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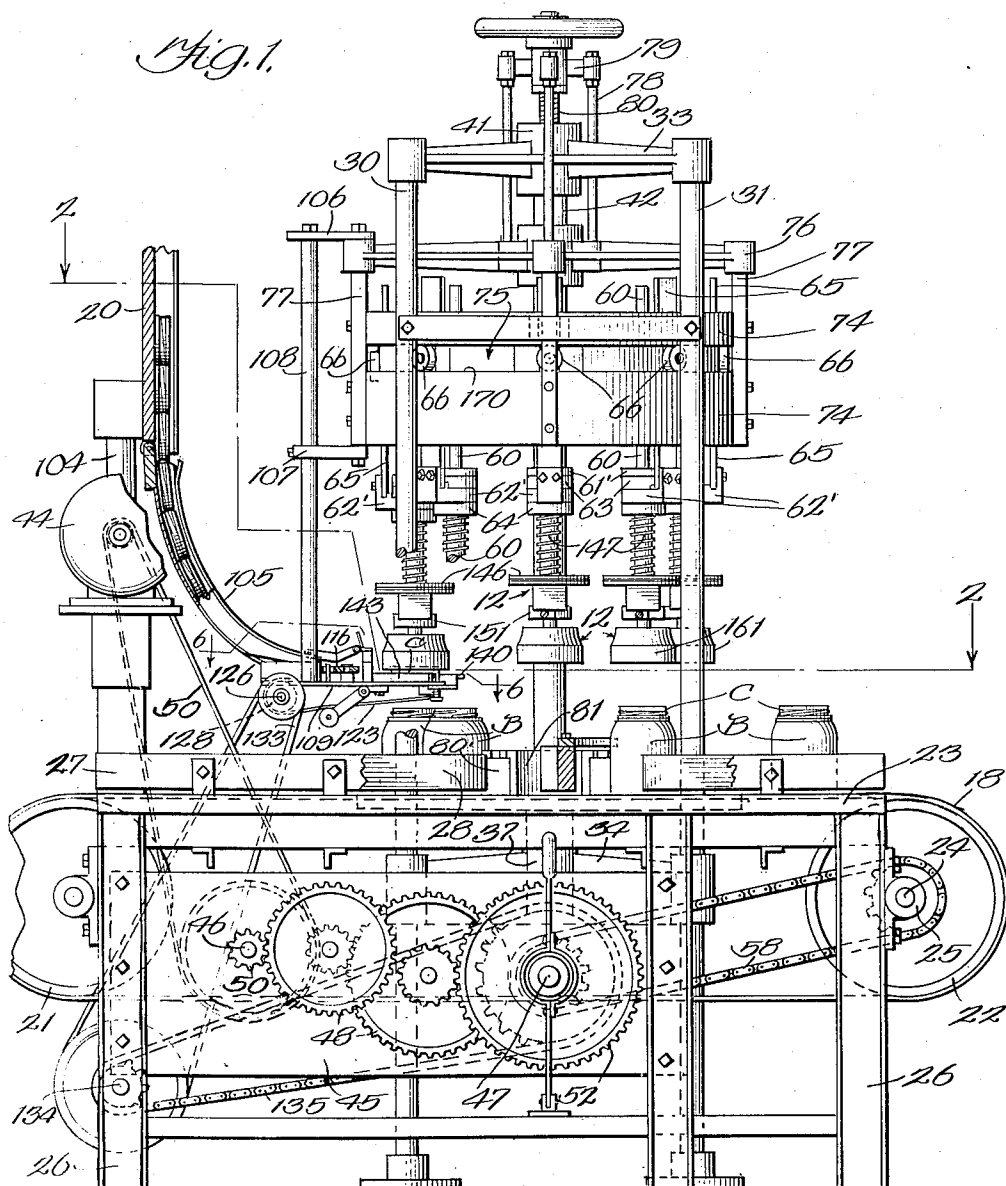
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1,835,335

