at its forward end and extends as a shank 194 which passes through a trunnion 195. A spring 196 is carried on the shank 194 and is held in place by a nut 197. The spring normally urges the trunnion back against the end of the link 193 as illustrated in Fig. 14.

The trunnion 195 is formed with pivotal extensions 198 on which an arm 199 of a bell crank lever 201 engages. Bell crank lever 201 is keyed to a rock shaft 202 which oscillates within bearings 203 formed in the bracket 76. The shaft 202 is shouldered and headed and is held in its rocking position by a nut 204 threadedly engaging one end. A second arm 205 of the bell crank lever 201 extends forward and its end carries a pin 206 on which a roller 207 is rotatably mounted. This roller operates within a groove 208 formed in a barrel cam 209 which is secured to the vertical shaft 103 directly above its bearing 105.

The upper surface of the floor of the plate runway 136 at its forward end is inclined at 215 (Fig. 14) and the first of the can covers in the can line as it rests on this inclined part of the runway, is engaged by the forward end 171 of the finger 165 when the latter is rocked as it passes in its rear position. Rocking of the finger is effected by a rocking of the compound lever 161, 163 as the shaft 152 is partially rotated in its mounting in the strap legs 151.

This first of the can covers resting on the inclined floor 216 is yielded in position by a spring finger 216 pivoted at 217 and attached to the feed table plate 135 on one side of the runway 136. A spring pressed barrel 218 presses against this finger so that the cover is held in position until it is positively fed forward as hereinafter described.
A cam track 221 (Figs. 14 and 16) is formed on the lower surface of a horizontal plate 222 and determines the position of the finger 165 while permitting unrestricted horizontal movement of the slide 145 and the levers carried by it. This plate 222 is carried on a parallel lever device pivoted on stationary parts of the machine. This lever device includes a cam track 221 and a front lever 222 both pivotally connected to the horizontal plate. Lever 222 is loosely mounted on a shouldered stud 227 clamped in a boss 228 of a frame bracket 229 (Figs. 1, 14, 15, and 16). The bracket frame 229 is bolted on forward extension 144 extending out from the side walls 61 of the frame.

In a similar manner the lever 225 is loosely mounted on a shouldered stud 285 carried in a boss 236 formed in the bracket frame 228. Levers 225, 226 operate as arms of a parallelogram, the distance between the pivot centers of the upper ends of the levers being equal to that of the lower ends.

The lever 223 is a bell crank lever and a laterally extending arm 237 (Figs. 14 and 16) thereof is carried on a central spindle 240 threadedly secured to a shouldered bolt 248 which is loosely mounted in a boss 249 of the bracket frame. The rod 246 is provided with a head 251 which is located in an upper chamber 252 of the sleeve 24 and a spring 253 mounted in the sleeve 24 which is seated in a lower chamber 254. The spring 253 presses against the dividing wall of the chambers at its top end and below against a collar 255 pinned to the rod. This construction normally urges the cam roller 259 downward, the cam surface 241 limiting such movement.

The roller 239 is on the lower level of the cam 242 the plate 222 is in its raised position. The roller 178 of the lever arm 175, 176 rides along the cam surface 221 of the plate 222, the arms 175, 176 (Figs. 16 and 18) of the levers 161, 163 being urged upwardly by a spring 281 located on the end of the lever hub 163. One end of this spring is secured to 226 to the arm 176 and the opposite end is secured at 263 to the strap leg 151. This spring 261 holds the roller 178 against the cam surface 221, the latter limiting the amount of lifting movement. When the plate 222 is in the raised position illustrated in Fig. 14 the end 171 of the finger 165 is in its lowered cover engaging position.

Considering the timing of the various actions when the slide 145 is in its rear position the roller 239 is on the end of the cam plate which is then in its low position, the roller 239 then riding on the high point of the cam 242. This lowered position of the cam plate has depressed the rear ends of the arms 175, 176 through the roller 178 and has raised the left roller 163. The raised finger at such a time is above and out of engagement with the cam covers a in the runway 136.

As the slide 145 begins its forward travel the cam 242 moves its low point surface beneath the roller 239, the levers 222, 225 rocking counterclockwise (Fig. 14) and raising the plate 222, and the spring 281 to rock the levers 161, 163 counterclockwise, depressing the forward end 171 of the finger 165.

This forward end engages inside of the cylindrical wall b of the foremost cover and pushes it forward, moving it down the incline end 215 of the chute 136. Continued movement of the lever 280 swings the cover into the station A where it is directly above a positioned turret pocket 82.

As the slide 145 approaches the forward end of its stroke the front end 171 strikes against a stop rod 265 (Figs. 14 and 18) which is carried in a runway extension 266 mounted on the forward end of the auxiliary table 135. The finger end is arrested in its movement but the slide 145 still continues to move forward a short distance for rounding up the cover.

The forward end of the slide 145 is formed with a semicircular pocket 288 (Fig. 18a) and this now presses against the cover and squeezes its opposite sides against the wall of a pocket 289 formed in a thicker middle portion 271 of the turret 81. The upper edge of the cover wall also fits a pocket wall 272 (Fig. 18) formed in the bracket 266. The cover is held in its rounded-up condition as it is moved down into the turret pocket beneath.

During the forward feeding of a can cover just described a vertically movable cover supporting head 281 (Fig. 14) is moved upwardly into the turret pocket. This head is carried on the upper end of a vertical shaft 282 which has sliding movement within a bearing 283 formed in the table 64.

The lifting of the head 281 moves it out of a pocket 284 formed in the table and its upper surface comes into a position for receiving the cover being flush with the lower surface of the slide 145. The lifting force for the head is applied by a spring 265 which surrounds the rod 282 and is located within a pocket in the bearing 283, the upper end of the spring pressing directly against the hub of the head. The spring action is controlled by a cam in the following manner.

The shaft 282 is pivotally connected to the upper end of an adjustable connecting rod 286, the lower end of which is pivotally connected at 287 to the end of a lever 288 (Figs. 14 and 19). This lever is pinned to one end of a rock shaft 289 which is mounted in a bearing 291 formed in one frame side 61. The rock shaft 289 on the opposite side of the bearing carries an arm 292 (see also Fig. 16) which is pivotally connected at 293 to a link 384 in its turn pivotally connected at 285 to the cam plate 282. This cam plate is mounted for slight rocking movement on a stud 297 (Figs. 15 and 19) carried in a bracket 288 bolted to the side frame 61.

The lever 286 intermediate its end carries a pin 299 (Fig. 16) on which is rotatably mounted a roller 301 which rides against a cam 302 (see also Fig. 19) which is secured to the cam shaft 92. This roller is held against the surface of the cam and in this way controls the action of the spring 285 beneath the head 281.

The cover a as it rests on the head 281 and is held in rounded up form by the slide 145 is directly beneath an inserting head 311 (Figs. 14 and 20) which is secured below and on one end of a cross head 312. This cross head is bolted to the lower end of a square vertical shaft 313.
which has sliding movement in bearings 314 formed in the bracket frame 229. When the crosshead 312 is lowered the lower end of the head 311 enters inside of the positioned can cover and continuing its lowering action it moves the can cover down into the turret pocket. The supporting head 281 at such time is forced down against the action of the spring 285 and enters its pocket 284.

The head 311 is slotted at 316 to permit clearance of the angule cover which is still in its forward position when the head 311 enters the cover 229. Other vertical slots 317 are also cut in the head to provide clearance for the guide bars 142 which extend in toward the center of the turret as has been fully described.

The shaft 313 is moved up and down by a cam and is pivotally connected to the lower end of an adjustable connecting rod 322 (Figs. 1 and 23). This rod is pivotally connected at its upper end to the end of a lever arm 324 (see also Figs. 17 and 21). The arm 324 is secured to a horizontal rod shaft 325 which is journaled in bearings 326, 327 formed on the upper ends of the bracket arms 97, 98.

The rock shaft 325 also carries a bell crank lever 331 which is keyed to one end and this lever has a short arm 332 (Fig. 22) which extends downward below the shaft and carries a pin 333 on which a cam roller 334 is rotatably mounted. The roller 334 operates in a cam groove 335 formed in one surface of a face cam 336 which is keyed to the crank shaft 91.

The can cover 229 has been seated in the turret pocket 22 at station A the turret remains stationary while the inserting head 311 returns into its raised position and moves up away from the cover. The supporting head 281 is held down in the pocket 284 by the action of the cam 302 at such a time. The turret 31 is now ready to advance the cover into the next station, the slide 145 in the meantime having moved back. In the backward movement of the slide, the finger 165 is rocked so that its end 171 raises up clear of the edges of the inserted cover and also clears the other covers within the runway 136.

This feeding of a can cover into station A and its insertion into the turret pocket is prevented if there has been a failure of proper feeding of a pouring spout at another part of the machine. This will be thoroughly brought out step by step when the wiring diagram and the electrical control circuits of the apparatus are later considered.

At the present time, however, it will be noted how feeding of a cover is mechanically prevented by failure of the finger 165 to engage the cover as it moves forward with the slide 145. The inserting head 311 is lowered in the regular way but there being no cover in position at station A this is a mere idle movement.

The bell crank lever 223 (Figs. 14 and 16) is formed with an arm 341 which extends up in a vertical position. Normally, that is during regular feeding of a can cover, this arm moves back and forth without meeting any interference, its upper end passing below and closely adjacent to the lower end of a vertically disposed rod 342 which is the core of a solenoid 343 associated with the electric control feature previously mentioned. As long as the arm 341 moves freely the cam plate 222 is moved up so that the finger 165 rocks on its mounting and moves its feed end into a cover.

In the event of an interruption to the normal spout feeding, however, this core rod 342 is allowed to drop down into the path of the arm 341 and prevent its movement. This also prevents the cam roller 239 following down the low 5° section of the cam track 241 which leaves the roller as the cam 342 turns the rotating shaft 103. The arm 237 at such time stays in raised position, the spring 253 remaining compressed until the completion of the cycle. The cam plate 222 stays down in such an event and the end 146 of the fed arm is held up as it passes back and forth over and free of the covers in the runway 136.

The solenoid 343 of the electric circuit is carried in a bracket 345 which is mounted upon the bracket frame 229. A boss 346 is formed in the bracket 345 and provides a sliding bearing for the solenoid core 343.

