H. E. MARSHALL.

BOTTLE CAPPING MACHINE.

APPLICATION FILED JUNE 30, 1908.

986,839.

Patented Mar. 14, 1911.

3 SHEETS—SHEET 1.

Fig.1

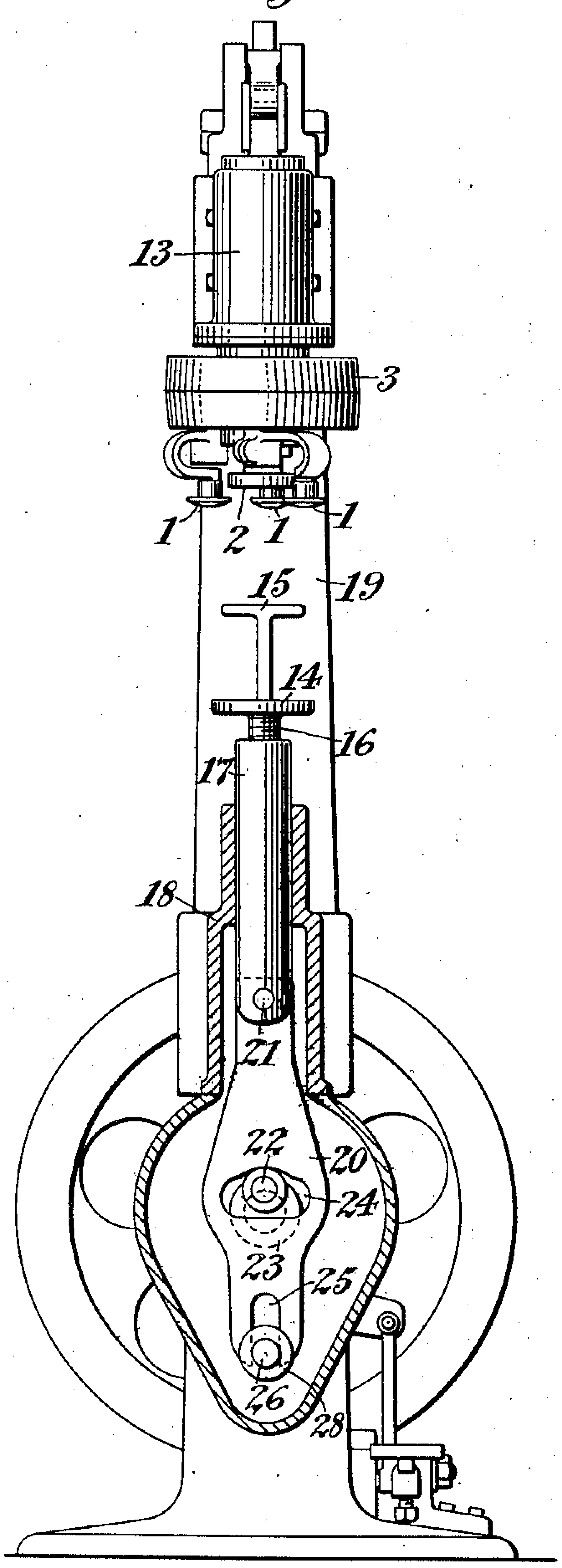

Fig.2

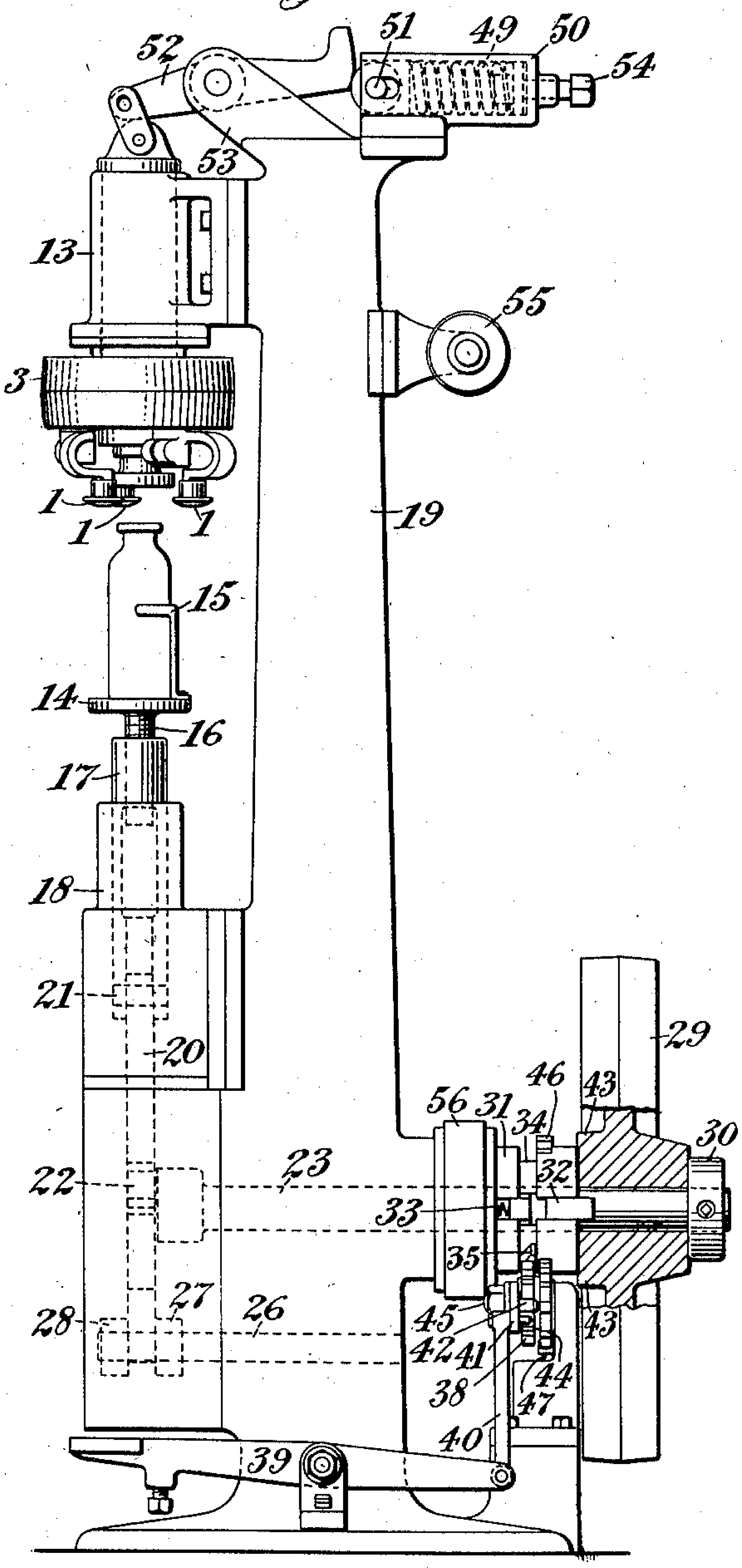

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