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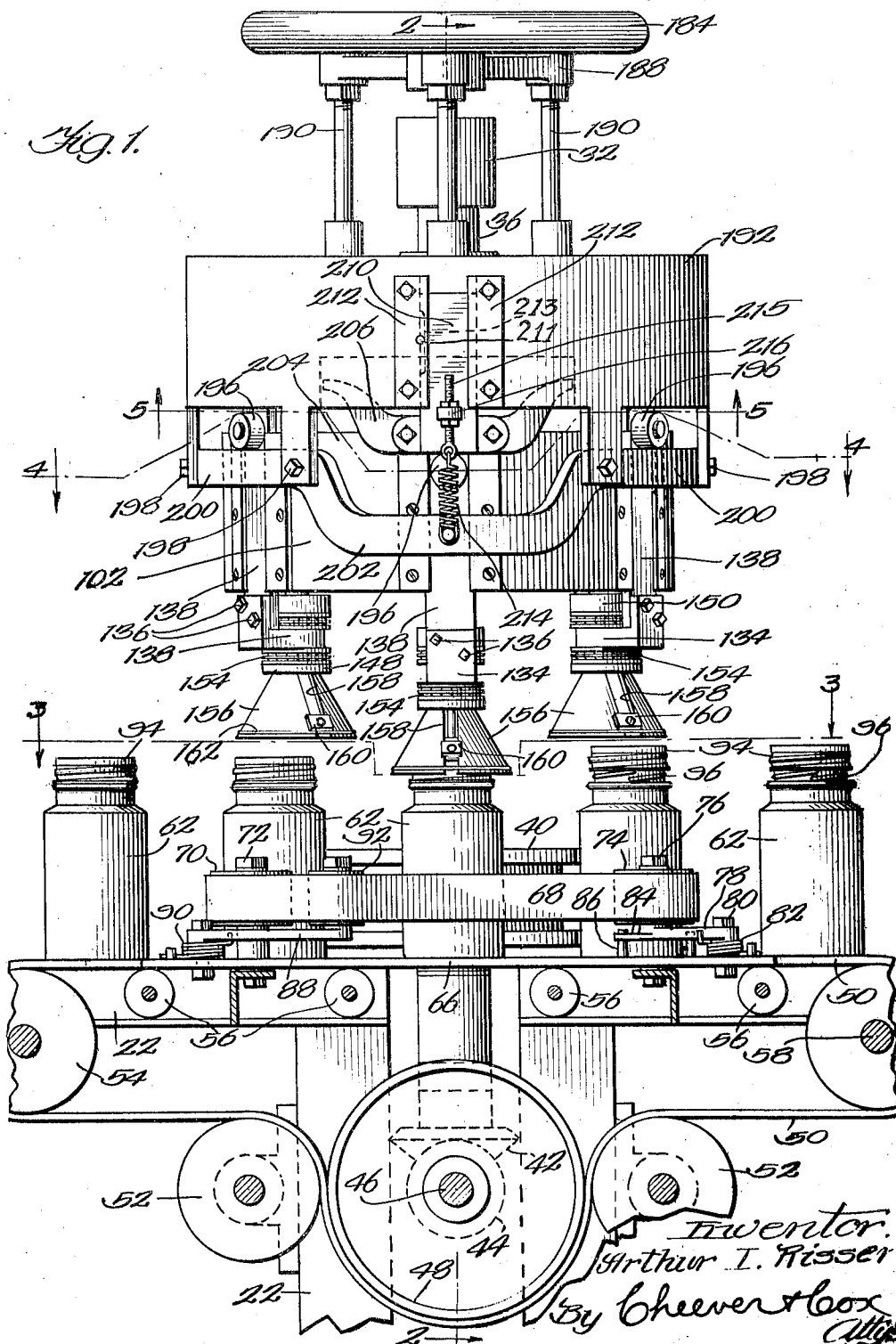
A. I. RISSE

1,598,392

BOTTLE SCREW CAPPING MACHINE

Filed Feb. 10, 1923

5 Sheets-Sheet 1



Aug. 31, 1926.

