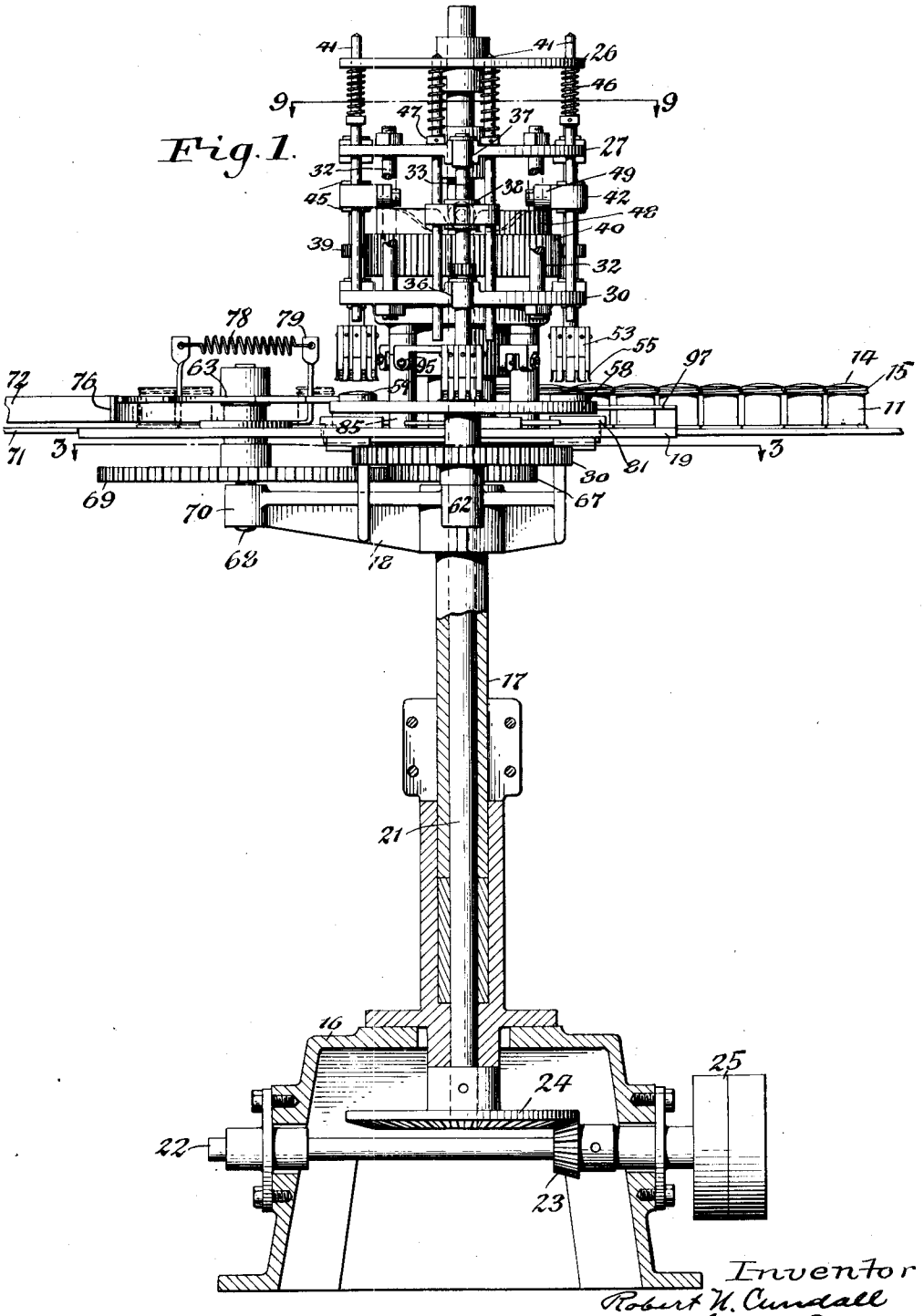
April 15, 1930. R. N. CUNDALL 1,754,461

BOTTLE CAPPING MACHINE

Filed July 25, 1922 5 Sheets-Sheet 1

Fig. 1.



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BOTTLE CAPPING MACHINE

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Fig. 2.

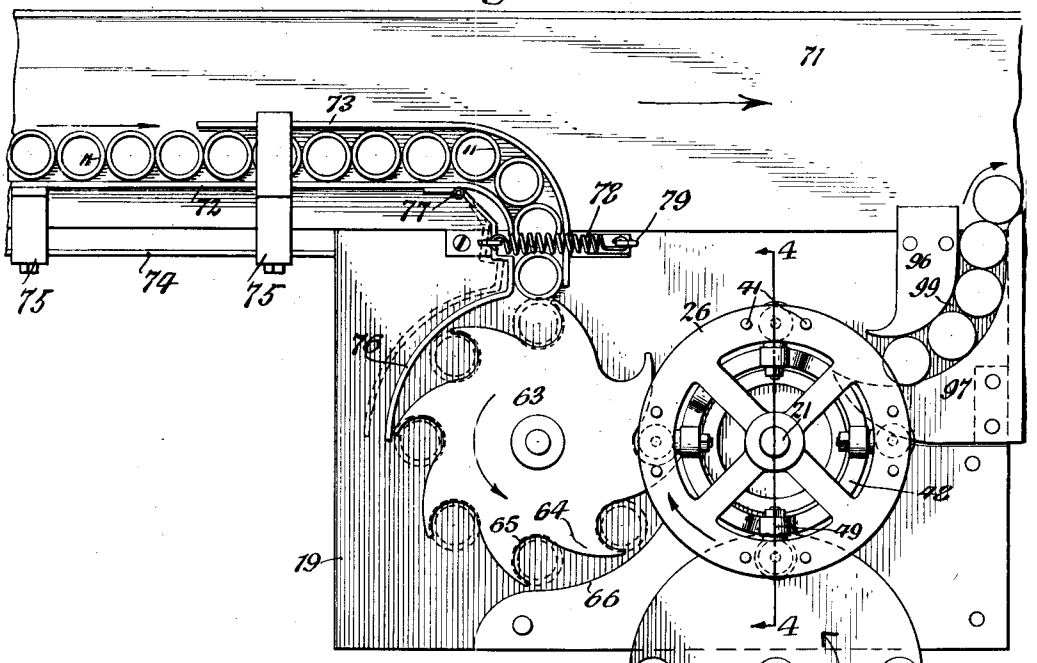
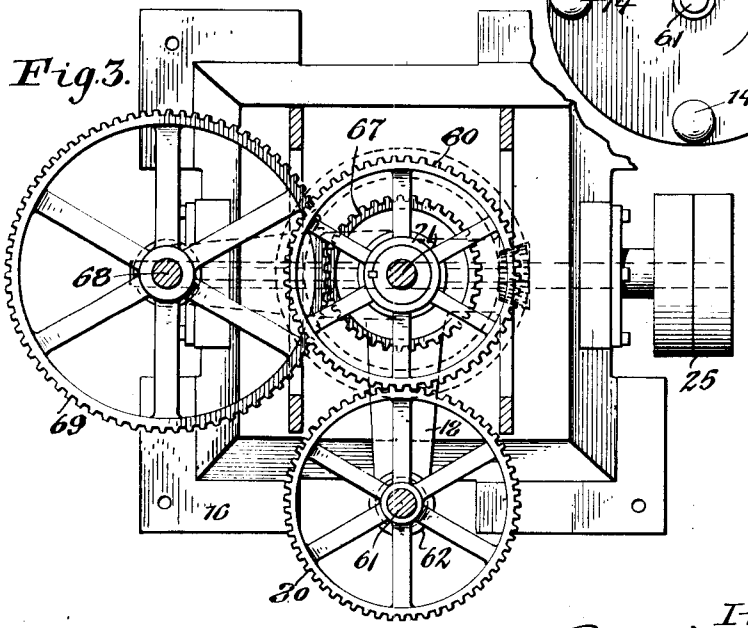


