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STRAIGHT LINE BOTTLE CAPPING MACHINE

Filed May 11, 1925

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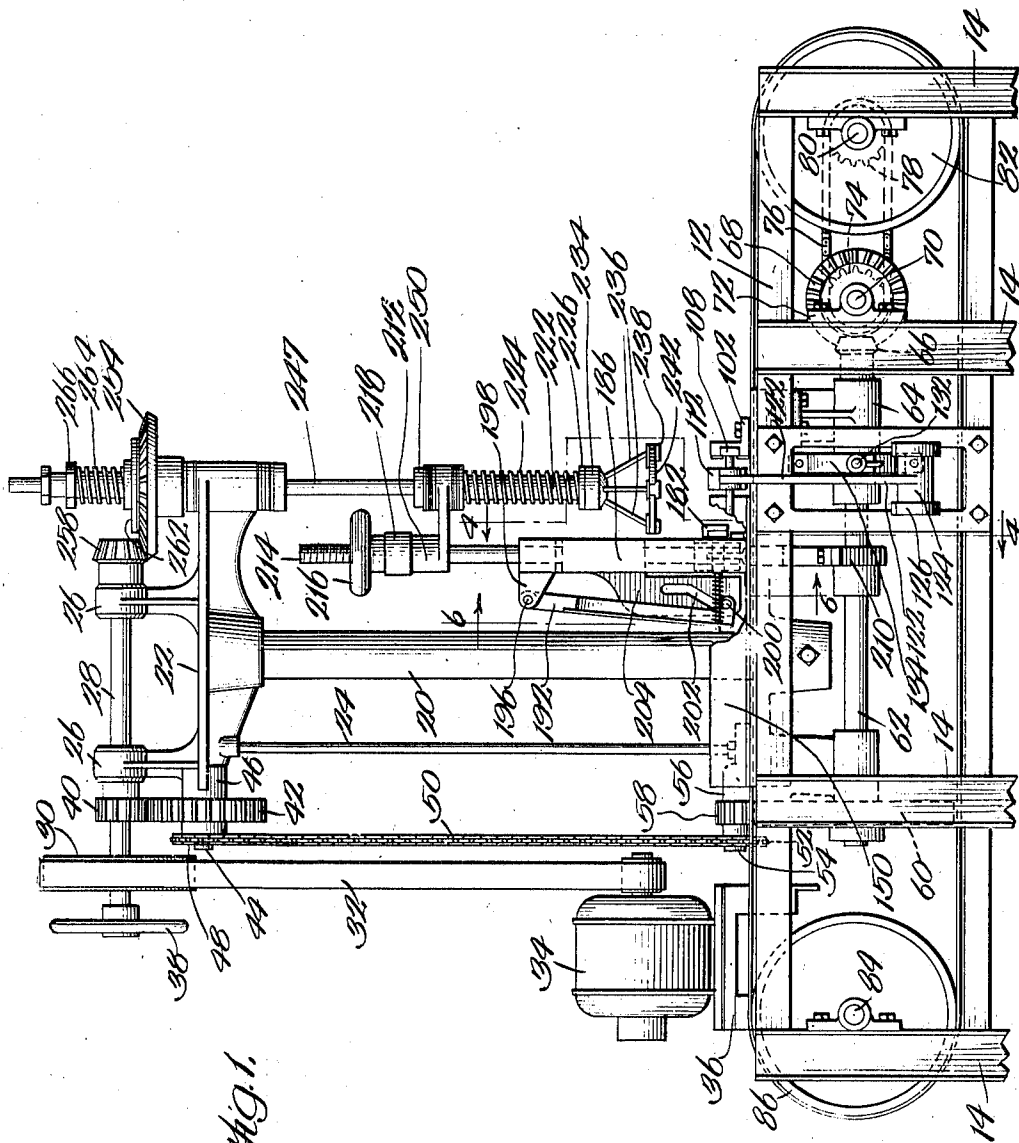


Fig. 1.

