May 23, 1933. J. J. GAYNOR 1,910,327

SINGLE AUTOMATIC ROTARY BOTTLE CROWNERS

Filed Feb. 20, 1930 2 Sheets-Sheet 1

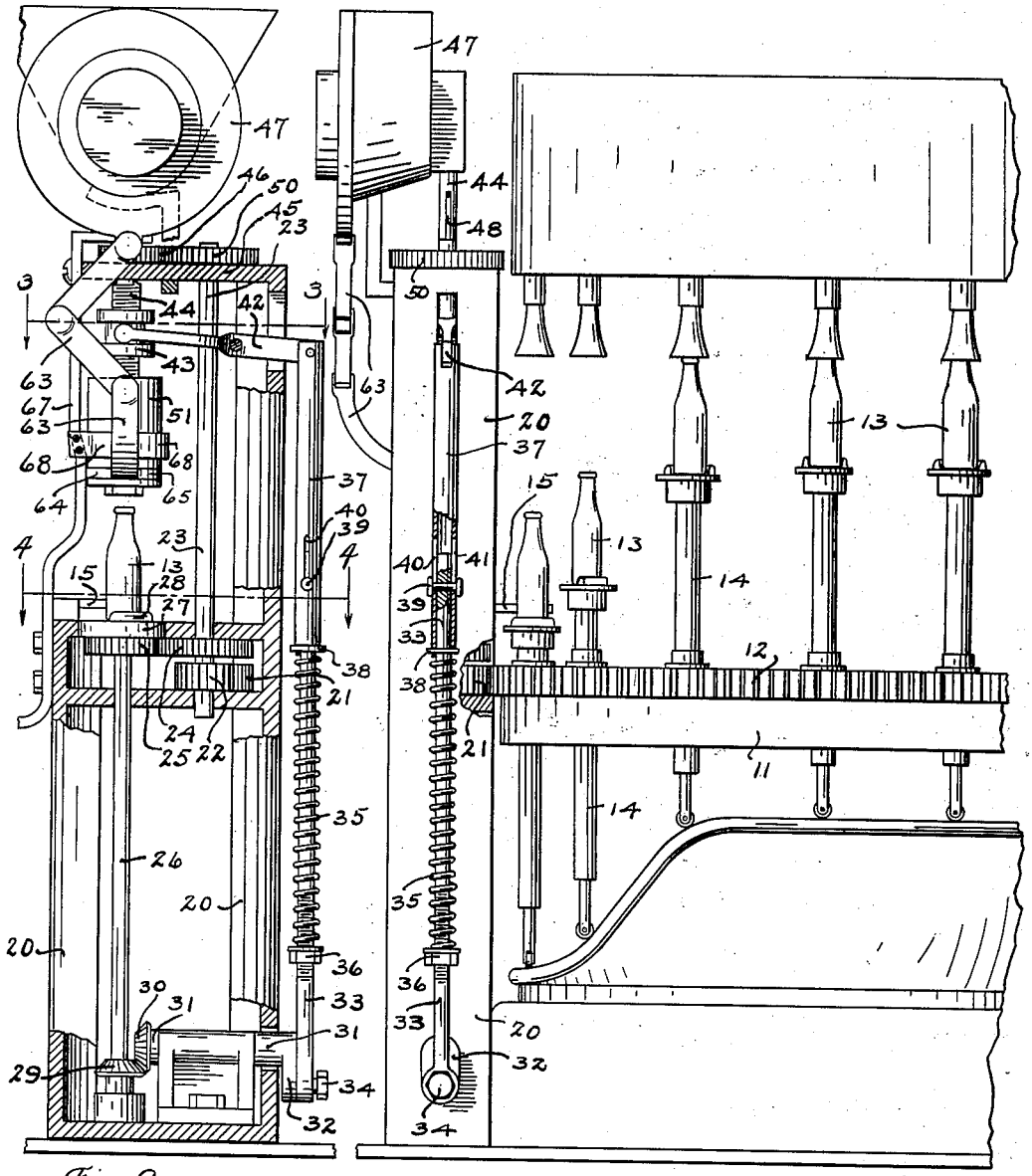

Fig. 2.

Fig. 1.

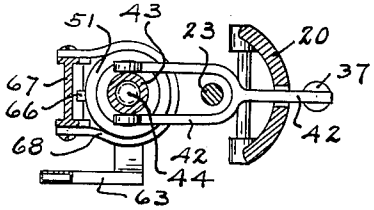

Fig. 3.