BOTTLE CAPPING MACHINE

Filed April 10, 1929

7 Sheets-Sheet 1



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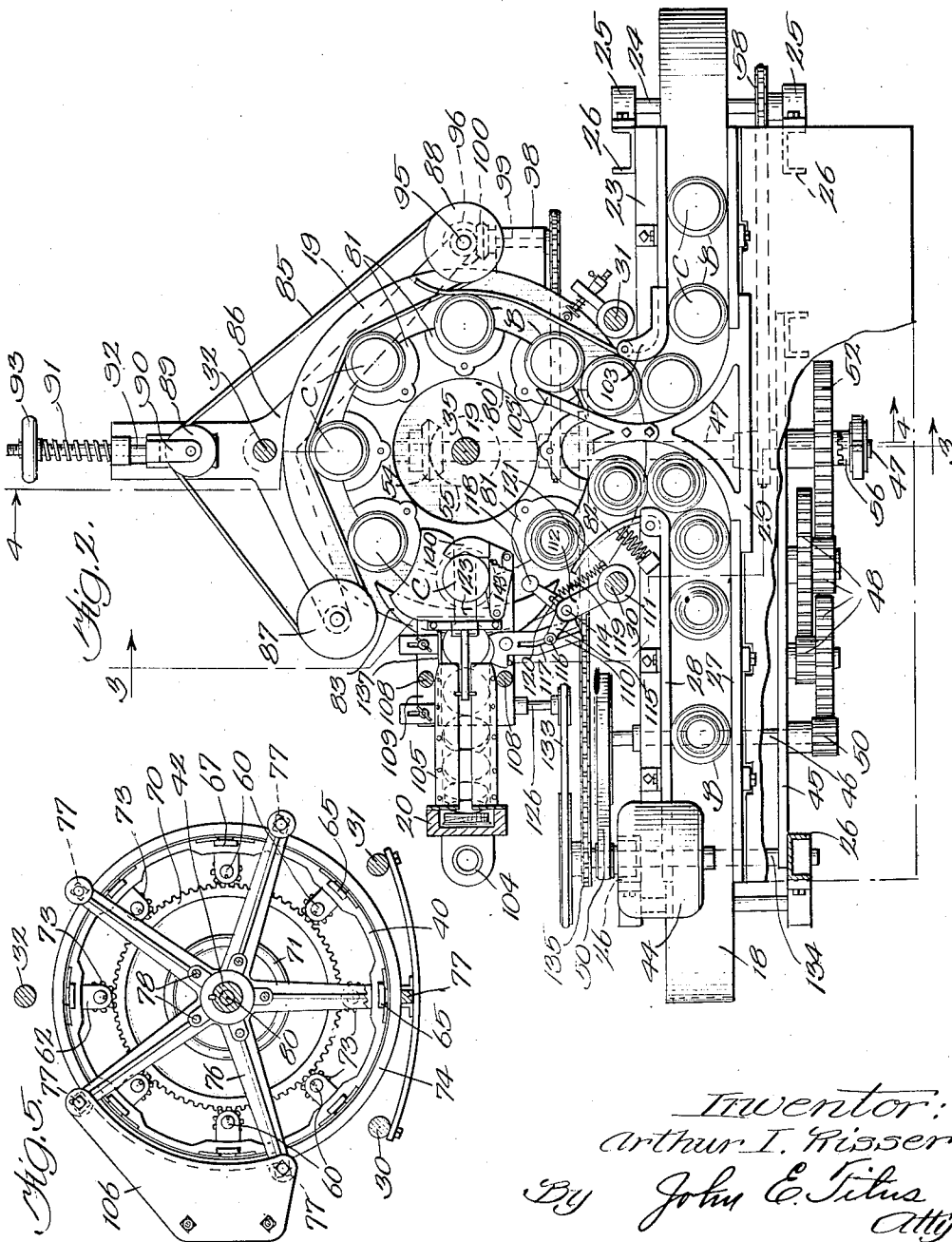
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7 Sheets-Sheet 2



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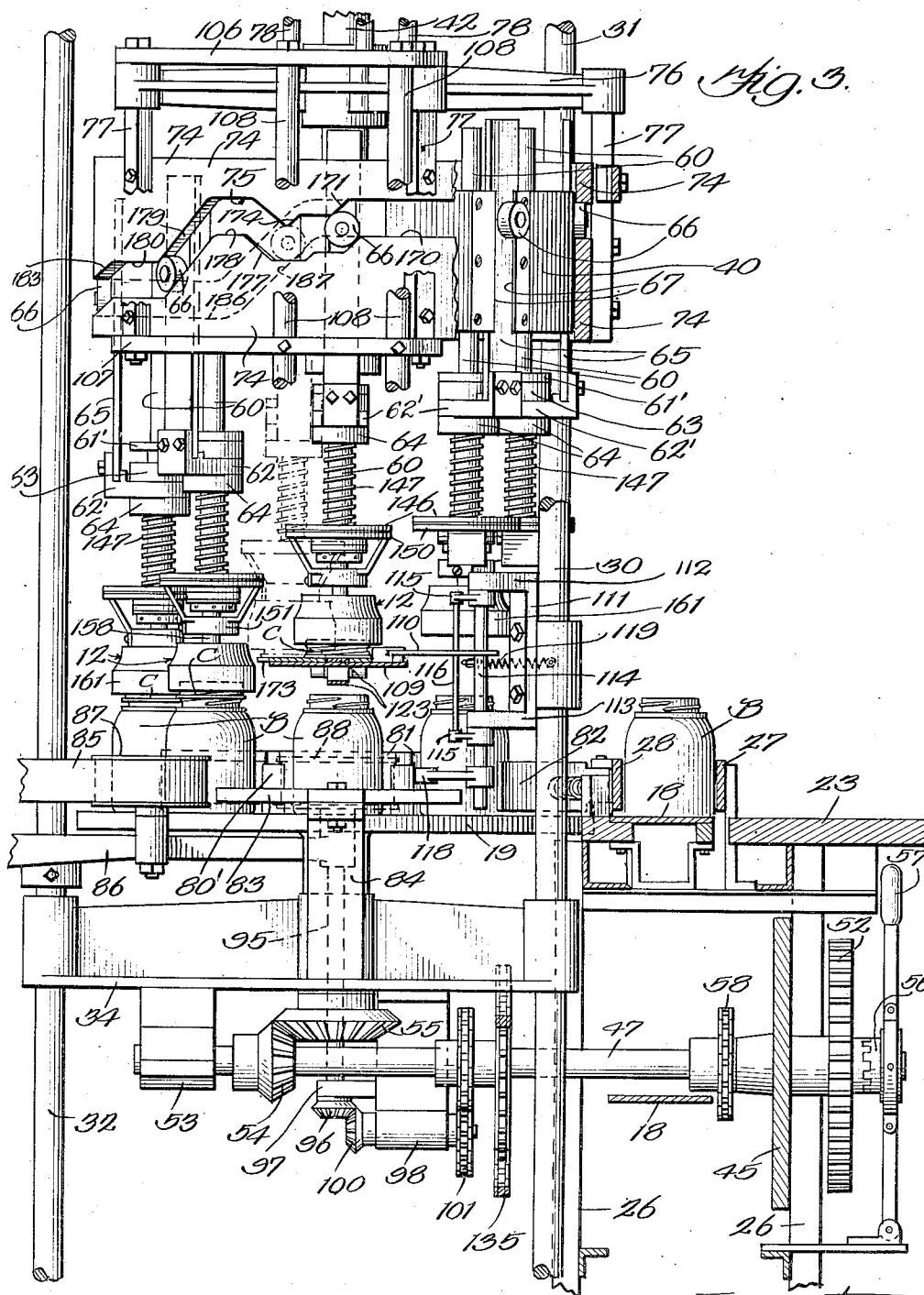
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BOTTLE CAPPING MACHINE

