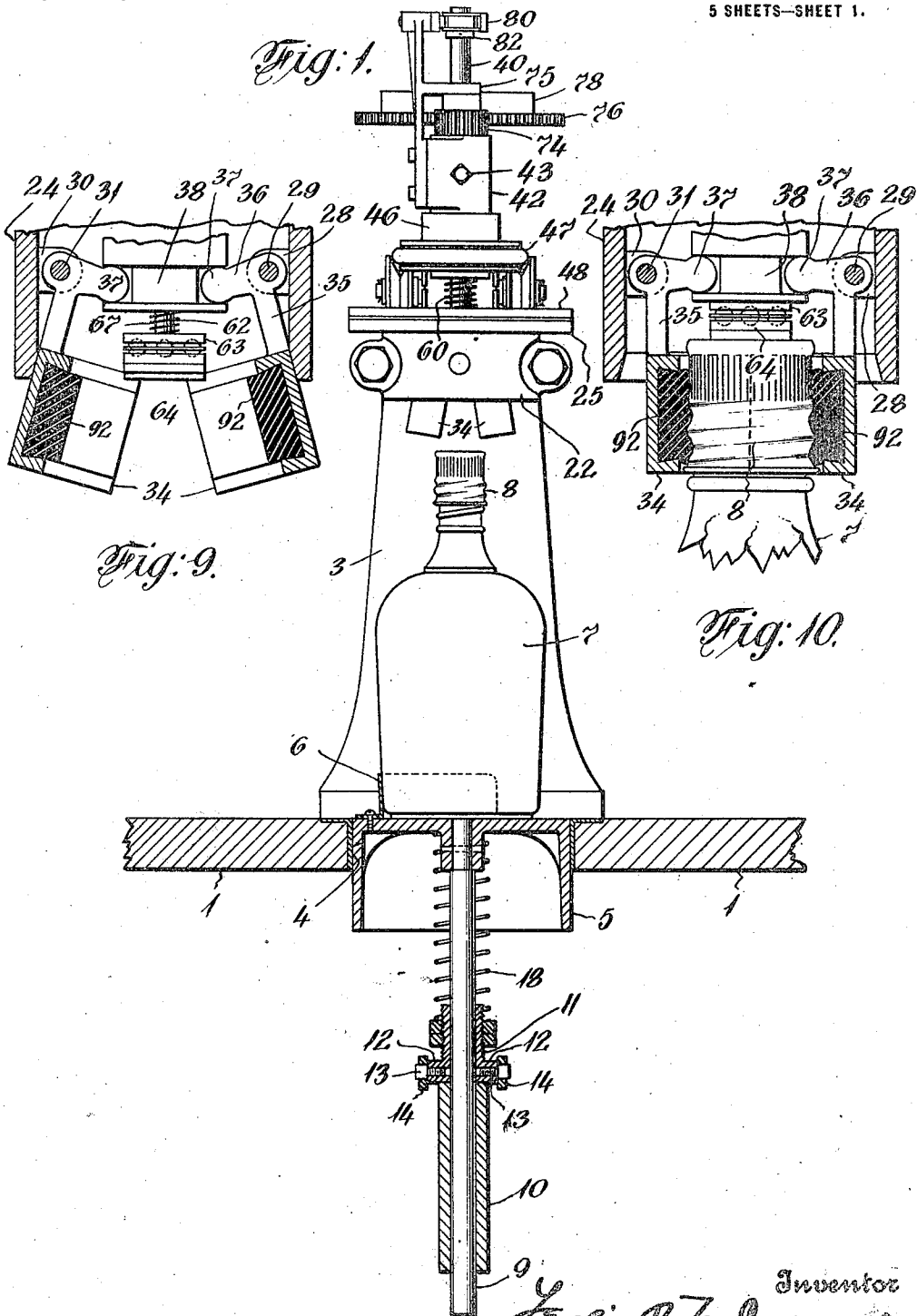


L. R. N. CARVALHO.
BOTTLE CAPPING MACHINE.
APPLICATION FILED NOV. 27, 1915.

1,249,025.

Patented Dec. 4, 1917.