Fig. 3

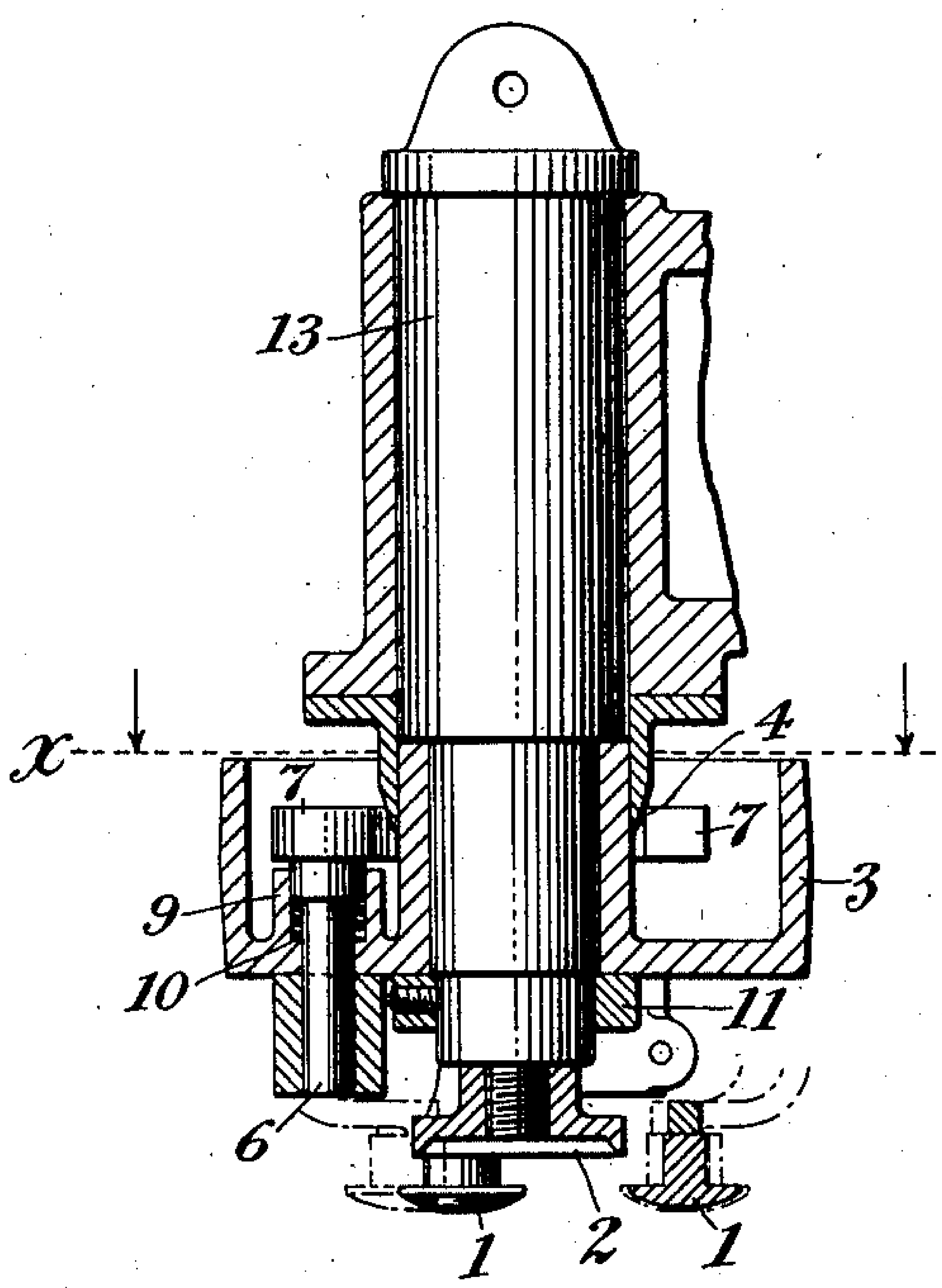


Fig. 4

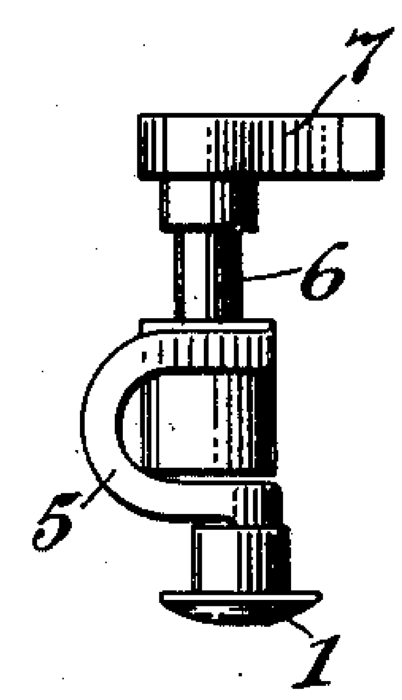


Fig. 5