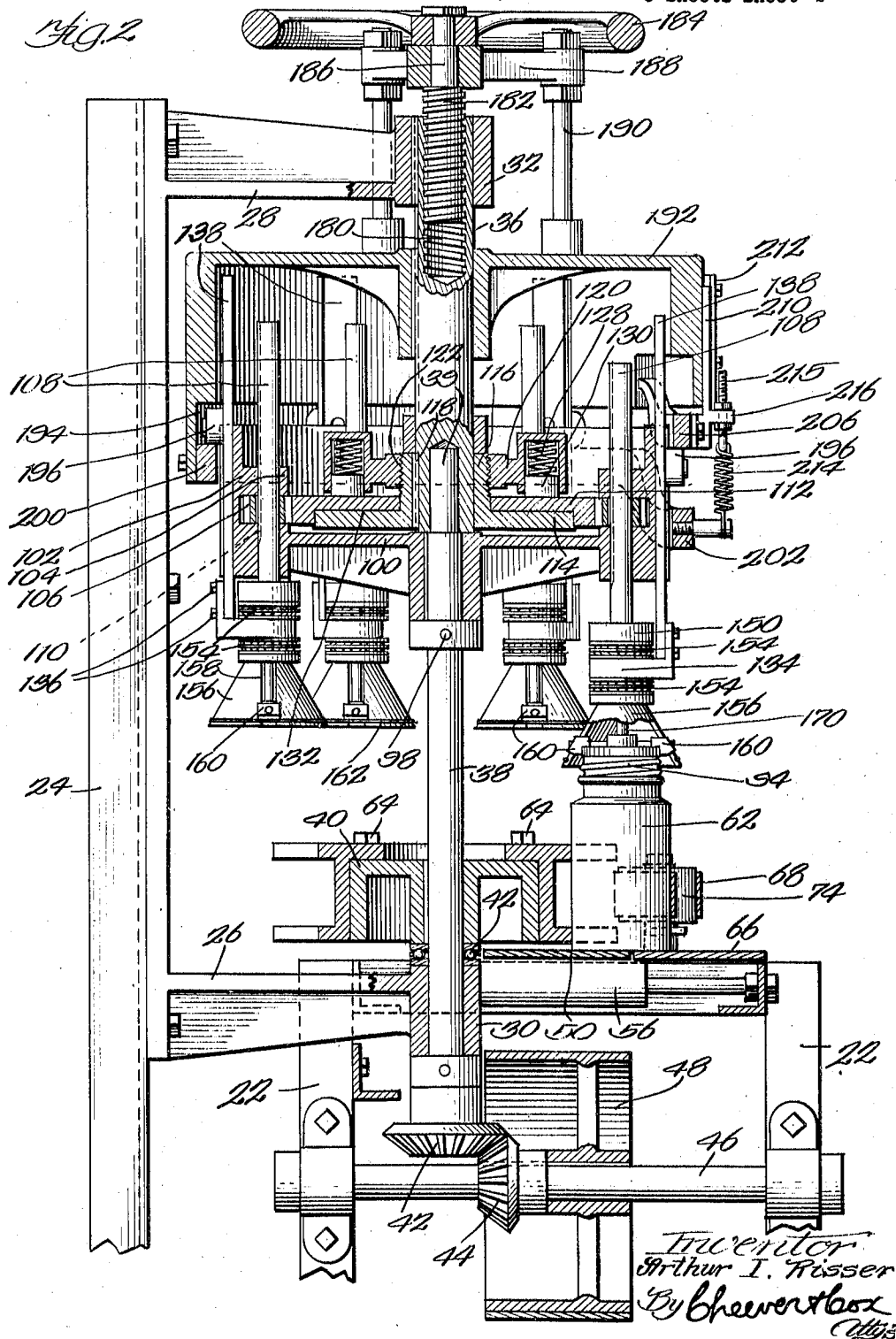
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BOTTLE SCREW CAPPING MACHINE