5 SHEETS—SHEET 1.



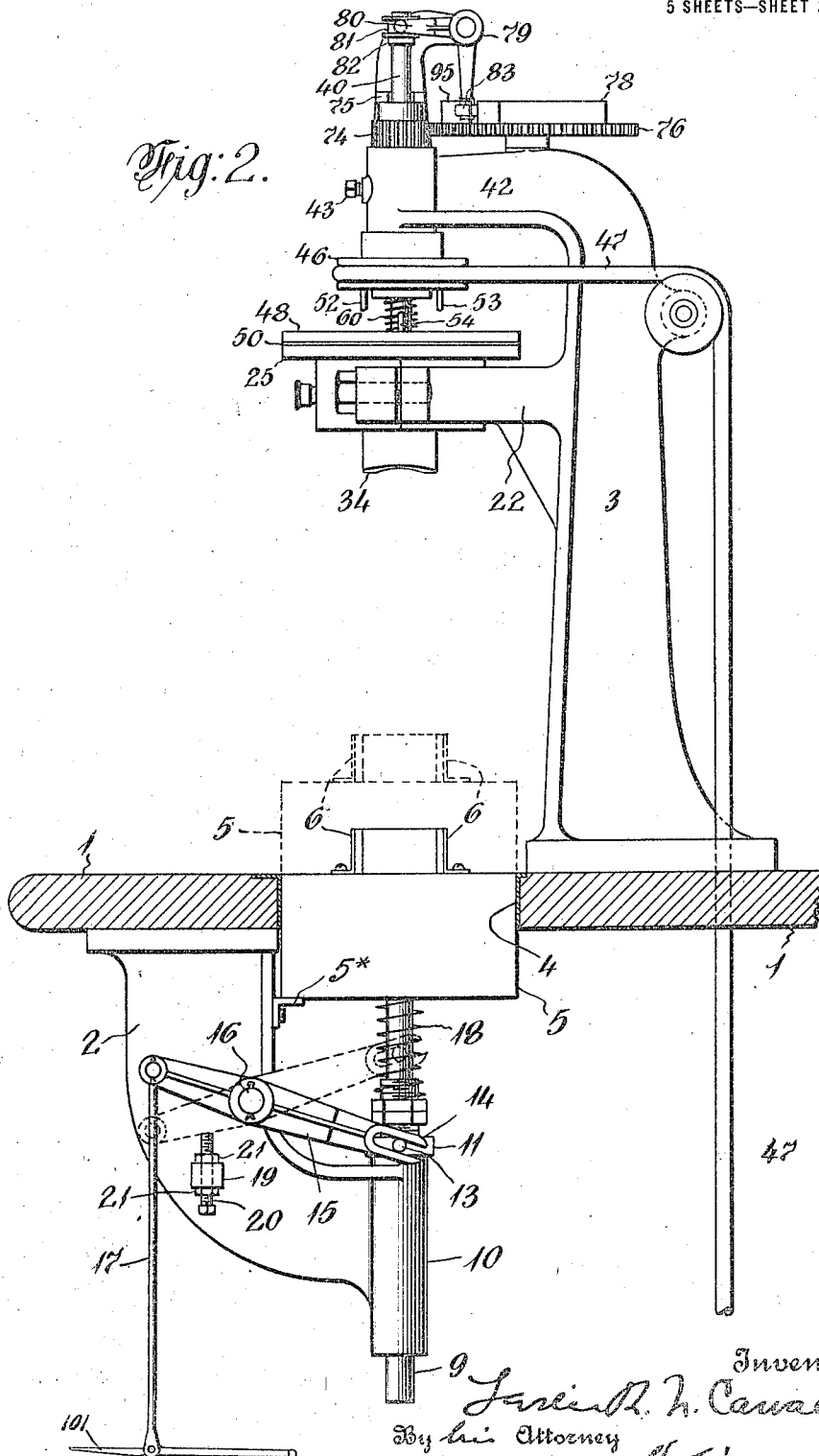
Inventor
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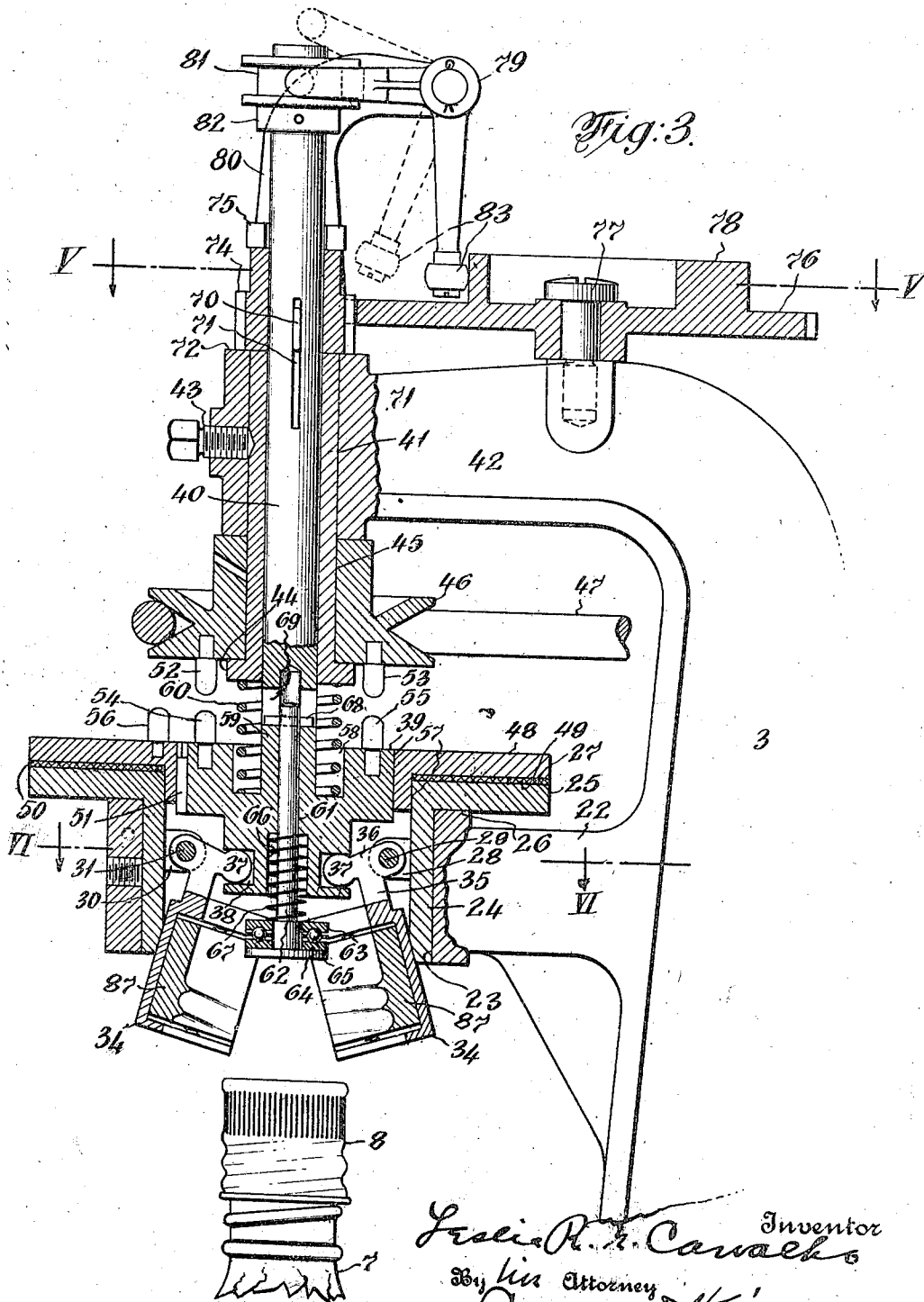
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