Fig. 3.



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BOTTLE CAPPING MACHINE

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Fig. 4.

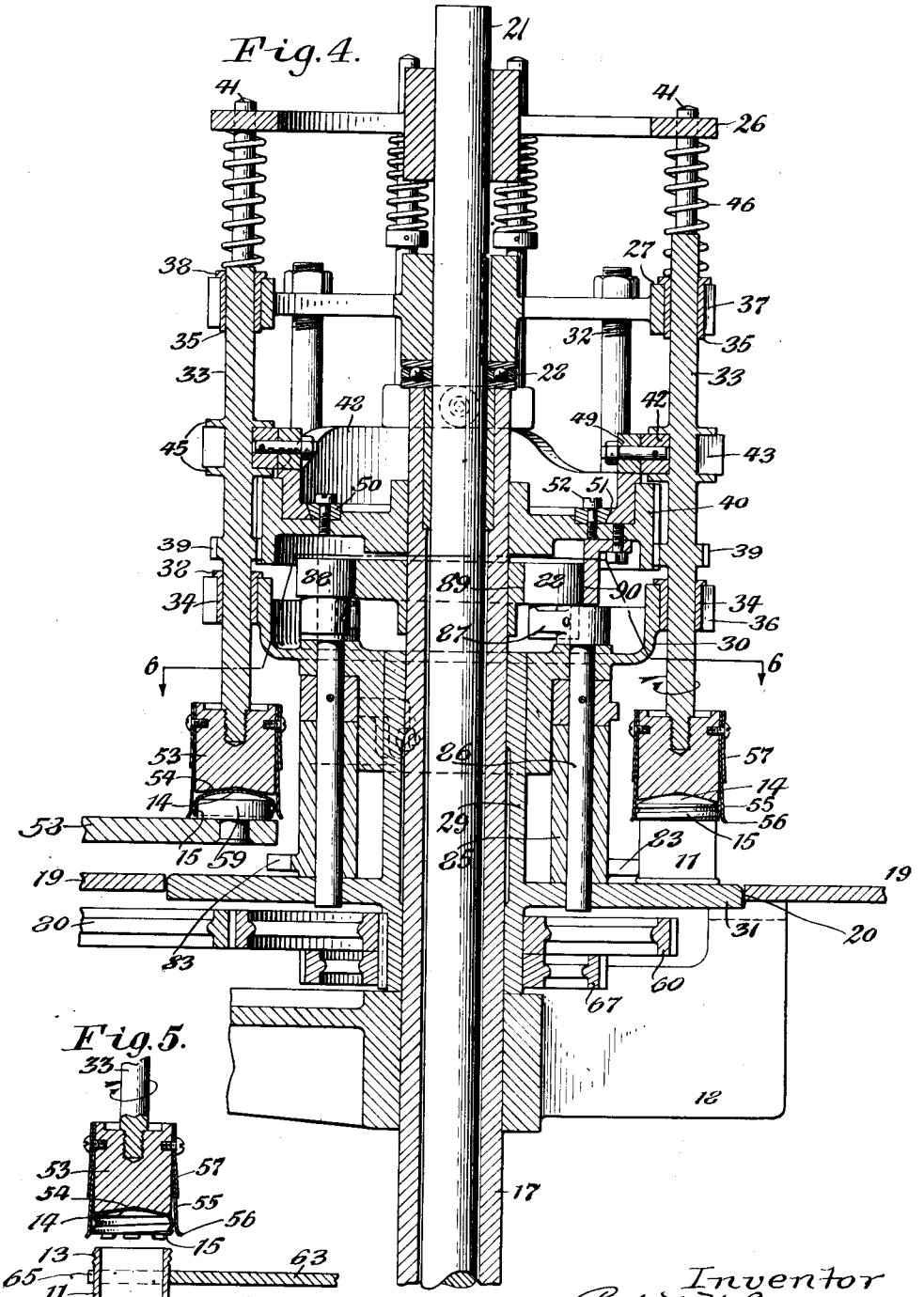


Fig. 5.

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BOTTLE CAPPING MACHINE

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Fig.6.