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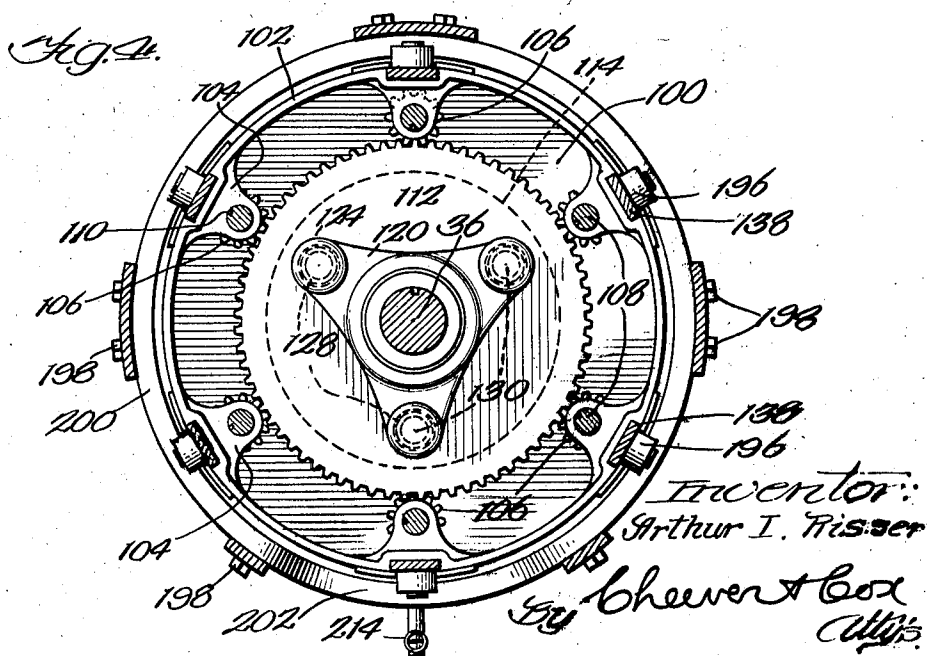
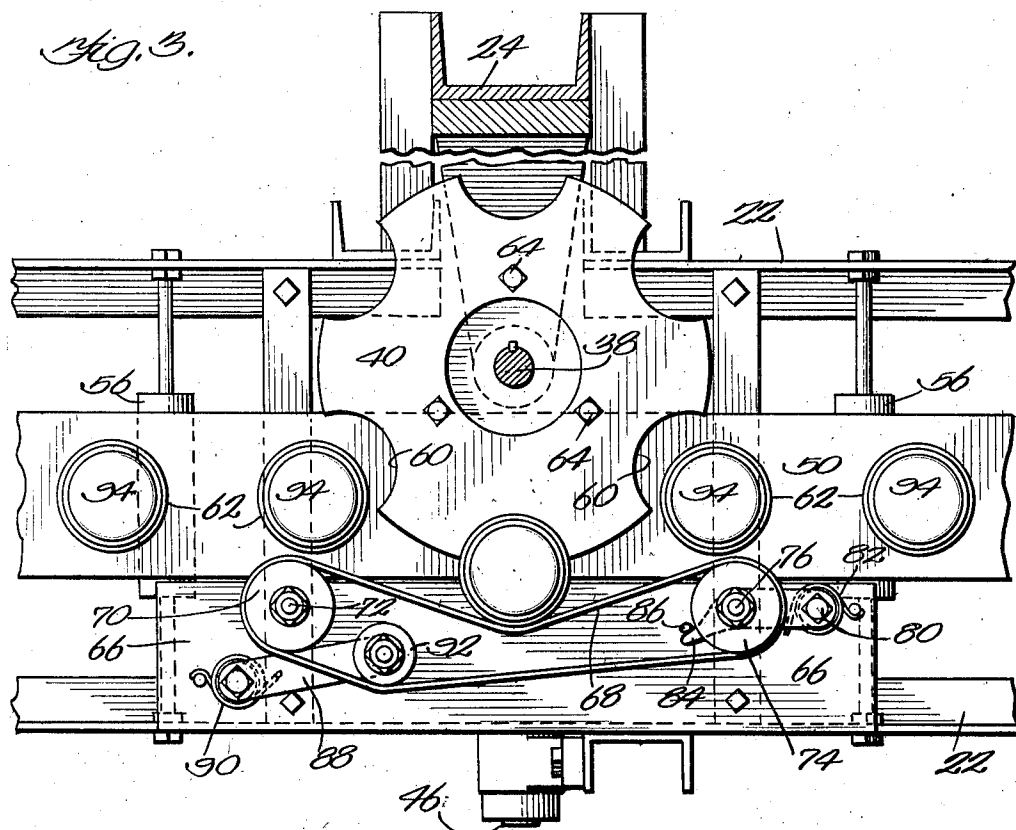
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BOTTLE SCREW CAPPING MACHINE

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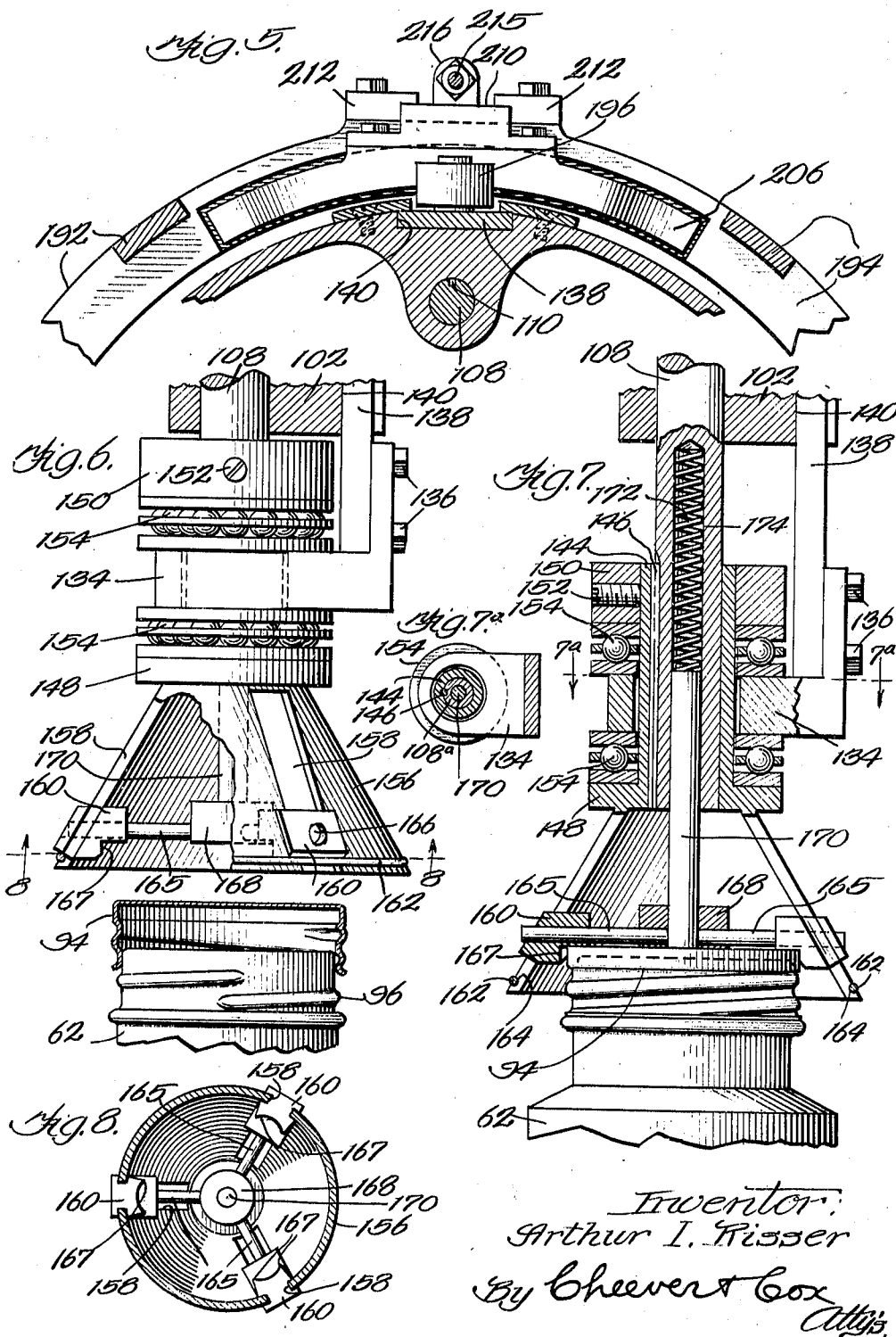
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BOTTLE SCREW CAPPING MACHINE