Returning again to a consideration of a can cover properly seated in the turret pocket at station A, upon the next step movement of the turret 31, the cover 229 is transferred from station A (Fig. 16) and is brought into station B. The cover fits fairly snug in the turret pocket but a supplemental clamping device is associated with each pocket for more positively holding the cover during the rotation of the turret. This holding device comprises a slide 351 (Figs. 14, 16, and 18) located in a radial slot 352 which is cut in the body of the turret 31 adjacent each turret pocket. Each slide 351 carries a clamping head or jaw 353 which has slight movement within an enlarged section 354 of its associated radial slot.

Each slide 351 is formed with a limiting slot 355 into which the lower end of a set screw 356 extends. This screw is threadedly engaged in the thick inner section of the turret 31. This slot and set screw construction limits the radial movement of the slide 351, a spring 357 being interposed between the inner end of the slide and the end wall of the slot 352. The spring normally holds the slide in the position illustrated on the left of Fig. 18 so that its jaw 353 is pressed into the turret pocket as shown at a station D where it engages a cover if there is a cover in the pocket.

This holding action of the jaw 353 is nullified in two places. One of these is at station A where the jaw is held back while a cover is located in the turret pocket. Each slide 351 is formed with a transverse slot 361 cut across its inner surface and as the turret moves to bring the associated pocket to the station A this slot 361 rides over the head of a screw 362 and the slide is moved back. This screw is embedded in the top of the table 64 being located along a radial line extending between the centers of the turret and station A (see Fig. 14).

As soon as the turret moves the can cover from station A the slide 351 passes beyond the stationary screw head 362 and the spring 357 of the slide thereupon forces its jaw 353 outwardly and against the wall of the can cover. This holds the can cover in the turret pocket and it is so clamped throughout subsequent turret movements including its pauses at the various stations up to and including station E. As it approaches station F, however, it engages a second positioning screw 363 (Fig. 18) which again draws the slide jaw back to register for discharge from the machine. This will be fully described later in connection with the cover discharge.

In the event of an interruption to the normal spout feeding, however, this core rod 342 is allowed to drop down into the path of the arm 341 and prevent its movement. This also prevents the cam roller 239 following down the low 5° section of the cam track 241 which leaves the roller as the cam 342 turns the rotating shaft 103. The arm 237 at such time stays in raised position, the spring 253 remaining compressed until the completion of the cycle. The cam plate 222 stays down in such an event and the end 146 of the fed arm is held up as it passes back and forth over and free of the covers in the runway 136.

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This holding action of the jaw 353 is nullified in two places. One of these is at station A where the jaw is held back while a cover is located in the turret pocket. Each slide 351 is formed with a transverse slot 361 cut across its inner surface and as the turret moves to bring the associated pocket to the station A this slot 361 rides over the head of a screw 362 and the slide is moved back. This screw is embedded in the top of the table 64 being located along a radial line extending between the centers of the turret and station A (see Fig. 14).

As soon as the turret moves the can cover from station A the slide 351 passes beyond the stationary screw head 362 and the spring 357 of the slide thereupon forces its jaw 353 outwardly and against the wall of the can cover. This holds the can cover in the turret pocket and it is so clamped throughout subsequent turret movements including its pauses at the various stations up to and including station E. As it approaches station F, however, it engages a second positioning screw 363 (Fig. 18) which again draws the slide jaw back to register for discharge from the machine. This will be fully described later in connection with the cover discharge.
At station B the cover is first clamped down on the table 64. Provision is also made at this station for detecting the presence of a cover so that in the event that the turret pocket is empty 'when brought into station B, feeding of wire for making the next staple will be held up until the cover is there for it. This detecting of the presence of a cover is done electrically and will be described in detail in connection with the wiring diagram. The mechanical features of the electrical contacts at station B, however, will be noted.

As the turret 81 comes to rest at station B the cover is located over an insert die block 375 (Figs. 18 and 24). This die block is held in the table 64 and its upper surface is flush with the upper surface of the table. This brings the cover over an electric contact which comprises a pin 378 located in insulating blocks 373, 381, 382 and blocks located in a vertical bore 382 cut in the table top 65. These insulating blocks insulate the pin 378 electrically from the table and from the frame of the machine.

The cover is clamped in position at station B by a clamping head 385 which is dimensioned to pass easily inside of the vertical cover walls 64 when the clamping head is brought down. The clamping head and its associated parts are electrically connected with the frame of the machine and this head carries a contact pin 386 which extends down below its lower surface when the clamping head is up.

An enlarged head 387 of the contact pin is located within a vertical bore 388 and a spring 389 is also located in the bore. The lower end of the spring engages the head of the pin and its upper end is engaged by a set screw 391 threaded in the clamping head and closing the upper end of the bore 388. This holds the contact pin in the position illustrated in Fig. 24 but as soon as the clamping head lowers into clamping position the lower end of the pin 386 strikes against the cover and is held against further movement.

The fibrous material of the can cover a acts as an insulating medium and prevents an electrical connection between the contact members 386 and 378. In the event, however, that a cover is not brought into station B the contact pin 386 directly engages the contact pin 378 and an electrical circuit is formed. This is the mechanism of the testing control contacts and their operation previously mentioned.

The upper end of the clamping head 385 projects outwardly in a flange 392 which is located within a recess 393 formed in the lower end of a head block 394 which is secured to a slide block 390 (Figs. 17, 20) of the press slide 395.

Slide 395 is associated with and is moved by connection with the crank shaft 91. For this purpose the slide is formed with inclined slide walls 397 one of these having sliding movement within a groove 398 formed in the upper web 63, the other being fixed and sliding on a gib 399 bolted to the frame web. Slide 395 is connected with the lower end of a pitman 401 connected to a crank block 402 operating over the crank 403 formed in the crank shaft 91.

The clamping head 385 (Fig. 24) is held within the chamber 393 by a clamping ring 405 secured on the head block 394 by screws 406. The flange 392 of the head 385 rests on the clamping ring when the parts are in raised position. Springs 407 are interposed between the head block 394 and the clamping head 385, the upper and lower ends of the springs being confined within vertical bores 408 and 409 formed respectively in the head plate and in the clamping head.

The active cutting die member for forming the spout opening c in the can cover a comprises a punch 415 having an enlarged end 416 which is seated in and bolted to the upper surface of the head block 394. The punch 415 extends down into a vertical opening 418 formed in the clamping head 385 and its lower surface is a slight distance above the lower surface of the clamping head when the parts are in the position of Fig. 24.

When the head block 394 descends for the cutting operation, the clamping head 385 first comes to rest within the can cover a and as the head block 394 continues its descent the springs 407 yield, the clamping ring 405 moving down over the outer wall of the now stationary clamping head. The punch 415 moves down through its vertical opening 418 until its lower surface engages the wall of the cover and thence, cooperating with the stationary die block 375, cuts through the cover wall and severs a piece 421 from it.

The cut out piece of cover wall is then pushed down into a die opening 422 cut in the die block 375, thus producing the spout opening c (Fig. 3).

The cut out piece 421 is pushed away from the lower surface of the punch 415 by an ejector pin 423 slidably located in the lower part of the punch, the head of the pin being backed up by a spring 424 located in a vertical bore 425 formed in the punch. The upper end of the spring is held by a set screw 426 which is threaded securely in the punch and which closes the bore 425.

The piece 421 falls into an opening 421 which is formed in the table 64 and thence into a discharge chute 428 boled to the under side of the table. This discharge chute leads the cut out piece to any suitable place of deposit.

Following the cutting operation the head block 394 is raised and the springs 407 hold the clamping head 385 in the can cover until the punch 415 has again moved back into its normal position and until the head flange 392 of the clamping head 385 rests against and is picked up by the clamping ring 405. This holding down of the cover until the punch is again seated provides a proper stripper action. Further continued upward movement then lifts the clamping head 385 from its position within the can cover and the cover now provided with its opening c is ready for transfer to the next station C.

To insure that the turret pockets 82 always stops at an exact point in the various stations A to F, inclusive, there is provided a pilot device associated with the press slide 389 and some consideration will be given to this feature at this time. The outer rim portion of the turret is formed with six spaced bosses 431 (Figs. 1, 17, 60 and 66), a boss being located on a radial line midway between adjacent turret pockets 82.

Each boss is cut through with a vertical bore 432 and as the turret comes to rest following each step movement one of these openings 432 comes directly beneath a pilot pin 433 (Fig. 17) carried by and extending downward from the press slide head 395. The lower end of the pilot pin is slightly rounded and easily enters into the turret bore each time the press slide moves down. In this manner each turret pocket is always definitely located at an operating station.

Wire feed

The wire for the staple d is cut off from the 75
end of a continuous wire which is intermittently fed into the machine and in addition to this feeding of a proper amount of wire to make each feeding of a proper amount of wire to make each staple so that a given supply of wire is presented in proper time and place to provide for the requirements of staples so that each can cover is properly supplied. Provision is also made for stopping the machine and for preventing any operation if the wire breaks. The feeding of the wire will now be considered.

The wire strand, designated by the numeral 441, is introduced into the back of the machine and is brought into station C (Fig. 18). The table 44 extends back and in between the side walls 41 as a projection 442 which is cut away at station C in a space extending over to station B. This provides a clearance chamber 443 (Figs. 27, 29, and 40) in which a ratchet feed mechanism for the wire 441 is located.

This wire in coming into the chamber 443 passes through a horizontal channel 444 cut in the table extension 442. The wire feed mechanism is carried in a guide block 445 which is held to the under side of the table, being formed with a foot 446 at the back and with four feet 448, 449, these directing respectively against the table walls.

The wire after passing through the channel 444 (Fig. 27) is further guided in a horizontal channel 445 formed in a guide block 446 which is held by screws 457 on the bracket 445. From the inner end of the block 446 the wire passes across an intervening space and is further guided in a channel 445 formed in a guide block 446 which is also mounted on the bracket 445 being held in place by screws 461.

The channels 455, 458 aligning with the channel 444 guide the wire in a straight line of travel and the wire is engaged for feeding in that part which extends between the spaced ends of the guide blocks 455, 458. This feeding mechanism comprises two grooved discs between which the wire is engaged and by means of which it is advanced.

One of these, a disc 455 (Figs. 29 and 40) is keyed to the upper end of a vertical ratchet shaft 472 which is mounted in a bearing 467 formed in the bracket 445. The other disc (designated by the numeral 471) is mounted on the upper end of a vertical shaft 472 which is journaled in a bearing 473 formed in a slide block 474. The sides of this block are grooved at 475 where they have sliding engagement with tongued walls 476 of the bracket 445.