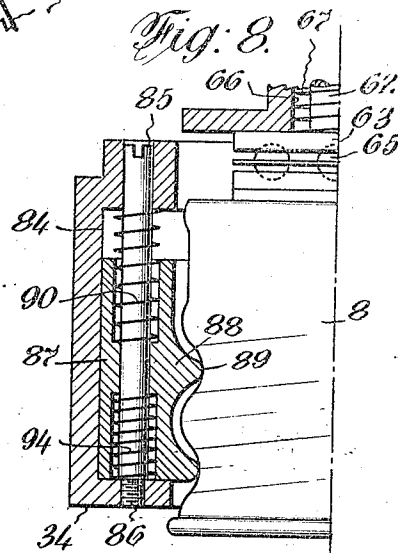
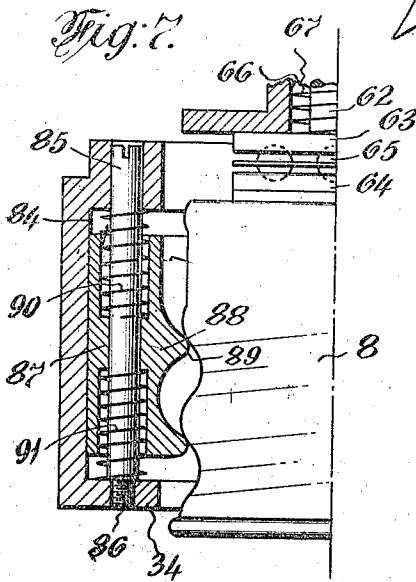
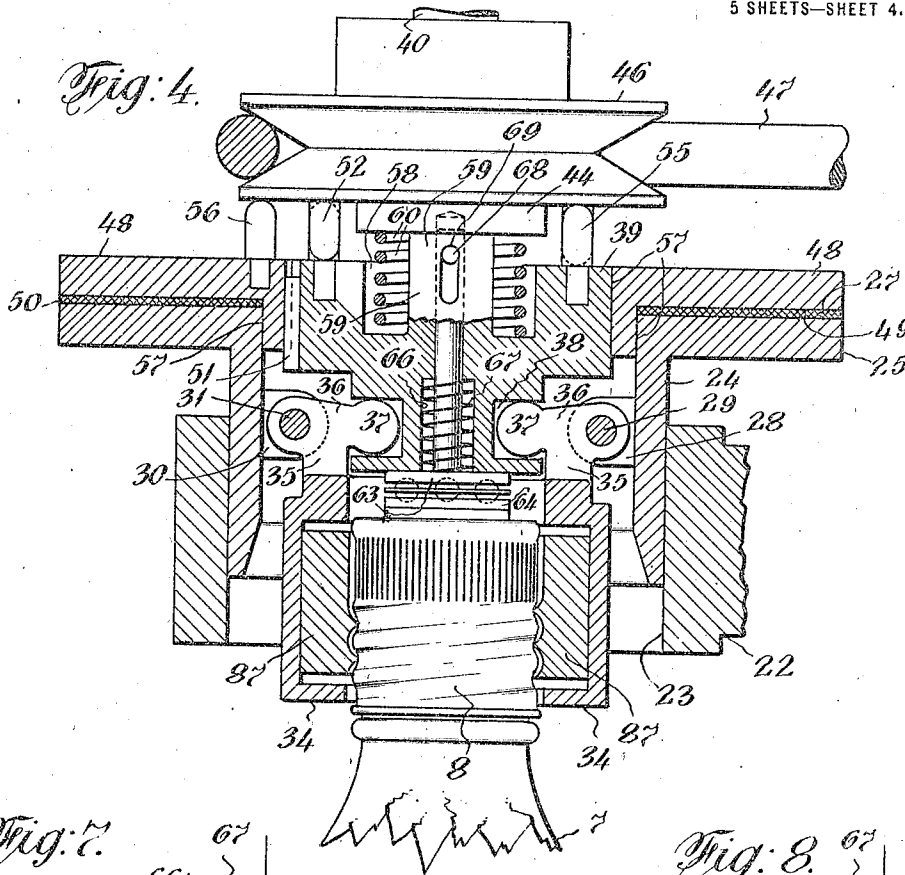
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5 SHEETS—SHEET 4.