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5 Sheets-Sheet 4



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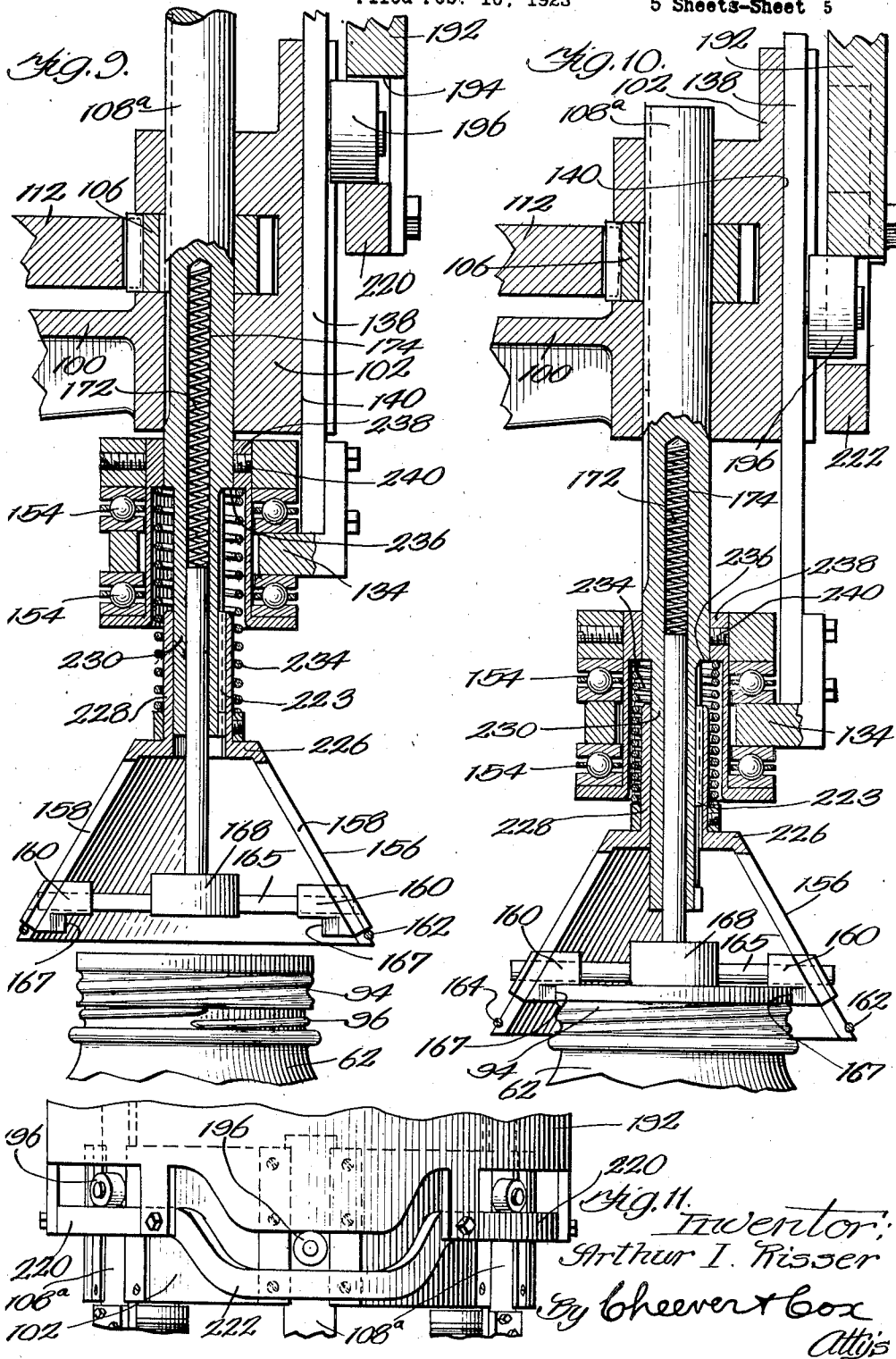
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BOTTLE SCREW CAPPING MACHINE

Filed Feb. 10, 1923

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UNITED STATES PATENT OFFICE.