The discs 455, 471 clamp the wire 441 in their corresponding grooves with a yielding force that provides a proper frictional engagement to effect the advancement of the wire when the discs rotate. The block 474 is backed up by a spring 477 for this purpose, the spring being partially confined within a pocket 478 formed in a spring cap 478 secured by bolts 481 to the bracket 445. The mounting of the block 474 in its grooved slide-ways permits the necessary slight movement under the holding action of the spring as will be readily understood.

A cover plate 452 (Figs. 18, 27, and 40) is set into the surface of the table extension 442 and this cover plate 452 forms a top for the chamber 443. Intermittent motion is transmitted to the feed discs 455, 471 by a pawl and ratchet connection mounted on the shaft 466. The shaft 466 is geared to the shaft 472, 75 a gear 485 (Figs. 29 and 40) being keyed to the shaft 466 and meshing with a gear 486 which is keyed on the other shaft. A nut 487 threadedly secured to the end of the shaft 472 holds the gear 486 in position for intermittently stopping the machine and for preventing any operation if the wire breaks. The feeding of the wire will now be considered.

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The discs 455, 471 clamp the wire 441 in their corresponding grooves with a yielding force that provides a proper frictional engagement to effect the advancement of the wire when the discs rotate. The block 474 is backed up by a spring 477 for this purpose, the spring being partially confined within a pocket 478 formed in a spring cap 478 secured by bolts 481 to the bracket 445. The mounting of the block 474 in its grooved slide-ways permits the necessary slight movement under the holding action of the spring as will be readily understood.

A cover plate 452 (Figs. 18, 27, and 40) is set into the surface of the table extension 442 and this cover plate 452 forms a top for the chamber 443. Intermittent motion is transmitted to the feed discs 455, 471 by a pawl and ratchet connection mounted on the shaft 466. The shaft 466 is geared to the shaft 472, 75 a gear 485 (Figs. 29 and 40) being keyed to
411. When the pawl 508 moves in the opposite direction the spring 509 yields and permits snapping of the pawl over the teeth of the ratchet 551 without moving the latter.

5 Reference has already been made to an electric control associated with the contact members 356, 376 of the cutting station B (Fig. 24). When these contacts are separated and forced one another by a can cover at that station the electric control set up at that time affects the feeding of the wire 441. This electrical operation will be fully described in connection with the wiring diagram but the mechanical elements associated with the wire feeding and affecting the movement of the feed discs 455, 471 will be briefly considered at this time.

The shaft 507 (Figs. 27 and 29) which is carried in the ratchet arm 506 also carries a second pawl or dog 531 which is pinned to the lower end of the shaft. The two dogs 508, 531 therefore move in unison as the shaft is moved. When there is failure of a can cover a at station B the wire feed for that cycle is interrupted by the operation of a solenoid 532 which is located below the wiring devices just described.

This solenoid is provided with a core 533 which is normally held below and out of the way of the dog 531 as illustrated in Fig. 27. When there is failure of feeding of a cover, however, the solenoid core 533 is raised into the path of travel of the dog 531 and as it strikes against the core in its bodily movement with the arm 505, it is shifted with its shaft 507 and with the upper dog 508 about the shaft center. This carries the end of the upper dog away from and free of the teeth of the ratchet 501. No feeding movement of the discs 455, 471 takes place and the wire remains where it is.

The solenoid 532 is of the same general type as the solenoid 543 used on the cover feeding end of the machine and already described. This solenoid 532 is bolted at 534 (Figs. 17, 27, and 40) on a bracket 535 which is in turn secured to the web 63 of the frame.

Before proceeding to a description of the formation of staples from the wire a brief consideration will be given to the mechanical contacts associated with the control that stops the machine if the wire breaks and that requires a wire supply before it can be operated.

The contact device comprises a detector rod 541 (Figs. 27 and 29) which is one element of an electric contact and which is held out of electric closing position by the wire 441. Rod 541 is formed with a groove 542 and as long as the wire is taut as it passes through the groove the rod 541 is held out in a non-contact position. The rod 541 is slidably mounted in a sleeve 543 which is formed with a foot 544 by means of which it is held in fixed position on the table extension 445.

Rod 541 is formed with an enlarged central section 546 which has sliding movement within a chamber 547 formed in the sleeve 543. The section 546 is slotted at 548 and the reduced end of a screw 549 threaded engaged in the sleeve projects into the slot 548 and acts as a feather to prevent turning of the rod so that its groove 542 will be properly presented to the wire at all times.

A spring 551 is located in the chamber 547 and surrounds the rod 541 one end abutting the section 546, the other end being confined by a hollow nut 552 threaded in the end of the sleeve.

The spring tends to pull the rod 541 within the sleeve but the rod is held out by the wire 441 as long as it is properly passing into and through the wire feeding mechanism.

The opposite inner end of the rod 541 projects into a sleeve chamber 553 which contains a threaded contact 554 associated with the electric control hereinbefore described. This contact is mounted in the sleeve 543 and is insulated from it by a bushing 555. Should the wire break or fail to properly pass into the feeding devices the spring 551 operates to snap the end of the rod 541 back into the chamber 553 and close the contact between the parts 554, 555. Since the sleeve 543 is grounded in the frame of the machine this closes the electric circuit.

The wire 441 after passing through the channel 456 of the guide block 549 enters into and passes through a channel 556 (Fig. 32) formed in a sleeve 561 which is clamped in a side wall 562 of a staple forming housing 563 (see also Figs. 27, 29, and 30). The sleeve 561 is shouldered in the wall 562 and is held in place by lock nuts 564 threadedly engaging its end where it protrudes beyond the wall. The upper part of the housing 563 is in the channel 443 and this housing is secured to the table extension 442. Bolts 565 clamp a horizontal foot 566 of the housing under the surface of the table.

The upper surface of the housing is flush with the upper surface of the table extension and has vertical movement on the upper side of the turret 51 moves freely above. This housing is also formed with a second side wall 567 (Figs. 27, 34, and 35) which is parallel to and spaced from the side wall 562. These walls enclose a chamber in which the staple forming and inserting mechanism is in part located.

A spacer plate 571 is located in the upper part of the housing between its side walls and is secured by screws 572 to the rear wall. An inner slide 573 is also located within the housing and its rear wall has sliding engagement with the spacer plate. Slide 573 is formed with a tapped front channel 574 leaving side walls 575 the forward edges of which are flush with the front edges of the housing side walls 562, 567.

An outer slide member 576 (Figs. 27, 30, 31, and 34) is inserted in the front of the slide 573 and has vertical movement in the inner slide 573. The side walls 575 of the former are grooved at 577 and tongues 578 are formed along the front and side edges of the outer slide 576. Plates 571 are screwed to the lower front edges of the housing walls and upper plates 573 are similarly secured to the upper front edges. These plates retain the outer slide member in sliding position and through it the inner slide.

The upper end of the slide 576 is inclined at 585 (Fig. 30) and a wire clamping block 596 formed with a hooked head 587 is positioned in front and on top of the slide being secured by bolts 588. The upper inner corner of the block 585 is formed with a transverse groove or pocket 589 in which the wire 441 is adapted to rest during the staple cutting and forming operations.

A lever 595 is mounted for rocking movement on a pin 596 held in lug 597 formed on the front of the housing walls 562, 567. Lever 595 is bent inwardly from its pivotal mounting and extends upwardly within the slide channel 574 as a vertical arm 598. A clamp block 591 is mounted on the upper end of this arm 598 and is secured by a
bolt 602. The clamp block 601 extends forward in a projection 603 which, in one position and when the wire extends through the pocket 589, overhangs the head 587 of the block and guides the wire as it passes through the groove 589.

A spring barrel 605 has a short sliding movement in a vertical bore 586 formed in the lower part of the inner slide 573 its upper end extending into the channel 574 of the slide. This spring barrel is seated on a spring 567 and is located in the bore, this spring extending inside of the spring barrel, forcing it against the lower end of the lever arm 568. This spring holds the lever (in the position illustrated in Fig. 30) with the clamp blocks 566, 601 together, their cooperation forming the pocket for the wire as just described.

The lever 595 is also formed with an off-set lower vertically extending arm 568 (Figs. 30 and 34) and the inner surface of its lower end is cut back or notched at 609. This cut back surface engages the front wall of a projection 611 extending out from a lower side block 612 (see also Figs. 27 and 36) of block 612, formed with depending spaced side plates 613 and is located in the lower end of the housing 563. The walls 613 slidably engage the housing walls 561, 567, being held in sliding position by the plates 611.

With the parts in the position illustrated in Figs. 27 and 35 the wire 441 is passed through the channel 560 in the sleeve 561 and through the pocket 589 (Fig. 30) formed in the block head 587 and its forward end is moved beyond the side wall of the latter until it is brought into engagement with the inner tapered end 631 (Figs. 27 and 29) of a stop pin 632. Pin 632 is carried in the upper end of the casing wall 567 and is held in place by lock nuts 633. The forward end of the wire is inclined to the same angle as the tapered pin end 631 and this incline in the wire is the result of a sharpening process used on the previous staple piece as will be hereinafter more fully explained.

The cutting of a staple piece or blank from the front end of the positioned wire 441 is effected by raising of the inner slide 573. During the cutting action the outer side 576 remains in the position illustrated in Figs. 30 and 35 wherein the end of the wire is retained in the same plane as the channel 560 of the sleeve 561.

The inner slide 573 in its lifting movement as a first act carries a cutting die into engagement with the wire. During the second part of the lifting which immediately follows the wire blank is cut. In a third part of the raising action the side ends of the wire are bent up at right angles to form the staple. All three elements of the lifting movement of the inner slide follow in rapid succession and the entire cutting and staple forming operations require only a relatively short time and staple lifting movement.

To effect this lifting of the slide 573 the block 612 is raised as will now be described. The sides 613 of the block 612 are pivoted connected by a pin 635 (Figs. 27 and 30) to the upper end of an adjustable connecting rod 636 (see also Figs. 13 and 19). The lower end of the rod is pivotally connected at 637 to the end of a lever arm 638 which is pinned on a horizontal rock shaft 639.