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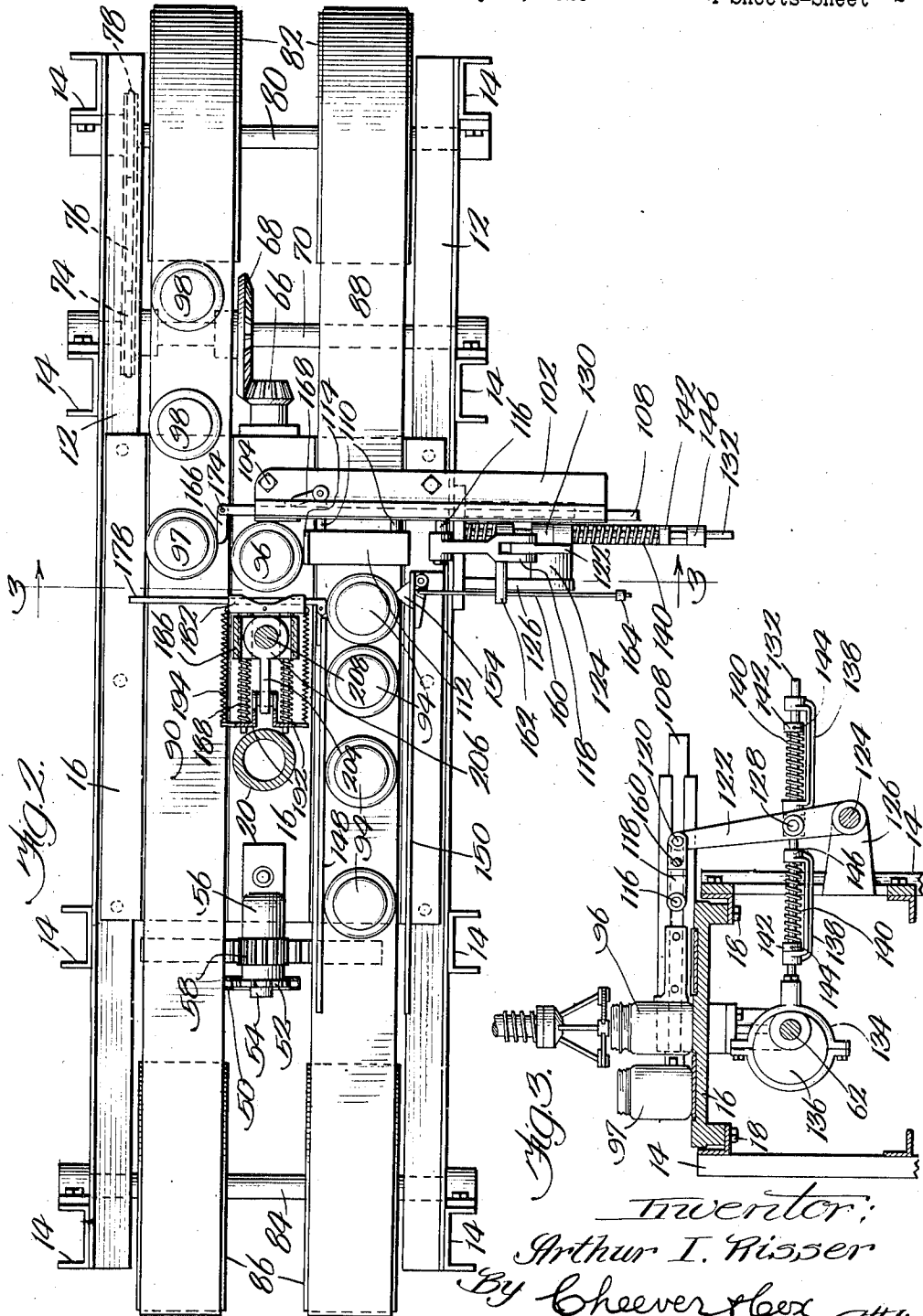
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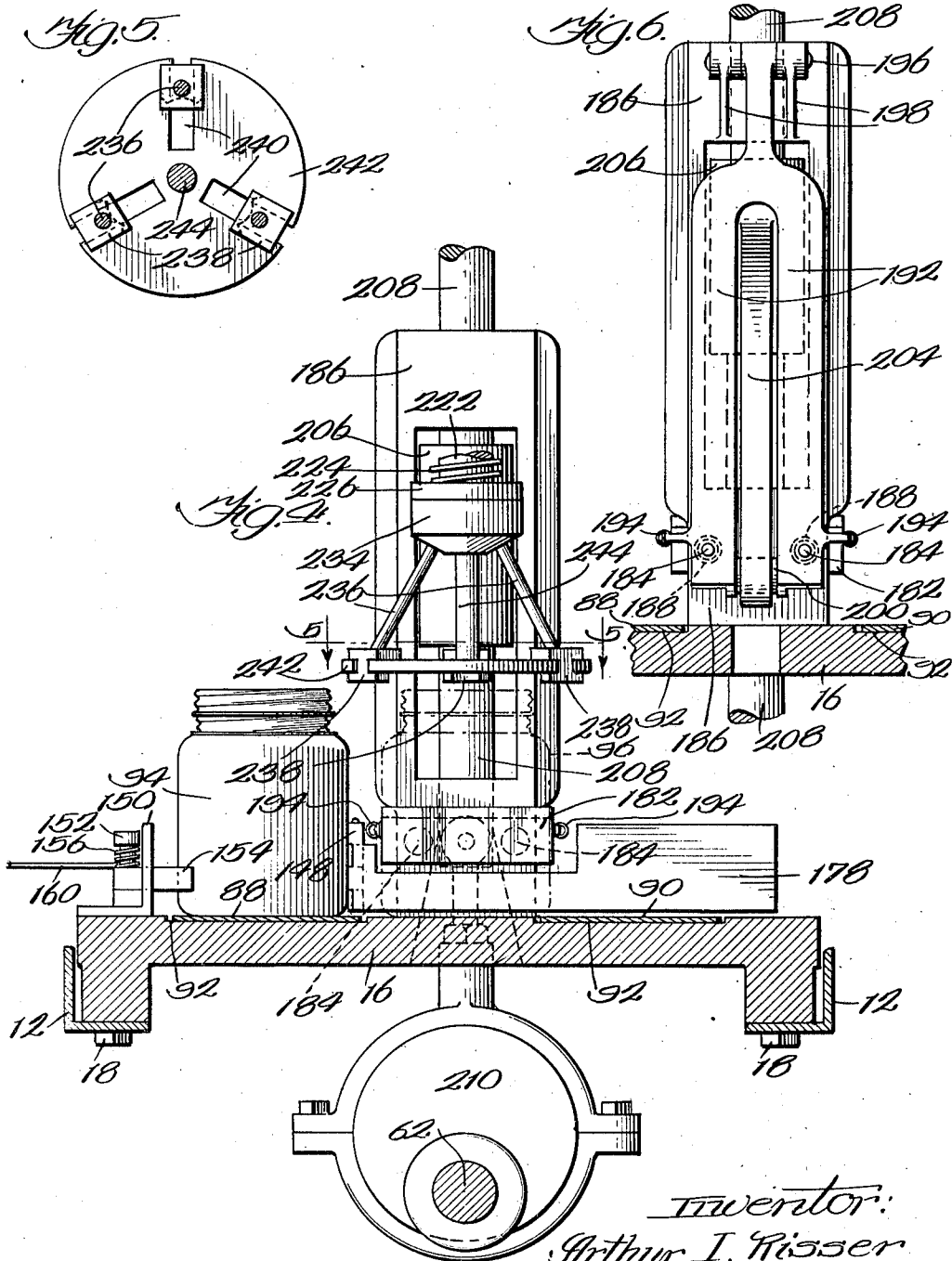