ARTHUR I. RISSE, OF CHICAGO, ILLINOIS, ASSIGNOR TO U. S. BOTTLERS MACHINERY CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

BOTTLE SCREW-CAPPING MACHINE.

Application filed February 10, 1923. Serial No. 618,276.

In a great many classes of bottle goods, the bottles are closed by applying to the open neck of the bottle a piece of cork or other sealing member carried within a metallic cap, screw threaded upon the neck of the bottle. To close such a bottle requires rotary or spinning movement of the cap with reference to the neck of the bottle.

The object of this invention is to provide an automatic machine adapted to mechanically turn or spin a closure device requiring rotary movement into its proper position with reference to the bottle to be closed. More particularly, the object of the invention is to provide such a machine which can be much more simply constructed than devices heretofore in use; which operates more positively, rapidly and efficiently than any prior device, and which is provided with various safety appliances so that the machine cannot accidentally damage either itself or the product which it is handling.

The invention consists in mechanism for attaining the foregoing and other objects, having—among others—the special features and details of invention hereafter more fully set forth in the specification and claims.

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

Figure 1 is a side elevation of the essential parts of mechanism illustrating this invention in its preferred form.

Figure 2 is a central, sectional elevation on the line 2—2 of Figure 1.

Figure 3 is a plan view, taken on the line 3—3 of Figure 1.

Figure 4 is a plan view on the irregular line 4—4 of Figure 1.

Figure 5 is an inverted plan view of the presser cam mechanism taken on the line 5—5 of Figure 1.

Figure 6 is an enlarged side view of a chuck mechanism for handling the screw cap.

Figure 7 is a central, sectional detail view of the device of Figure 6.

Figure 7^a is a detail plan view on the line 7^a—7^a of Figure 7.

Figure 8 is a bottom view of the chuck taken on the line 8—8 of Figure 6.

Figure 9 is a sectional, detail view of an alternative form of pressing device for moving a chuck into contact with a bottle cap and holding it there, the same replacing the structure of Figures 2 and 7.

Figure 10 is a changed position view of the parts in Figure 9.

Figure 11 is a side elevation of the cam mechanism used in connection with the mechanism of Figures 9 and 10.

The machine is suitably supported at a working height above the floor by a conventional form of open frame work 22 which includes a vertical upright 24, having horizontal arm 26 and 28, terminating in suitable bearing 30 and 32, respectively, supporting a compound vertical shaft 36—38, the former stationary, the latter rotating on bearing 39 in the lower end of the former. Rigidly secured to shaft 38, just above the bearing 30, is wheel 40 carried by step bearing 42. Shaft 38 carries at its extreme lower end a beveled gear 42, meshing with another bevel gear 44 on shaft 46 carrying pulley 48 over which passes conveyer belt 50, held in working contact by any suitable means, as friction rollers 52. After leaving the pulley 48, belt 50 passes over two spaced pulleys 54 and thence extends horizontally of the machine just below rotatable wheel 40 (Figs. 1, 2 and 3), being supported and retained in this position intermediate of pulleys 54 by small conventional rollers 56. The parts described may be power driven in any conventional manner, for instance, by applying an electric motor, not shown, to shaft 58 of either one of the pulleys 54.

Wheel 40 is provided with circumferential notches 60 adapted to receive the bottles 62 to be capped, brought to working position, as shown in Figure 3 by the conveyer belt 50 moving in a given direction, for instance, from right to left. In order that the machine may be used for different sized bottles, the wheel 40 is made in two parts (Figure 2) detachably secured together by any suitable means, as for instance the bolts 64, so that by removing the bolts, another outer wheel section, having different shaped notches 60 from those shown in the drawing may be substituted as may be required to take care of larger or smaller bottles than those shown in the drawings.

Conveyer belt 50 passes adjacent to the wheel 40 in such a position that a bottle 62, when in contact with the wheel as shown in Figure 3, rests approximately one-half on the belt and the other half on a stationary rigid table 66 mounted on the frame at the side of the belt, so that when the bottle cap-

ping mechanism to be hereafter described is in operation and pressing the bottle downward, actual movement under this pressure will be resisted by this rigid table, a function which the flexible belt 50 alone could not perform.