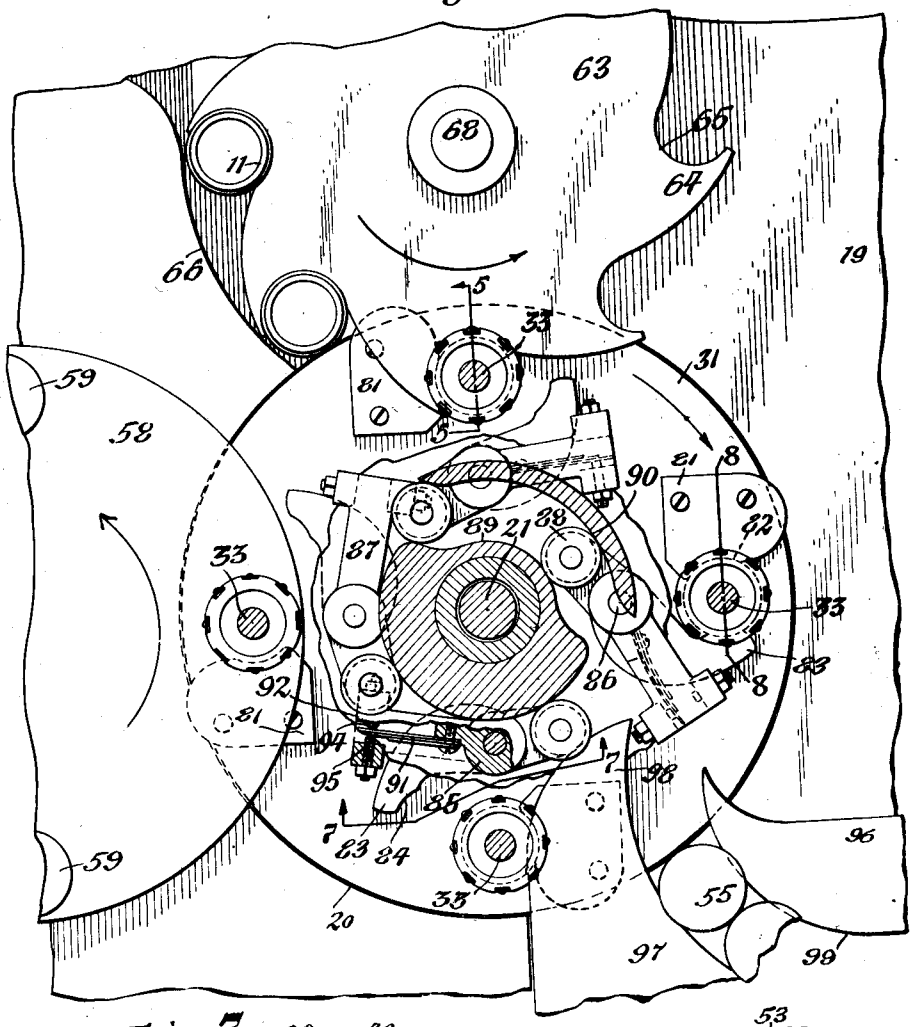
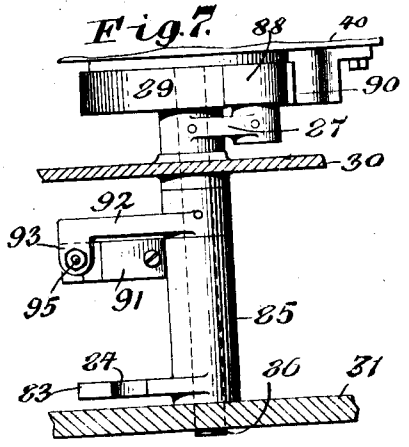


Fig.7.



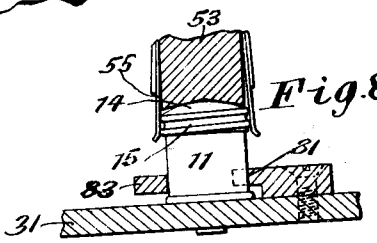


Fig.8.

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BOTTLE CAPPING MACHINE

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Fig. 9.

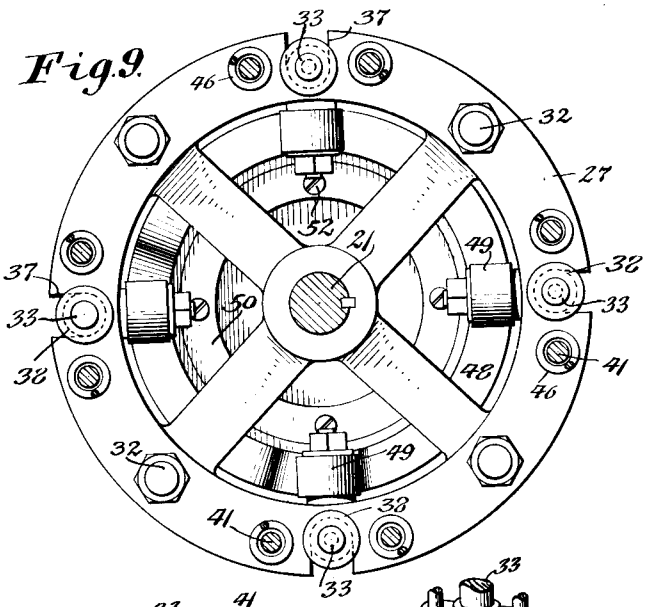
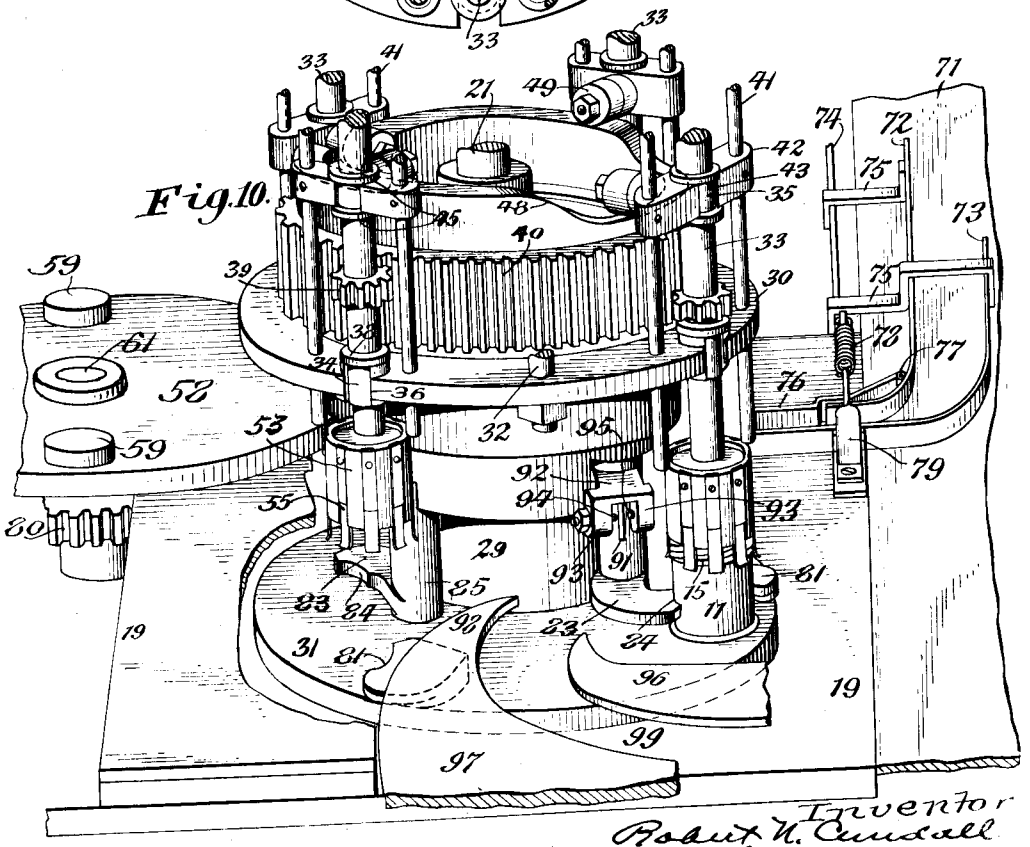


