Nov. 15, 1927. 1,649,266

O. N. TEVANDER

BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925 8 Sheets-Sheet 1

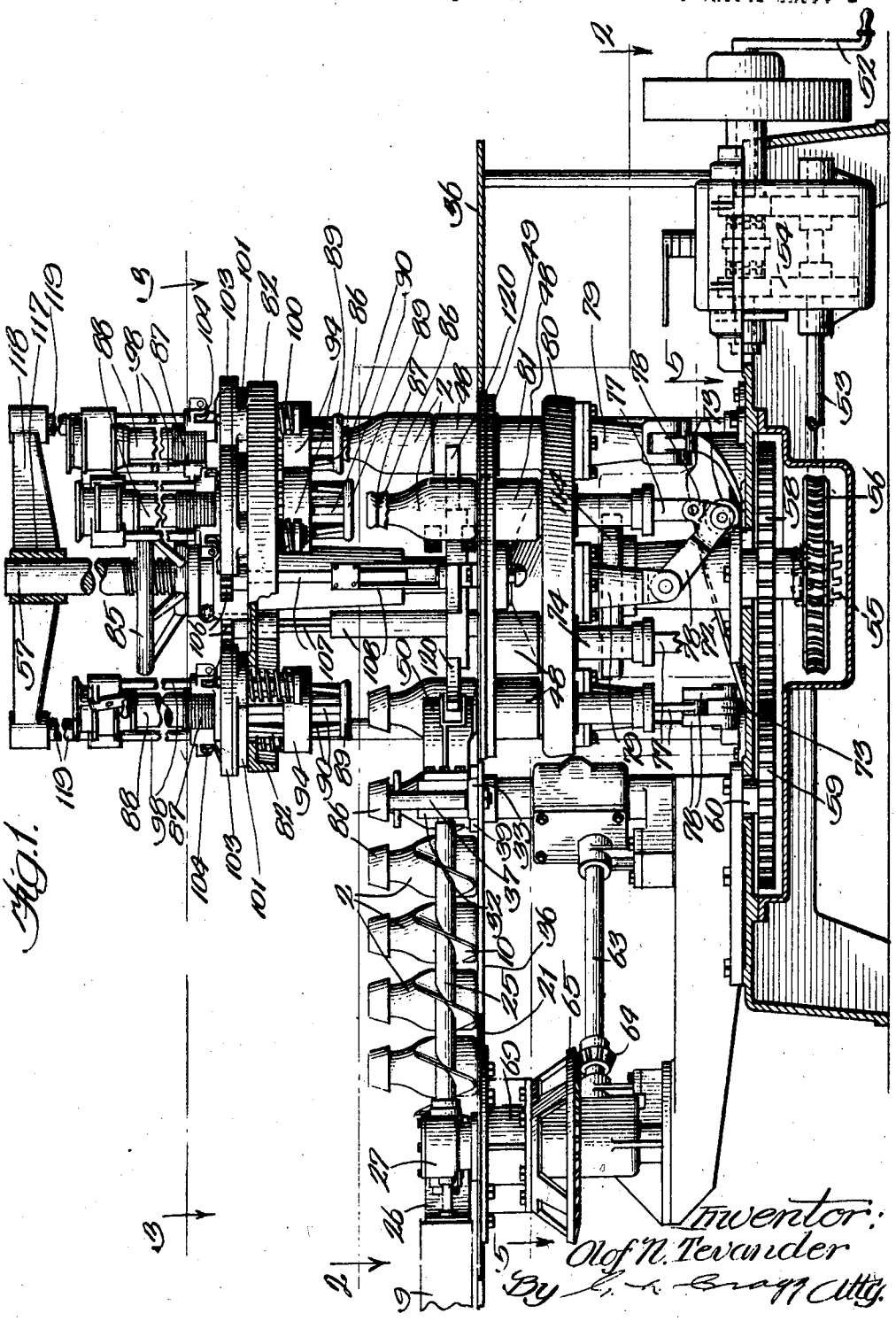

Fig. 1.

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Olof N. Tevander
By E. A. Gragg Atty.

Nov. 15, 1927.

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BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925

8 Sheets-Sheet 2

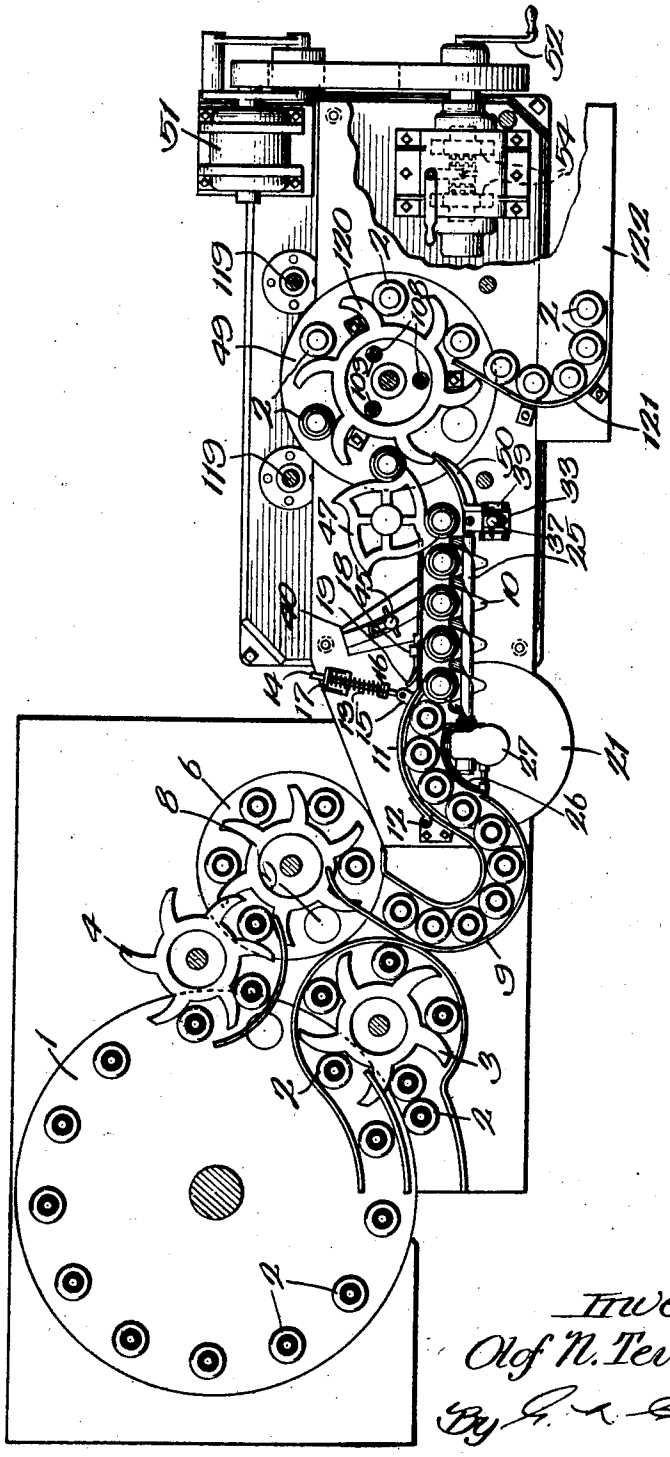

Fig. 2.