As a bottle 62 is brought from the right of Figure 3 by the belt 50, it obviously strikes the rotating wheel 40, supposedly enters one of its notches 60 and, guided by suitable means, such as vertically disposed, flexible belt 68, passes over table 66 and back onto the belt 50 by which it is carried onward to the left to a point where it is removed, either by an operator or by other means not entering into this invention. Belt 68 is carried by a vertical pulley 70, mounted on a stationary vertical pivot 72, carried by the table, and another vertical pulley 74, carried on a vertical shaft 76, supported on a crank-arm 78, pivoted to the table at 80. A coil spring 82 is provided tending to move arm 78 in a clockwise direction as viewed in Figure 3 until a finger 84 on lever 78 engages a stop 86 on the table. Near the opposite end of table 66, is pivotally mounted another lever arm 88 urged by spring 90 in a clockwise direction to force roller 92 against the inside of belt 68. The two lever arms 78 and 88 are so positioned, and their respective control springs are so adjusted that the belt 68 is maintained taut over any bottle in a notch 60 in wheel 40 which may be passing adjacent to the belt—this even when a bottle being delivered to the wheel by the belt 50 does not in the first instance register with a notch 60 in the wheel and therefore momentarily presses roller 74 and consequently the entire belt mechanism adjacent thereto in a counter-clockwise direction about pivot 80, this motion being that for which the lever 78 is primarily provided. Belt 68 is mounted on these pulleys 70 and 74 for the sole purpose of providing a flexible retaining device to hold each bottle as it passes in rigid engagement with the wheel 40 while bottle moves from the right hand side of wheel 40 through the central position of Figure 3 over the table 66 and thence back to the position on the belt shown in the left hand half of Figure 3. Therefore, the belt has no longitudinal movement except as the same is caused by the frictional engagement of the belt with the moving bottle.

The problem to be solved by this invention is to provide means, operating while a bottle is traveling in contact with the wheel 40 in the manner described, for gripping a screw threaded bottle cap 94 manually or otherwise placed upon the bottle as it approaches the wheel 40 to rotate said cap so that it travels down the screw threads 96 on the bottle itself to final sealed position before the bottle leaves the circumference

of wheel 40 and begins traveling to the left of Figure 3 on belt 50 away from the wheel. The preferred form of mechanism for accomplishing this result is shown in the drawings above the wheel 40 and will now be described.

Rigidly secured upon shaft 38 by any suitable means, as for instance pin 98, is the spider 100 of a horizontally disposed ring 102 provided on its interior with pairs of inwardly projecting lugs 104 spaced apart to receive and retain small pinions 106, loosely splined on vertically reciprocable shafts 108 taking bearing in these lugs 104, the mounting being such that the splines 110 slip freely through these gears which are stationary as to vertical movement when the shafts reciprocate vertically.

All of these pinions 106 are mounted about and mesh with a gear plate 112 in frictional engagement with the flange 114 of a hub 116 rigidly attached to stationary shaft 36 by any suitable means as, for instance, a key 118. Hub 116 carries rigidly a triangular frame 120 held in place by any suitable means, as for instance, screw threads 122. The frame carries inverted cups 124 within which are mounted springs 128 which press piston like blocks 130 against gear plate 112 to make it engage flange 114 along the flat surface 132 with sufficient friction so that under normal conditions members 112 and 114 will remain stationary while pinions 106 are driven around gear 112 but so that if the machine becomes obstructed at any point as, for instance, by a bottle catching in entering its proper notch in wheel 40, member 112 can slip on surface 132 and move in unison with pinions 106 about the axis of shaft 38. This yielding may also occur upon the development of resistance between the cap and the bottle on completion of screwing the cap on the bottle.

Each shaft 108 is journaled at its lower end in a ball-bearing mechanism shown in detail in Figures 6 and 7, carried by an L-shaped bracket 134, secured by any suitable means such as screws or bolts 136 to a vertically extending rod 138, reciprocable in grooves 140 formed at the proper points in the outer circumference of the ring 102, there being in the particular case here illustrated six such rods 138, each carrying a shaft 108.

The form of anti-friction bearing for shaft 108 of Figures 6 and 7 includes the collar 144 fastened to the lower end of the shaft by any suitable means, such as key 146, there being on one end of the collar a fixed flange 148 and on the other end a removable flange 150, detachably secured in place by any suitable means, as for instance, the screw 152. These flanges are on opposite sides of the bracket member 134, and

between each flange and said bracket is a conventional form of ball or thrust bearing 154. The result of the construction just described is that shaft 108 and the collar mechanism 144—148—150 rotate as a unit in the bracket 134 on the anti-friction bearings 154 and that independent of such rotation, the shaft 108 and adjacent rod 138 reciprocate in unison with reference to the ring 102 and parts heretofore described carried by it.