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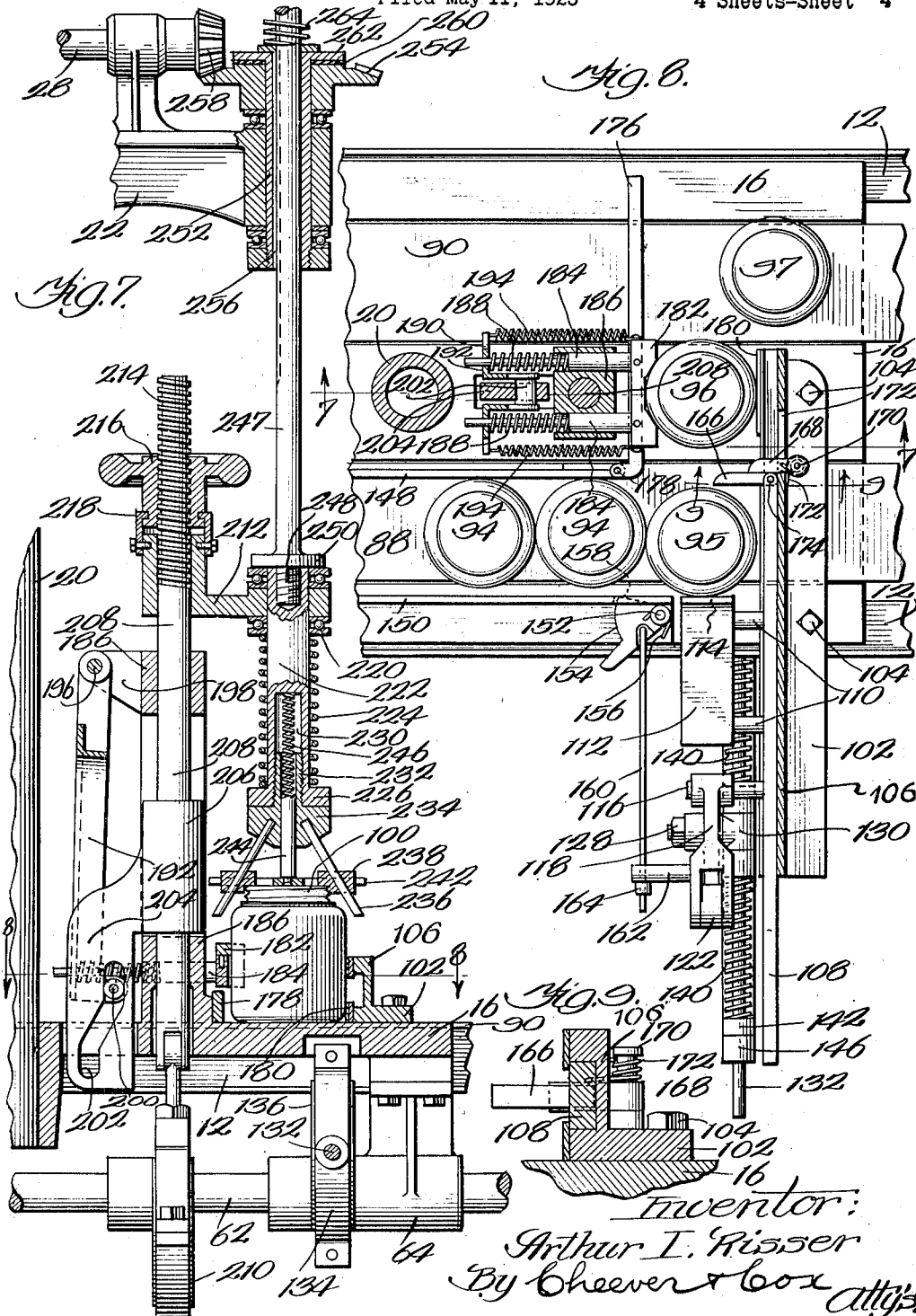
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STRAIGHT LINE BOTTLE CAPPING MACHINE