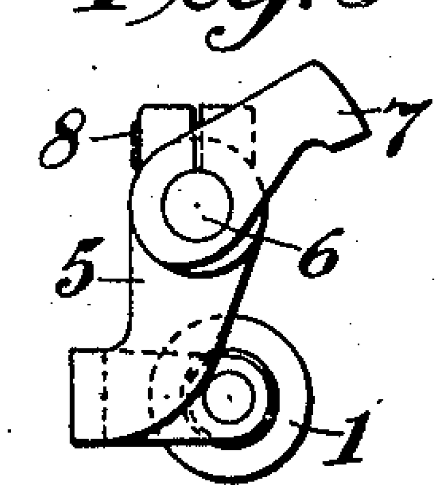


Fig. 6

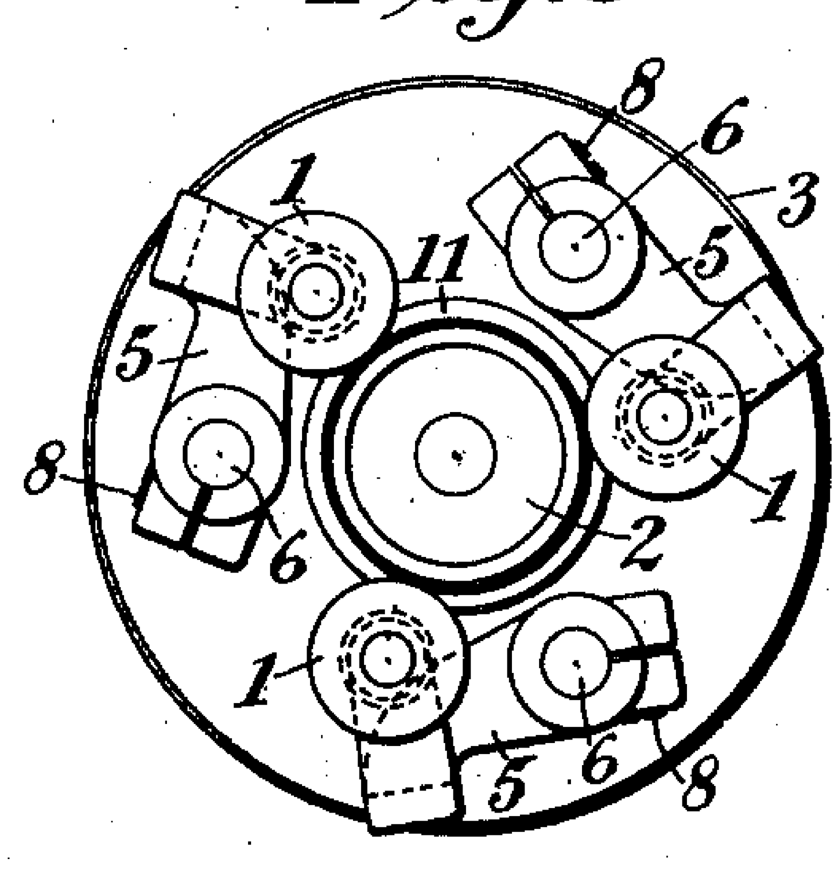
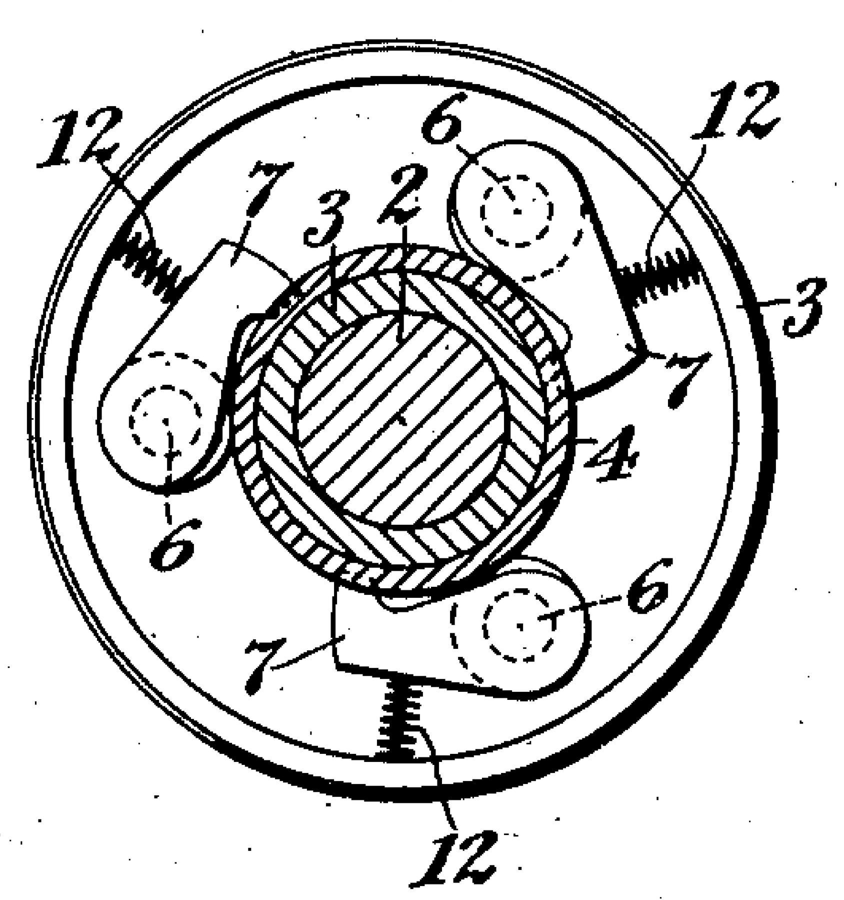