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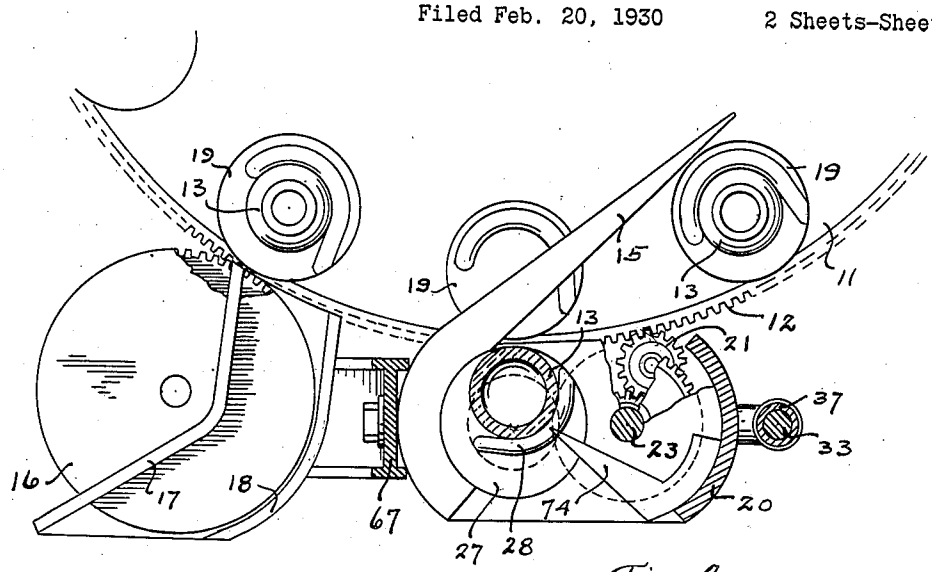


Fig. 4.

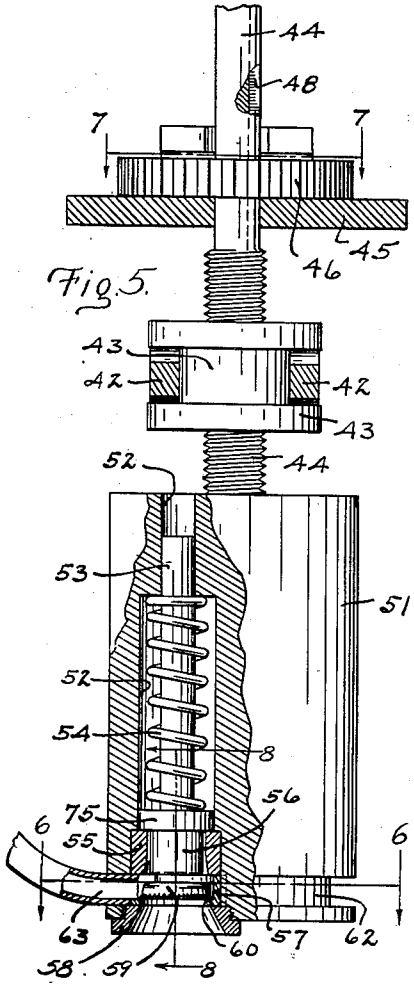


Fig. 5.

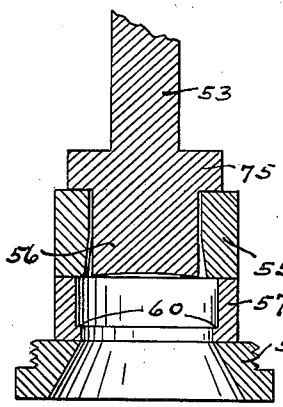


Fig. 8.

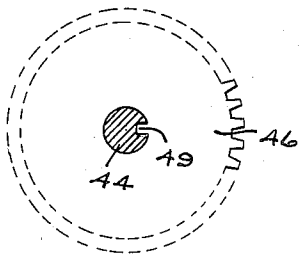
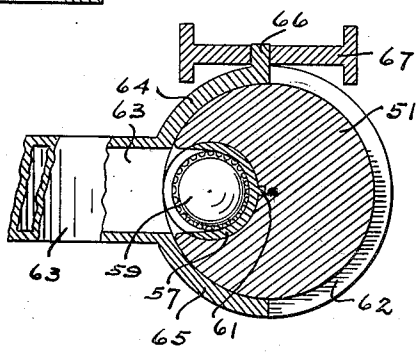


Fig. 7.

Fig. 6.



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Patented May 23, 1933

1,910,327

UNITED STATES PATENT OFFICE

JOHN J. GAYNOR, OF DELPHI, INDIANA

SINGLE AUTOMATIC ROTARY BOTTLE CROWNER

Application filed February 20, 1930. Serial No. 429,847.