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Nov. 15, 1927.

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BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925

8 Sheets-Sheet 3

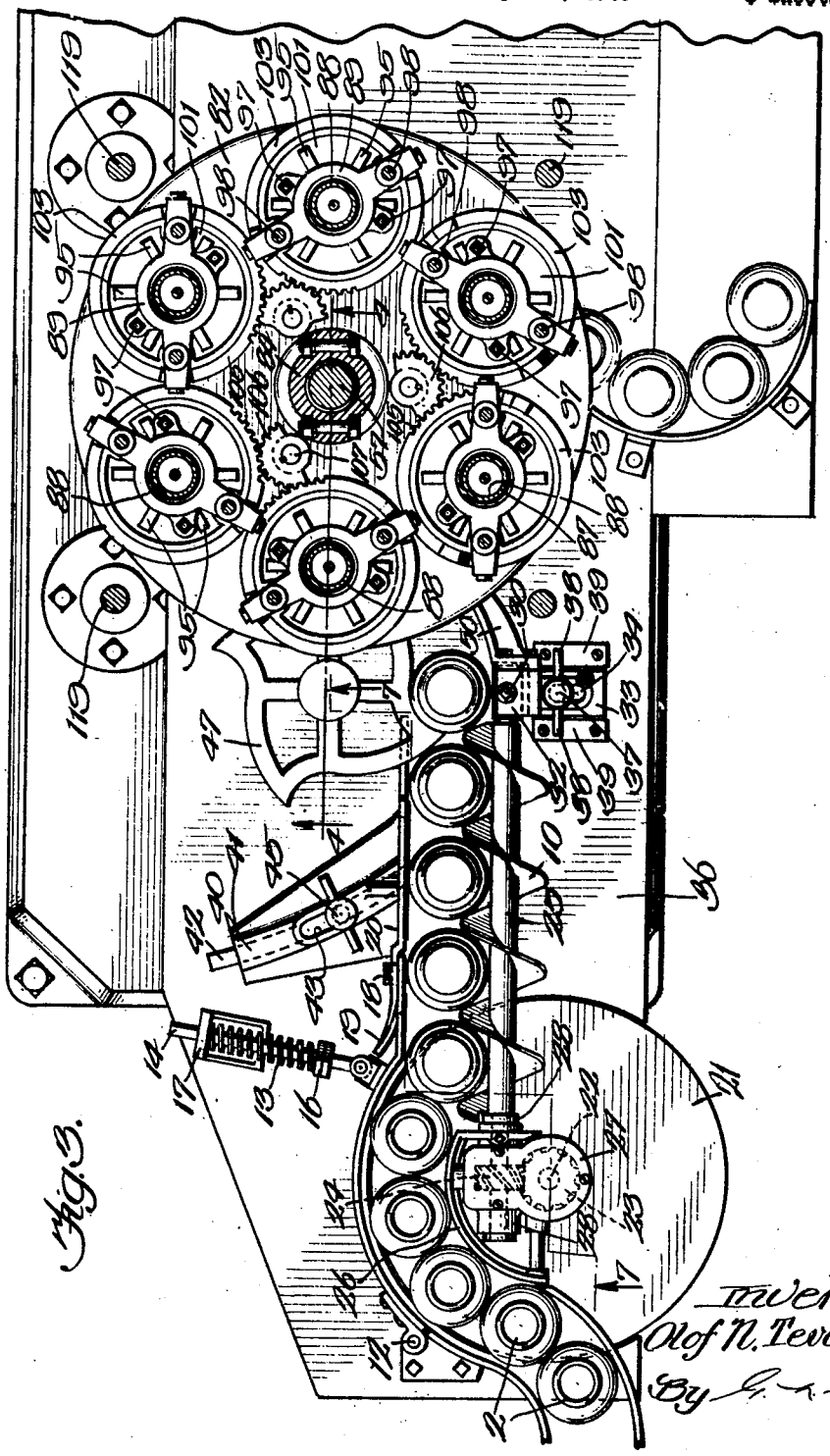

Fig. 3.