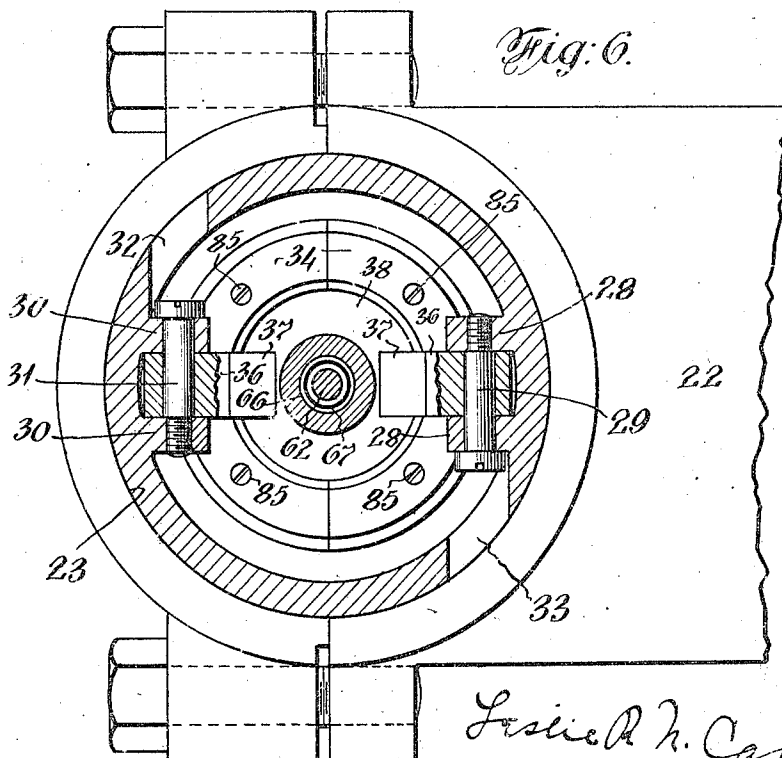
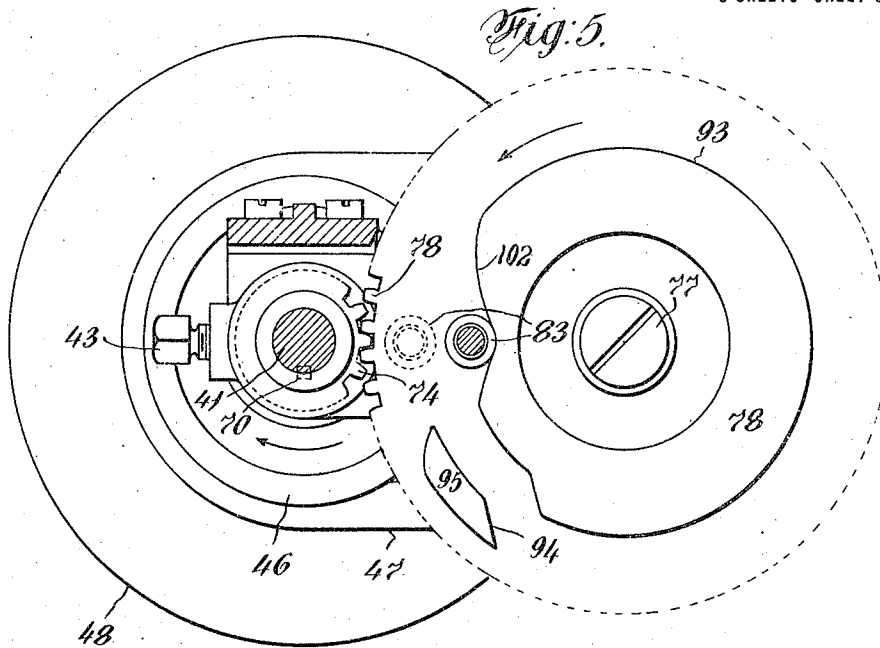
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5 SHEETS—SHEET 5.



Inventor
Luis R. N. Carvalho
By his Attorney
Charles H. Wilson

UNITED STATES PATENT OFFICE.