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7 Sheets-Sheet 3



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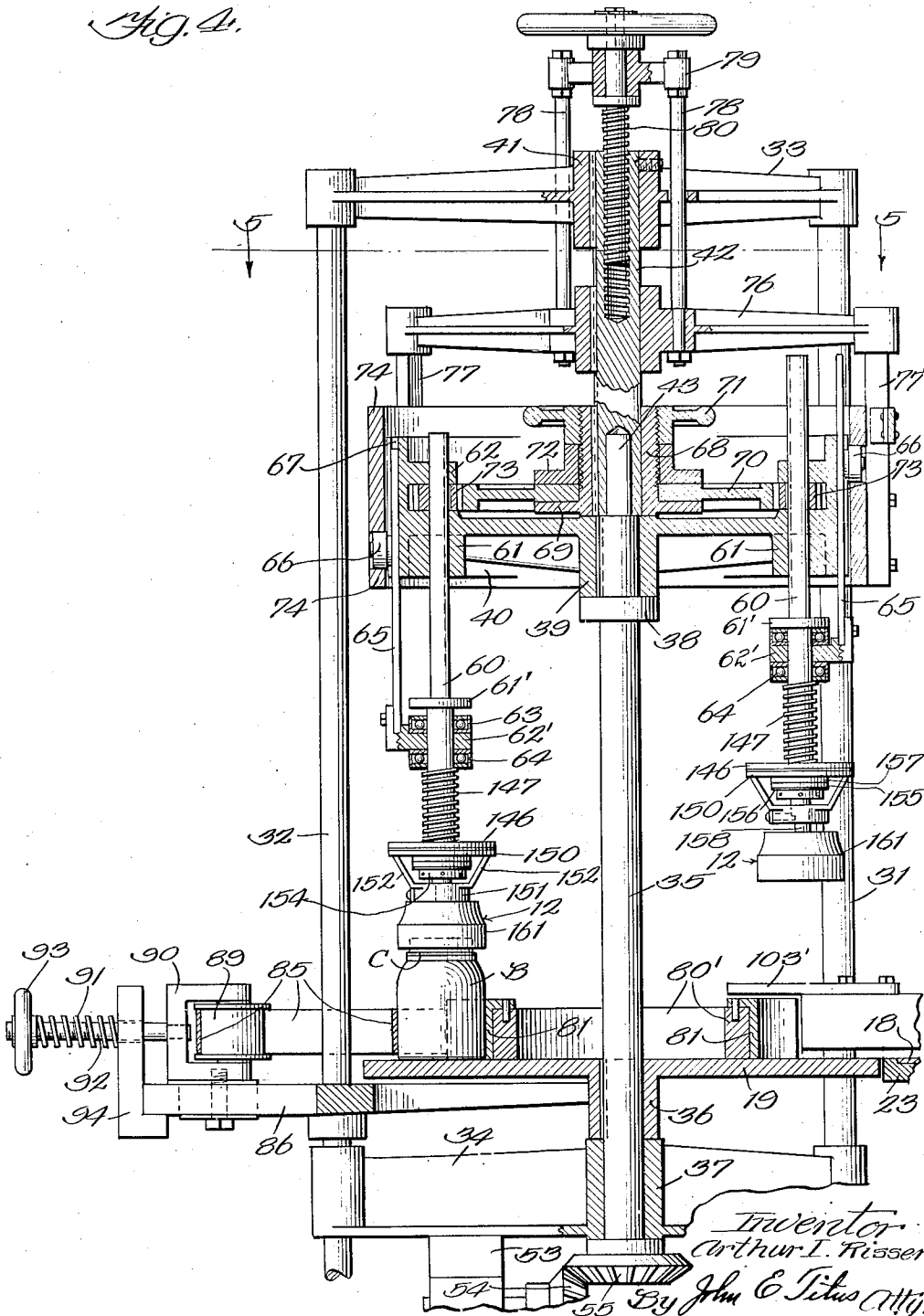
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Fig. 4.