Fig. 7



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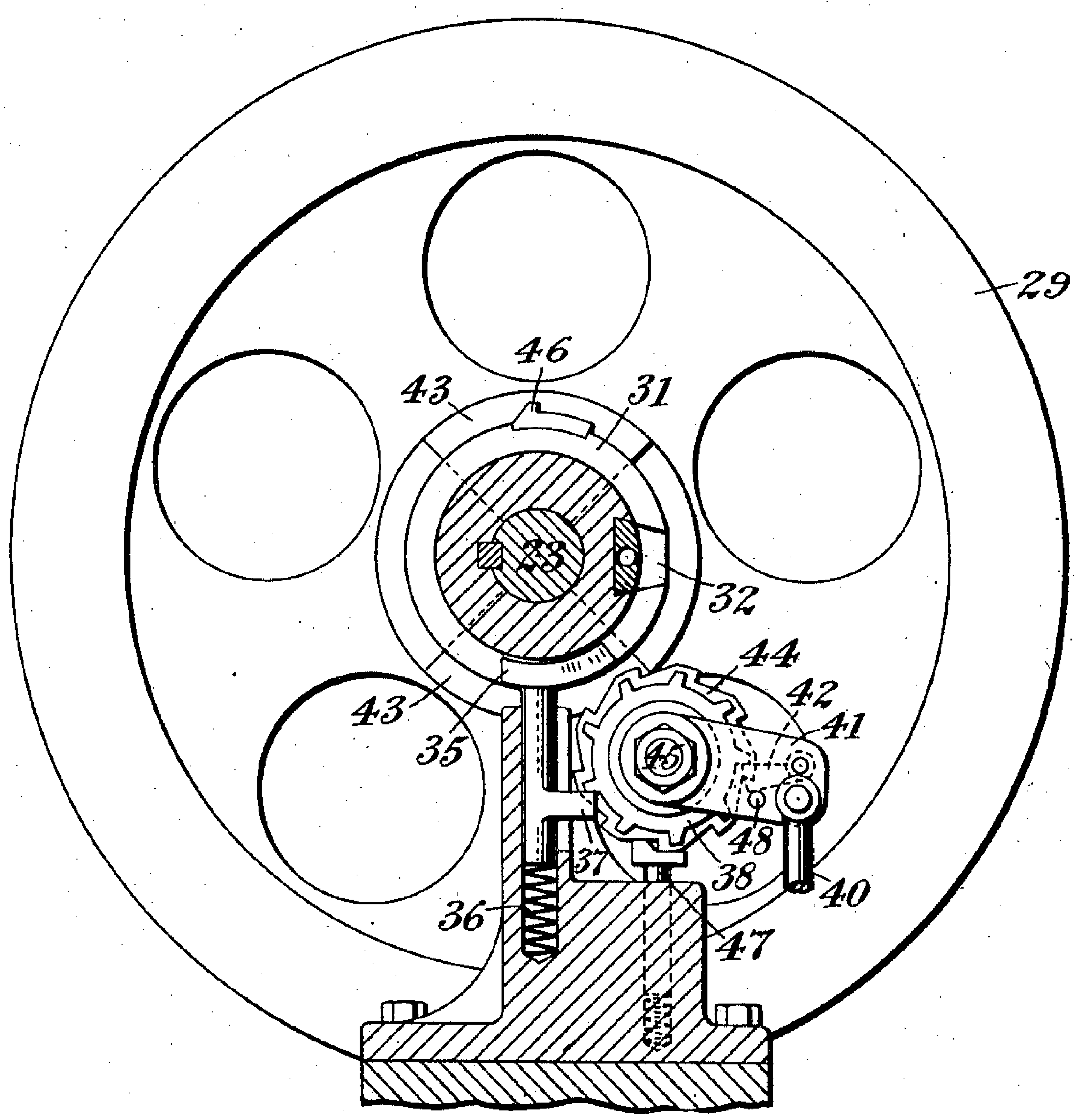
3 SHEETS—SHEET 3.