Fig. 10.



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1,754,461

UNITED STATES PATENT OFFICE

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BOTTLE-CAPPING MACHINE

Application filed July 25, 1922. Serial No. 577,418.

This invention relates to a machine for applying caps or covers to bottles or jars, such for instance as the glass or porcelain bottles or jars to which metal caps are connected by screw joints or the like and adapted to receive foods, salves, cosmetics or similar goods or products which are packed for the trade.

It is the object of this invention to produce a machine for assembling the caps and bottles or jars of this character which is efficient and reliable in operation, comparatively simple and durable in construction and capable of a large output so that the cost of doing this work is materially reduced.

In the accompanying drawings:

Figure 1 is a side elevation, partly in section, of a capping machine embodying my invention. Figure 2 is a top plan view of the same. Figure 3 is a horizontal section, taken on line 3—3, Fig. 1. Figure 4 is a fragmentary vertical section of the machine, on an enlarged scale, taken on line 4—4, Fig. 2. Figure 5 is a fragmentary vertical section taken on line 5—5, Fig. 6. Figure 6 is a horizontal section taken on line 6—6, Fig. 4. Figures 7 and 8 are fragmentary vertical sections taken on the correspondingly numbered lines in Fig. 6. Figure 9 is a horizontal section, on an enlarged scale, taken on line 9—9, Fig. 1. Figure 10 is a fragmentary perspective view of the upper part of the machine.

Similar characters of reference refer to like parts throughout the several views.

Although this machine may be organized for assembling jars or bottles and caps or covers which may be constructed of various materials and which are designed for various uses, the machine shown in the drawings, for example, is more particularly adapted for assembling bottles or jars of glass or porcelain with caps which are made of sheet metal, each of these jars have a cylindrical wall 11, a flat bottom 12 arranged at the lower end of the cylindrical wall and an external screw thread 13 arranged at the upper end of the wall, and a cap having a convex crown 14 and an internally threaded flange 15 which is adapted to be screwed upon the external thread of the bottle for closing the upper end of the same and confine the contents of the material which is packed therein, such for instance as the well known cosmetic or salve which is being marketed under the name "Mentholatum".

In its general organization this machine comprises means for supplying bottles or jars which are to be capped, an assembling mechanism for screwing the caps upon the jars or bottles, means for transferring the bottles from the supply means to the assembling mechanism, means for feeding the caps to the assembling mechanism, and means for discharging the assembled bottles and caps from the assembling mechanism.

The main frame of this machine may be of any suitable character to support the various working parts, but in the form shown in the drawings the same comprises a base 16, a hollow column 17 rising from the base and a bracket 18 secured to this column between its upper and lower ends. Upon this bracket is mounted a horizontal stationary table 19 which is provided centrally with a circular opening 20 for a purpose which will presently appear.

Within the hollow column, is arranged an upright main or master shaft 21 which is journaled in suitable bearings therein and rotated by any suitable mechanism, for instance as shown in the drawings, by means of a horizontal driving shaft 22 journaled in suitable bearings on the base and provided with a bevel pinion 23 which meshes with a bevel gear wheel 24 on the lower end of the master shaft, and a pulley 25 arranged on the driving shaft and adapted to receive a power driven belt.

Upon the upper end of the master shaft 21 is arranged an upper head 26 and below this upper head the same is provided with an intermediate head 27 which heads are of circular form and secured to the shaft so as to be compelled to turn therewith, but held against vertical movement thereon. A thrust bearing 28 is preferably interposed between the hub of the intermediate head and the upper end of the supporting column for the purpose of sustaining the weight of this shaft and the parts connected therewith. Immediately above the bracket 18 is arranged an up-

right tubular shaft 29 which is journaled on the periphery of the column and provided at its upper end with a lower head 30 of substantially circular form and on its lower part with a rotatable table 31 of disk shaped form arranged within the opening 20 of the stationary table and having a flat upper surface which is flush with the upper surface of the stationary table, as best shown in Fig. 4. The intermediate and lower heads are connected by means of a plurality of upright coupling rods 32 arranged in an annular row around the axis of the master shaft and each secured at its upper end to the marginal part of the intermediate head and the lower head, as best shown in Fig. 1. The upper, intermediate and lower heads 26, 27, 30, the tubular shaft 29 and the rotatable table 31 together form a turret which turns with the main shaft 21 and supports some of the bodily movable parts of the machine as will be explained further on.