LESLIE R. N. CARVALHO, OF BROOKLYN, NEW YORK.

BOTTLE-CAPPING MACHINE.

1,249,025.

Specification of Letters Patent.

Patented Dec. 4, 1917.

Application filed November 27, 1915. Serial No. 63,752.

To all whom it may concern:

Be it known that I, LESLIE R. N. CARVALHO, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Bottle-Capping Machines, of which the following is a specification.

This invention relates to a bottle capping machine and more particularly to a new and improved machine for applying screw caps to receptacles such as bottles, jars and the like.

One of the objects of the invention is to provide mechanism designed to more expeditiously apply a cap to a bottle than it has been possible to do with machines or devices heretofore constructed.

Another object of the invention is to provide means whereby a cap designed to effect a tight closure upon a receptacle may be applied to such receptacle with the desired degree of pressure automatically and without danger of injuring either the receptacle or the closure.

Another object of the invention is to provide mechanism for mechanically applying a lacquered, painted, decorated, or otherwise coated cap to a receptacle without injuring or defacing the outer surface of the cap.

Another object of the invention is to provide new and improved means for applying a screw threaded cap provided with a lining or sealing member, such that the lining or sealing member will be pressed against the mouth of the receptacle with the required amount of pressure to form a tight seal.

A further object is to provide mechanism as above, which will operate substantially automatically.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles, constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings which are to be taken as a part of this specification, and in which I have shown a preferred form of embodiment of the invention:

Figure 1 represents a front elevational view, partly in section, of a machine constructed in accordance with my invention.

Fig. 2 represents a side elevational view of the machine shown in Fig. 1.

Fig. 3 represents a sectional view of the major part of the mechanism shown in Figs. 1 and 2, showing one type of a receptacle with a cap positioned thereon, ready to be operated upon by the machine.

Fig. 4 represents an enlarged sectional view of a part of the mechanism shown in Fig. 3, the parts, however, being in a different position.

Fig. 5 represents a plan view partly in section, taken substantially on the line V—V of Fig. 3, looking in the direction of the arrows.

Fig. 6 represents a sectional view taken substantially on the line VI—VI of Fig. 3.

Fig. 7 represents a view in section, on an enlarged scale, of one of the clamping jaws which is adapted to grasp the cap.

Fig. 8 represents a similar view of the same part of the mechanism, with the parts in a different position.

Fig. 9 represents a sectional view of a different embodiment of the means for grasping the cap; and

Fig. 10 represents a view similar to Fig. 9, with the parts in a different position.

Similar reference characters refer to similar parts throughout the various figures of the drawings.

Referring now to the embodiment of my invention illustrated in the drawings, the reference numeral 1 indicates a suitable support or platform. 2 indicates a bracket member which may be secured to the platform 1, in any convenient manner, said bracket being adapted to support certain parts of the operating mechanism hereinafter to be described. 3 denotes a stanchion which is supported upon the rear of the platform 1, and which rises from the platform so

as to carry other parts of the operating mechanism, presently to be described.

The platform 1 is provided centrally with an aperture 4 in which a table 5 is adapted to be vertically reciprocated. The table 5 has means for engaging and holding the receptacle to which the cap is to be attached, such holding means in the present instance comprising angled clips 6, shown in Figs. 1 and 2. These clips are adapted, when the receptacle is moved into the proper position to be operated upon, to hold such receptacle in a predetermined position with relation to the devices that are to be employed in applying the cap thereto. In the present instance the receptacle is shown as a bottle 7; the cap 8 being shown positioned upon the upper end thereof.

The table 5 is supported upon a post 9, which is adapted to slide in a bearing 10, provided in the end of the bracket 2. A collar 11 is slidably mounted upon the post 9 and is provided with oppositely extending parts 12, adapted to receive pins 13, which pins are engaged by the forked ends 14 of a lever 15. The lever 15 is journaled intermediate its ends upon a stud 16 formed upon the bracket 2. The opposite end of the lever 15 is pivotally attached to a rod 17, and the lower end of this rod is affixed to a suitable treadle 101. This treadle is adapted to be engaged and manipulated by the foot of the operator, in a manner which will be well understood.

Interposed between the collar 11 and the under surface of the table 5 is a compression spring 18. This spring encircles the post 9.

From the foregoing description it will be understood that a downward movement of the rod 17, under the influence of the treadle operated by the foot of the operative, will, through the lever 15, and spring 18, cause the table 5 to be lifted through the aperture 4, as shown in dotted lines in Fig. 2 of the drawings.

Extending laterally from the bracket 2 is an arm 19 through which is threaded a bolt 20, said bolt projecting upwardly through said arm so that its upper end may act as a stop for the outer end of the lever 15 when the same is swung by the rod 17. This bolt being adjustable, operates to determine the extent of the upward movement of the table 5. Jam nuts 21 are adapted to hold the bolt 20 in any adjusted position. A rest 5* is fitted to support the table 5 when the latter is in its normal position.