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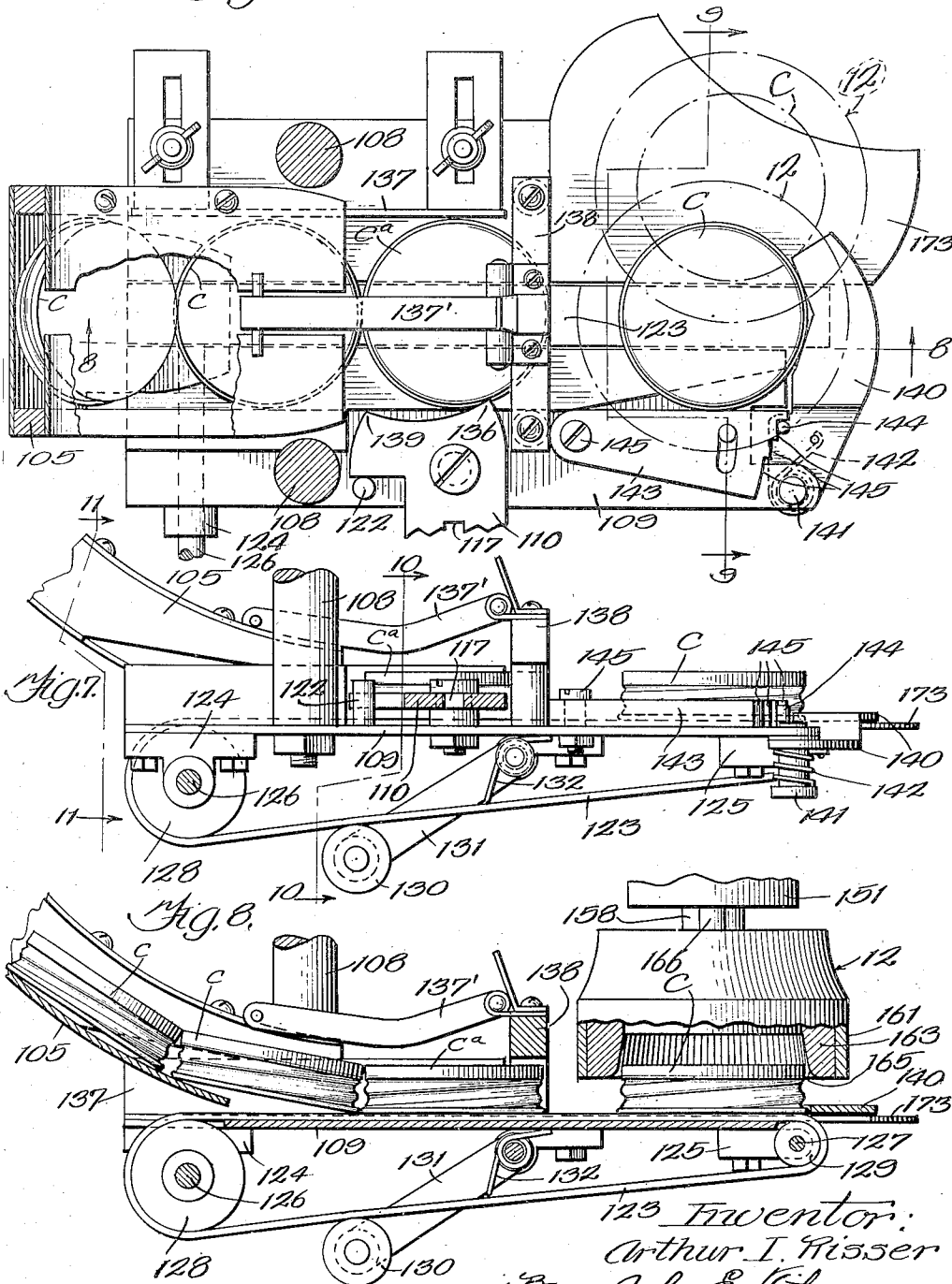
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BOTTLE CAPPING MACHINE

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7 Sheets-Sheet 5

Fig. 6.



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Dec. 8, 1931.

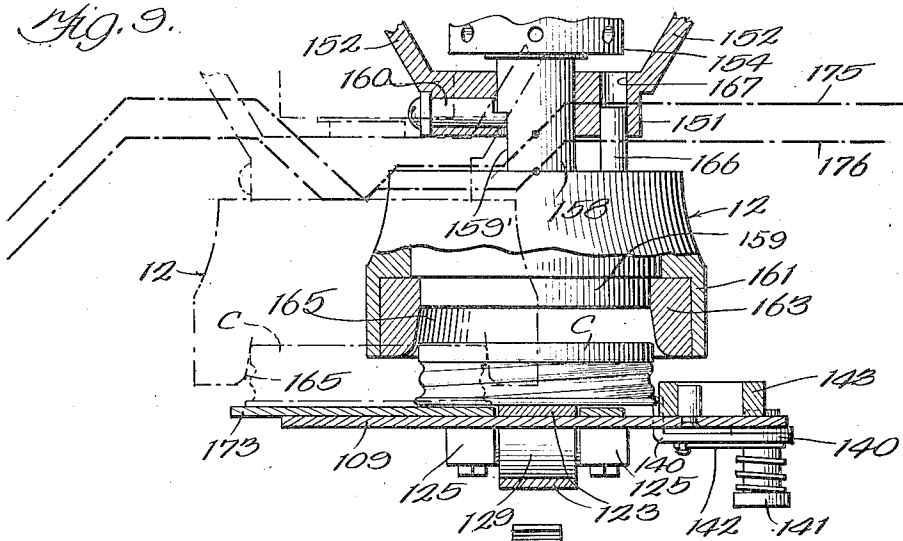
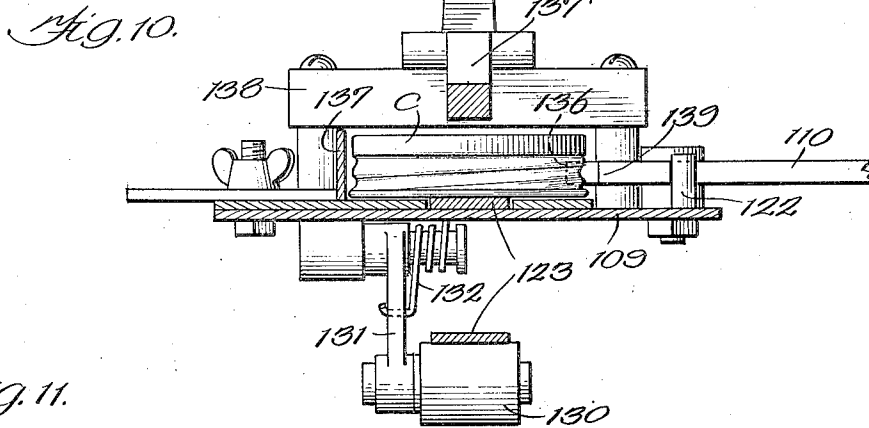
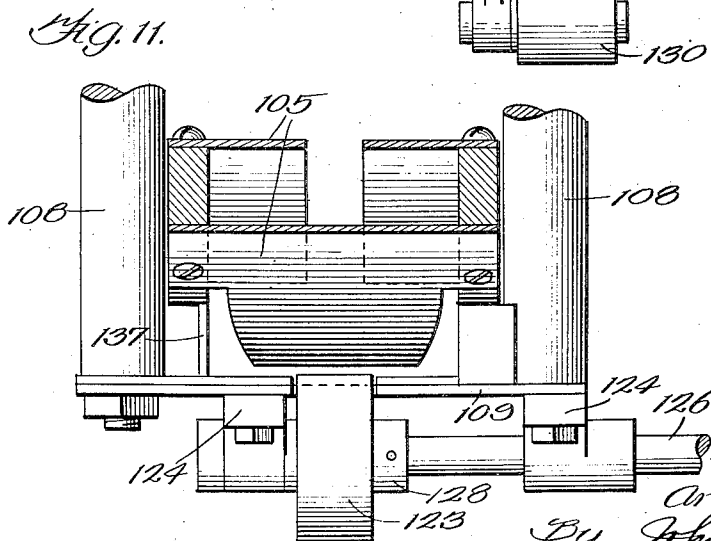
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BOTTLE CAPPING MACHINE