This invention relates to the art of bottle cappers, and particularly to a unitary device capable of being attached to a bottle filling machine.

An important object of this invention is to provide a simple efficient mechanism that may be attached to a bottle filling machine in very close proximity to the discharge point of the machine whereby the bottles filled thereby are capped at once upon leaving the bottle filling machine so as to practically eliminate the exposure to the air or the cooling of the contents after the filling operation is completed.

Another important object resides in the provision of a capping device that may be operated directly from the filling machine in timed sequence therewith and that is adapted, through minor changes, to be applied to the various makes of filling machines previously built.

Further objects reside in the extreme simplicity of the device and in the particular details of the cap attaching members, promoting long life and low cost of production.

These and other objects will become apparent in the following description of the invention as shown in one particular form by the accompanying drawings, in which

Fig. 1 is a fragmentary side elevation of a bottle filling machine with my invention applied thereto;

Fig. 2 a front elevation of the bottle capper with parts of the supporting frame work removed to disclose the interior construction;

Fig. 3 a transverse section on the line 3—3 in Fig. 2;

Fig. 4 a transverse section on the line 4—4 in Fig. 2;

Fig. 5 a fragmentary side elevation of the capping head;

Fig. 6 a transverse section on the line 6—6 in Fig. 5;

Fig. 7 a transverse section on the line 7—7 in Fig. 5; and

Fig. 8 a vertical section on an enlarged scale on the line 8—8 in Fig. 5.

Like characters of reference indicate like parts throughout the several views in the drawings.

The customarily employed bottle filling machine to which my invention is attached has a horizontally rotating table 11 with a spur gear 12 therearound. A plurality of bottles 13 are carried around by the table and are raised by the shafts 14 to the filling positions and then lowered and carried around where a finger 15 directs the bottles from off the table. Referring to Fig. 4, a rotating disc 16 carries the bottles onto the table between the guides 17 and 18 to position the bottles one at a time on the carriers 19 on the shafts 14. The table 11 here shown is revolved in a clockwise direction.

Now, in place of the usual conveyor (not shown) customarily employed to carry the filled bottles away from the intercepting finger 15, I position my capping device which is supported by the frame 20 which is so mounted as to carry a spur gear 21 to be meshed with the table gear 12. The gear 21 is in constant mesh with the gear 22 fixed on the vertical shaft 23, Fig. 2.

The shaft 23 also carries a spur gear 24 thereon just above the gear 22 and in mesh with the spur gear 25 which is fixed on the shaft 26. The upper end of the shaft 26 has a bottle carrier 27 fixed thereon with a rib 28 projecting upwardly to retain the bottle 13 in an eccentric position on the carrier 27. The shaft 26 extends downwardly and carries a bevel gear 29 near its lower end in mesh with the gear 30 which is fixed on the transverse shaft 31. The outer end of the shaft 31 carries a crank arm 32 to which is rockably attached the connecting rod 33 by the cap screw 34.

This rod 33 has a compression spring 35 slidingly slipped thereover with its lower end bearing against the adjusting nut 36 screw-threadedly carried on the rod 33. A tube 37 telescopically fits over the upper end of the rod 33 with a sliding fit and is supported vertically thereon by resting on the washer 38 pressing against the upper end of the spring 35. The travel of the tube 37 on the rod 33 is limited by a rivet 39 fixed in the rod 33 and slidingly passing through slots 40 and 41 in the tube by its ends. The spring normally permits the rivet 39 to remain at

the lower ends of the slots 40 and 41 as indicated in Fig. 1 and 2.

The upper end of the tube 37 is pivotally secured to the outer arm of the lever 42 which is rockably supported by the frame 20. The other end of the lever 42 is bifurcated to pass around the shaft 23 and engage the collar 43 which is screw-threadedly carried on the vertical head shaft 44. This shaft 44 has its upper end rotatably guided by the horizontal member 45 of the frame 20 and extends vertically therebeyond slidingly through the spur gear 46 and on up into operative connection with the cap hopper 47. The hopper 47 is of the usual construction well known to those versed in the art and its detailed construction is, therefore, not shown. The shaft 44 has a keyway 48 along one side to receive the key 49 as carried by the gear 46, and a gear 50 on the upper end of the shaft 23 is in constant mesh with the gear 46 so that the shaft 44 may be revolved by the gear 46 as the shaft 44 may slide up and down therethrough.