The bracket 3 has a laterally extending arm 22 which is provided with a bearing 23. Rotatable and reciprocable in this bearing is a clutch housing 24, said housing being provided with an annular laterally extending flange 25, which is adapted to rest on the upper bearing surface 26, of the arm 22.

The upper portion of the flange 25 has an annular friction surface 27, the purpose of which will be apparent hereinafter.

The clutch housing 24 is hollow, (see Fig. 4), and a pair of ears 28 are arranged therein, said ears being apertured, to receive a pivot pin 29. A second pair of ears 30 with a pivot pin 31 is arranged directly opposite the ears 28. The pivot pins 29 and 31 preferably extend loosely through one of the ears and are threaded into the opposite ear so that they are retained in position. The wall of the housing is apertured, as at 32 and 33, to facilitate the insertion of the pivot pins 29 and 31.

Carried upon each of the pivot pins 29 and 31 is a clutch member 34, each of which is provided with an arm 35 connected with a short lever arm 36, one end of which is positioned upon the pivot pin. The other end 37 of the lever 36 is rounded and received in an annular slot 38, provided in the clutch operating head 39. The clutch members 34 are similarly constructed and mounted within the housing 24, and are arranged in opposed relation, as clearly shown in the drawings.

The clutch operating head 39, in the present instance, is rigidly connected with a shaft 40 which is slidably and rotatably mounted in a bearing sleeve 41 fixed, as by set screw 43, within the head 42 of the bracket 3. The lower end of the sleeve 41 is extended to provide a bearing 45, upon which is rotatably mounted a pulley 46, adapted to receive a belt 47 which may be connected with a motor, or other source of power. A flange 44 is formed upon the sleeve 41 to retain the pulley against displacement.

The clutch operating head 39 is encircled by an annular friction ring 48 provided with a friction surface 49, which is located directly above the friction surface 27, of the flange 25 of the clutch head. A friction disk of leather or other suitable material, is positioned between the surfaces 27 and 49. The friction ring 48 and the clutch operating head 39 are connected by means of the spline 51, which, while permitting relative vertical movement, compels said parts to rotate in unison.

Rotation of the clutch operating head 39 will thus be transmitted frictionally to the clutch housing 24.

The driving connection between the clutch operating head 39 and the pulley 46, comprises pairs of opposed contact pins 52-53 and 54-55. The pair of pins indicated as 52-53 are connected with the pulley 46 and depend therefrom, whereas the contact pins 54-55 are mounted upon the clutch operating head 39 and extend upwardly therefrom. The ends of both sets of pins are preferably rounded off, as shown.

Normally the two sets of pins do not engage each other, owing to the wide space between the under surface of the pulley and the upper surface of the clutch operating head. When, however, the clutch operating head is raised, as will be presently set forth, the pair of pins 54—55 are carried into the path of the pins 52—53. A driving connection is thus established between the pulley and the clutch operating head.

A pin 56 is provided upon the friction ring 48, for engaging against the under surface of the pulley 46, for a purpose presently apparent.

The friction ring 48 has an annular extension 57, which is received within the upper end of the clutch head 24 and adapted to maintain the parts in proper coöperative engagement at all times.

A compression spring 60 is interposed between the lower end of the sleeve 41 and the clutch operating head 39, said spring being disposed to encircle the intervening portion 59 of the shaft 40. Preferably a recess 58 is formed in the upper surface of the clutch operating head into which the lower end of the spring is seated so as to facilitate the use of a longer spring than would otherwise be possible. This spring serves to maintain the clutch operating head pressed downwardly when not in use, in which position the gripping members 34 are held open, as shown in Fig. 3.

An aperture 61 is formed vertically through the clutch operating head and upwardly through the portion 59 of the shaft 40, and a plunger rod 62 is slidably mounted within said aperture. The lower end of the plunger rod projects downwardly beneath the lower surface of the clutch operating head and is fitted with a ball bearing disk comprising an upper member 63 and a lower member 64, between which balls 65 are arranged. The under surface of the lower member 64 is adapted to be engaged by the upper surface of the cap to be operated upon and is freely and easily rotatable with respect to the rod 62.

A light compression spring 67 is interposed between the lower end of the clutch operating head and the upper surface of the ball bearing disk, being partly received in a recess 66 formed in the clutch operating head, for urging the ball bearing disk downwardly with respect to the clutch operating head. A pin 68 is arranged transversely at the upper end of the plunger rod 62 and projects laterally therefrom within a slot 69 formed in the shaft 40, said pin serving to retain the plunger rod against displacement and serving also to limit the downward movement thereof.

A spur gear 74 is slidably and non-rotatably mounted upon the shaft 40 above the

upper end of the sleeve 41, said gear being connected to said shaft by means of a key 70, which is carried by the gear and projects into an elongated slot 71 formed longitudinally of the shaft. A lug 75, carried by an extension 80 of the head 42, is arranged above the gear to maintain it against vertical movement along the shaft 40.

Meshing with this spur gear is a gear wheel 76 suitably mounted for rotation upon a stud 77 carried upon the head 42.