The shaft 639 is journaled at one end in the bracket 258 and at its opposite end in a bracket 641 (see also Fig. 15). Bracket 641 like the bracket 298 is secured to a side frame 61 of the machine. The shaft 639 also carries a lever arm 642 (Fig. 19) which at its outer end carries a pin 643 rotatably supporting a cam roller 644. The roller 644 operates in a groove formed in one face of a double face cam 645 which is carried by and secured to the shaft 52. This cam groove is of a shape to oscillate the shaft 639 and its lever arm 638 first for a wire cutting operation and then for a staple forming and then a staple inserting operation.

The block 612 is spring connected with the inner slide 573 and the latter carries a stud 651 (Figs. 30 to 32, inclusive) which extends down through the inner slide bore 652 formed in the block 612. Block and slide are urged apart by a spring 653 which is located on the stud 651 and the upper end of the spring being seated in a vertical bore 564 in the lower end of the inner slide.

The lower end of the spring is seated in a counter bore 655 formed in the upper surface of the block. Lock nuts 666 threadedly mounted on the lower end of the stud 651 limit the amount of separation between the parts 573, 612 under the spring 655. When the stud 651 begins its upward movement the inner slide 573 is also moved up, the spring 653 maintaining the space between these members for a fractional distance of travel which is the first time interval previously referred to for bringing the upper end of the slide into engagement with the wire.

The upper end of one of the side wall slides 575 of the inner slide 573 carries a die insert 661 (Figs. 27, 29, and 35) set into the front face of the wall. It is held in position by screws 662.

This die insert is formed with an inclined wall 663 which engages a similar inclined wall 664 formed on the inner end of the sleeve 561. These inclined walls slide on one another at all times and as the inner slide 573 is raised in its initial movement it is the upper end of the die insert 661 that comes against the wire where it protrudes beyond the channel 560 of the sleeve.

When the upper end of the die 661 engages the wire the inner slide 573 is momentarily arrested in its lifting movement but the block 612 continues to rise as the spring 653 yields and the distance between the upper surface of the block 612 and the lower surface of the inner slide becomes less. At the same time the upper end of a finger 665 (Figs. 30 and 31) is slid in a notch 666 cut in the inner slide wall and as the inner slide remains stationary held by the resistance of the wire from above until the upper end of the finger strikes against the end wall of the notch.

Finger 665 is pivotally mounted on a pin 671 carried in lugs 668 which extend back from the rear wall of the block 612. The lower end of the finger 665 is engaged by a spring barrel 669 (see also Fig. 28) which slides vertically in a bore 671 formed in a boss 672 extending back from the rear wall of the housing 563. This spring barrel is carried on the upper end of a spring 673 which is located within the bore and the spring pressure against the end of the finger holds its upper end within the slot 666.

The rising finger 665 on striking against the inner slide 573 lifts it with the block 612. The die 661 is thus forced out of the way and with its inclined face 663 shears off a length of wire thus providing the staple blank. By reason of the angular cutting both of the blank ends are angular and this provides sharpened ends for the staple subsequently formed from the blank.

This completes the second act of the inclining lifting and immediately follows the third part of
the movement with the slide 573 still rising. The ends of the wire piece or staple blank now begin to bend as illustrated in Fig. 36.

This bending of the staple ends is accomplished on one side by the cutting die 664 and on the opposite side by the slide 575 of the inner slide. This wall is cut out at 675 to provide clearance so that the slide moves up without striking the end of the pin 632. The die 661 is formed with a vertical slot 677 and the slide wall 575 on the opposite side is formed with a similar slot 678. These slots 677, 678 are used up to the ends of the staple as these ends begin to bend from the straight position into the angular position of Fig. 36 and as the slide continues its upward movement the staple ends come into a right angled position within the slots and the staple is fully formed.

It will be observed by comparison of Figs. 30 and 32, which show the position of the parts for the operations just described, that the inner slide 573, the block 612 and the finger 665 are disengaged, and while the finger is still within the and moved, the lever 595, the outer slide 576 and parts associated therewith having remained in a stationary position. During this movement, however, the spring barrel 669 has been crowded farther into its bore 666 against the action of the spring 667 as the front lower part of the slide 573 approaches closer to the right angle bend in the lever 595. At the same time the projection 611 of the block 612 has moved up within the slot 660 thus closing the space between the upper inclined wall of the slot and an inclined upper wall 661 of the projection.

The finger 665 at such time rocks slightly on its pin 667. This finger is formed with an inclined rear wall 662 which is spring held by a roller 663 in engagement with a roller 663. The roller 663 is rotatably mounted on a pin 664 carried in the side walls 562, 561 of the housing 563.

During the upward movement of the finger with the rising of the block 612 now being continued, while the finger is still within the notch 666 of the inner slide 573, its inclined surface 662 is forced forwardly by the roller 663. This rocks the finger in a counter-clockwise direction against the action of the spring barrel 669. At the end of the upward movement of the inner slide, this bore 666 has passed through the forming operations are completed, the finger has moved up and rocked back into the position illustrated in Fig. 32. Its upper end is now just ready to snap out of the notch 666 of the inner slide.

At the same time the space between the upper surface of the block 612 and the lower face of the outer slide 576 has been lessened. These parts are yieldingly associated through a spring device which comprises a stud 668 which is threadedly secured to the lower part of the slide and which extends down through a vertical bore 667 cut through the block 612. A spring 668 is located on the lower end of the stud and is held under compression, with its upper end against the lower face of the block 612, by nuts 669. Spring 668 tends to pull down the outer slide 576 and hold it against a shoulder 671 formed on the inner face of each plate 581 (see Figs. 32 and 34).

Staple inserting

The formed staple d is still in the pocket 589 of the block head 587 and its ends e are seated within the slots 677, 678 of the die 661 and the slide wall 575. By the time the staple forming parts have been brought into the position illustrated in Fig. 32 the can cover a has been clamped from above and is ready to receive the staple. This clamping of the can cover will first be considered.

As soon as the turret comes to rest with the can cover at station C a staple inserting and clinching head mounted above the turret comes into action. This head comprises a clamp block 701 (Fig. 30) carried by a positive engagement of the press slide head 395 (see also Fig. 17). The clamp block is supported on bolts 703 which are threadedly secured in the upper part of the block and which have sliding movement within the press head. The clamp block is formed with a central opening 704 in which a stem 705 of the press slide head projects.

The clamp block is normally supported directly on the heads of the bolts 703 and is forced down by a spring 711 located in a central depression 708 formed in the clamp block (see also Fig. 39). When the press slide 395 is forced down the clamp block 701 passes into the cover positioned in the turret pocket at station C and as the spring 711 yields, the cover is firmly pressed down on the table extension 442.

The clamp block 701 at station C, like the clamping head 365 at station B, is also provided with an electric contact device by means of which an electric current is set up if there is no can cover present at this station. The electric circuit associated with such a contact will be fully described in connection with the wiring diagram but at the present time the physical or mechanical features relating to the contact devices at station C will be considered.

A contact pin 711 (Figs. 30 and 39) is slidably located in a vertical bore 712 formed in the lower part of the clamp block 701. This pin is held within the bore by a threaded washer 713 and is backed up by a spring 714. When the clamp block 701 is in its raised position the contact pin 711 extends below the lower surface of the block as in Fig. 17.

As long as there is a cover at station C it will act as an insulation when the contact pin 711 is brought down on it. Upon engaging the cover the pin is pushed back into the clamp block (Fig. 30) and the forming operations of the machine will proceed. If there is no cover within the turret pocket to act as an insulation the contact pin 711 when brought down will engage the upper end of a fixed contact pin 715 which is held in insulated bushings 716 seated in the ends of an opening 711 formed in the table projection 442. These bushings insulate the contact pin 715 from the frame of the machine. When an electric contact takes place between the pins 711, 715 the electric control circuit functions to interrupt subsequent operations as will be hereinafter fully set forth.

With the cover clamped down on the table extension 442 and during the final lifting of the block 612, the staple is carried up and its sharpened ends (which it will be recalled were cut off at an angle) are pushed through the wall of the cover, the inserting devices moving from the position illustrated in Fig. 32 to that shown in Fig. 33. During the inserting movement of the staple the overhanging extension 603 of the clamp block 601 is slowly moving back or toward the left (Fig. 32) while the lower inclined wall of the overhang holds the staple in the pocket

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589 of the clamp block 587. This inserting action will be more fully analyzed before proceeding further with the description.

Movement of the clamp block 501 is effected by a rocking of the lever 595 on its mounting 596. The inclined surface 591 of the block 512 slides up and along the inclined top wall of the slot 609 and this throws out the arm 608 of the lever rocking it and further depressing the spring bar 605 so that the upper lever arm 598 with the clamp block 501 is moved back. This is only an initial rocking of the lever 595 but at this time the upper surface of the block 612 is moving into engagement with the lower surface of the outer slide 575.

Both block 612 and slide 576 now move up and the upper corner of the head 587 pushing against the inclined surface of the overhang 603 rocks the lever 595 further on its pivot and its lower end swings free of the block 612. At the same time the inner slide 573 moves from the position of Fig. 32 into that of Fig. 33 but this movement is under the yielding pressure of the spring 653. The inner slide 573 is stopped against further movement, and while the block 512 is still rising, by engagement of a rear shoulder 721 (Figs. 22 and 33) formed in its lower end, with the upper wall of the slot 722 formed in the inner lower end of the spacer plate 571. This final lifting of the outer slide 573.

The actual insertion of the staple is effected by a lifting of the outer slide 576 which is raised on the last part of the movement of the block 512. When the block 512 reaches its uppermost position as shown in Fig. 33, the finger 665 under the action of the roller 663 has been rocked into the position shown in that figure. A spacing pin 723 extends in back of the upper part of the finger 665, being held in the housing walls 602, 607, and prevents excessive oscillation of the finger.

Staple clinching

As the sharpened ends e of the staple d pass through and protrude above the wall of the can cover a they move between the ends of a pair of spaced fingers 731 (Figs. 30 and 38). Each finger 731 is pivotally mounted on a shouldered stud 732 (see also Fig. 39) which is threadedly secured in the clamp block 701. At the front the block 701 extends out in side walls 733 and forms a chamber 734 which is closed by a front plate 735.

The fingers are located in this chamber.

Each finger 731 along the inside and at its lower end is grooved at 736 and it is into these grooves that the ends of the staple enter when they pass up through the can cover wall. The clamp block 701 is also formed with the belt 707 tongue 737 which extends into the chamber 734 in between the fingers.