Arranged in an annular row around the axis of the turret and compelled to move bodily in a circular path around the same and capable of individual vertical motion are a plurality of upright spindles or shafts 33 each of which is journaled near its lower end in a bearing 34 mounted on the periphery of the lower turret head 30 and also journaled near its upper end in a bearing 35, which is mounted on the periphery of the intermediate turret head 27. These bearings 34, 35 engage with laterally opening recesses 36, 37 formed in the peripheries of the turret heads 30, 27 so as to be capable of horizontal movement into and out of these recesses for assembling or dismembering the machine. These bearings are also provided at their upper ends with laterally projecting flanges 38, forming shoulders thereon whereby the same rest upon the upper sides of the turret heads 27, 30 and are thereby held against downward movement thereon after being assembled therewith. Rotary motion is imparted to these spindles by means of gear pinions 39 formed thereon immediately above the lower bearings 34 and meshing with the external teeth of a master gear wheel 40, which is secured with its hub to the upper part of the column 17 so that the same is stationary, the teeth of this master gear wheel being elongated vertically so that the pinions of the spindles are retained in mesh therewith during the entire vertical movement of these spindles. Upon rotating the turret carrying these spindles the latter are carried bodily in a circular path around the axis of the turret and at the same time each of the spindles is turned by engagement of its pinion with the teeth of the master gear wheel. In addition to sliding in its bearings each of these spindles is guided in its vertical movement upon the turret by a pair of upright guide rods 41, 41, which are arranged on opposite sides of each spindle and slide at their upper ends in openings formed in the peripheral part of the upper turret head 26 and at their lower ends in openings formed in the lower head of the turret, and a cross piece or yoke 42 connecting each pair of guide rods between the turret heads 27, 30, and provided centrally with an outwardly or laterally opening recess 43 which receives the respective spindle immediately above its gear pinion and engages its upper and lower sides with upper and lower shifting collars or shoulders 45 formed on the adjacent part of the spindle, as best shown in Figs. 1, 4 and 10.

Each of the spindles is yieldingly held in its lowered position by means of a pair of lowering springs 46, 46 which surround the upper parts of these guide rods and each of which bears at its upper end against the underside of the upper turret head 26 while its lower end bears against a collar 47 secured to the respective rod which collar is also adapted to bear against the upper side of the intermediate turret head 27 and thereby serve in co-operation with the collar on the companion guide rod to limit the downward motion of these rods and the spindle associated therewith.

The upward motion of the spindles and the parts associated therewith is produced by means of a stationary cam 48 mounted on the master gear wheel and having a cam-shaped upper surface which engages with the underside of the lifting rollers 49 pivoted on the inner sides of the cross pieces or yokes 42, as shown in Figs. 1, 2, 4, 9 and 10. This lifting cam is preferably constructed in the form of a ring which is secured upon the web of the master gear wheel and held thereon by means of a clamping ring 50 which has a wedging engagement with this cam by means of co-operating inclined surfaces 51 formed on these parts by means of screws 52 which connect this clamping ring with the master gear wheel, as best shown in Figs. 4 and 9.

At its lower end each of the spindles is provided with a gripping chuck or holder whereby the same grasps the cap or cover which is to be applied to one of the bottles. In its preferred form each of these holders, as best shown in Figs. 1, 4, 5, 6, 8 and 10, comprises a cylindrical head 53 which is preferably connected by means of a screw joint with the lower end of one of the spindles and provided with a concave face 54 on its underside and a plurality of upright spring fingers or jaws arranged in an annular row around the head of the chuck and each preferably composed of one or more leaf springs which are secured at their upper ends to the periphery of the chuck head and the lower end of at least one of the springs projects downwardly below the concave face of the chuck head. As shown in the drawings, each of these gripping fingers or jaws is composed of an inner

leaf-shaped spring 55 which has its lower part projecting below the chuck head and terminating in an outwardly bent guide lip 56 and an outer leaf-shaped spring 57 which bears against the outer side of the inner spring and terminates at its lower end above the lower end of the respective chuck head. In this manner a chuck is produced which upon being lowered over a bottle cap or cover will cause these fingers to slide downwardly along the periphery of the cap so as to embrace the same and obtain a frictional hold thereon by reason of the spring jaws of the chuck being spread by the periphery of the cap which is of sufficiently large diameter for this purpose. The jaws are guided downwardly over the bottle cap by the outwardly turning lips on the lower ends of the same and the downward movement of the chuck relative to the cap is limited by engagement of the concave underside of the chuck head with the convex crown of the cap.

The caps may be presented to these gripping chucks in any suitable manner, but preferably by means which are constructed as follows:

58 represents a horizontally rotatable feeding disk which has one part of its peripheral portion arranged below the circular path of travel of the gripping chucks as they move bodily with the turret around the axis of the latter. This cap feeding disk is provided on its upper side with a plurality of feeding chucks 59 of circular form which are arranged in an annular row about the axis of this disk and over which an attendant places the screw caps which are to be applied to the necks of the bottles. The relative arrangement of the axis of the turret and the feeding disk is such that when a gripping chuck on the turret and a feeding chuck on the feeding disk are on a horizontal line extending through the axes of the turret and the feeding disk the axes of the respective cap gripping chuck and cap feeding chuck will be vertically in line, as shown in Fig. 2 and at the left hand side of Fig. 4.

Although the number of chucks may be varied to suit different conditions and characters of caps and bottles which are operated upon, it is preferable to employ four gripping chucks and associated parts, which are arranged equi-distant in a circular row on the turret, and a corresponding number of cap feeding chucks on the feeding disk and so timing the movements of the turret of the feeding that at the end of each quarter turn of the turret and feeding disk, one of the gripping chucks will be vertically in line momentarily with one of the cap feeding chucks, as the circular path of travel of the gripping chuck and the feeding chuck intersect each other. For this purpose the distance from the axis of the turret to the axis of each chuck spindle and the distance from the axis of the feeding disk to each of the feeding chucks is the same, and the turret and feeding disk are rotated at the same speed by means of intermeshing gear wheels 60, 80 of the same diameter which are secured respectively to the lower part of the hollow shaft 29, and an upright shaft 61 which latter carries the feeding disk at its upper end and is journaled at its lower end in a bearing 62 on the bracket 18, as best shown in Figs. 1, 3 and 4.