The upper surface of the gear 76 is shaped to provide a cam 78. A bell crank lever 79 is mounted upon the extension 80, said lever having the end of one of its arms received in an annular recess 81 formed in a collar 82, which is fixed to the upper end of the shaft 40. The end of the remaining arm of the bell crank lever is provided with an anti-friction roller 83 disposed to engage the cam 78.

One of the more important problems to be overcome in the production of a machine for threading closures, of the type herein suggested, upon receptacles, is to provide a means which will not only efficiently and expeditiously seat the cap uniformly and tightly upon the receptacle, but to provide a means which will perform this operation without defacing or mutilating the decorative or preservative features of the cap or closure, which features may comprise embossing, paint, printed matter, or lacquer, or the like.

In the present instance such a means is provided by so constructing the clutch members that they will grasp a portion only of the cap or closure which is not subject to defacement, or which if slightly defaced, will not present an objectionable appearance.

These clutch members may be of varying design according to the particular type or style of cap or closure upon which they are designed to operate, but in the present instance they each comprise a box-like structure 84. The construction of each of the clutch members is identical and a further description of one only will suffice.

A pin 85 extends longitudinally within the structure, being preferably threaded at one end, as at 86, to prevent displacement. This pin serves as a slide for the gripping jaw 87, said jaw being apertured to receive the pin, as clearly shown in Figs. 7 and 8. The working surface of the jaw is provided with deep threads having a pitch corresponding to the pitch of the threads on the cap or closure. These threads, as 88, are relatively sharper than the configuration of the threads on the cap and the outer ends are preferably rounded, as at 89. The depth of the threads is designed to be such that the rounded surfaces 89 are the only portions which come into contact with the surface of

the cap. Centering springs 90 are disposed between opposite surface portions of the jaw and the adjacent walls of the box-like structure, said springs serving to maintain the jaw normally in a relatively central position, but permitting sliding movement of the jaw longitudinally of the pin 85 to allow any slight movement which may be required to enable the parts 89 of the threads to seat themselves within the hollows of the threads on the cap. Such a relative movement is clearly depicted by comparison between the disclosures in Figs. 7 and 8.

A modification of the gripping jaws is shown in Figs. 9 and 10 of the drawings, wherein those parts are shown as being constructed of a relatively soft material, such for instance as india rubber, indicated at 92, the construction being such that when the gripping jaws are moved into engagement with the screw cap the yielding character of the material of which the jaws are constructed will operate to cause them to hug closely to the configuration of the cap, as shown in Fig. 10.

Having thus described the construction of my improved machine, the operation thereof may now be understood.

In describing this operation it will be understood that a receptacle, such as the bottle 7, has been positioned upon the table 5 and in proper position thereon, which is determined by the engagement of the walls of the bottle with the clips 6. A cap 8 has been dropped upon the neck of the bottle over the mouth thereof, as clearly shown in Figs. 1 and 3. This cap is now ready to be screwed home upon the threads of the bottle neck. It will be assumed also that the driving mechanism is operating through the belt 47 to drive the pulley 46 at a predetermined speed. It will be further assumed that the parts are in the position shown in Figs. 1, 2 and 3 of the drawings, and that the cam 78 and the anti-friction roller 83 are in the position shown in the full lines of Fig. 3.

The operator first depresses the treadle 101, causing the table 5 to move upward, which operation carries the top of the screw cap 8 into engagement with the disks 63, 64.

Further upward movement of the table causes the bottle cap 8 to move the disks 63, 64 upward against the tension of the relatively weak spring 66, until its upper surface is in engagement with the under surface of the clutch operating head 39.

Continued upward movement of the bottle cap causes the clutch operating head 38 to move upward, thereby swinging the clutch members 34 toward each other to grip the cap. The pins 52-53 and 54-55 are not yet in working engagement.

Further upward movement of the bottle cap, carries the pins into working engage-

ment, whereupon the clutch operating member 39, and the friction ring 48, begin to rotate. The clutch head 24 and the gripping jaws also begin to rotate, due to the friction between the friction ring 48 and the flange 25, causing the bottle cap to be screwed downwardly upon the bottle neck.

When the swinging movement of the jaws is arrested by engagement with the bottle neck the housing 24 begins to move upwardly and lifts the friction ring 48 until the pin 56 engages the under surface of the pulley 46. The upward movement of the friction ring 48 being thus arrested, any further pressure upon the treadle 101 will increase the degree of friction between the ring 48 and flange 25 and thereby determine the degree of tightness with which the cap is screwed upon the bottle neck. It will of course be understood that the friction between parts 48 and 25 will at no time exceed the power of the grip of the jaws upon the surfaces of the cap for if this were not so the ornamental or like characteristic of the cap might be defaced by the rotation of the jaws thereupon.

During the operation of screwing the cap home, the bell crank lever 79 stands in the position indicated by dotted lines in Fig. 3, having been brought to that position from the position shown in full lines in said figure by the upward movement of the shaft 40 and by contact with the inclined portion 102 of the cam 78, which latter is actuated as set forth. The bell crank lever is maintained in this position, during the screwing of the cap, as the result of its engagement with a concentric portion 93 of the cam 78, so that the shaft 40 is positively held in its raised position with the pins 52, 53 and 54, 55 in coöperative engagement, and, preferably, with the pin 56 abutting the under surface of the pulley 46.