Fig. 8



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UNITED STATES PATENT OFFICE.

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BOTTLE-CAPPING MACHINE.

986,839. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed June 30, 1908. Serial No. 441,182.

To all whom it may concern:

Be it known that I, Herbert E. Marshall, a citizen of the United States, residing in the borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Bottle-Capping Machines, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to bottle-capping machines, and particularly to machines for applying caps having a downwardly extending flange, such machines employing rapidly spinning rollers to bend the lower part of the flange inward to form an inset ring gripping under a shoulder of the neck of the bottle. Many difficulties have been encountered with machines of this class, particularly the inability to satisfactorily compensate for the difference of the thickness of the heads of the bottle; the inability to readily and accurately adjust the bottle to the desired height and retain it at this height; and in that no reliable provision is made for adjusting the pressure on the top of the bottle and maintaining this pressure uniform. Furthermore, it frequently occurs that the caps are not satisfactorily applied, due to the fact that the spinning rollers engage the bottle-head too soon and do not spin about the flange of the cap sufficiently long to properly secure it to the bottle.

The object of my invention is to obviate these difficulties, and to this end, first, I employ a spring or other resilient means in connection with the spinning rollers which allows the proper movement of the rollers to enable them to always engage the shoulder of the neck of the bottle, regardless of the thickness thereof; secondly, I provide the vertical stem of the bottle-rest and its bearings with fine screw threads, which allow of ready and accurate vertical adjustment of the rest; third, I provide an adjusting screw to adjust the tension of the spring employed to exert pressure on the top of the bottle to hold the bottle firmly in position; and to avoid compressing the spring until it exerts undue pressure, I employ a cam roller in connection with the cam lever instead of connecting the lever directly with the spring. To bring the spinning rollers slowly into contact with the head of the bottle, I employ a cone, the angle of which is much less than of those commonly used; and whereas heretofore, in machines of this class, the bottle immediately begins to descend as soon as it reaches its highest limit, I provide means for holding the bottle-head in contact with the rollers during substantially one-sixth of the revolution of the pulley and shaft, thus allowing time for the cap to be securely fastened.

It is common in machines of this kind to employ a cam to raise and lower the plunger, as well as to employ various more complicated movements, but I have found that a crank-pin on the shaft acting directly in a slot in the plunger affords the simplest as well as the most satisfactory method of actuating the plunger.

Other objects and advantages of my bottle-capping machine will appear from the following description.

I shall now describe the means embodying my invention which are illustrated in the accompanying drawings and shall thereafter point out my invention in claims.

Figure 1 is a front elevation, partly in section, of my bottle-capping machine. Fig. 2 is a side elevation of the same, showing the bottle in position to be capped. Fig. 3 is a detail sectional elevation of the spinning head. Fig. 4 is an enlarged detail view of the spinning-roller showing the finger connected with it. Fig. 5 is a plan view of the same. Fig. 6 is an inverted plan of Fig. 3. Fig. 7 is a sectional plan of the parts shown in Fig. 3, taken on the line x—x, Fig. 3. Fig. 8 is a detail view of the clutch mechanism.

The capping mechanism consists of the spinning-rollers 1, the buffer 2, the pulley 3, and the hollow cone 4. The pulley 3, resting on the collar 11, is mounted to rotate on the buffer 2, and carries with it the spinning-rollers 1. These rollers have arms 5, the ends of which are split and are fastened to the lower ends of the studs 6 of the fingers 7 by means of screws 8, as shown in Figs. 4 and 5. The studs 6 extend through the bearings 9 in the pulley 3 and are surrounded in the bearings by springs 10, which bear against the shoulders of the studs. These springs allow of the necessary vertical play of the rollers to compensate for the difference in the thickness of bottle-heads. The fingers 7 are held in contact with the cone 4 by springs 12. It is evident, therefore, that as the buffer 2 is pressed upward in its bearings 13, the pulley 3 will be carried along by the collar 11, and, hence, as the fingers 7 mount the cone 4, they will be pressed outward against the tension of the springs 12 and the rollers 1 will be pressed inward accordingly.