Rotatable in unison with and by the shaft 108 in the particular case here illustrated, rigidly attached to the flange 148, is a chuck mechanism for taking hold of a screw cap 94 to be applied to a bottle 62. In the preferred form of the mechanism of this invention, this chuck includes a hollow cone 156 rigid with flange 148, provided with a plurality, in the particular case here illustrated, three substantially equally spaced longitudinal slots 158, each provided with a reciprocable block 160. In the particular case here illustrated, these slots 158 are open at their lower ends so that the blocks can be slid into place in the obvious manner and then retained in place by a ring 162, preferably of elastic material, lying in the circumferential notch 164 provided for it adjacent to the lower end of conical member 156. The fit of these blocks in the slots 158 is such that they are freely reciprocable vertically of the cone 156 in which they are mounted. Each of these blocks is horizontally reciprocable on a rod 165 passing through a perforation 166 in the block. These rods 165, one for each block, are as shown mounted radially of the cone 156 like spokes in a hub 168 rigid on a plunger 170 reciprocable with reference to shaft 108 and normally pressed downward from the end of shaft by spring 172 mounted in a suitable recess 174 provided for it in the interior of the shaft.

The result of the construction just described is that when the mechanism of Figures 6 and 7 is in the initial or normal position of Figure 6, the spring 172 will move hub 168 and rods 165 downward as far as they will go, with the result that the inclined cam surface of the cone 156 spreads the blocks 160 as far as the construction of the particular device will permit. In other words, this action opens the blocks or jaws 160 as wide as possible for the reception of a bottle top 94. When mechanism hereafter described lowers cone 156 and attached parts onto the bottle cap 94 or to the position of Figure 7, the top 94 being stationary, resists further downward movement of hub 168 and rods 165, with the result that the cone 156 being still in motion, the cone cam travels downward with reference to the stationary top 94 and the now vertically stationary blocks 160, with the result that the cam action of cone 156 forces the blocks or jaws

160 inward until their clamping notches 167 grip the edge of the bottle top 94, whereupon further attempted movement of the cone 156 downward rigidly locks the jaws 160 onto the cap 94 to such an extent that rotation of the shaft 108 will cause the cap 94 to rotate in unison with the cone 156 and said shaft 108. Conversely, when the operator or mechanism hereafter described moves cone 156 from the gripping position of Figure 7 upward with reference to a capped bottle, the spring 172 urges rods 165 and jaws 160 downward with reference to the cone 156 now receding from the bottle, with the result that the jaws 160 are automatically forced outward from the circumference of the bottle cap, thereby completely releasing the bottle from this gripping mechanism.

The upper end of shaft 36 is hollow and internally provided with screw threads 180 interfitting with which is a screw 182, rotatable by any suitable means, as for instance a hand wheel 184 at the top of the machine. Between screw 182 and wheel 184 is a bearing 186 journaled in a frame 188 from which depend a plurality—in the particular case here illustrated—three suspension rods 190, carrying at their lower ends an open bottomed, cylindrical case 192 loosely enclosing the ring 102.

The lower portion of the interior face of the side wall of cylindrical case 192 is cut away in the circumferential recess 194 adapted to receive rollers 196, one of which is journaled at a convenient point on each of the rods 138, heretofore referred to.

Suitably attached to the lower inside edge of the case 192 by any suitable means, as for instance, the bolts 198, is a segmental track 200 for the rollers 194. Said track completely envelopes the shaft mechanism 36—38 except at the front of the machine as viewed in Figures 1 and 3 where its ends are connected together by a downwardly curved supplemental cam track 202. The drop in this track is sufficient to allow the cone clutch mechanisms 156—160, heretofore described, to, on their respective rollers 196 reaching this track, drop down from the position of Figure 6 to that of Figure 7, thereby engaging a bottle cap and permitting the rotating mechanism heretofore described to, in the manner hereafter described, rotate the cap onto the bottle.

Immediately above track 202 in the space 204 provided for it is a vertically reciprocable cam track 206 mounted in any convenient manner for the purpose desired—in the particular case here illustrated on a bar 210 sliding in guides 212. Track 206 is normally urged downward toward track 202 by a retractile spring 214, having one end rigidly attached to the track 202 and the other end adjustably attached to track 206 by a

screw 215 passing through a lug 216 on the bar 210 and adjustably held in position by conventional nuts shown in Figure 1 immediately adjacent above and below the lug 216. A stop 211 entering an elongated notch 213 in the side of bar 210 prevents the spring 214 drawing cam track 106 too close to cam portion 202 for proper operation of the device.

In the operation of the mechanism thus far described, the parts are assembled as shown and bottles 62 with caps 94 positioned thereon as shown in the right hand half of Figure 1 are carried by the belt 50 from the right of Figure 3 toward the rotating wheel 40. As each bottle reaches the wheel, it is moved with more or less automatic adjustment into one of the notches 60 in the wheel 40 and thence carried between the wheel 40 and the belt 68 over the table 66 and thence back to the belt 50 and thence to the left off from the machine. All the time that bottles are being so passed through the machine, shaft 38 is rotating, thus causing the pinions 106 to travel over the surface of normally stationary gear mechanism 112—114 thereby rotating the pinions, consequently the shafts 108 and consequently the cone clutch mechanisms 156. This same rotation of shaft 38 causes rollers 196 to travel the cam track 200—202 with the result that in the case of a single individual chuck mechanism 156, it remains in elevated position as long as its roller is on track 200 but when it passes the front of the machine, as viewed in Figure 3, its roller descends on track 202 thus allowing the chuck to cover a bottle and the gripping mechanism 160 to actually take hold of the cap 94. Whenever this gripping of the cap 94 takes place, the cap is, of course, rotated, this because of the continuous rotation of the adjacent shaft 108. During the time that chuck mechanism 156 is in lowered position, as above, while traveling over track 202, spring 214—through the agency of track 206—exerts a yielding pressure on the top of passing roller 196, thus holding chuck 156—160 down upon the bottle cap and at the same time allowing the chuck mechanism to assume different vertical positions as may be necessary when bottles of slightly different sizes are engaged, or there are defects in the screw threads of the caps.