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE.

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STRAIGHT-LINE BOTTLE-CAPPING MACHINE.

Application filed May 11, 1925. Serial No. 29,278.

This invention relates to bottle capping machines of the type in which a screw threaded cap is rotatively placed in permanent position upon a bottle at a predetermined point in its passage through the machine.

The object of the invention is to provide such a machine which occupies very little floor space and particularly economizes upon the floor space occupied by the large circular table machines in common use.

The invention consists in a machine accomplishing the foregoing and other objects; which can be easily and comparatively cheaply made; which is satisfactory in operation and not readily liable to get out of order. More particularly, the invention consists in numerous features and details of construction which will be hereafter more fully set forth in the specification and claims.

Referring to the drawings in which like numerals represent the same parts throughout the several views:

Figure 1 is a side elevation of a complete machine illustrating the invention in its preferred form.

Fig. 2 is a horizontal section showing in top plan the arrangement of the main frame portions of the machine.

Figure 3 is a sectional end view, taken on the line 3—3 of Figure 2.

Figure 4 is a face view of the bottle clamping and capping applying mechanism taken at the point indicated by the irregular line 4—4 of Figure 1.

Figure 5 is a detail plan view of the bottle capping mechanism on the line 5—5 of Figure 4.

Figure 6 is a rear view of the mechanism shown in Figure 4, taken on the irregular line 6—6 of Figure 1.

Figure 7 is a central side elevation, partly in section, taken on the line 7—7 of Figure 8.

Fig. 8 is a plan detail view of many parts in section on the line 8—8 of Figure 7.

Figure 9 is a detail side elevation taken on the line 9—9 of Figure 8.