On the lower end of the shaft 44, is mounted a capping head 51 which has a vertical bore 52 therethrough on an axis removed from the center of the head. This bore 52 is of three different diameters, having a small diameter at the upper end serving as a guide for the upper end of the plunger rod 53; an increased central diameter to receive freely therein the compression spring 54; and the largest diameter at the bottom into which is fitted a throat ring 55. The internal diameter of the upper part of the ring 55 is less than that of the bore thereabove so that the top surface of the ring 55 forms a stop against which the ring 75 on the plunger rod 53 may rest as directed by the compression spring 54 pressing thereon from above. The ring 75 has a sliding fit in the bore 52. The internal diameter of the throat ring 55 is increased toward the bottom to give the inner wall a nine degree slope from the axis. A head 56 freely projects from the end of the rod 53 to within the throat ring 55 and has its under side normally in the plane of the under side of the throat ring 55.

A cap ring 57 is fitted into the lower end of the bore 52 to bear against the under side of the throat ring 55 and is there secured by the retaining nut 58 which is screw-threadedly engaged in the bore 52. This nut 58 is essentially a ring with its inner walls flaring outwardly. The internal diameter of the cap ring 57 immediately below the throat ring 55 exceeds that of the throat ring and is of sufficient size to receive therein a cap 59. The lower portion of the ring 57 has a diameter slightly less than the diameter of the upper portion in order to form an annular shoulder 60 therearound on which the cap 59 may rest. This cap ring 57 is cut through from one side in the upper portion so as to permit a cap 59 to be slide horizontally through that opening and onto the shoulder 60. A key 61 on the side of the ring 57 fits into a corresponding keyway found in the bore 52 to prevent rotation of the ring 57 therein.

The lower end of the head 51 has an annular circumferential groove 62 formed therein and an opening is cut through horizontally from this groove 62 to communicate with the side opening in said cap ring 57. From the hopper 47, extends a cap conductor tube 63 with suitable hinge joints therein. The lower end of this tube 63 is curved around and directed toward the opening through the groove 62 and there maintained by means of the yoke arms 64 and 65 slidingly engaging within the groove 62; and the pin 66 extending from the arm 64 into a vertical guide in the bracket 67 which is fixed to the frame 20. The bracket 67 also carries a guide 68 through which the head 51 may reciprocate vertically.

As the bottles 13 are intercepted in their travel with the table 11 one at a time by the finger 15, a bottle 13 is positioned on the carrier 27 against the rib 28. The carrier 27 is constantly rotated in timed sequence through the train of gears 25, 24, 22, and 21 as driven by the filling machine table gear 12. The capping head 51 is also constantly rotated in timed sequence with the carrier 27 through the gears 46 and 50, shaft 23, and gears 22 and 21 by the gear 12. The vertical axis of the bore 52 through the head 51 coincides with the vertical axis of the bottle 13 when positioned on the carrier 27 against the rib 28, the common axis being at a distance from the common center of rotation of both the head 51 and the carrier 27.

Since the crank arm 32 is continually revolved by means of the horizontal shaft 31 gear driven directly from the shaft 26, the rod 33 is reciprocated vertically to in turn, through the intermediate members, lower and raise the head 51. The vertical reciprocation of the head 51 is timed so that as soon as the bottle 13 is brought onto the carrier, the head 51 is lowered to perform the capping operation and then raised to clear the bottle by the time the bottle has been carried around by the carrier 27 to bring the bottle into contact with the stop finger 74, from which position the bottle may be removed by hand or by a conveyor (not shown). On the up stroke of the head 51, a cap 59 discharges from the lower end of the tube or chute 63 through the side opening into the cap ring 57 to be ready for the following down stroke. The lower end of the chute 63 is positioned at the proper circumferential location to have the opening into the cap ring 57 arrive at the proper time during its horizontal rotation to receive a cap therein while the head 51 is being raised. Should a cap 59 be in the ring 57 when the opening is presented to the chute end, a cap from the chute cannot enter by reason of the obstruct-

ing cap already there present and the head may continue revolving as before.

Caps are fed down the chute 63 from the hopper 47 on edge and the lower end of the chute 63 is curved around to present the caps 59 to the head 51 right side up in a horizontal plane. Normally the cap at the lower end of the chute 63 bears against the bottom of the groove 62 as it revolves therepast.

Referring now more particularly to the application of the cap 59 to the bottle 13, as the head 51 is lowered with a cap 59 resting in the cap ring 57, the nut 58 passes with considerable clearance over the mouth of the bottle and the cap 59 is brought down to contact the mouth. The cap 59, by continued downward travel of the head 51, is immediately contacted from above by the plunger head 56 which serves to steady the cap and maintain it in a horizontal position over the bottle mouth. As the head 51 continues downward, the spring 54 yields to permit the cap 59 to enter within and be pushed upwardly into the throat ring 55 thereupon, by reason of the tapered wall of the ring 55, the lateral projecting corrugated lip of the cap 59 is pressed vertically downwards to carry the depressions of the lip corrugations around under the bottle mouth lip at which time the head 51 has completed its down travel and starts upwardly.