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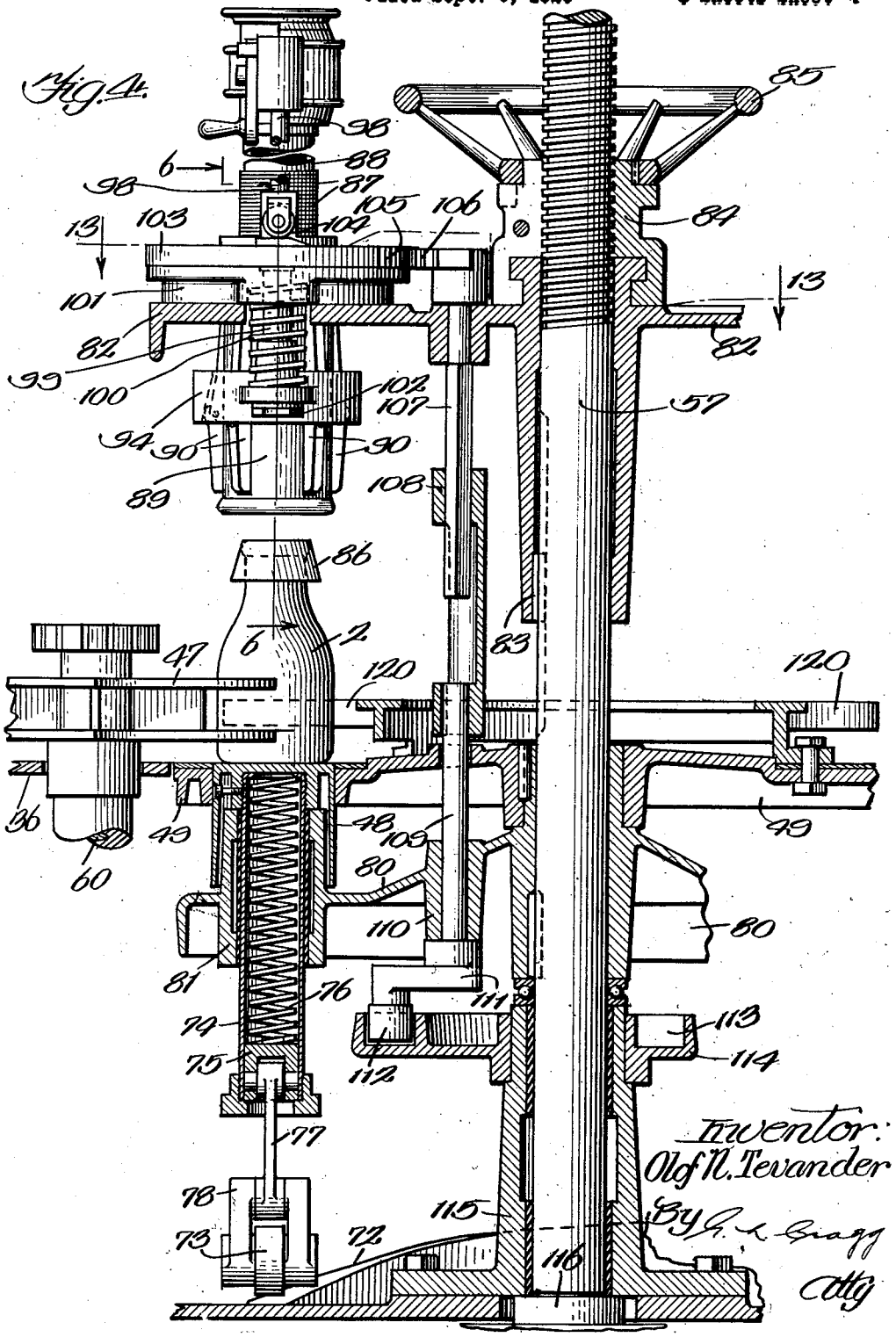
BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925 8 Sheets-Sheet 4



Nov. 15, 1927. 1,649,266

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BOTTLE CAPPING MACHINE

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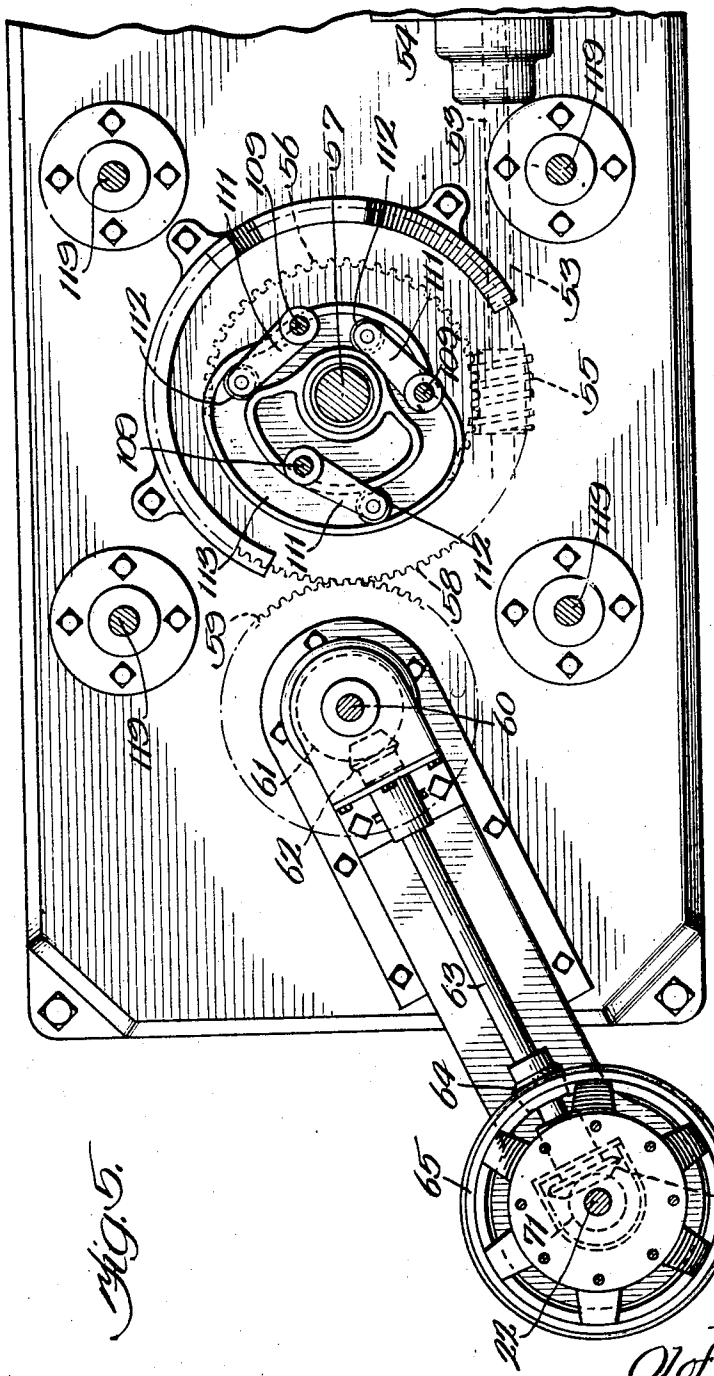

Fig. 5.