The mechanism of this invention is carried in or sustained by a more or less conventional main frame composed of parallel side bars 12, supported from the floor or the like on uprights 14, there being between the

bars 12 and in approximately the longitudinal center of the machine, as viewed in Figure 2, a table 16, detachably secured in place by any suitable means, as bolts or screws 18.

Rising from and rigidly secured to the frame, specifically table 16, is a vertical column 20 supporting at its upper end a gear supporting casting 22, steadied by a vertical rod 24 connected at its lower end to some fixed part of the frame. On this casting 22 are bearings 26 rotatably sustaining horizontal main power shaft 28, equipped at one end with a pulley 30 to which power is delivered in any suitable manner—in the particular case here illustrated by means of a belt 32 driven by a motor 34 conventionally mounted at any convenient point, specifically as illustrated in Figure 1, on a platform 36, sustained by the frame of the machine. Manual manipulation of shaft 28 is also provided for in the drawings by means of a hand wheel 38 on the end of shaft 28.

Rigidly mounted on shaft 28 is a pinion 40 meshing with a gear 42 on a short shaft 44, suitably journaled in a bracket 46 protruding from casting 22. Rigid on shaft 44 is a sprocket pinion 48 operating a depending sprocket chain 50, embracing at its lower end the sprocket pinion 52 on a short shaft 54 journaled in a bearing 56, rigidly secured to the frame in any conventional manner. Rigid on shaft 54 is a pinion 58, meshing with a large gear 60 on a horizontal shaft 62 extending longitudinally of the frame below the table 16. This shaft is journaled in suitable depending bearings 64, located below table 16, and carries at its end, opposite from gear 60, the bevel pinion 66, meshing with the bevel gear 68 on a short shaft 70 at right angles to shaft 62, journaled in suitable brackets 72 in the frame of the machine. Shaft 70 carries a sprocket gear 74 driving the sprocket chain 76, operatively applied to another sprocket gear 78 on a horizontal transverse shaft 80, located at the extreme right hand end of the machine, as shown in Figure 1. Rigidly attached to shaft 80 are two spaced parallel belt carrying pulleys 82. At the opposite end of the machine on a shaft 84, parallel to shaft 80, are two other corresponding belt carrying pulleys 86.

One pair of pulleys 82—86 carry and drive a bottle feeding belt 88, while the remaining

two pulleys 82—86 correspondingly sustain and operate the parallel bottle delivery belt 90. These two belts 88 and 90 travel in grooves 92 in the surface of table 16, sufficiently separated to permit of a bottle standing on the table between moving belts 88 and 90 during the capping operation.

Belt 88, traveling to the right, as viewed in Figure 2, carries each bottle 94, placed on it by any suitable means not shown, until the bottle is in position 95 (Figure 8) from which it is moved, by mechanism hereafter described, to position 96 on table 16, where the bottle capping operation takes place. From this position, the bottle is moved to position 97 on belt 90 which carries it along to the right through positions 98 until it is removed from the belt by any suitable means, not shown. Bottles 94 carry caps 100, loosely applied, ready to be rotated to place. When a bottle reaches position 95 before the mechanism for moving it to position 96 is ready to act, belt 88 simply slips along under it, the bottle being held stationary or substantially so by engagement with cross-member 102, rigidly positioned by bolts 104 entering the frame.

Cross member 102 is provided with an upstanding flange 106, recessed on its face, which is approached by bottles 94 on belt 88 to provide for horizontal reciprocation transversely of the frame of a bar 108. Extending horizontally from bar 108, away from cross member 102, are horizontally disposed pins 110 sustaining the pusher plate or block 112, having at its end an upturned flange 114 adapted to engage a bottle in position 95 of Figure 8, and shove it to position 96 of Figure 8 where the bottle capping operation takes place. Bar 108 and the attached parts just described are reciprocated for the purpose just described by any suitable means, in the particular case here illustrated through the following mechanism operatively connecting the bar with shaft 62. On bar 108 is a stud 116 having pivotally connected thereto a link 118 whose opposite end is connected through a pivot 120 to the upper end of a lever 122 rockable about pivotal connection 124 at its lower end with a bracket 126 on the frame. On lever 122, intermediate between pivots 120 and 124 is a rockable pivot pin 128 carrying at the side of the lever 122 a block 130 through which slides a rod 132, one of whose ends is rigidly attached to an eccentric band 134 enclosing an eccentric cam 136 mounted on shaft 62. On each side of block 130 and slidable on rod 132 is a U-shaped yoke 138 between whose ends and enclosing the rod 132 is a compression spring 140. The end of each of these springs 140 farthest from block 130 abuts against a stop 142, rigidly secured by the rod 132 by any suitable means, as, for instance, a pin 144. The result of the construction just described