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7 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

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BOTTLE CAPPING MACHINE

Application filed April 10, 1929. Serial No. 354,013.

This invention relates to improvements in bottle capping machines, more particularly for threaded caps as are commonly used on glass fruit jars, or bottles. The cap feeding mechanism, shown herein, is more fully described and claimed in my application Serial No. 354,014.

In the more simple form of machine as shown in my Patent Number 1,593,382, dated Aug. 31, 1926, it was necessary to place the caps on the bottles before the bottles reached the machine which merely screwed the caps down. Also the caps were gripped in mechanically contracted chucks which engaged the caps at spaced points. Light flimsy caps of thin soft material were difficult to handle, and a hand operation of placing the caps was required.

In my present invention I provide a machine which is fully automatic, it only being necessary to fill a magazine with caps and feed the bottles to the machine on a belt. Very thin and flat caps can be handled, if desired, although the machine is well adapted for the deeper or heavier caps.

Particular objects and advantages of my invention will become apparent in the following description, taken with reference to the accompanying drawings, in which

Fig. 1 is a front elevation of the bottle capping machine, with parts broken away and parts shown in section.

Fig. 2 is a plan section of the machine, taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional elevation of a portion of the machine, taken substantially on the line 3—3 of Fig. 2.

Fig. 4 is a section taken substantially on the line 4—4 of Fig. 2.

Fig. 5 is a detail section on the line 5—5 of Fig. 4.

Fig. 6 is a plan view of the lower end of the cap magazine taken on line 6—6 of Fig. 1.

Fig. 7 is a side elevation of the parts shown in Fig. 6.

Fig. 8 is a central section, on the line 8—8 of Fig. 6 showing a changed position of parts of the machine.

Fig. 9 is taken on the line 9—9 of Fig. 6,

with the parts in a changed position subsequent to Fig. 8.

Fig. 10 is a section on the line 10—10 of Fig. 7.

Fig. 11 is a detail section on line 11—11 of Fig. 7.

Fig. 12 is a detail view of the capping head and chuck, shown at 12 in Fig. 1, with portions of the chuck broken away.

Fig. 13 is a section looking upwardly on the line 13—13 of Fig. 12.

Fig. 14 is a detail view looking in the direction of the arrow 14 in Fig. 12.

Fig. 15 is a section on the line 15—15 of Fig. 12, and shows the parts in position for placing the cap C on the bottle B.

Fig. 16 shows substantially the final stage of the capping operation.

The bottles B are carried across the machine, from left to right in Figs. 1 and 2, on the conveyor belt 18, and are diverted onto the rotating turret table 19, near the middle of the machine, which table carries the bottles around in a clockwise direction, as viewed in Fig. 2, and returns the bottles to the belt 18, from which the bottles are discharged at the right of Fig. 2. While the bottles are on the turret table 19, the caps B are supplied from the magazine 20, placed on the bottles, and screwed home as will be described in detail hereinafter.

The belt 18 runs over the pulleys 21 and 22 which are rotatably mounted at the opposite ends of the conveyor table 23 respectively, the shafts 24 of said pulleys being rotatably supported in the bearing brackets 25 which are bolted to the end pairs of legs 25 of the table. The upper portion of the belt 18 is supported from underneath by the table, and suitable guide rails 27 and 28, secured to the table, see Fig. 3, are provided at the front and rear sides of the belt to prevent the bottles from leaving the belt.

Near the middle of the table the bottles are diverted from the belt by the Y shaped guide member 29, secured to the table, and guided back onto the belt as the bottles contact with the opposite side of the Y guide member after the bottles have completed the circuit of the turret table 19.