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BOTTLE CAPPING MACHINE

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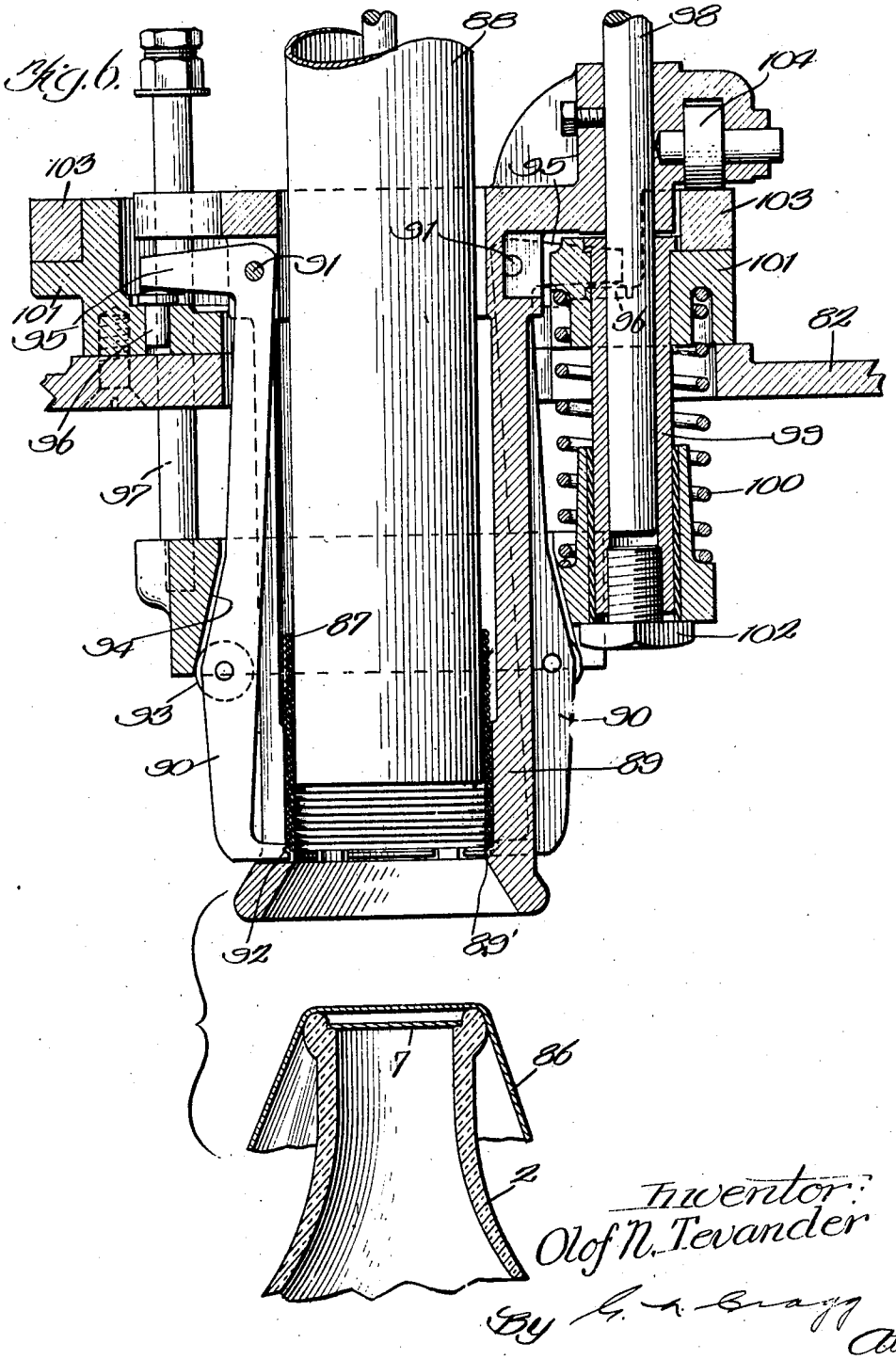
Fig. 6.



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BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925 8 Sheets-Sheet 7

Fig. 7.

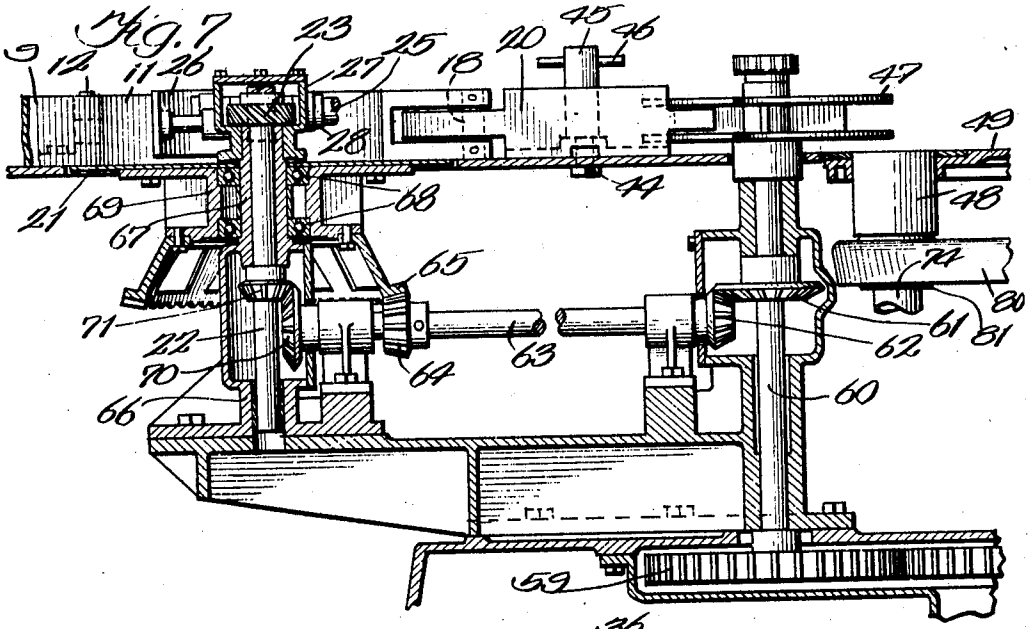


Fig. 8.

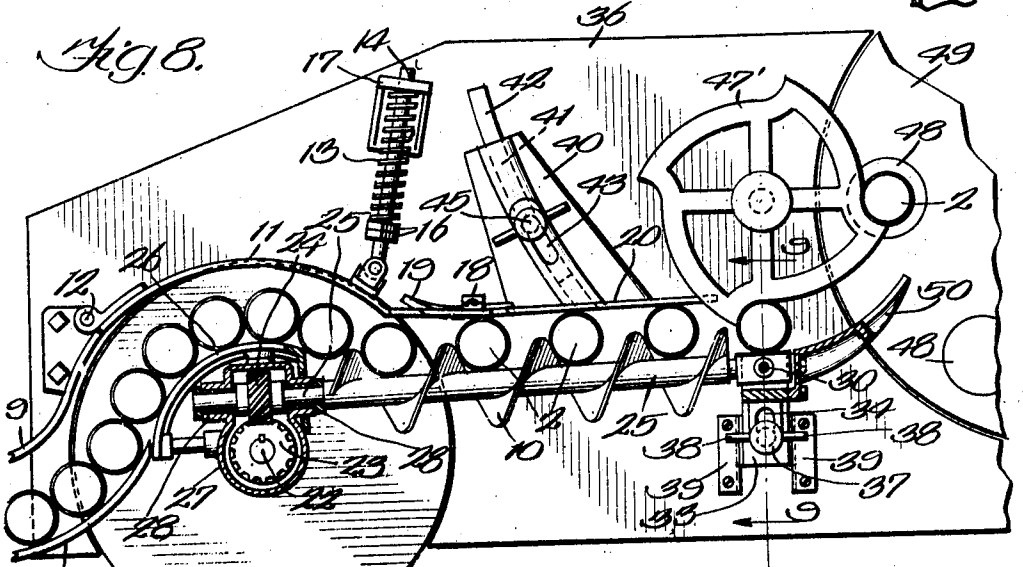
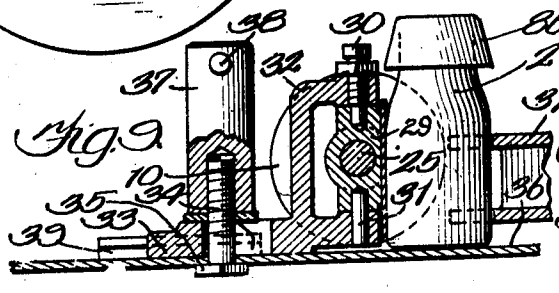