is that on rotation of shaft 62 and consequent rotation of eccentric 136, rod 132 is reciprocated with consequent rocking of lever 122 about pivot 124 and consequent reciprocation with member 112—114, the direction of such reciprocation depending upon which inner end 146 of a yoke 138 is, in the reciprocation of rod 132, forced against lever 122. The extent of movement of member 112—114 under the condition just described is determined by the extent to which the spring 140 of that particular yoke is compressed, due to either initial size or irregularity in surface of the bottle which is being pushed from position 95 to position 96, Figure 8. In other words, the springs 140 provide a safety device in the mechanism described which allows for any unexpected obstructions which may impede the path of member 112 either in its movement pushing a bottle from position 95 to position 96 or in returning to original position.

Bottles 94 on belt 88, as they approach position 95, travel between parallel guides 148 and 150. Pivoted at 152 on guide 150 is a triangular latch 154 urged by a spring 156 of any suitable construction to move from the position shown in Figure 8 in a clockwise direction to a point where the far corner 158 of the latch is in the path of and acts as a stop for an approaching bottle 94 on belt 88. Latch 154 is retracted against the action of the spring to the position shown in the full lines of Figure 8 by a rod 160 attached to the latch at one end and slidable at its other end through a post 162 projecting from link 118. The point at which post 162 acts to move rod 160 to carry latch 154 to the full line position of Figure 8 against the action of spring 156 is adjusted by rotation of a nut 164 screw threaded on the end of rod 160. Latch 154 is, by the mechanism just described, so adjusted that only one bottle 94 will be in position 95 at a time, all other bottles on belt 88 being held back by latch 154 while member 112—114 is pushing a bottle in position 95 to position 96 on table 16.

The reciprocation of member 112—114 as described transfers a bottle from position 95 to position 96 on table 16. It has nothing to do with the movement of the bottle from position 96 to position 97, Figure 2. This latter movement is accomplished by a dog 166 pivoted to the end of bar 108 and adapted, when the parts are in the position of Figure 8 to be thrown into the position shown at right angles to bar 108 and between bottles in positions 95 and 96,—this through the action of lever or second dog 168, rotatably mounted on a stationary pivot 170 at the rear of the upstanding flange on stationary member 102. This lever 168 is normally urged to the position shown in Figure 8 by coil spring 172. This lever 168

is rockable in a clockwise direction from the position of Figure 8 to that of Figure 2 through pressure of the side of the body of bar 108. In the movement described, lever 168 moves through a slot 172' in the flange of member 102 provided for the purpose. The result of the construction just described is that when rod 108 and attached dog 166 approach the position of Figure 8, after having been previously in the position of Figure 2, lever 168 springs up through slot 172' and throws dog 166 from any position it may then be in, to the upright position of Figure 8. In this position, dog 166 is between a bottle in position 96 and any bottle approaching from position 95, with the result that as soon as bar 108 starts to move upward as viewed in Figure 8, to the left as viewed in Figure 3, the dog 166 engages the bottle in position 96 and thus on further reciprocation carries said bottle in position 96 over to position 97 on belt 90 where the belt can carry it along to successive positions 98. As soon as the bottle has been delivered to position 97 and bar 108 starts to move in the opposite direction downward, as viewed in Figure 8, to the right, as viewed in Figure 3, the dog 166 swings freely on its pivot 174 as it engages the bottle just left in position 96 with the result that the dog 166 slips freely past that bottle until, as it approaches the position of Figure 8, lever 168 again drops the dog 166 to the position shown in Figure 8 where it is ready to repeat the operation described.

The mechanism just described is assisted in delivering a bottle traveling from position 96 to position 97 by a transversely extending guide bar 176, secured to guide 148 at 178.

It is obvious that while cam 136 rotates continuously, a bottle in position 96 remains at rest on table 16 the length of time approximately equal to a half revolution of cam 136, viz while member 112 moves from the position in which it left the bottles in position 96 until it reaches the position shown in Figure 8 where it is ready to push another bottle from position 95 to position 96. It is during this period of rest of a bottle in pushing position 96 that the capping operation takes place and the mechanism for that purpose will now be described.