The face of the cam 48 has two low parts and two high parts which alternate circumferentially and engage successively with the roller 49 of each yoke 42 whereby each of the cap gripping chucks is free to be lowered under the action of the respective lowering spring 46 when this chuck is vertically in line with one of the cap feeding chucks and the respective roller 49 engages one of the low parts of the cam face 48, then this gripping chuck is raised by engagement of the next following high part of the cam 48, then this gripping chuck is again permitted to descend by the next following low part of the cam 48 and place the cap held thereby on the respective container, and then the gripping chuck is again raised by the next following high part of the cam 48 for disengaging the gripping chuck from the cap which has been applied to a container, preparatory to beginning another cycle of operations.

The bottles which are to be capped are fed successively to the gripping chucks in a position to permit these chucks to screw the caps on the threaded necks of the bottles by means of a star shaped feeding wheel 63 which is arranged above the stationary table 19 and preferably has its axis arranged on a radial line of the turret which is at right angles to the radial line extending from the turret to the axis of the cap feeding disk. The bottles to be capped rest with their lower ends or bottoms on the upper side of the table 19 and are moved forwardly by means of a plurality of hook-shaped jaws 64 formed on the periphery of the bottle feeding wheel, each of said jaws being constructed to form a substantially semi-circular concave seat 65 which embraces the rear half of the bottle adjacent to the lower end thereof and to move this bottle in a circular path from one part of the periphery of the bottle feeding wheel to another part thereof where the axis of each of these seats is in line with the path of travel of the gripping chucks. As each seat of the bottle feeding disk or wheel is arranged on a line extending through the axes of the turret and the bottle feeding disk, the axis of the respective seat is vertically in line with one of the gripping chucks and at this time the respective gripping chuck is lowered by the action of the respective lowering spring 46 so as to engage the respective cap with the upper end of the adjacent bottle, this being permitted by the formation of the cam 48. As the gripping

chucks move bodily around the axis of the turret, each of these chucks also rotates continuously about its own axis so that when one of these chucks moves downwardly and places a cap against the upper end of a bottle which is presented thereto by the bottle feeding wheel, this cap is engaged with the bottle by a rotary action whereby the cap is screwed on the bottle. This screwing action commences the instant the cap is engaged with the bottle and causes these members to be coupled and move in the circular path with the turret and away from the circular path of the bottle feeding wheel. This rotary motion of the cap under the action of its chuck continues after the bottle has been taken away from the bottle feeding wheel until the cap has been tightly screwed upon the bottle after which the respective chuck slips idly around the cap without producing any further action thereon. In the present machine the tightening of the cap on the bottle is effected during about one quarter turn of the turret, but this timing may be varied to suit different conditions.

To insure proper transfer of the bottles from the delivery side of the feeding wheel to the rotary table 31 and into line with a cap gripping chuck a delivery guard wall 66 is arranged along the delivery part of the periphery of the feeding wheel and secured to the stationary table adjacent to the receiving part of the rotary table.

In order to permit the gripping chucks to carrying the bottles out of the jaws of the bottle feeding wheel without interference from the latter the bottle feeding wheel is turned at a slower rate than that of the turret and the number of jaws on the feeding wheel is greater than the number of gripping chucks on the turret so as to supply a sufficient number of bottles to keep pace with the caps which are presented by the turret.

In the preferred construction, the bottle feeding wheel is provided with eight bottle carrying jaws or pockets which are spaced equi-distance circumferentially and this wheel is turned at one-half the speed of the turrent by a two to one gearing interposed between the turret and the bottle feeding wheel. This reducing gear, in its preferred form, consists of a gear pinion 67 secured to the lower part of the hollow turret shaft 29 and meshing with a gear wheel 69 twice the diameter of this pinion secured to the lower end of a shaft 68 which carries the bottle feeding wheel at its upper end while its lower end is journaled in a bearing 70 on an adjacent part of the bracket 18. The bottles may be fed to the feeding wheel in any suitable manner, the means for this purpose shown in the drawings being constructed as follows:

71 represents the operative stretch of a conveyor belt which moves along one edge of the table 19 and is operated by any suitable means. Arranged above the feeding portion of this conveyer belt is a channel composed of inner and outer walls 72, 73 having longitudinal receiving portions arranged lengthwise of the conveyer belt and secured in place by means of arms 75 which are attached to a bar 74 extending laterally from the table 19 while the delivery parts of these channel walls extend laterally on a curve and over the adjacent part of the table 19 to the receiving part of the periphery of the bottle feeding wheel which is away from the place where the bottles are delivered to the gripping chucks. The bottles are moved forwardly through this feeding channel by frictional engagement of the conveyer belt with the undersides of the bottles and as each bottle successively reaches the front end of the row it is pushed into the path of one of the jaws of the bottle feeding wheel so that the latter obtains control of the bottle and moves the same to the place where it receives a cap from a gripping chuck. The gearing between the bottle feeding wheel and the turret is such that the opposing parts of the rotary table 31 and the bottle feeding wheel move in the same direction. In order to insure engagement of each bottle with a jaw of the bottle feeding wheel a guard arm 76 of curved form is arranged circumferentially along the receiving part of the bottle feeding wheel. This arm is preferably mounted yieldingly so that if a bottle is not fed to the feeding wheel at the proper time and becomes caught between this wheel and the guard arm, the latter will yield and thus avoid breaking the bottle. For this purpose the rear end of the guard arm 76 is pivoted adjacent to the inner wall of the bottle feeding channel by means of an upright hinge 77 so that this guard arm can swing horizontally and the same is drawn inwardly toward the feeding wheel by means of a spring 78 connecting the guard arm with a stationary bracket 79 mounted on the table 19, as best shown in Figs. 1, 2 and 10.