Now, as the head 51 is withdrawn from over the bottle 13, the spring 54 returns to its normal position forcing the head 56 down to eject the cap 59, now secured on the bottle, from the throat ring 55, and, since the annular lip of the cap 59 has been turned downwardly, the cap ring 57 is carried on up over and above the cap 59 without the shoulder 60 striking the cap. The initial height of the head 51 above the bottle 13 is adjustable by means of varying the position of the collar 43 along the shaft 44 in order that bottles of varying heights may be accommodated thereunder. Also, to provide for slight variations in heights of bottles, and to prevent breakage, the rod 33 yieldingly pushes the tube 37 through the spring 35 which is sufficiently strong to position the cap 59 on the bottle normally before the rivet 39 reaches the upper end of the slots 40 and 41 to positively force the tube 37 upwardly.

It is to be seen from the foregoing description of the structure and operation of my invention that I have provided a single rotary bottle capper wherein the bottles are capped one at a time while in motion from the filling machine. By the close proximity of my capper to the filling machine, which is permitted because of its unique construction, I prevent the heretofore loss of carbonic gas from carbonated beverages, the loss of heat from canned goods such as catsup and the like, or the entrance of bacteria from the air, to a degree not attainable where the bottles or containers must be carried to an independently operated capper removed from the filling machine.

While I have here shown and described my invention in the one form as now best known to me, it is obvious that many structured changes may be made therefrom without departing from the spirit of the invention, and I, therefore, do not desire to be limited to that form, nor any more than may be required by the following claims.

I claim:

1. In a bottle capping unit, a horizontally rotatable bottle carrier, a horizontally rotatable capping head, a driving gear, gear means between said driving gear, said carrier and said head causing said carrier and head to be revolved simultaneously at the same speed upon rotation of the driving gear, a rock shaft operated from said driving gear for lowering and raising said head once during each revolution of the carrier, said head have a vertical bore eccentric of the head axis, a throat ring carried in the bore, a cap ring below the throat ring, and a plunger head normally projecting into the throat ring, said cap ring having a part of one side removed to permit caps to be moved horizontally therethrough, a shoulder within the cap ring normally supporting a cap, and a cap supply chute having its lower end fixed and abutting against the circumferential side of the said head, said head having an opening registering with the opening into said cap ring and adapted to register with the end of said chute.

2. In a bottle capping unit, a single rotatable bottle carrier, a single capping head revolvably mounted on a common axis above said carrier, gear means for revolving in unison said carrier and said head each about its individual axis, a head raising and lowering rod, means for actuating said rod upon rotation of said carrier, and a capping plunger in said head mounted in a bore therein eccentric of the head axis.

3. In a bottle capping unit adapted to be attached to a bottle filling machine having a horizontally rotatable table and a ring gear about the table, a single capping head, a shaft carrying the head, a head gear, said shaft being axially slidable through but rotatably fixed to said gear, a single bottle carrier rotatably mounted to revolve about its own axis under said head, gear means between said ring gear, said head gear and said bottle carrier to rotate said head and said carrier in unison each about its own axis, a rod vertically reciprocable by said gear means, and lever means interconnecting said rod and said head shaft.

4. In a bottle capping unit adapted to be attached to a bottle filling machine having a horizontally rotatable table and a ring gear about the table, a single capping head, a shaft carrying the head, a head gear, said shaft

being axially slidable through but rotatably fixed to said gear, a single bottle carrier rotatably mounted to revolve about its own axis under said head, gear means between said ring gear, said head gear and said bottle carrier to rotate said head and said carrier in unison each about its own axis, a rod vertically reciprocable by said gear means, and lever means interconnecting said rod and said head shaft, and a collar adjustably carried on said head shaft receiving said lever means.

5. In a bottle capping unit adapted to be attached to a bottle filling machine having a horizontally rotatable table and a ring gear about the table, a single capping head, a shaft carrying the head, a head gear, said shaft being axially slidable through but rotatably fixed to said gear, a single bottle carrier rotatably mounted to revolve about its own axis under said head, gear means between said ring gear, said head gear and said bottle carrier to rotate said head and said carrier in unison each about its own axis, a rod vertically reciprocable by said gear means, and lever means interconnecting said rod and said head shaft, said rod being yieldingly retractible in length.

In testimony whereof I affix my signature.

JOHN J. GAYNOR.