It is, in the first instance, necessary that the bottle in position 96 be held stationary specifically against plate 180 on stationary member 102. This is accomplished through the agency of an opposing jaw 182 reciprocal between the positions of Figures 2 and 8, in the former of which a bottle can spring into position 96 and in the latter of which, it is yieldingly clamped against member 180. Jaw 182 is carried at its opposite ends on horizontally reciprocal shafts 184, slidable through perforations provided for them in

the stationary rectangular post 186 rising from the table 16. The ends of these shafts opposite the jaw are reduced in diameter to carry compression springs 188, each bearing at one end against a full-sized portion of the adjacent shaft and at the opposite end against the flange 190 of a lever 192 through which the reduced end portions of the shaft or shafts pass. These flanges 190 are also connected with the jaw 182 by retractile springs 194, serving the purpose of pulling the jaw 182 away from a bottle in position 96 when lever 192 begins to move from the position of Figure 8 toward that of Figure 2. The upper end of lever 192 is pivoted at 196 on a lug 198 projecting from post 186. The lower end of lever 192 carries a roller 200 traveling in irregular cam slot 202 in a vertically reciprocal block 204 rigidly attached to a cross-head 206, rigid on a rod 208 vertically reciprocal through post 186 as best seen in Figure 7 under the control of an eccentric cam 210 on shaft 62. Cam slot 202 is so designed and proportioned and eccentric cam 210 is so adjusted on shaft 62 with reference to eccentric 136 that jaw 182 will be moved from the position of Figure 2 into that of Figure 8 and back again during the period of time heretofore described, when a bottle is at rest in position 96 on table 16. Springs 188 provide a yielding contact between the jaw 182 and the capping position 96, so as to allow of handling of different sized bottles and to allow for variations in the surfaces of successive bottles which are supposed to be of the same size.

The capping mechanism, viz: the machinery for turning each cap 100 onto a bottle clamped in position 96 as described is, broadly speaking, carried by an L-shaped bracket 212, adjustably positionable on the upper end of shaft 208. The adjustability referred to is accomplished by providing the upper end of the shaft 208 with screw threads 214, engaged by a screw threaded hand wheel mechanism 216 to which the bracket 212 itself, sliding freely on shaft 208, is detachably secured by any suitable means as, for instance, clasps 218. By rotating hand wheel 216, the bracket 212 and attached parts may be selectively positioned up and down shaft 208.

The lower or body portion of bracket 212 is provided with anti-friction devices, specifically ball bearings 220, through which a vertical shaft 222 is reciprocal. A compression spring 224 encloses this shaft and bears at its upper end against the lower ball bearing 220 and at its lower end against a flange 226 at the lower end of the shaft. This spring 224 reacting from bracket 212 tends normally to urge shaft 222 downward to its limit of movement with respect to said bracket as shown in Fig. 7, but permits the

shaft to yield upwardly with respect to bracket 212, so that bottles of different heights may be accommodated between the table 16 and a cap gripping mechanism carried by the lower end of said shaft, without changing the throw of an eccentric 210 on shaft 62 which is operatively connected with shaft 208 for reciprocating the latter.

The lower end of shaft 222 is provided with a longitudinal recess 230 into which a stem 232 projecting from capping head 234 is screw threaded. Downwardly projecting from head 234 is the cap gripping mechanism proper, of the general type shown, described and claimed in my prior patent application, Serial Number 618,277, filed February 10, 1923. The gripping mechanism includes a plurality of conically disposed rods 236 on which slide gripping jaws 238 horizontally reciprocal in radial slots 240 in a horizontal plate 242. This plate 242 is carried on the lower end of a vertically reciprocal shaft 244 normally pressed downward by a spring 246 entering recess 230, this to press on the top of a bottle cap and assist in holding the bottle in place while the jaws 238 are released from the finally capped bottle, all as more fully set forth in said prior patent application.