The upper part of each finger 731 constitutes a tapered end 738 and these two ends are tied together by a spring 739 its ends connecting with pins 741 carried in the fingers. This spring is secured in the clamp block 701 and fingers 731 are stationary. The spring 707 yields at such a time.

During this movement of the slide head a roller 745, which is mounted on a stud 746 threaded securely in the stem 705 of the head, engages the inclined inner surfaces of the upper finger ends 738 and forcing the ends apart rocks the fingers on their pivotal mountings. This moves the lower ends of the fingers closer together and bends the staple ends e in toward each other laying them flat against the upper surface of the can cover wall. This completes the clinching action and cover and staple then appear as illustrated in Fig. 71.

The stapled can cover is released from clamped position when the clamp block 701 is raised with the slide head 395 the cover remaining held within the pocket of the turret 81. The next turret movement carries the cover into the spout inserting station D.

Spout feeding

The pouring spouts f are introduced into the spout feeding table 73 by a belt conveyor, the inner machine portion of which is best indicated in Figs. 1 and 13. This conveyor carries horizontally disposed belt 751 which in the machine end passes over a grooved belt pulley 752 mounted on and keyed to a horizontal shaft 753. The shaft 753 is mounted in bearings 754 formed in an auxiliary table 755 while an auxiliary table 756 is bolted to the end of the spout feeding table 73.

The auxiliary table is formed with spaced parallel guide walls 756 between which the upper run of the belt 751 passes. The pouring spouts f are positioned in close processional order on the upper run of the belt in any suitable manner and as they pass between the walls 756 and over the pulley 752 they leave the belt and slide along a table top 757 formed in the auxiliary table 756. Belt pulley 752 may be constantly rotated with its shaft 753 in any suitable manner as by application of rotating power to a sheave 788, secured to one end of the shaft, a belt drive 759 being used for this purpose.

An electric control device is associated with the feeding of the spouts at this point and in order for the solenoid 343 of the cover feeding mechanism to permit feeding of the covers, as previously described, it is necessary that certain electric contacts be closed while the spouts are still in the auxiliary table. The electric features pertaining to this control will be hereinafter described.

In connection with the wiring diagram the saws presented are the mechanical elements of the contacts will be noted.

An insulating block 761 is inserted in the upper part of the spout passageway in the auxiliary table and this block is mounted in fixed position on the walls 756. Block 761 carries two contact plates 762, 763 which extend down into the spout path. The spouts as they are moved forward by the slide head pass beneath and engage these contact members.

As long as the supply of spouts is sufficient to hold adjacent spouts closely together so that there is an unbroken metal connection between them, an electric circuit will be completed between the contacts and current will pass through the interposed spout walls. In the event that there is a failure of feeding of the spouts so that there is an intervening space between adjacent spouts the electric current associated with the contact members is broken as will hereinafter more fully be described.

The belt 751 keeps the spouts in close processional order on the table top 751 and slides along under the spouts when not moving them forward.
The spouts pass from the auxiliary table top 197 to a horizontal floor 765 of the spout feed table 73 and at such time pass between side walls 766 (see also Fig. 15) formed in the table 13. These walls 766 are formed by inwardly projecting guide rails 767 which retain the spouts in a straight line of travel and at the same time provide support for a feed bar 768 which is substantially T-shape in cross section, its wider head portion 769 moving from the auxiliary table top 757 to a horizontal floor 65 of the spout feeding table 73. A slotted top plate 772 rests on and is secured to the walls 766 and retains the feed bar against upward displacement. The feed bar 768 operates to advance the foremost spout in the processional line into station D and at the same time fits sufficiently close in the spouts and between their side walls 7 to hold them in proper feeding position. The lower surface of the feed bar is grooved at 773 (Figs. 13 and 15) which provides a clearance passage for the hinge tabs 7 of the spouts.

The inner end of the feed bar 768 is recessed along its under surface at 775 (Figs. 13 and 43) and a feed dog 776 is pivotally mounted in the recess having rocking movement on a pin 777. The forward end of the feed dog 776 engages the hinge tab 7 of the foremost spout when the feed bar moves the spout from the table floor 765. Movement of the feed bar is effected by a cam on the cam shaft 82 in the following manner.

A lug 781 (Figs. 1, 13, and 15) extends up from the rear end of the feed bar and is pivotally connected to an adjustable link 785 which is also pivotally connected to the end of a lever arm 785 secured to a rock shaft 786. The rock shaft 786 is journaled in a bearing 787 formed in a bracket 788 carried on the bracket frame 229 and in a bearing 789 formed in a bracket 791 bolted to the face of one of the frame side walls 61. Rock shaft 786 also carries a lever arm 792 secured to the shaft and pivotally connected to the upper end of a spring sleeve 794. A spring rod 795 projects into the sleeve 794 and carries a collar 796 which engages and confines a spring 797 mounted on the rod and located entirely within the sleeve. A collar 798 is also pinned to the rod 795 outside of and below the end of the sleeve and this limits the action of the spring 797 which holds up the rod.

The lower end of the rod 795 is pivotally connected to the outer end of a lever arm 801 which is secured to a horizontal rock shaft 802. The shaft 802 is journaled in a bearing 803 formed in a bracket 804 which is bolted to the side frame 61. This shaft also carries a lever arm 805 which extends downwardly and carries a pin 806 on which a cam roller 807 is rotatably mounted. The roller 807 operates within a cam groove 809 formed in a barrel cam 809 carried on the cam shaft 85. Normally the cam of the shaft 802 imparts a similar movement to the shaft 786 and thence to the feed bar 768, the rod 795 and the sleeve 784 functioning as a unit.

Provision is made for interrupting the feeding of spouts into the feed bar 768. An electric control is utilized at such a time which is associated with the contact members 711, 715 located at the staple inserting station C and when there is a failure of feeding of a cover into that station an electric control is utilized. A solenoid 811 (Figs. 1, 13, and 15) carried on a bracket 812 bolted to the side frame 61. The electric circuit will be fully discussed later and at present only the mechanical stopping of the feed bar will be considered.

This solenoid 811 is associated with a horizontal slide rod 813 which constitutes the core of the solenoid, this rod extending forward and sliding in a bearing 814 formed in a bracket 815 which is an integral part of the cover plate 772. Normally, the solenoid core rod 813 is drawn in and held out of the way of the lever arm 785 and as long as it is in this withdrawn condition the feed bar 768 is actuated. When the control circuit functions, however, the rod 813 is pushed forward, this being when the feed bar 768 is on the back stroke as illustrated in Fig. 13.

The projected end of the solenoid core now extends in the path of the swinging lever arm 785, and as the latter moves forward it is blocked by the core rod. Not only is the lever arm 785 now held against movement but there is no rocking of the shaft 786 or movement of the parts 792, 794 so that as the rod 795 moves down the spring 797 yields and is compressed, permitting the full stroke of the rod 795 without its transmitting any motion to the stationary sleeve 794.

Before the foremost spout is separated from the row of spouts by a feeding stroke of the feed bar 768 the spout must pass by an escapement located in the inner end of the spout feeding table 73. This escapement comprises a pair of front fingers 821 (Figs. 42, 43, and 44) and a pair of rear fingers 822, both pairs of fingers being arranged on opposite sides of the line of travel of the spouts. As the feed belt 751 crowds the spouts into the machine the line of spouts is stopped by the front fingers.

Each finger 822 is mounted above its corresponding finger 821 and the two fingers on each side of the feed bar are pivotally mounted on a shoulder stud 823 carried in the upper end of the side wall 766 of the spout feeding table 73 and in the cover plate 772, being held in position by a nut 824. The side walls of the feed table are recessed at their forward ends to provide chambers 825 in which the fingers are located.

Each finger 821 is formed with an inward projection 826 and a rectangular pin 827 extends down from this part. The inner extremity of each projection 826 is rounded at 828 and when the feed bar 768 is in its rear or non-feeding position each projection extends into a recess 829 cut in the side wall of the bar at its forward end. The depending pins 827 extend into the path of travel of the spouts and hold the entire row or line of spouts by engaging the side lugs 7 of the foremost spout (Fig. 44). The lifting tab 7 of one spout in the row extends under the hinge tab 7 of the proceeding spout and this maintains a uniform order.

The fingers 821 are held in this inner position and their projection extends further into the recess 829 by spring bars 831 which are slidable mounted in horizontal bores 832 formed in the feed table side walls 766. Each spring barrel 831 is backed up by a spring 833 which forces it against the forward end of the finger. A spring 834 is slidable and upward extending posts 835 mounted on the fingers and assists the springs 823 in their holding actions.

The upper or rear fingers 822 are shorter than the fingers 821 and these are also provided with inner projections 836. Each projection 836 is slidable mounted with a rounded extremity 837 which strikes against the side walls of the forward end of the feed bar 768. When the bar is in its rear posi-
tion (Fig. 45) which is the position now under consideration, the forward ends of the fingers 822 are spread apart. Each finger 822 carries a depending rectangular pin 833 which like the pins 827 of the fingers 821 extends down. These pins 833 on the spread fingers 822 are out of the line of travel of the spout lugs h.

The rounded ends 837 of the projections 836 are held against the side walls of the feed bar in the same manner as the corresponding ends of the fingers 821 just described. Each finger 822 is backed up by a spring barrel 839 which has a sliding inclined horizontal bore 841 cut in the forward end of the side wall 766. This spring barrel is pushed inwardly by a spring 842 also located within the bore. Fingers 822 also carry upwardly extending posts 843 and the two posts are connected by a spring 844.

When the feed bar 768 moves forward and the foremost spout f' is advanced with the feed finger 715 pushing against its hinge tab k, the position of the fingers 821, 822 is reversed, that is, the front fingers move out and the rear fingers move in. This action carries the pins 827 out of engagement with the spout lugs h of the foremost spout and places the pins 833 in the path of the spout lugs of the second spout in the row and as the full line of spouts moves forward, this second spout is immediately stopped by engagement of its spout lugs h with these pins.