At the rear of the conveyor table are the posts 30, 31, and 32, resting on the floor and in a triangular arrangement, the posts 30 and 31 being positioned adjacent the conveyor table. Connecting the upper ends of the posts and secured thereto is a frame spider 33, and a second frame spider 34 is secured to the posts just below the plane of the upper portion of the belt 18. Rotatably mounted in the spider 34 is the vertical turret shaft 35 on which is keyed the turret table 19, with the hub 36 of the turret table resting on the bearing 37 in the spider 34.

Near its upper end, the shaft 35 has a collar 38 which supports the hub 39 of the capping head spindle support spider 40, keyed to the shaft 35 and rotatable therewith. In the bearing 41, of the spider 33, which is in axial alignment with the shaft 35, is fixed the cam drum supporting shaft 42, and the lower end of the shaft 42 is bored to receive the reduced upper end 43 of the turret shaft 35 and thus provides an upper bearing therefor.

The belt 18 and turret shaft 35 are constantly driven by the motor 44 which is mounted on the left rear table leg 26 as shown in Figs. 1 and 2. On the legs 26 at the front side of the conveyor table is bolted a gear support plate 45, in which are rotatably mounted the shafts 46, the main drive or clutch shaft 47, and the shafts of the compound reducing and interchangeable gears 48. The shaft 46 is connected by the belt 50 to the motor 44, and the pinion 51, keyed on the shaft 46 is connected through the change gears 48 to the gear 52 which is loosely mounted on the drive shaft 47. The rear end of the shaft 47 is rotatably supported in a bearing 53 which is fixedly mounted on the spider 34, and the shaft 47 is connected to the turret shaft 35 by the mating bevel gears 54 and 55, keyed to the respective shafts. The gear 52 is rigidly connected at will to the shaft 47 by the clutch collar 56, the clutch collar being splined to the shaft 47 and slidably positioned thereon by means of the lever 57 which is fulcrumed to the frame of the conveyor table at its lower end, as shown in Fig. 3. The shaft 47 and the shaft 24 of the belt pulley 22 are connected by the chain 58.

As described above the turret table 19 and the spindle support spider 40 rotate together on the shaft 35. Slidably and rotatably mounted in the spider 40 are the circle of capping head spindle shafts 60 which are received in pairs of spaced bearings 61 and 62 formed in the spider 40, equally spaced from each other and at the same radial distance from the center.

For raising and lowering the spindles 60 with respect to the turret table 19, as is required in the capping operation, each spindle is provided with an integrally formed flange

61'. Below the flange 61' is a collar 62' rotatable and slidable on the enlarged lower portion of the spindle shaft 60, and suitable ball thrust bearings 63 and 64 are provided above and below the collar 62'. To the collar 62', at the outer side, is bolted an upwardly extending bar 65 which carries a cam roller 66, and is slidably guided in ways 67 cut in the outer surface of the support 40.

Resting on the head 40 and keyed to the non-rotating shaft 42 is a flanged hub 68, and rotatably supported by the flange 69 on the member 68 is a gear wheel 70. This gear is locked in rotative positions to properly adjust the timing of the operations controlled by the gear, by means of the hand wheel 71 which is threaded on the stem of the member 68 and forces the flange collar 72 down so that the central portion of the gear 70 is locked between the flanges 69 and 72.

Held between the pairs of bearings 61 and 62 are the pinions 73 which are splined on the shafts 60. The pinions 73 all mesh with the non-rotating center gear wheel 70, as shown best in Fig. 5, and the size of the pinions is such that the capping-head spindles 60 are rotated about eight times at each revolution of the turret.

The shafts 60 are vertically positioned by means of the cylindrical cam drum 74 which has an irregular, circumferential groove 75 in which the rollers 66 travel as the turret is rotated. The cam drum 74 is adjustably supported by the spider 76 which is splined on the shaft 42. The ends of the spider arms of the spider 76 are connected to the drum 74 by depending arms 77, and the spider is vertically supported by rods 78 which connect the spider 76 to the arms of the yoke 79, carried by the adjusting screw 80 which threads into the end of the shaft 42.

Concentrically mounted on the turret table is a ring 80' which has peripheral, semi-circular pocket members 81 for receiving the bottles B, as the bottles are deflected from the conveyor belt 18 by the stationary guide member 29. As the bottles are moved in a line along the left side of the guide member 29, they are urged by the succeeding bottles against the periphery of the ring 80' and into one of the pockets 81 as the pocket comes into registration with the bottle. As the bottle is carried around it is pressed tightly into the pocket by the spring pressed lever 82 which is pivoted into the end of the rear rail 28.

For a short distance beyond the lever 82 the bottles are held in the pockets by the outer segment 83 which is rigidly supported by the bracket 84, secured to the spider 34. Then for holding the bottles from turning at the rear side of the turret, I provide a belt 85. A forked frame 86 is mounted on the post 32, and the belt 85 runs over pulleys

87 and 88, rotatably mounted in the respective ends of the forks of the frame 86, and over the tensioning pulley 89. The pulley 89 is carried by a yoke 90, is slidably guided on the upper surface of the frame member 86 and drawn rearwardly by the spring 91 which encircles the rod 92 and is compressed between the adjusting wheel 93, threaded on the outer end of the rod 92, and the bracket 94, secured to the frame 86. The inner end of the rod 92 passes loosely through the bracket 94 and is secured to the yoke 90.

The shaft 95, keyed to the pulley 88, projects downwardly below the frame 86, and carries at its lower end a bevel gear 96. The lower end of the shaft 95 is rotatably supported in an arm 97 of the bracket 98 which is bolted to the frame spider 34. In the bracket 98 is rotatably mounted a horizontal shaft 99 which carries a bevel gear 100 meshing with the gear 96, and is connected for driving to the shaft 47 by the chain 101. The driving ratio from the shaft 47 to the belt 85 is such that the belt travels in contact at the same speed as the bottles.