Fig. 9.



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BOTTLE CAPPING MACHINE

Filed Sept. 3, 1925 8 Sheets-Sheet 8

Fig. 10.

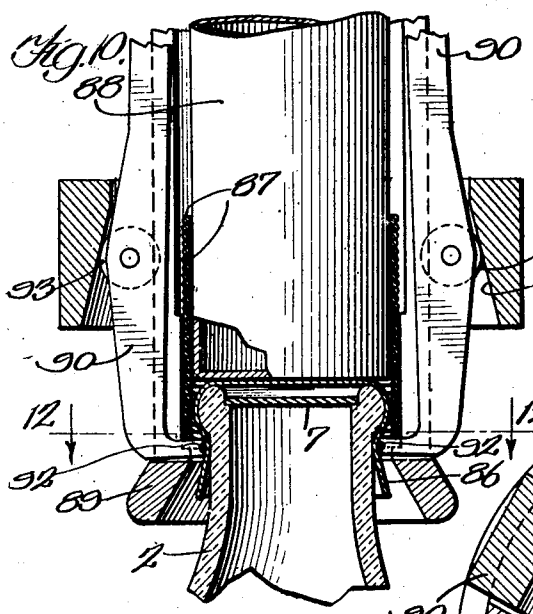


Fig. 11.

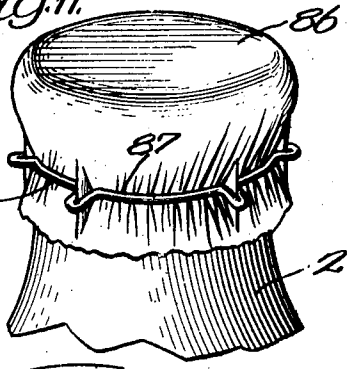


Fig. 12.

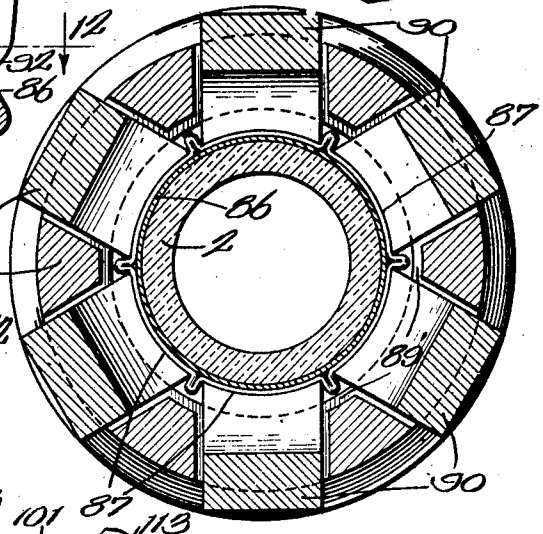
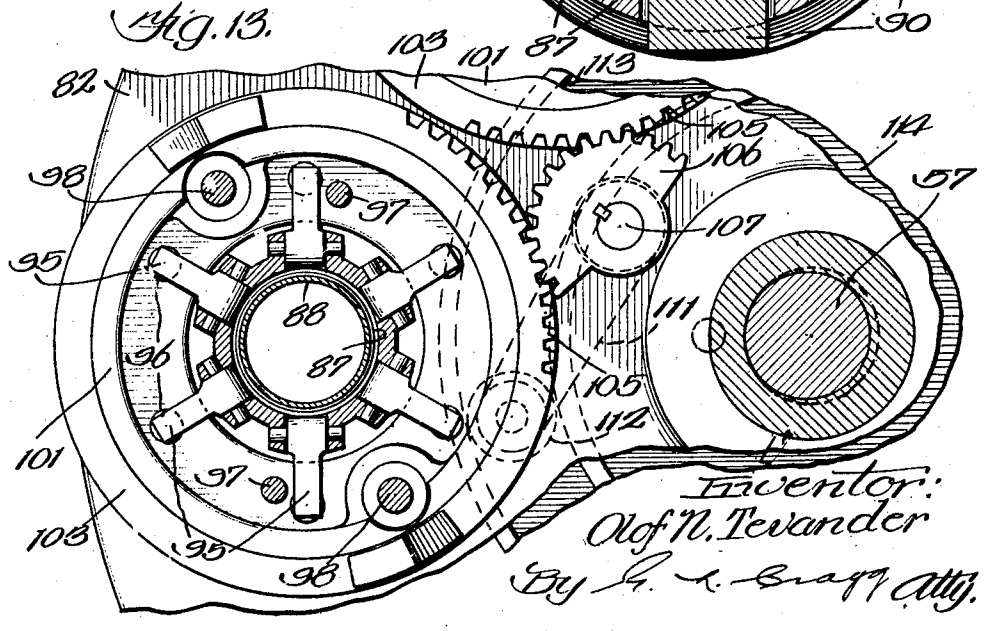


Fig. 13.



Inventor:
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By G. L. Bragg Atty.

Patented Nov. 15, 1927. 1,649,266

UNITED STATES PATENT OFFICE.

OLOF N. TEVANDER, OF CHICAGO, ILLINOIS, ASSIGNOR TO STANDARD CAP & SEAL CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF VIRGINIA.

BOTTLE-CAPPING MACHINE.

Application filed September 3, 1925. Serial No. 54,283.

My invention relates to bottle capping machines and has a number of objects and advantages in view.