This shifting of the fingers 821, 822 is directly effected by the feed bar. The side walls of the feed bar recesses 829 (Fig. 42) curve outwardly so that as the feed bar advances the forward ends of the fingers 821 ride out of the recesses and are forced apart as their rounded projections 826 come against the wide part of the feed bar. The rounded extremities 837 of the rear finger projections 836 which initially rested against the wide part of the feed bar move in under the combined actions of the springs 842, 844 and enter side recesses or slots 845 cut in the side walls back of and above the recesses 828. It will be observed that the recesses 845 are of substantial length and permits an extended forward movement of the feed bar while holding the rear feed fingers in.

The feed bar 768 moves the forward spout from the end of the feed table and through an opening 846 cut through a wall of the turret table 64, this opening connecting with a chamber 847 formed in the turret at station D. The devices which receive the spout at this station and the inserting instrumentalities are located within the chamber 847.

The spout is received in a cage unit which comprises a pair of side wings 851 (Figs. 42, 45, 46, and 48) located on opposite sides of the line of travel of the spout. Each wing 851 extends toward the turret shaft 119 and is hinged on a vertical shouldered stud 852. This stud is held in a boss 853 formed in a bracket 854 which is bolted to the under side of the table 64, a nut 855 holding the stud in fixed position.

Each side wing 851 carries a block or insert 856 secured in the free or unhinged end of the wing by screws 851. Each block insert is formed with a lower inclined side wall 858 the two opposed walls providing a pocket for the incoming spout, each wall having about the same angle as the side wings g of the spout. Directly above the lower wall 858 of each insert is a transverse groove 859 in which a side lug h of the spout freely passes. When the spout is received in the cage the side wings 851 are held together in their inner or closed positions (Fig. 48). A transverse rod 861 passes through an opening formed in each side wall and its ends project beyond the walls. Lock 852 is thereby secured on each end of the rod 861 hold a pair of springs 863 also located on the ends of the rod, the springs forcing the free ends of the walls inwardly and holding projections 864 of the block inserts 858 in engagement, these projections providing a front wall for the cage spout pocket.

As the spout moves between the block inserts 1086 it rides over the upper surface of a spout inserting plunger 865 which is slidable mounted in a boss 866 and formed in the bracket 854. As the spout comes to rest between the inclined walls 858 of the blocks the front tab 1081 strikes against and is stopped by the wall projections 864, this position being illustrated in Fig. 45.

A cover plate 886 (Figs. 18 and 45) is positioned over the cage unit and provides a floor for the cap cover brought into the station D by 80 moving the turret shaft 81. This plate is set in flush with the upper surface of the table 64 and extends over and is connected to the table. The plate 886 is cut out at 884 and this opening exposes the upper end of the pocket formed by the 95 block inserts 858 so that the pouring spout f, as it rests on the plunger 865, is in vertical alignment with and located below the opening c cut in the cover a. The spout is thus in position for insertion within the cover, which operation will now be described.

Spout inserting

Prior to lifting of the spout and inserting it into the cover opening devices are brought down into holding position within the turret. These devices are carried in a clinching head which is moved up and down and which is shown in detail in Figs. 13, 45, and 49. A clamping head 875 is adapted for movement into the positioned can cover at station D and is formed with an enlarged upper end 876 which normally rests upon a clamping ring 877 carried on the lower end of a clinching head 878, bolts 879 being used to hold the ring in position.

The head 875 has vertical movement within the clamping ring and springs 885 are located in vertical bores 882 formed in the clinching head below the lower end of the springs being seated in depressions 883 formed in the upper end 876 of the head. These springs normally hold the shoulders part 878 of the head against the clinching ring as illustrated in Fig. 48. The clinching head 878 is carried by a cross head 885 (Figs. 13, 20, and 45) a bolt 886 being used to hold the parts together. Cross head 885 is secured to the lower end of a square vertical shaft 877 which is substantially the same construction as the shaft 313 for the cross head 312. The shaft 887 has vertical movement within bearings 888 formed in the bracket frame 229.

The upper end of the shaft 887 (Figs. 1 and 22) is pivotally connected to the lower end of an adjustable connecting rod 892 which at its upper end is pivotally connected to the forward end of an arm 854 carried on the lever 331 (see also Fig. 21). Oscillation of the rock shaft 325 thus provides for the vertical movement of the clinching head 878 which when lowered moves the clinching head 875 into the position can cover 70 at station D.

The cover a and spout f are now in the relative position illustrated in Fig. 6, the cover being held down in its seat against the plate 866 and within the turret pocket 82 by the clamping head 75.
The spout is inserted by a combination of lifting the spout as the plunger 865 is raised and by partial squeezing together of the spout wings g which are held at such time within the block inserts 856. Figure 7 shows the squeezing together of the upper ends of the spout wings to allow the lugs h to pass into the opening c of the cover.

The clamping head 875 is cut out along one side to form a chamber 901 (Fig. 45) which is directly above the opening c in the clamped cover. The plunger 865 directly below is held within the boss 866 by a plate 902 and is pivotally connected to the upper end of a connecting rod 903 (Figs. 13, 45, and 46). This rod is connected by an adjustable link 904 to the front end of a lever arm 905 (see also Fig. 19). Lever arm 905 is loosely mounted on the shaft 839 between the lever arm 835 and the bearing 841. Arm 905 carries a cam roller 906 which operates in the groove of a face cam 907 secured to the cam shaft 92.

The insert blocks 956 are formed with inclined walls 905 (Figs. 45 and 46) which join with the wings 951 which are formed in a horizontal bore in the clamping block inserts 856. The inclined walls 905 of the insert blocks 956 are still held together the rising plunger 865 lifting the spout carries its side wings g against these inclined walls 905 which force the spout wings 851 into at their top ends and while so held insert them into the cover opening c. It will be observed by reference to Fig. 46 that the groove 859 is extended upwardly in a grooved section 911 which allows for clearance on each side for the spout lugs h.

After the spout has thus been partially inserted within the opening the continued upward movement of the plunger forces it farther into the inserted position. At this time, however, the side wings 851 hinge out on their pivotal mounting 952 and the insert walls 905 are moved back and away from the spout holding position so that the spout wings under their natural spring move out and up against the adjacent side edges of the cover opening. This spreading of the side wings and the moving apart of the insert blocks 956 is effected by the plunger 865.

The upper part of the plunger is relatively narrow as illustrated in Fig. 46 and the side walls of the narrow part merge in inclined walls 812 in the full width of the plunger. Each side wing 851 is formed with depending lugs 913 (Figs. 46 and 47) there being a pair of lugs on each side of the plunger. A pin 914 is carried in each pair of lugs and a roller 915 is rotatably mounted on each pin.

When the plunger is in its lower position these rollers barely engage the side walls of the narrow upper end of the plunger and as the latter moves up and effects the partial insertion of the spout just described the inclined walls 812 strike these rollers and upon continued upward movement of the plunger the rollers spread as they pass to the sides of the wider part of the plunger. This action spares apart the forward ends of the side walls 851 and moves the insert blocks 956 out of engagement with the spout as has just been described.

Discharge

The can cover with its inserted and hinged spout is next advanced from station E to station F (Fig. 18) which is a discharge station. Since passing the station A it will be recalled that the cover has been held in the turret pocket 82 by the clamping jaw 353 (Figs. 18 and 18a) and as the turret pocket comes to rest at station F the groove 351 formed in the slide 351 is engaged by and rides on the screw 353 previously described.
This backs up the jaw and releases its hold against the wall of the cover. The cover is then only loosely held in the turret pocket. This turret pocket at station F is directly above a discharge plunger 941 (Figs. 1 and 20) which is carried on the forward end of the cross head 312. When the cross head 312 is lowered the plunger moves down into the cover and forces it down into the depression 936 and out of the turret pocket moving it between the opposed serrated walls of the spring pressed blocks 937. These blocks yield sufficiently to allow the cover to enter fully into the depression. This brings the rim of the cover and the spout entirely below the surface of the table 64 so that when the turret moves on its makeup stroke the spout clears the discharged spout. The can cover is now directly in front of a discharge pin 942 (Figs. 18 and 50) carried upon an arm 943 mounted on a vertically extending header stud 944 (see also Figs. 1 and 16). This stud is held in a bearing 945 formed in the table 64.

A rack bar cage 946 is secured to the lower end of the stud and a gear segment 947 is rotatably mounted on the stud directly above the cage and is secured to the hub of the lever arm 943. The segmental rack 947 is engaged by a rack bar 948 which slides within guide ways formed in the rack cage 946 and is pivotally connected to an adjustable connecting rod 949 which is pivotally connected to an arm 951 of a bell crank lever (Fig. 19). This bell crank lever is loosely mounted on the shaft 929 and is located between the lever members 938, 642 and has an arm 952 which extends forward. The arm 952 rotatably supports a cam roller 953 which operates within a cam groove 954 formed on the opposite side of the double cam 645 from the groove in which the roller 644 operates.

By means of the described connections the lever arm 943 (Figs. 18 and 50) is moved forward each cycle of the machine and its pin 942 at such times is moved along an arcuate slot 955 formed in the table 64 below the depression 936. This pin engaging the cover sweeps it from its position, carries it along an arcuate passage 956 which is cut in the table top 65 and pushes it into a discharge chute 957 bolted to the table. This completes the operations in the apparatus as far as they are related to producing a hinged spout can cover.

Electric controls

The electric controls which have been mentioned from time to time in the foregoing description are graphically indicated in the wiring diagram (Fig. 51) and reference should now be had to that diagram. There is indicated an electric motor 100 which may be of any suitable form, this form being of no importance as far as the present invention is concerned. For present purposes this motor will be considered as the prime moving element for driving the crank shaft 91 through the belt pulley 99.

Motor 100 is preferably connected in a three-phase wire electric system comprising lead wires m, n, o which preferably pass through a suitable service switch 200 and thence into a switch box 300 which contains start and stop buttons 5 400 and 500. In this wiring diagram these buttons have been spread out for the sake of clearness and are shown outside of the dotted outline of the switch box. A wire p leads from one side of the starting button switch 400 and connects with the wire o, the opposite side of the starting switch being connected by a wire q to an automatic switch having four-contact points r one point of which is joined by wire s back to the motor 100.

An electric magnet 600 is also located in the switch box 300 and includes a movable solenoid core or similar device which L associated with the automatic switch embodying the four contact points r. This switch is a spring back or normally open switch. The magnet 600 is joined by a wire t to the two wires m, n and by a wire u to the frame of the machine which is indicated in the wiring diagram as a ground v. The two contact points r which close with the wires m, n are connected to the motor 100 by wires w and x.