After passing out of engagement with the belt 85, the bottles are held in the pockets by the spring pressed arm 102 pivoted on the rail 103 which is mounted on the right end of the conveyor table at the rear side of the conveyor belt 18. Then the bottles contact with the finger 103', secured to the guide 29, and travel along the right side of the guide 29 and back onto the conveyor belt 18. At the left side of the turret is a post or standard 104 on which is mounted the cap magazine 20 which has a chute or foot portion 105, hinged to the lower end of the magazine, see Fig. 1. On the upper frame member 76 and the lower edge of the drum 74 are secured respectively the spaced plates 106 and 107. In these plates are secured the two depending bars 108, on the lower ends of which is mounted the cap feed shelf plate 109 on which the lower end of the chute 105 rests. The shelf 109 projects over the path of the bottles on the turret.

On the front side of the shelf 109 is pivoted a trigger plate 110, the inner end of which is suitably formed to hold the caps in the magazine, see Fig. 2 and Fig. 6. Mounted on the post 30 is a bracket 111 which has spaced rearwardly projecting arms 112 and 113 in which is rotatably mounted a shaft 114. On the shaft 114 are securely pinned, in spaced relation, the two levers 115, in the outer ends of which is carried a rod 116. This rod 116 engages in a slot 117 formed in the outer end of the trigger 110, and on the lower end of the shaft 114 is fixed a finger 118 which projects into the path of the bottle which is moving on the turret toward the magazine. The shaft 114 is urged to rotate clockwise, see Fig. 2, by the spring 119 which is extended between a projecting pin 120, fixed in

the side of the shaft 114, and a pin 121, fixed in the hub of the bracket 111. The trigger plate 110 is stopped in counterclockwise rotation, under the spring 119 acting through the levers 115, 116, by a pin 122 fixed in the shelf 109.

A short carrier belt 123 is provided for moving each cap from the lower end of the magazine to the inner end of the shelf to a position directly over the top of the bottle. Pairs of brackets 124 and 125 are bolted to the front and rear, respectively, on the under side of the shelf, in which are rotatably mounted the shafts 126 and 127, which carry the pulleys 128 and 129 on which the belt 123 is mounted. The upper reach of the belt slides on the upper surface of the shelf, and the belt is tensioned by the tightener pulley 130, rotatably mounted on the end of the arm 131 which is pivotally mounted on the under side of the shelf. The pulley 130 is pressed against the lower reach of the belt 123 by means of the torsional spring 132. The shaft 126 is driven by a belt 133 from the jack shaft 134, mounted in the left end frame members 26; and the shaft 134 is connected to the drive shaft 47 by the chain belt 135, see Fig. 1.

With the trigger 110 in normal position, as shown best in Fig. 6, the cap Ca, at the end of the magazine is held between the point 136 of the trigger 110 and the guide rail 137 which is adjustably secured on the opposite side of the shelf, the caps being fed down to the position of Ca by gravity. For giving ready access to the cap at Ca a bar 137' is hinged to a bridge member 138 which is secured to the shelf and spans the path of the caps. The left end of the bar 137' rests on the upper portion of the chute 105. With the novel arrangement just described it can be seen that the shelf can be raised or lowered for different height bottles without disturbing its cooperative relation with the magazine 20.

When the trigger 110 is rotated clockwise by a bottle coming into contact with the finger 118, the point 136 moves away and releases the cap at Ca, and the point 139 of the trigger moves inwardly to catch the succeeding cap. Then when the trigger swings back to normal position the succeeding cap slips by the point 139 and is caught by the point 136.

When the cap is released it is carried by the belt 123, which is continuously running against the stop arm 140. This arm 140 is pivotally mounted on a post 141 which is fixed to the under side of the shelf 109, and the arm is urged in a counterclockwise direction by the torsional spring 142, anchored to the post 141. This holds the arm 140 against an adjustable stop plate 143, the arm 140 being provided with a pin 144 which engages in the notches 145 in the end of the

plate 143. The plate 143 is pivoted and frictionally secured to the shelf by the bolt 145. In this manner a quick adjustment is provided for different sizes of caps so that the centers of the caps may be in the same position when against the stop 140, and in the proper cooperative relation with the spindles 60.

The spindles 60 are of course in corresponding arrangement and in vertical alignment with the pockets 81 in which the bottles are closely held as described above. The novel capping features of my invention will now be fully explained, one of the capping heads being described, it being understood that all of the mechanisms are of the same construction. For the detailed construction of the capping mechanism see particularly Fig. 15.

Near the lower end the spindle 60 is provided with a flange 146, and a coil spring 147 is compressed between the collar thrust bearing 64 and said flange. Supported on the lower end 148, of the spindle 60, is the capping head member consisting of the flange 150, rotatably mounted on the spindle end 148, and the hub 151 which are connected in spaced relation by the arm portions 152. A friction ring 153 is inserted between the flanges 150 and 146, and the flanges are held in frictional engagement by the nut 154 which is threaded on the lower end of the spindle. A resilient ring 155, of such material as rubber, with washers 156 and 157 on either side, is interposed between the nut 154 and the flange 150 so that an even, resilient pressure is maintained between the flanges 146 and 150, and also that the flange 150 may slip under the rotating action of the flange 146, at a predetermined resistance to turning.