The caps which are desirably applied to the bottles are inclusive of skirts which surround the bottle necks. In order that these caps may be applied to the bottle necks 2, nonresilient metallic bands are placed about the skirts of the bottle caps and are then contracted or crimped at intervals to closely apply the skirts of the caps to the bottle necks.

The capping mechanism is inclusive of ring contracting jaws, a cam for governing the positions of the ring crimping or contracting ends of said jaws, and a cam for defining the relative positions of the aforesaid cam and the jaws.

In the preferred embodiment of the invention there is a set of jaws and cooperative parts for each bottle and located vertically in line with the adjustable table section that carries such bottle. Other cam mechanism is employed for elevating the adjustable table sections and the bottles thereon into cooperative relation with the ring crimping jaws and parts complemental to these jaws. The bottles are desirably capped in succession though the invention need not be thus restricted. The construction is desirably such that when the bottles are raised, they elevate the ring crimping jaws pertaining thereto, to move these jaws in relation to the cam that is to operate upon the jaws to crimp the rings. There is a carrier for the jaws upon which the jaws are pivoted and there is also provided a magazine for the rings between the jaws that is in line with the bottle to be capped. This magazine and the jaw carrier are desirably relatively fixed and both are movable upwardly by the bottle with relation to the jaw contracting cam in order that the bottle may cause the jaws to contract or crimp the ring.

The invention will be more fully explained in connection with the accompanying drawings in which Fig. 1 is a front elevation with parts shown in section; Fig. 2 is a sectional plan view on line 2—2 of Fig. 1 with other mechanism supplied thereto, as will appear; Fig. 3 is a sectional plan view on line 3—3 of Fig. 1; Fig. 4 is a sectional elevation on line 4—4 of Fig. 3; Fig. 5 is a sectional plan view on line 5—5 of Fig. 1; Fig. 6 is a sectional elevation on line 6—6 of Fig. 4, on a larger scale; Fig. 7 is a sectional elevation on line 7—7 of Fig. 3; Fig. 8 shows a part of the machine as it appears in Fig. 3 but with the conveyor channel for the bottles adjusted to a smaller size and with a larger bottle adjusting star wheel for removing the bottles from the feeding channel; Fig. 9 is a sectional elevation on line 9—9 of Fig. 8; Fig. 10 is a view showing part of the structure appearing in Fig. 6 to illustrate changed positions of the jaws and cooperating parts; Fig. 11 is a perspective view of the upper portion of a bottle after it has been capped; Fig. 12 is a sectional view on line 12—12 of Fig. 10; and Fig. 13 is a sectional plan view on line 13—13 of Fig. 4.

Reference will be first made to Fig. 2 in which I have illustrated a rotatable table 1 of disc form upon which bottles 2 are placed in empty condition, this table desirably forming a part of a bottle filling mechanism which constitutes no essential part of my invention. The empty bottles are placed upon the peripheral portion of the table by means of a suitably operated empty bottle advancing star wheel 3. After the bottles are filled, they are removed from the table 1 by means of another star wheel 4 and are placed by this star wheel 4 upon the sections 5 of another table 6. This table 6 is desirably a part of mechanism that is employed for inserting disc-like caps or closures 7 in the bottle mouths, the table sections 5 being elevated to place the bottles in position to receive these caps. This closure applying mechanism also forms no essential part of my present invention.

A suitably operated star wheel 8 transfers the bottles having the disc-like caps therein from the table 6 to a chute or channel way 9 and forces these bottles to travel through this chute or channel way. The discharge section of the chute or channel way 9 has one side composed of a bottle feeding screw 10 cooperating with the opposite channel wall in defining the channel spaces through which the bottles travel as they pass from the chute. The channel wall is inclusive of a section 11 which will yield

to any bottle that may encounter the crown of the thread of the feeding screw 10 as the bottle is entering engagement with the screw. This channel side 11 is desirably hinged at 12 at one end, and is held in its normal position by means of a buffing spring 13. This spring surrounds a rod 14 that is pivotally connected with a tongue 15 projecting from the wall section 11. The spring bears, at one end, against a nut 16 screwed upon the rod 14 and, at its other end, bears against a stationary abutment 17 through which the rod slides. The front end of the wall section 11 is prevented from being projected into the channel way, by the action of the spring, by means of the stirrup 18, carried by the wall section 11, which embraces the tongue 19 upon the wall section 20 that is in front of the wall section 11. The front end of the wall section 11 is bifurcated to receive said tongue. The base of the stirrup normally engages the tongue and faces outwardly so as not to limit the outward swinging of the wall section 11. The bottles are carried to the feeding screw 10 by means of a rotating disc-like table 21, the portion of the bottle conveying chute adjacent to the receiving end of the feeding screw overlying the table and conforming in curvature thereto.

The table 21 is turned upon the axis of the shaft 22. The shaft carries a worm gear 23 which is in mesh with the worm gear 24 that is fixed upon the shaft 25 of the feeding screw. A housing is provided for the gear elements 23 and 24, this housing being fixed with respect to a section 26 of a chute wall. A complemental portion 27 of the housing is suitably assembled with the portion 26 and carries bearings 28 for the shaft 25 of the feeding screw 10. The feeding screw is capable of bodily swinging movement about the axis of the shaft 22. This screw 10 is provided with means at its discharge end, whereby it may be swung in order to adjust the channel space defined by the screw and the opposite chute wall portions 11 and 20.

As illustrated, the shaft 25 of the screw 10 is journaled in a bearing block 29 which has trunnion connection at 30 and 31 with the sides of a yoke 32, the trunnions being arranged to enable the block 29 to turn upon an upright axis. The base of the yoke 32 is laterally extended as indicated at 33, the base extension of the yoke having a slot 34 therein. A threaded bolt 35 is passed upwardly through the stationary deck 36 into threaded connection with a sleeve 37. This sleeve has a rod 38 passed through its upper end whereby it may be turned with respect to the bolt. When the sleeve is tightened, it clamps the extended base of the yoke 32 against the deck. When it is loosened, it permits the yoke to be moved transversely of the feeding screw in the guide ways 39 to the extent permitted by the slot 34. The bearing block 29 will turn upon its upright axis to permit various adjustments thereof without binding the shaft of the screw 10. The chute walls 11 and 20 are preferably, together, also adjustable toward and from the feeding screw. To this end, the chute wall section 20 has a wing extension 40 formed to provide an arcuate channel 41 that receives an arcuate rib 42 provided upon the deck 36. The top wall of the channel 40 is formed with a slot 43 through which a bolt 44 passes, this bolt passing through the deck 36 and having its head engaged with the deck as does the head of the bolt 35. The bolt 44 is received in the sleeve 45 into which this bolt is screwed. The bottom end of this sleeve bears upon the top wall of the channel 41. The sleeve has a rod 46 passing therethrough in order that it may be readily turned. When the sleeve 45 is loosened, the chute wall sections 11 and 20 may be adjusted for bottles of another size. See Figs. 3 and 8 where the adjustments are for larger bottles and smaller bottles respectively. When these wall sections have been adjusted to selected position, the sleeve is tightened to hold them in such position. The teeth of the star wheel 47, employed for the larger bottles or the teeth of the star wheel 47′, employed for the smaller bottles, serve to continue the travel of the bottles as they leave the feeding screw and to direct the same individually onto the vertically adjustable sections 48 of a disc-like table 49. The table sections 48 are elevated and lowered in the manner hereinafter described. The yoke 32 carries an arcuate arm 50, substantially concentric with the star wheel 47 or 47′ and cooperating with the periphery of such wheel to define the final portion of the channel through which the bottles are passed onto the table sections 48. Because of the adjustability of the feeding screw 10 and chute wall sections 11 and 20, the bottles are brought into proper relation with the pitch circle of the employed star wheel 47 or 47′.