The upper end of shaft 222 carries an upwardly directed extension, in the particular case here illustrated, an entirely separate shaft 247. The two shafts are connected together by screw threads 248 and shaft 247 carries a flange 250 resting on upper ball bearing 220. This extension shaft 247 is reciprocally but non-rotatably connected with the hub 252 of a bevel gear 254, the method in this particular instance being a conventional spline 256. Gear 254 is driven by a bevel pinion 258 on shaft 28. The result of the construction just described is that shaft 247 and consequently shaft 222 and attached parts are continuously rotating regardless of the vertical position of the shafts under the control of eccentric 210. The mechanism carried by bracket 212 is so vertically positioned through the agency of hand wheel 216 that as eccentric 210 rotates, shaft 222 and attached parts are lowered just at the proper time to cause the jaws 238 to grip the bottle cap 100 on a particular bottle in position 96 on table 16 and rotate that cap to sealed position while the bottle is still at rest in said position, and thereafter release said jaws 238 from the gripping position before dog 166 begins to move the bottle from position 96 to position 97, plate 242 also being withdrawn in ample time from engagement with the bottle cap 100 to permit transfer of the bottle from position 96 to position 97, without the bottle striking any one of the angularly disposed rods 236.

In the complete operation of the machine, bottles 94 with loose caps 100 resting on

them, are applied by any suitable means to belt 88 which carries them along until the forward bottle is temporarily stopped in the position shown in Figure 2, adjacent to transverse push mechanism 112. At the proper moment, latch 154 is withdrawn from the position of Figure 2 to that of Figure 8 allowing one bottle to move into position 95, Figure 8, whereupon push mechanism 112 carries the bottle from that position to position 96 on table 16. In this position, the bottle is gripped by jaw 182 and firmly held. Bracket 212 simultaneously descends applying the cap engaging and rotating jaws 238 to the cap 100 of the bottle; shaft 222 rotates to apply the cap, whereupon the jaws 238 are released, the jaw 182 is released and thereupon dog 166 moves the capped bottle from position 96 to position 97; mechanism 112 simultaneously moving another bottle from position 95 to position 96. The bottles placed on belt 90 are successively removed to the right, as viewed in Figure 2, as described.

The machine is shown and described as a bottle capping machine but it is obviously capable of use on other articles than bottles. The term "bottle" in the claims is used in this generic sense.

The bottle cap 100 is further protected from being turned too far onto the bottle through the presence of a fibre disc 260 between flange 262 of hub 252 splined to shaft 247 and bevel gear 254 (Fig. 7). The hold or grip of this clutch is regulated by a spring 264 selectively controllable by a nut 266 on the upper end of shaft 247 (Fig. 1). By properly adjusting the spring and consequently the disc 260, the operator can very nicely adjust the power applied to bottle top 100 and the point at which slipping between disc 260 and gear 254 occurs as the bottle top reaches closed position before jaws 238 begin to let go of the top.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine for capping receptacles, a capping mechanism, a reciprocal member movable to and from a position to clamp a receptacle in a position to be capped by said mechanism, means for reciprocating said member, a compression spring between said means and said member for yieldably transmitting the operating force of the former to the latter, and a contractile spring between said means and said member through which movement of the former to move the latter from clamping position is transmitted to the latter.

2. In a machine for capping receptacles, a rotatable reciprocal shaft, a capping mechanism carried by said shaft, a second reciprocal shaft parallel to said first shaft, a connection between said shafts whereby recipro-

5 cation of said second shaft reciprocates said first shaft, a member movable to and from a position to clamp a receptacle in position to be capped by said capping mechanism, and a
10 connection between said second shaft and said member whereby reciprocation of said second shaft moves said member to and from a clamping position, the connection between said second shaft and member being inde-
15 pendent of the connection between said shafts.

3. In a machine for capping receptacles, a reciprocal shaft, a capping mechanism carried by said shaft, a second reciprocal shaft
15 parallel to said first shaft, a connection between said shafts whereby reciprocation of said second shaft reciprocates said first shaft, a member movable to and from a position to clamp a receptacle in position to be capped
20 by said capping mechanism, a cam member secured to said second shaft, and a cam fol-

lower carried by said clamping member in operative relation to said cam member.

4. In a machine for capping receptacles, a reciprocal shaft, a capping mechanism carried by said shaft, a second reciprocal shaft
25 parallel to said first shaft, a connection between said shafts whereby reciprocation of said second shaft reciprocates said first shaft, a member movable to and from a position to clamp a receptacle in position to be capped by said mechanism, a fixed support,
30 a lever pivoted to said support, means whereby said lever is oscillated by reciprocation of said second shaft, and yieldable means between said lever and said clamping member
35 for transmitting movements of the former to the latter both to and from clamping position.

In witness whereof, I have hereunto subscribed my name. 40

ARTHUR I. RISSER.