The lower end of the spindle is also bored out and receives the stem 158 of the circular chuck member 159, and the side of the stem 158 has a notch 159' in which the reduced end of the pin 160, inserted in the hub portion 151, loosely engages to permit a limited amount of vertical movement of the stem in the bore of the spindle. Fixed on the member 159 is a cup shaped member 161, and the members 159 and 161 are formed to provide an annular recess 162 in which the hardened steel ring 163 is removably held by the screws 164. The ring 163 has a slightly conical or tapered bore having serrated walls 165 which frictionally engage the sides of the bottle cap with which the head is used. For different sizes of caps different sizes of chucks are used, the chucks being readily interchanged by removing the pin 161. Then, for imparting rotational movement to the chuck from the capping head, a pin 166, fixed in the cup 161, is slidably engaged in a hole 167 provided in the hub 151.

It will now be seen that the spindles rotate with the turret table and are directly

over and in accurate alignment with the bottles in the pockets 81. The height of the capping heads is controlled by the cam groove to raise and lower the chucks with respect to the bottles, and the entire capping mechanism can be vertically adjusted by raising or lowering the cam drum 74 by means of the adjusting screw 80, the cap feed shelf 109 being supported with the drum and the hinged magazine chute 105 being arranged to rest on the shelf.

At the front of the turret the capping heads are carried at a distance above the height of the bottles by the roller 66 riding in the horizontal portion 170 of the cam groove 75. As the bottle moves into a pocket and is carried under the cap feed shelf, a cap is released from the magazine and positioned against the stop 140. Then the angular drop 171 of the cam groove lowers the capping head until the top of the cap just enters the bore in the chuck ring 163 as shown in Figs. 8 and 9. As the chuck moves along it drags the cap off from the belt 123 onto a plate 173 which is fixedly mounted on the shelf 109, see dotted line position in Fig. 9. The head is then further depressed by the angular drop 174 and the cap is pressed tightly into the chuck ring. In this part of the operation, the chuck is lowered lightly onto the cap and rests thereon by the weight of the chuck, allowing the cap to center itself accurately in the chuck ring while it is turning loosely on the plate 173. The spindle continues its downward movement until the hub 151 contacts with the top of the cup 161 and the cap is pressed tightly into the ring. The relative travel of the chuck and spindle are illustrated diagrammatically in Fig. 9, line 175 representing the travel of a point in the hub 151, and line 176 representing the path of a point in the chuck.

The cap is then lifted off from the plate 173 by the cam angle 177 and carried along over the bottle by the short horizontal cam dwell 178 until the bottle is gripped by the belt 85. The cap is then lowered by the angular cam portion 179 and carried along by the horizontal cam dwell 180 with the cap resting loosely under the weight of the head on the top of the bottle. This is the position shown in Fig. 15 in which it will be seen that the spindle is lowered with the end of the pin 160 out of engagement with the top of the notch 159. The length of the cam dwell is such that the chuck is turned slightly more than one complete revolution to insure the thread groove 181 finding the end of the thread 182 on the top of the bottle. The free motion of the chuck permits the cap to screw down onto the bottle in case the thread is found near the beginning of this horizontal motion, as indicated in broken lines in Fig. 15. The capping head is then lowered in the angular drop 183 of the groove, 130

and the cap is screwed tightly down against the gasket 185, see Fig. 16, while the cam roller is in the lowest horizontal cam portion 186. During this operation the cap is under the resilient pressure of the spring 147, and the head stops turning when a predetermined resistance is met, slippage occurring between the flanges 146 and 150.

In this manner the caps are accurately placed on the bottle and positively screwed home with a predetermined pressure without danger of breaking the bottles.

Before the bottle moves out of engagement with the holding belt 85 the capping head is lifted out of engagement with the bottle cap, and the spindle is raised by the cam roller traveling in the angular rise 187 back into the highest cam dwell portion 170.

Since the feeding of the caps is controlled by the bottles, it is impossible to get a cap wedged into the cup ring 163 unless there is a bottle to receive it. At all parts of operations accidents to the bottles or the mechanism of the machine are effectually prevented. The operation of the machine is rapid and continuous, and adjustments or changes for different sizes of bottles and caps can be readily made.

While I have shown but one illustrative embodiment and use of my invention, many modifications or omissions can be had without departing from the spirit of my invention, as defined in the following claims.

I claim:

1. In a bottle capping machine, a rotatable spindle, a capping head rotatably mounted on the spindle and frictionally connected thereto for rotation, a chuck loosely mounted in the end of the spindle and rotatably connected to the head so that the chuck can have a limited axial movement in the spindle.

2. In combination in a bottle capping machine, a rotatable spindle having a flange, a capping head rotatably mounted on the spindle and having a flange cooperating with said flange, a nut threaded on the spindle, a rubber ring inserted between the nut and flange of the head so that the flanges are resiliently pressed into frictional driving engagement by screwing the nut onto the spindle, and a chuck loosely held in the spindle and rotatably connected to the head with a limited amount of axial movement permitted for the chuck relative to the spindle.

3. In a bottle capping machine, a rotatably mounted spindle, means for raising and resilient means for depressing the spindle, a capping head rotatably mounted on and frictionally connected to the spindle, a chuck slidably mounted in the end of the spindle, and means for positively connecting the chuck to the head for rotational movement.

4. The combination with a bottle capping machine, of a rotatably mounted spindle adapted to be moved to raised and lowered po-

sitions, a bottle cap chuck rotatably mounted at the end of the spindle and having a limited amount of free axial movement with respect thereto, means for yieldably connecting the chuck to the spindle for rotational movement, and means for causing the spindle to dwell intermediate its raised and lowered positions to allow the chuck to have movement axially with respect thereto during the initial capping operation of a bottle.

Signed at Chicago this 2nd day of April, 1929.

ARTHUR I. RISSER.