Any suitable mechanism may be employed for operating the various operating elements that are located above the deck 36. In the embodiment of the invention illustrated, an electric motor 51 or a hand crank 52 may be employed for operating a main drive shaft 53. Power is transmitted to this drive shaft at adjustable speed through the intermediation of any suitable speed changing gearing 54. The shaft 53 has a worm 55 thereon which is in mesh with a worm wheel 56. This worm wheel is fixed upon a shaft 57 on which there are also fixed the spur gear 58 and the table 49. This spur gear is in mesh with another spur gear 59 that is fixed upon a shaft 60 upon which shaft is also fixed the star wheel 47. A bevel gear 61

is also fixed upon the shaft 60 and is in mesh with a bevel pinion 62 fixed upon a shaft 63. Another bevel pinion 64 is fixed upon the shaft 63 and is in mesh with a crown gear 65 that is in fixed relation with the table 21. The axis of rotation of the crown gear 65 is defined by the bearings 66 and 67 for the shaft 22, there being roller bearings 68 interposed between the hub 69 of the crown gear 65 and the bearing 67. A bevel gear 70 is fixed upon the shaft 63 and is in mesh with a bevel pinion 71 upon the shaft 22 whereby this shaft and the parts thereon are turned. The housing portion 27 is also journaled upon the bearing 67 so as to be oscillatable as the feeding screw 10 is swung.

All of the bottle supporting tables are constantly turned. While the table 49 is being turned, the sections 48 thereof are gradually elevated from the plane, proper, of the table and gradually restored to this plane, the final capping operation that is to be described occurring when said table sections are in their upper limits of their movements.

I provide a stationary cam track 72 upon which cam rollers 73 travel, to rise and fall. Each table section 48 is assembled with a cam roller so as to rise and fall therewith. As illustrated, each table section 48 is carried at the upper end of a spring barrel 74. A piston 75 is within the lower end of the spring barrel and is normally held in fixed relation therewith by means of a spring 76 which abuts at its lower end upon the piston and at its upper end against the top end wall of the spring barrel. A link 77 connects each piston 75 with one end of a bell crank 78 upon whose elbow the corresponding cam roller is journaled. The other end of this bell crank is pivoted upon arm 79 depending from a bearing support 80 which is fixed upon the shaft 57 and is located below the table 49.

As the shaft 57 turns, the cam rollers move bodily therewith over the cam track 72 to elevate and lower the table sections 48 to enable these table sections to function as will hereinafter appear. As the shaft 57 and the parts thereon turn, the spring barrels 74 rise and fall due to the normally fixed relation of the pistons 75 therewith. These spring barrels are guided in their movement by bearings 81 in the bearing support 80. If, in the final capping operation, the bottles should encounter undue strain, the springs 76 will yield to prevent the bottles from breaking, the pistons 75 then rising in the spring barrels.

A support 82 is in normally fixed relation with the shaft 57. This support has splined connection with the shaft 57 as indicated at 83 whereby it may be permitted movement lengthwise of the shaft. A large split nut 84 is screwed upon the upper end of the shaft 57 and has tongue and groove connection with the support 82 so that this support may be elevated and lowered along the shaft. A hand wheel 85 is provided upon the nut 84 to facilitate the turning thereof. The support 82 is provided for the balance of the mechanism, complemental to the table sections 48 and the mechanism that operates these table sections, employed for applying the skirted caps 86 to the bottles. These caps 86 are fastened upon the bottles by means of the non-resilient metallic rings 87 which are supplied from the magazine 88, there being one magazine individual to each table section 48 and in vertical alinement therewith. Each magazine is in the form of a tube surrounded by the rings and from which the rings drop in a manner to have them applied singly to the bottles.

Each magazine 88 is in fixed relation with a jaw carrier 89 individually thereto. Jaws 90 are pivoted at their upper ends at 91 upon the jaw carrier. The lower ends of the jaws are formed with ring receiving spaces 92 in which the lowermost ring that has left the magazine is to be held in readiness for application to the skirt of the bottle cap that is about to be applied to the alined bottle. When each table section 48 has been raised to its upper limit, the corresponding bottle, with a cap thereon, has been received within the bore of the jaw carrier 89, the bottle having caused, in the completion of its upper movement, the complete upper movement of magazine 88 and the jaw carrier 89 moving with this magazine. When the bottle or the cap thereon engages the bottom of the magazine, it and the cap thereon are in proper position with respect to the jaws 90 to have the ring in the jaw recesses 92 applied to the cap. As the magazine and the jaw carrier are moved upwardly together following the initial engaging of the bottle cap with the magazine, the cam rollers 93 ride upwardly upon the normally stationary cam 94 whereby the roller ends of the jaws are moved inwardly to crimp the ring about the cap and assemble it with the cap as illustrated in Fig. 11. When this operation has been performed, the bottle is lowered to permit the magazine and the jaw carrier to be lowered of their own weight, the angular extensions 95 of the jaws 90 engaging the abutments 96 to swing the lower ends of the jaws outwardly to remove the ring engaging ends of the jaws out of the path of downward movement of the rim of the bottle.