When bottles 62 of supposedly predetermined standard size are to be capped, wheel 184 is adjusted to properly position case 192 so that the machine will satisfactorily operate upon that particular size or class of bottles. When the style of bottle to be taken care of is changed, the wheel 184 and consequently case 192 is adjusted as may be necessary depending upon the height of the bottles: the chuck mechanism 156 takes care of a wide necked bottle at the extreme bot-

tom of the cone and takes care of a smaller necked bottle further up in the cone.

In the alternative form of device of Figures 9, 10 and 11, adjustability of the track section 206 is entirely omitted and a conventional form of plain parallel cam track 220—222 is substituted therefor, as shown in Figure 11, the flexibility produced by spring 214 on the first described construction being obtained by mounting the conical chuck case 156 on a head 226 having a tubular extension 228 slidable on a reduced section 230 of shaft 108^a which replaces shaft 108 of the original construction. Member 228 is reciprocable on member 230 but is rendered non-rotatable thereon by means of a spline connection 223. Surrounding the members 228 and 230 is a compression spring 234 bearing at one end against the head 226 of the clutch mechanism and at the other end against a shoulder 236 on shaft 108^a, the result being that this spring always urges the chuck mechanism downward onto track 220—222 just as spring 214 does with reference to track 202 as heretofore described. Spring 234 is encased in the space provided for it inside of the sleeve 238 replacing sleeve 148 of the original construction, and held in place on shaft 108^a by any suitable means, as, for instance, a screw 240.

The cone chuck mechanism for gripping the bottle cap and holding it during its rotary movement onto the bottle forms the subject matter of a companion application, Serial Number 618,277, in which all of its essential features are fully shown, described and claimed.

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

1. In mechanism of the class described, a central stationary disc, a concentric gear frictionally engaging the disc, yielding means urging the gear into engagement with the disc, a rotatable ring, concentric with the gear and carrying a pinion meshing with the gear, mechanism driven by the pinion, and means for rotating the ring.

2. In mechanism of the class described, a central stationary disc, a concentric gear frictionally engaging the disc, a rotatable ring, concentric with the gear carrying a pinion meshing with the gear, a shaft in non-rotatable relation to the pinion, reciprocable through the pinion, a useful working tool on the shaft, means positioning the shaft through the pinion, and means for rotating the ring.

3. In mechanism of the class described, a central stationary disc, a concentric gear frictionally engaging the disc, a rotatable ring, concentric with the gear carrying a pinion meshing with the gear, a shaft in non-rotatable relation to the pinion, reciprocable through the pinion, a useful working

tool on the shaft, a cam mechanism selectively positioning the shaft through the pinion while the pinion is rotating, and means for rotating the ring.

4. In mechanism of the class described, a central stationary disc, a concentric gear frictionally engaging the disc, a rotatable ring, concentric with the gear carrying a pinion meshing with the gear, a shaft in non-rotatable relation to the pinion, reciprocable through the pinion, a useful working tool on the shaft, a cam mechanism selectively positioning the shaft through the pinion while the pinion is rotating, means selectively positioning the entire cam mechanism with reference to the length of said shaft, and means for rotating the ring.

5. In mechanism of the class described, a rotating, notched wheel, a moving conveyer overlapping the edge of the wheel, a stationary table adjacent to said conveyer, a belt enclosing a portion of the wheel adjacent to said conveyer adapted to hold a receptacle, brought by the conveyer to the wheel on said conveyer and table and in engagement with one of the notches of the wheel while passing the wheel, a yielding mounting for the belt allowing it in emergency to

move away from the wheel, and a bottle capping device exerting pressure on a bottle carried by the belt and wheel resisted by said table as the bottle passes over it.

6. In mechanism of the class described, a rotating, notched wheel, a moving conveyer overlapping the edge of the wheel, a stationary table adjacent to said conveyer, a belt device enclosing a portion of the wheel adjacent to said conveyer adapted to hold a receptacle, brought by the conveyer to the wheel on said conveyer and table, and in engagement with one of the notches of the wheel while passing the wheel, and a bottle capping device exerting pressure on a bottle carried by the conveyer and wheel resisted by said table as the bottle passes over it.

7. In mechanism of the class described, a rotatable drive shaft, a friction member affixed with respect to said drive shaft, a gear plate in frictional engagement with said friction member, a ring rotatable with said shaft, a plurality of pinions carried by said ring in mesh with said gear plate, and a chuck driven by each pinion.

In witness whereof, I have hereunto subscribed my name.

ARTHUR I. RISSER.