After the cap has been firmly screwed home, or, in other words, after the clutch operating head has been caused to rotate for a given number of times, the bell crank lever is returned again to the full line position, by engagement with the inclined surface 94 of the detachable cam member 95 which is associated with the cam 78, (see Fig. 5). This movement of the bell crank slides the shaft 40 downwardly so as to disengage the pins 52, 53, and 54, 55, and permit the clutch head to again rest upon the surface 26. This movement also forces the bottle and cap downwardly, the table 5 yielding on its spring 18, and simultaneously swings apart the gripping jaws.

At this juncture the operator may release his pressure upon the treadle and allow the table to reseat itself upon the rest 5*, in normal position, so that the machine is in con-

dition for acting upon a second bottle and cap.

It will accordingly be seen that I have provided means particularly adapted to obtain, among others, all objects and ends above pointed out in an exceedingly efficient manner. The mechanism operates substantially automatically, it being merely necessary for the operator to place the receptacles with the cap in proper position upon the table and then operate the treadle. All the operations are taken care of automatically.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the details herein shown and described except as they may be specifically included in the claims.

What I claim is:

1. Apparatus of the character described comprising, a bottle support, means for screwing the cap onto the bottle, and means for moving the bottle support to actuate the screwing means.

2. Apparatus of the character described comprising, a bottle support, means for screwing the cap onto the bottle, and means for moving the support for carrying the bottle and cap into engagement with the screwing means for actuating the latter.

3. Apparatus of the character described comprising, a bottle support, means for screwing the cap onto the bottle, and means for moving the support for carrying the bottle and cap into engagement with the screwing means for causing the latter to grip the cap and screw it home.

4. Apparatus of the character described comprising, a bottle support, means for screwing the cap onto the bottle, and means for moving the support for carrying the bottle and cap into engagement with the screwing means for actuating the latter so as to cause it to first grip the cap and then rotate for screwing the cap home.

5. Apparatus of the character described comprising, a bottle support, means for screwing the cap onto the bottle, means for moving the support for carrying the bottle and cap into engagement with the screwing means for actuating the latter, and means for moving the bottle and cap out of engagement with the screwing means.

6. Apparatus of the character described comprising, a bottle support, means for screwing the cap on to the bottle, manually operable means for moving the support for carrying the bottle and cap into engagement with the screwing means for actuating the latter, and automatic means for moving the bottle and cap out of engagement with the screwing means.

7. Apparatus of the character described comprising, means for gripping the cap, and yieldingly driven mechanism for rotating the gripping means in order to permit a slip after the cap has been screwed home.

8. Apparatus of the character described comprising, means for gripping the cap and frictionally driven mechanism for rotating the gripping means in order to permit a slip after the cap has been screwed home.

9. Apparatus of the character described comprising, a bottle support, a constantly rotating element, means for gripping the cap, and means for engaging the gripping means with the rotating element when the former is in engagement with the cap, for screwing the cap home.

10. Apparatus of the character described comprising, a bottle support, a constantly rotating element, means for gripping the cap, and means for moving the bottle and cap into engagement with the gripping means for causing the latter to engage the cap and also engage the rotating element, to screw the cap home.

11. Apparatus of the character described comprising, a bottle support, a constantly rotating element, means for gripping the cap, means for moving the bottle and cap into engagement with the gripping means for causing the latter to engage the cap and also engage the rotating element, to screw the cap home, and means for throwing the gripping means out of engagement with the rotating element after the cap has been screwed home.

12. Apparatus of the character described comprising, a bottle support, a constantly rotating element, means for gripping the cap, means for moving the bottle and cap into engagement with the gripping means for causing the latter to engage the cap and also engage the rotating element, to screw the cap home, and automatic means for throwing the gripping means out of engagement with the rotating element after the cap has been screwed home.

13. Apparatus of the character described comprising, a bottle support, a constantly rotating element, means for gripping the cap, and manually operable means for moving the bottle and cap into engagement with the gripping means for causing the latter to engage the cap and also engage the rotating element, to screw the cap home, and automatic means for throwing the gripping means out of engagement with the rotating element after the cap has been screwed home.

14. In an apparatus of the character described, gripping means for the cap, said means being yieldingly mounted for automatically adjusting itself to the contour of the cap upon engagement therewith.

15. In an apparatus of the character de-

scribed, gripping means for a screw cap, said means being fashioned with a thread and being yieldingly mounted in order to permit its thread to automatically mate with the thread on the cap upon engagement therewith.
 5 16. In an apparatus of the character described, gripping means for the cap, said means comprising a supporting member and
 10 a contact member, the contact member being

yieldingly mounted in the supporting member for automatic adjustment with respect to the contour of the cap upon engagement therewith.

In testimony whereof I affix my signature 15
 in the presence of two witnesses.

LESLIE R. N. CARVALHO.

Witnesses:

IRA SKUTCH,
 ROBERT A. RUSSELL.