The normally stationary cam 94 is provided with guiding rods 97 that themselves are guided in their movement by being in snug sliding fit within openings provided in the bearing support 82. The rods 98 are fixed upon the jaw carrier 89 and pass through sleeves 99 which are carried upon the support 82. Springs 100 intervene be-

tween the cam 94 and the block 101 that constitutes the means through which the sleeves 99 are held by the support 82. These springs 100 serve normally to fix the cam 94 with respect to the support 82. The downward movement of the cam is limited by the heads of bolts 102 which are screwed into the lower ends of the sleeves 99. If any unusual strain should be imposed upon the cam, the springs 100 would yield.

In preparing for the next ring applying operation, the lower ends of the jaws 90 are brought into engaging and holding position for the lowermost ring below the magazine, such lowermost ring resting upon shoulder 89′ of the jaw carrier which positions this ring in the zone of the jaw formations 92. To this end I employ an annular cam track 103 which is co-axial with the magazine and upon which cam rollers 104 turn, these cam rollers being carried upon the jaw carrier 89. Each cam track 103 is oscillated to bring the jaws 90 into light holding engagement with the lowermost ring, as described, and to move the jaws outwardly from this position, after the ring crimping operation to permit a new ring to drop into place by the ensuing capping operation. To this end each cam track 103 is provided with a segmental gear 105 which is oscillated by a segmental pinion 106.

As illustrated, one segmental gear 106 may be in cooperating relation with two segmental gears 105. Each segmental gear 106 is fixed upon a square shaft 107 which slides within a bearing 108, this shaft and this bearing, however, turning together. Each bearing 108 is carried upon the upper end of a shaft 109. Each shaft 109 is mounted to turn in a bearing 110 in the bearing support 80. The lower end of the bearing support 109 carries a crank 111. A cam roller 112 is mounted upon the outer end of each crank. These cam rollers travel in a cam groove 113 formed in the stationary cam element 114. The shafts 109 are oscillated by the cam element 114 as the shafts turn bodily about the shaft 57. The shafts 107, being journaled upon the support 82 and being driven upon the shafts 109, also turn with the shaft 57 so that the properly timed movement of the cams 103 occur as the apparatus is operating. Any suitable means may be employed for journaling the shaft 57. I have illustrated a sleeve bearing 115 and a step bearing 116 at the lower end of the shaft and a sleeve bearing 117 at the upper end of the shaft, this sleeve bearing being carried by a stationary spider 118 which is carried upon the rods 119, supported in the bed of the machine.

After the bottles have been capped, they are discharged from the table 49 by the star wheel 120 which is fixed with respect to the shaft 57. The bottles are directed from the table 49 by means of a chute 121 onto an extension 122 of the deck 36.

The chute structure herein disclosed forms subject matter of my copending application, Serial No. 84,060, filed June 27, 1926.

Changes may be made without departing from my invention.

Having thus described my invention, I claim:

1. A bottle capping machine including a movable magazine for holding rings and formed to permit rings to drop therefrom; a jaw carrier surrounding and assembled with said magazine and mounted to be movable therewith, this jaw carrier being formed to catch and position a ring falling from the magazine; a plurality of jaws mounted upon the jaw carrier and having ring holding formations in the zone in which the ring is positioned; a cam surrounding said jaw carrier and in contracting relation to said jaws to cause the jaws initially to hold the ring positioned upon the jaw carrier and thereafter to contract this ring; mechanism for causing initial movement of the jaws with respect to the cam to initially hold a ring; a rotatable support for the bottle being capped; a cam track on which said support rides and serving to elevate the support to bring the bottle neck into the lowermost ring and to cause elevation of the magazine and jaw carrier with reference to the cam to effect contraction of the jaws; and cam mechanism in operating relation to the mechanism that causes the initial movement of the jaws and including an element traveling with the bottle support.

2. A bottle capping machine including a movable magazine for holding rings and formed to permit rings to drop therefrom; a jaw carrier surrounding and assembled with said magazine and mounted to be movable therewith, this jaw carrier being formed to catch and position a ring falling from the magazine; a plurality of jaws mounted upon the jaw carrier and having ring holding formations in the zone in which the ring is positioned; a cam in contracting relation to said jaws to cause the jaws initially to hold the ring positioned upon the jaw carrier and thereafter to contract this ring; mechanism for causing initial movement of the jaws with respect to the cam to initially hold a ring; a rotatable support for the bottle being capped; a cam track on which said support rides and serving to elevate the support to bring the bottle neck into the lowermost ring and to cause elevation of the magazine and jaw carrier with reference to the cam to effect contraction of the jaws; and cam mechanism in operating relation to the mechanism that causes initial movement of the jaws and including an element traveling with the bottle support.

3. A bottle capping machine including a

movable magazine for holding rings and formed to permit rings to drop therefrom; a jaw carrier surrounding and assembled with said magazine and mounted to be movable therewith, this jaw carrier being formed to catch and position a ring falling from the magazine; a plurality of jaws mounted upon the jaw carrier and having ring holding formations in the zone in which the ring is positioned; mechanism for initially contracting said jaws to initially hold a ring and to further contract the jaws to contract the ring; a rotatable support for the bottle being capped; a cam track on which said support rides and serving to elevate the support to bring the neck of the supported bottle into a ring and in operating relation to the mechanism that causes the initial movement of the jaws and operating in conjunction with the bottle to actuate the jaw contracting mechanism; and cam mechanism in operating relation to the mechanism that causes initial movement of the jaws and including an element traveling with the bottle support.

4. A bottle capping machine including a jaw carrier formed to catch and position a ring; a plurality of jaws mounted upon the jaw carrier and having ring holding formations in the zone in which the ring is positioned; a cam surrounding said jaw carrier and in contracting relation to said jaws to cause the jaws initially to hold the ring positioned upon the jaw carrier and thereafter to contract the ring; a rotatable support for the bottle being capped; a cam track on which said support rides and serving to elevate the support to bring the neck of the supported bottle into a ring and operating in conjunction with the bottle to actuate the jaw contracting mechanism; mechanism for effecting relative movement of the jaws and cam to initially hold the ring; and cam mechanism in operating relation to the mechanism that causes initial movement of the jaws and including an element traveling with the bottle support.

5. A bottle capping machine including a movable magazine for holding rings and formed to permit rings to drop therefrom; mechanism for contracting the rings and inclusive of ring contracting jaws, a carrier for the jaws assembled with the magazine to be movable therewith, and a cam in contracting relation to the jaws and engaged by the jaws when the magazine and jaw carrier are moved; a rotatable support for the bottle being capped; and a cam track on which said support rides and serving to elevate the support to bring the bottle neck into the lowermost ring and into actuating relation with the jaw contracting mechanism.

In witness whereof, I hereunto subscribe my name.

OLOF N. TEVANDER.