Means are provided for holding each bottle against turning about its own axis and also retaining the same in axial alinement with the respective cap gripping chuck while this bottle is being carried bodily around with the turret. The preferred organization of these clamping means shown in the drawings is as follows:

81 represents a plurality of relatively stationary clamping jaws secured to the upper side of the rotary table and each having a concave face 82 which engages with the rear or trailing side of a bottle adjacent to the lower end thereof. 83 represents a plurality of movable clamping jaws each having a concave face 84 which is movable toward and from the advance side of a bottle adjacent to the lower end thereof. Each of these movable clamping jaws is mounted on the lower end of an upright hollow rock shaft or sleeve

85 which is pivotally mounted upon an upright rock shaft 86 which is journaled in bearings on the lower head and table of the turret. A rocking movement is imparted to the rock shaft 86 by means of a rock arm 87 secured to the upper end thereof above the lower turret head and having a roller 88 at its free end which engages with a cam consisting of an inner section 89 secured to the hollow column above the lower turret head and an outer section 90 which is secured to the underside of the stationary master gear wheel, as best shown in Figs. 4, 6 and 7. A yielding rocking movement is transmitted from the inner rock shaft 86 to the outer rock shaft 85 by means of a yielding arm 91 secured to the upper part of the outer rock shaft 85 and preferably composed of a plurality of leaf-springs, and a rigid rock arm 92 secured to the inner rock shaft 86 above the outer rock shaft and provided at its outer or free end with two downwardly projecting lugs 93 on which are mounted screws 94, 95 adapted to engage opposite sides of the free end of the spring arm 91, as best shown in Figs. 6, 7 and 10. During the rotary movement of the feeding wheel, each of its jaws moves a bottle over the stationary table 19 and the rotary table 31 and in front of one of the relatively fixed clamping jaws 81. Immediately thereafter the companion movable jaw 83 is moved toward the opposite side of the bottle and holds the same against turning upon its own axis while rotating bodily with the turret, thereby holding the bottle stationary relatively to the cap gripping chuck. The latter is rotated at this time in frictional engagement with the screw cap and turning the same so that its screw thread runs on to the screw thread of the respective bottle and causes these parts to be assembled. This operation of screwing a cap on a bottle occurs during about one-quarter of the movement of the turret after the bottle and cap have been first brought together and thereafter the movable clamping jaw is disengaged from the bottle so as to permit the same to be carried away from the rotary table. The faces of the cam sections 89, 90 have low faces which upon engaging each roller 88 operate to close each movable jaw for gripping a bottle when the latter is presented to the respective gripping chuck and high faces which upon engaging each roller 88 operate to open this clamping jaw for releasing the bottle when the cap has been applied thereto. By interposing a yielding member in the train of transmitting means between each movable clamping jaw and the cam sections 89, 90, it permits the movable clamping jaw to bear yieldingly against a bottle and thereby not only avoid breaking the same, but also allowing for a reasonable variation in the diameter of the bottle or defect in the same and also avoiding the necessity of constructing the cam section and associated parts with absolute nicety and still secure a practical working operation of the means for holding the bottle against turning.

After the bottle with a cap applied thereto, has been released by the respective clamping jaw, the same is moved from the rotary table 31 to the stationary table 19 and then conducted to the delivery part of the conveyer belt 71 which latter carries the same away to the desired place. The preferred means for accomplishing this delivery of the bottles from the rotary table to the conveyer belt which are shown in the drawings comprise a curved delivery channel 99 which is formed between inner and outer guide walls or rails 96, 97 which are secured to the adjacent part of the stationary table, said outer wall being provided at its inner end with a curved horn or ejector 98 which projects over the rotary table and across the path of the bottles as they are moved forwardly by the rotary table whereby the bottles upon engaging with this horn or ejector will be deflected from the rotary table and directed into the delivery guide channel. As the bottles are successively discharged from the rotary table into the delivery channel 99 each bottle is advanced in this channel by being pushed by the next following bottle so that the bottles in this delivery channel, as they reach the outlet end of the same are successively delivered upon the conveyer belt and carried away to the place intended to receive the same.

Briefly described, the main operations of this machine are as follows:

One operator places the bottles to be capped in a longitudinal row upon the conveyer belt 71 so that the latter moves the same forwardly through the feed channel from the outlet end of which these bottles are picked up one at a time by the jaws of the feed wheel 63 and presented successively to the cap applying chucks. At the same time another operator places previously formed caps successively on the cap feeding chucks which latter present these caps successively to the cap gripping chucks of the turret. As each cap feeding chuck of the feeding disk comes vertically in line with one of the gripping chucks on the turret, the respective gripping chuck is lowered and raised quickly whereby this gripping chuck grasps the cap on the respective feeding chuck and lifts this cap therefrom. The gripping chuck then advances one quarter turn which brings the same over a bottle which has just been presented by the feeding wheel and then the gripping chuck is lowered and engages the cap therein with the respective bottle and by reason of the continuous rotary motion about its own axis, screw the cap on the bottle while the cap and bottle move forwardly together with the rotary turret, so that the bottle is carried away from the feeding wheel. While

the cap is being thus screwed on to the bottle the latter is held against turning by the clamping jaws 81 and 83 engaging the rear and front sides of the same. The turret makes about a quarter turn as the operation of screwing the cap upon the bottle is effected and then the movable clamping jaw is disengaged from the bottle so that immediately thereafter the bottle together with the cap thereon may be discharged by the delivery means from the rotary table to the delivery portion of the conveyer belt.

The relative timing of the several main groups of mechanisms is such that the bottle transferring means have a greater propelling speed than the bottle supplying means, and the bottle and cap assembling means have a greater propelling speed than the transferring means, whereby the speed of travel of the bottles is gradually accelerated from the time they enter the machine until they receive the caps and thus avoid spilling the contents of the bottles when filled to the brim.