The wire q connects with one side of the stop switch 500 as well as one side of the start switch 400 and the opposite side of the stop switch connects with a wire y. The solenoids 343, 532, 811 are each connected at one side to the wire y and throughout the normal operation of the machine an electric current flows and energizes the three solenoids by passing to the frame of the machine shown herein as a ground v.

As long as the solenoids are energized the various operating parts of the machine function normally and it is only when a solenoid is de-energized that the operating parts associated with the control cease to operate. There is one exception to this general statement and that relates to the broken wire detector which is not associated with any of the three solenoids but which stops the motor and all of the machine operations when a short circuit is set up through the contacts 541, 554, 641. These various electric circuits will be individually considered in connection with the work performed by a control device associated therewith.

In starting the motor 100 the service switch 200 is first closed in the lead lines m, n, o and then the start button 400 is depressed. A momentary starting current flows from the line o, wire p, starting switch 400, stopping switch 500 which normally remains closed, wire g through a connecting wire s which joins the wire y with a ground wire z connected with a ground v. Connecting through the ground v, which is the frame of the machine, the current flows through the wire u and the electro-magnet 600 and wire t back to the lead lines m, n.

This energizes the electro-magnet 600 and closes the automatic switch at contacts r leading the current into the electric motor 100, the current passing through wire o and wire s and through the wires m, n, w, x to excite the fields of the motor and thus cause its rotation. As soon as the automatic switch is closed at the contact points r a holding current is established which follows the same path as the starting current only now it passes along the wire q instead of the wire p.

The starting button switch 400 no longer is included and its immediate release by the oper-
ator in no way affects the operation of the motor. As long as the current flows in this manner the motor operates, the electromagnet 500 remaining energized and holding the automatic switch closed and connecting the wires to the armature of the motor 383, 384 and 385 leading into the motor.

The first control device utilizes the electric contacts 762, 763 located on the spindle feeding end of the machine and the cover feeding solenoid 343. The core 342 (Fig. 14) of the solenoid is associated with the rocking of the finger 165 so that its end 171 is either held out of feeding contact with a can cover or in engagement for feeding as has been already described.

The solenoid core 342 of the cover feed solenoid is held back and out of the way of the arm 341 as long as the solenoid is energized. Current flows in this circuit to maintain the solenoid energized as long as there is an electric path between the contacts 762, 763 and this path is maintained by an adequate supply of spouts feeding against each other as previously described. The end of the winding of the solenoid 343 is connected with the wire y by a wire ca which preferably leads through an equalizing lamp. The prefix c in wire designations signifies that it relates to the cover. The other side of the solenoid by means of a wire cb to the contact 762. The contact 763 is joined by means of a wire cc to the ground wire zz.

The energizing current for the solenoid 343 therefore utilizes the following path between wires y and ca, that is wire ca and lamp through the winding of the solenoid, wire cb, contact 762, the pouring spouts closing the circuit to the contact 763 and wire cc to the ground wire zz. If there is a failure of a sufficient supply of pouring spouts feeding against each other the current is broken between the contact 762, 763 then dropping of the solenoid core 342 on the deenergizing of its solenoid 343 blocks the movement of the lever arm 341 and the feed finger 165 is held out of engagement with a can cover.

The second electric control in point of operation utilizes the contacts 385, 375 at station B (Fig. 24) and the wire feed solenoid 532 (Fig. 27). In this case the solenoid 532 first energizes its core 533 out of engagement with the dog 531 so that the dog 531 has no influence over the normal engagement of the ratchet 531 associated with the feeding of the wire 441.

This solenoid is normally energized by a circuit which does not include the wire contacts 385, 375, 386, 378 located at station B but when these contacts are allowed to electrically connect which occurs only when there is no can cover at station B, then an independent shunt circuit is established which offers less resistance than the resistance of the solenoid winding and the electric current instead of passing through the solenoid is shunted as will now be described.

The one end of the winding of solenoid 532 is connected (Fig. 51) to the wire y by a wire wc, a lamp being also interposed in this wire line. The prefix w here signifies that the line relates to the wire (staple) feed. The opposite end of the solenoid winding connects with a wire wb which leads an electric current through a solenoid core wc of an open relay solenoid 700 and a contact wc connected with a wire wc which joins the ground wire zz. This is the normal current flow through the solenoid 532.

In the event that there is no cover at the station 75 B when the cutting head descends and the contacts 385, 378 are electrically connected then a momentary current is set up which deenergizes the magnet 532. This momentary current sets the relay 700 so that a more extended circuit which is then established will hold the solenoid 532 deenergized and give time for the movements of the ratchet feed parts after the contacts 385, 378 are separated. One end of the winding of the open relay solenoid 700 is connected by a wire wc to the wire y and the other end of the winding 10 connects by a wire wc to the contact 386. The contact 378 is connected by a wire wc to the ground wire zz.

The momentary current flowing through the wire wc, winding of the solenoid 700, wire wc, 15 contacts 386, 378, wire wc and ground wire energizes the open relay solenoid and lifts the solenoid core wc, breaking the current through the solenoid 532 at the contact wc.

This lifting of the solenoid core wc closes a contact 20 for the holding circuit referred to and for this purpose the solenoid core is formed with an associated core part wc which when lifted closes a contact at wc connected to a wire wc leading into a switch 961 the other side of which is joined 25 by a wire wc to the ground wire zz. The upper end of the solenoid core part wc is joined to a wire wc which joins the wire wc leading from one side of the winding of the solenoid 700.

In the holding circuit electric current now flows as before as far as the wire wc but instead of passing into the ground wire by way of the contacts 386, 378 the current flows by way of the wire wc, solenoid core wc, contact wc, wire wc, switch 961 and wire wc back to the ground line. This, it will be observed, still energizes the solenoid 700 and holds the contact wc open so that solenoid 532 remains deenergized.

Reference has just been made to a switch 961 and this switch is shown in Figs. 16 and 26. It is carried on a bracket 962 which is secured to the side frame 61. The switch is provided with the usual contacts which are opened and closed by movement of a lever 963 which carries a roller 964. The position of the lever 963 throughout most of the period of one cycle of operation is closed and at such time the roller is spring held away from the bracket 962.

A cam 965 is secured to the vertical shaft 103 and the roller 964 at all times engages this cam. As each cycle of operation of the various movable parts on the machine nears completion a high point on the cam 965 presses the roller 963 toward the bracket 962 as illustrated in Fig. 26 and this opens the switch 961. Without this provision there would be nothing to deenergize the solenoid 700 once the holding circuit was established. By opening the switch 961 at the end of each cycle the parts of the device are set for proper actuation.

As soon as the switch 961 is open (Fig. 51) the holding circuit passing through the winding of the solenoid 700 is broken and the solenoid core parts wc and wc drop and open the contact wc. At the same time the contacts in the circuit of the solenoid 532 close and that solenoid is immediately energized, restoring the wire feed devices for normal wire feeding operation.

A third control relates to the feeding or prevention of feeding of a pouring spout in position below the turret pocket at station D and includes the solenoid 811 and the contacts 711, 715 at station C. Like the preceding electric control for the wire feed just described, an electric current normally flows through the windings of
the solenoid 811 and energizes it so that its core 813 is held out of the path of travel of the spout feed arm 785. One end of the winding of the solenoid 811 is joined by a wire 8a to the wire 8y and a resistance lamp is preferably introduced in this line. The prefix a now used signifies that the line refers to a spout feed. The other end of the solenoid 811 winding is joined by a wire 8b to a movable solenoid core part sc of an open relay solenoid 880. The solenoid core sc is joined through a contact sd to a wire se connected to the ground line zz. Flowing of current through this path energizes the solenoid 811.

Normal conditions as to the feeding of spouts obtain as long as the contacts 714, 715 are electrically separated by the presence of a can cover at station C. If there is no cover, however, at this station and the contacts are electrically connected as has been already described, a momentary circuit similar to and functioning the same as the circuit previously described in connection with the solenoid 532, is first set up.

For the momentary circuit current flows from the wire y through a wire 8y to one end of the winding of the solenoid 880 the other side of the winding being joined by a wire sb to the contact 711. The contact 715 is joined by a wire sj to the ground line zz. As soon as the control contacts are closed and current flows through the windings of the solenoid 880 its core part sc is lifted and the current flowing through the solenoid 811 is broken at the contact sd.

This lifting of the core is simultaneous with the lifting of a second core part sk associated with the core part sc. The lifting core part sk closes a contact sl connected with a wire sm which passes into a switch 971. The opposite side of this switch is connected by a wire sn to the ground line zz.

When the contact sl is closed the holding circuit is established and current then flows along the wire sj through the solenoid 880, wire sb and thence by a wire so connected to the top part of the solenoid core sk, the current flowing through the core, thence through the contact sl, wire sm, switch 971 and wire sn back to the ground wire. This current 811 can be observed still energizes the solenoid 880 and as long as its core ra is held up the contact 8d is broken and the solenoid 811 remains deenergized.

The switch 971 (Fig. 16) is the same kind of switch and is operated in the same manner as the switch 961 and is also carried on the bracket 962 above. The switch 971 is opened near the end of each cycle by the operation of a cam 975 secured to the shaft 183 so that the holding circuit is interrupted and the solenoid energizing circuit for solenoid 811 is restored.

The contacts 541, 554 (Fig. 29) which are normally held separated by a wire 441 have been fully described and reference should now be had to Fig. 51 for the wiring of an electric shunt circuit which is set up if the wire breaks and allows the spring 531 to close the contacts. Contact 554 is joined to the wire 8y by a wire 8b and the other contact 541 is joined by a wire 8b preferably through a resistance lamp, to one side of a switch 981. The prefix b herein used designates a line associated with a broken wire. The opposite side of this switch is joined by a wire 8c to the wire 8. A shunt circuit established by the closing of the contacts 541, 554 (broken wire or absence of wire) provides a short cut path between the wire y and the opposite side of the lead lines by way of the wire 8. This shunt circuit has less resistance than the resistance set up in the solenoid 880 and the normal current is diverted momentarily from the solenoid windings whereupon the automatic switch utilizing the contacts r snaps open and breaks the current flow passing through the motor 100. The machine thereupon stops and remains stopped until the start switch is again operated.

The switch 981 (Fig. 16) is mechanically like the switches 961, 971 and is also mounted on the bracket 962. Switch 981 unlike the other switches is open for the greater part of the operating cycle of the machine and only closes contact at the end of the cycle. A cam 985 also mounted on shaft 102 operates the switch 981. When a wire breaks and the contacts 541, 554 close they remain closed until a new wire is manually inserted. The stopping shunt circuit, 981 just described is not established, however, until the cam 985 comes around to its high point to close the switch 981.

This provision insures stopping of the machine at the same place each time, that is, with the crossheads 312, 365 and the press slide 366 up so that the various heads carried thereby are held away from the work. This feature prevents mutilation of the cover, staple or spout parts under the various stages of formation or assembly.

A shunt circuit is also employed in the manual stopping of the machine by the stop button 980. The flow of current in the wire y at such a time is interrupted by the circuit break in the stop button switch and this momentarily cuts off the holding circuit through the solenoid 880. The automatic switch utilizing the contacts r snaps open and breaks the current flow passing through the motor 100. The machine, therefore, stops and remains stopped until the start switch is again operated.

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 the advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An apparatus for producing pouring spout cover, comprising in combination, devices for holding a formed can cover having an opening therein and having a wire staple secured in the cover wall with its ends on opposite sides of said opening, and instrumentality for inserting a pouring spout into said cover opening and into hinging position relative to and with said staple, and means for bending a portion of the spout on said staple.

2. An apparatus for producing pouring spout cover, comprising, in combination, devices for holding a formed can cover having an opening therein, means for clinching a wire staple in said cover with its ends on opposite sides of said opening, and instrumentality for inserting a pouring spout into said cover opening and into hinging position relative to said staple.

3. An apparatus for producing pouring spout cover, comprising, in combination, devices for holding a formed can cover having an opening therein, means for clinching a wire staple in said cover with its ends on opposite sides of said opening.
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opening, and instrumentalities including squeezing elements for holding together the spring side walls of a pouring spout while inserting it into said cover opening and into hinging position relative to said staple.

4. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein and having a wire staple secured in the cover wall with its ends on opposite sides of said opening, means for squeezing together the spring side walls of a pouring spout, and instrumentalities for inserting said spout into said cover opening while its side walls are held by said squeezing means so the spout is brought into hinging position relative to and with said staple, and means for bending a portion of the spout on said staple.

5. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein and having a wire staple secured in the cover wall with its ends on opposite sides of said opening, devices for feeding a pouring spout into alignment with said cover opening, instrumentalities for inserting said spout into the said cover opening, and yieldable members for guiding the forward ends of said spout through walls of said cover opening during its insertion by said instrumentalities to bring it into hinging position relative to and with said staple, and means for bending a portion of the spout on said staple.

6. An apparatus for producing pouring spout can covers comprising in combination, devices for feeding a formed can cover into a spout inserting station, said cover having an opening therein and also having a wire staple secured to a wall thereof and extending across said cover opening, devices for inserting said spout into alignment with said opening while said cover is at said inserting station, and instrumentalities for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of the staple that extends across said cover opening, means for feeding a pouring spout into alignment with said cover opening while the cover is at said inserting station, instrumentalities at said inserting station for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of the staple that extends across said cover opening, and clinching means for hingedly securing the engaged part of said spout on said cover opening so that the spout is loosely connected with said cover.

7. An apparatus for producing pouring spout can covers, comprising in combination, a conveyor for bringing can covers into the machine, devices for successively feeding a formed can cover from said conveyor and for placing it into a spout inserting station, means for forming a spout opening in said cover, means for securing a wire staple to a wall of said cover so as to extend across the said opening, devices for feeding a pouring spout into alignment with said cover opening while the cover is at said inserting station, instrumentalities for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of said staple that extends across said cover opening, and means for clinching said wire staple in said cover to form a hinge pintle across said opening for a pouring spout.

8. An apparatus for producing pouring spout can covers, comprising in combination, devices for feeding a formed can cover into a spout inserting station, said cover having an opening in its wall and also having a wire staple secured to the wall and extending across the said cover opening, a clenching head at said inserting station for holding said cover, devices for feeding a pouring spout into alignment with said cover opening while the cover is at said inserting station, instrumentalities at said inserting station for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of the staple that extends across said cover opening, and clinching means for hingedly securing the engaged part of said spout on said cover opening so that the spout is loosely connected with said cover.

9. An apparatus for producing pouring spout can covers, comprising in combination, devices for feeding a formed can cover into a spout inserting station, said cover having an opening in its wall and also having a wire staple secured to the wall and extending across the said cover opening, a clenching head at said inserting station for holding said cover, devices for feeding a pouring spout into alignment with said cover opening while the cover is at said inserting station, instrumentalities at said inserting station for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of the staple that extends across said cover opening, and clinching means for hingedly securing the engaged part of said spout on said cover opening so that the spout is loosely connected with said cover.

10. An apparatus for producing pouring spout can covers, comprising in combination, devices for feeding a formed can cover into a spout inserting station, said cover having an opening in its wall and also having a wire staple secured to the wall and extending across the said cover opening, a clenching head at said inserting station for holding said cover, devices for feeding a pouring spout into alignment with said cover opening while the cover is at said inserting station, instrumentalities at said inserting station for inserting said aligned spout into the opening of said cover with a part thereof in engagement with that portion of the staple that extends across said cover opening, and clinching means for hingedly securing the engaged part of said spout on said cover opening so that the spout is loosely connected with said cover.

11. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover, piercing means for cutting an opening in said held cover, devices for feeding a wire staple to said cover, means for clinching a wire staple in said cover opening and in position extending across said cover opening, and instrumentalities for inserting a formed pouring spout into said cover opening with the spout in hinging position on said staple.

12. An apparatus for producing pouring spout can covers comprising in combination, devices for holding a formed can cover, piercing means for cutting an opening in said held cover, devices for feeding a wire staple to said cover, means for clinching a wire staple in the cover wall and in position extending across said cover opening, and instrumentalities for inserting a formed pouring spout into said cover opening with the spout in hinging position on said staple.

13. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein, devices for forming a wire staple having sharp pointed ends, a positioning member for forcing said sharpened staple end through said wall of said cover and in a position with its middle part extending across said cover opening, and means for clinching said wire staple in said cover to form a hinge pintle across said opening for a pouring spout.
14. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover, piercing means for cutting an opening in said held cover, devices for forming a wire staple, a positioning member for inserting the staple ends into said cover with its middle part extending across said cover opening, means for clenching said wire staple in said cover, instrumentality for inserting a formed pouring spout into said cover opening with the spout in hinged position on said staple, and clenching means for hingedly securing said spout on said staple.

15. An apparatus for producing pouring spout can covers, comprising in combination, a clamping head for holding a formed can cover, piercing means carried by said head for cutting an opening in said held cover, devices for forming a wire staple, a stapling head for holding the cover, a positioning member associated with said stapling head for inserting the staple ends into said cover with the middle part of the staple extending across said cover opening, means for clenching said wire staple in said cover, means for holding said cover, instrumentality for inserting a formed pouring spout into the cover opening with the spout in hinged position on said staple, and clenching means for hingedly securing said spout on said staple.

16. An apparatus for producing pouring spout can covers, comprising in combination, devices for feeding a formed can cover into the machine, piercing means for cutting an opening in said cover, feeding devices for bringing a wire into the machine, means for cutting a given length of wire therefrom, devices for forming a wire staple from the said cut wire piece, a positioning member for inserting the staple ends in said cover with its middle part extending across said cover opening, and means for hingedly securing a pouring spout on said staple and in said cover opening.

17. An apparatus for producing pouring spout can covers, comprising in combination, devices for feeding a formed can cover into the machine, a clamping head for holding said cover, piercing means carried by said head for cutting an opening in said held cover, feeding devices for bringing a wire into the machine, means for cutting a given length of wire therefrom, devices for forming a wire staple from the said cut wire piece, a stapling head for holding said cover, a positioning member associated with said stapling head for inserting the staple ends in said cover with its middle part extending across said cover opening, a clenching head for holding said cover, and means for hingedly securing a pouring spout on said staple and in said cover opening.

18. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein, feeding devices for bringing a wire into the machine, shearing means for cutting off a piece of said wire on a slant so that its ends are pointed, forming said wire piece into a wire staple having sharpened ends, a positioning member for forcing the sharpened ends of said staple through said cover wall, and means for securing said staple in said cover so that it extends across said opening and in position for hingedly retaining a pouring spout in said cover opening.

19. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein, feeding devices for bringing a wire into the machine, means for cutting off a piece of said wire and forming it into a wire staple, a positioning member for incorporating the said staple in said cover and extending across said cover opening, means for hingedly securing the pouring spout on said staple and in said cover opening, and safety means associated with said wire feeding devices for stopping the other machine operations upon failure of proper wire feeding.

20. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover, piercing means for cutting an opening in said held cover, means for forming and clenching a wire staple in said cover and in position extending across said cover opening, instrumentality for inserting a formed pouring spout into said cover opening, means for clenching said spout in hinging position on said staple, and electric stop devices for preventing formation of a staple when there is no cover to be pierced and also for preventing the feeding of a said pouring spout when there is an absence of a cover with its clunched staple.

21. In an apparatus for applying hinged spouts, for use on containers, means for forming an opening in the material to which the spout is to be applied, means for attaching a hinge-staple to said material and extending across said opening, means for inserting a spout into said opening, and means for bending a portion of the spout around said staple so as to turn on and relative to said staple.

22. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein and having a wire staple secured in the cover wall in predetermined relation to said opening, and instrumentality for inserting a pouring spout into said cover opening and into hinging position relative to and with said staple, and means for bending a portion of the spout on said staple.

23. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein, means for clenching a wire staple in said cover in predetermined relation to said opening, and instrumentality for inserting a pouring spout into said cover opening and into hinging position relative to said staple.

24. An apparatus for producing pouring spout can covers, comprising in combination, devices for holding a formed can cover having an opening therein, means for clenching a wire staple in said cover in predetermined relation to said opening, and instrumentality for inserting a pouring spout into said cover opening and into hinging position relative to said staple.

25. In an apparatus for applying hinged spouts, for use on containers, means for forming an opening in the material to which the spout is to be applied, means for attaching a hinge-staple to said material in predetermined relation to said opening, means for inserting a spout into said opening, and means for bending a portion of the spout around said staple so as to turn on and relative to said staple.

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