The feeding chucks 59 are sufficiently high that when the caps rest with their crowns on the tops of these chucks that the lower edges of the flanges of the caps do not engage the top of the feeding disk 58 and are therefore not supported thereon, as shown in Fig. 4. It follows from this that the caps are subsequently gripped by a comparatively heavy pressure on the crown between the top of the feeding chucks and the heads of the gripping chucks while the flanges of the caps are only engaged lightly by the spring jaws of the gripping chucks. This permits of grasping the caps and presenting the same properly to the bottles regardless of any uneveness on the lower edges of the flanges of the caps which is produced during manufacture of the same and renders it possible to apply the caps to the bottles with certainty and accuracy. Furthermore this manner of engaging the caps permits of making the same of comparatively thin metal without liability of distorting or marring the same.

By varying the tension of the spring jaws on the gripping chucks, any degree of tightness of the caps on the bottles may be secured to suit the requirements of different products.

Although the machine hereinbefore described is designed more particularly for attaching caps to bottles by means of a screw joint between the same, it is to be understood that the same is equally useful for connecting bottles and caps having similar or other forms of interlocking means, and is also applicable to containers in which the bottles and caps are merely connected by friction.

It will thus be apparent that the operation of the machine is automatic with the exception of the replenishing the bottles and caps which may be supplied in any suitable manner either automatically or manually.

As a whole this machine is comparatively simple in construction considering the character of work which it performs, and it is durable and reliable in operation and requires but little power for running the same. Furthermore, the same is compact in construction and the same is not liable to become clogged or break any of the bottles which are operated upon, thereby insuring a large output and enabling the operation of capping the bottles to be effected expeditiously and economically.

I claim as my invention:

1. A machine for applying a cap to a bottle comprising a continuously rotatable cap feeder having a cap holder, a continuously rotatable bottle feeder having a jaw adapted to carry a bottle, a continuously rotatable turret moving past said cap and bottle feeders, a cap gripping chuck mounted on said turret and movable laterally by the same from said cap feeder to said bottle feeder, and means for moving said gripping chuck toward and from said cap feeder, and toward and from said bottle feeder.

2. A machine for applying a cap to a bottle comprising a rotatable cap feeder having a cap holder, a rotatable bottle feeder having a jaw adapted to carry a bottle, a rotatable turret moving past said cap and bottle feeders, a cap gripping chuck mounted on said turret and moved laterally by the same from said cap feeder to said bottle feeder, means for moving said gripping chuck toward and from said cap feeder, and toward and from said bottle feeder, and means for rotating said gripping chuck on said turret.

3. A machine for applying a cap to a bottle, comprising a rotatable cap feeder having a cap holder, a rotatable bottle feeder having a jaw adapted to carry a bottle, a rotatable turret moving past said cap and bottle feeders, a cap gripping chuck mounted on said turret and moved laterally by the same from said cap feeder to said bottle feeder, means for moving said gripping chuck toward and from said cap feeder, and toward and from said bottle feeder, means for rotating said gripping chuck, and clamping means for holding said bottle while said gripping chuck is applying the cap thereto.

4. A machine for applying a cap to a bottle comprising a rotatable cap feeder having a cap holder, a rotatable bottle feeder having a jaw adapted to carry a bottle, a rotatable turret movable past said cap and bottle feeders, a cap gripping chuck mounted on said turret and movable laterally by the same from said cap feeder to said bottle feeder, means for moving said gripping chuck toward and from said cap feeder, and toward and from said bottle feeder, means for rotating said gripping chuck, and a clamping device movable bodily with said turret and adapted to hold said bottle while said gripping chuck is applying a cap thereto and to

release the same while the gripping chuck is disengaged from said bottle.

5. A machine for applying caps to bottles comprising a rotary cap feeding disk provided with an annular row of cap holders, a bottle feeding wheel provided with a plurality of bottle carrying jaws, a cap gripping chuck, a turret which carries said cap gripping chuck and which traverses said cap and bottle feeders so as to bring the gripping chuck successively in line with a cap holder and a bottle carrying jaw, a spindle journaled on said turret and carrying said gripping chuck, means for turning said spindle comprising a pinion arranged on said spindle, and a stationary gear wheel which meshes with said pinion, and means for moving said spindle lengthwise of its axis comprising a pair of guide rods sliding lengthwise on said turret parallel with said spindle, a cross piece connected with said guide rods and also connected with said spindle so that the latter can turn relatively to the cross piece but is compelled to move lengthwise therewith, springs interposed between said turret and shoulders on said guide rods for lowering the spindle and associated parts, and a stationary cam which actuates said cross piece for lifting said spindle and associated parts.

6. A machine for applying caps to bottles comprising a rotary cap feeding disk provided with an annular row of cap holders, a bottle feeding wheel provided with a plurality of bottle carrying jaws, a cap gripping chuck, a turret which carries said cap gripping chuck and which traverses said cap and bottle feeders so as to bring the gripping chuck successively in line with a cap holder and a bottle carrying jaw, and gearing connecting said turret and bottle feeding wheel for turning the former faster than the latter.

7. A machine for applying caps to bottles comprising a rotary cap feeding disk provided with an annular row of cap holders, a bottle feeding wheel provided with a plurality of bottle carrying jaws, a cap gripping chuck, a turret which carries said cap gripping chuck and which traverses said cap and bottle feeders so as to bring the gripping chuck successively in line with a cap holder and a bottle carrying jaw, and gearing connecting said turret and cap feeding disk for turning the same in unison, and gearing connecting the turret and bottle feeding wheel for turning the former faster than the latter.

8. A machine for applying caps to bottles comprising a hollow column, an upright shaft journaled in said column, a turret having a head secured to said shaft above the column, a hollow shaft turning on said column and having a head connected with the head on the shaft, a rotary table arranged on the lower part of said hollow shaft and adapted to support on their undersides the bottles to be capped, cap gripping chucks mounted on said turret, and means for holding the bottles engaged by the gripping chucks on the rotary table comprising a stationary clamping jaw arranged on the turret and adapted to engage one side of a bottle, a movable clamping jaw pivotally mounted on the turret and adapted to engage the opposite side of said bottle, and yielding means for actuating said movable clamping jaw comprising an outer rock shaft connected with said movable clamping jaw and having a spring arm, a stationary cam, and an outer rock shaft having an upper rock arm engaging said cam and a lower rock arm engaging said spring arm.

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