During the capping process, the bottle stands on the bottle rest 14 against the gage 15, as shown in Fig. 2. The rest 14, which serves as a complementary pressure head, coöperative with the buffer 2, has a stem 16 which is very finely screw-threaded and screws into the top of the plunger 17. This method of mounting the bottle-rest permits the bottle to be easily and accurately adjusted toward and from the buffer and assures against the liability of the rest being pushed down by the pressure on the top of the bottle. The plunger 17, which slides in the bearings 18, these bearings being attached to the main column 19, is connected with the driving shaft by the pitman 20, the upper end of which is pivotally connected to the plunger by the pin 21.

To actuate the plunger 17, I employ a crank-and-slot movement. The crank-pin 22 on the end of the driving-shaft 23 enters the slot 24 formed in the pitman 20, and by its rotation raises and lowers the plunger. The slot 24 is shown as having its upper side curved to conform to the arc described by the crank-pin 22 for a distance equal substantially to 60 degrees. Consequently, after the plunger has reached its uppermost limit, it is held there during one-sixth of the rotation of the crank-pin, thus giving ample time for the cap to be well spun on to the bottle. The lower end of the pitman 20 is provided with a vertical slot 25, which slides upon the stud 26 between the collars 27 and 28, thus forming a guide for the pitman to keep it alined with the plunger.

The clutch mechanism, used to actuate the plunger as desired, forms no part of the present invention, but is fully shown, described and claimed in an application filed by me simultaneously herewith under Serial Number 441,183. The main driving-pulley 29 is mounted loosely on the shaft 23 between the collars 30 and 31, the latter being keyed on to the shaft. To connect the shaft 23 with the pulley, the sliding bolt 32 is provided, which slides laterally in the collar 31 and tends to be moved into engagement with the wings 43 of the pulley by the thrust-spring 33. The collar 31 has an annular groove 34 and the sliding bolt 32 has a corresponding groove. To withdraw the bolt from engagement with the driving-pulley, a wedge-member 35 is held in the groove 34 by the thrust-spring 36 acting on the end of the stem of the wedge, as shown in Fig. 8; in this position, the wedge is adapted to engage the groove in the bolt 32 as the shaft revolves and slide the bolt back until it disengages the wings of the pulley. The stem of the wedge-member has a finger 37, and to remove the wedge from the path of the sliding-bolt, a ratchet-wheel 38 is mounted on the stud 45 and the teeth of the wheel, as the wheel rotates, engage the finger 37 and carry it down, thus withdrawing the wedge from the groove 34. The ratchet wheel 38 is actuated by pressing down the treadle 39, which, acting through the arm 40 and the connecting plate 41, which is loosely mounted on the stud 45, raises the pawl 42 by means of the pin 48 on the plate 41 and hence rotates the ratchet wheel. This rotation is just sufficient to withdraw the wedge 35 from the groove 34 and still leave the tooth of the wheel 38 in slight engagement with the finger 37, so that only a little further rotation of the ratchet is needed to release the finger 37 and allow the wedge 35 to shoot back into its disengaging position in the groove 34. To provide this further rotation, another ratchet wheel 44 is keyed on to the stud 45 beside the wheel 38 and with its teeth in the path of a tooth 46 on the collar 31. As this tooth engages the ratchet wheel 44, the wheel is rotated, thus rotating the wheel 38 and releasing the wedge-member 35. To stop the ratchet wheels in the proper position, the locating pin 47 is spring supported in the frame and by its location and shape arrests the wheels just after the finger 37 is released, while at the same time the wheel 44 is so positioned as to have a tooth caught by the tooth 46 in its next rotation. The band-brake 56 stops the shaft immediately.

It is evident from the foregoing description that when the operator has once pressed the treadle down, thus withdrawing the wedge and allowing the bolt to slide into engagement with the pulley, the wedge is automatically released by the action of the tooth 46 and the clutch is disengaged irrespective of whether or not the operator releases the treadle. In other words, the plunger is actuated but once for one operation of the treadle, and to actuate the plunger again, the treadle must be first released and then pressed down again. Consequently, no harm can result from the operator forgetting or delaying to remove his foot from the treadle, and an absolute safeguard is provided against the injuries which frequently occur from carelessness in this respect.

It is necessary that the bottle be held in its place during the capping operation by a certain amount of pressure, and also that there be a yielding resistance after the bottle comes in contact with the buffer 2, and for this purpose the spiral spring 49 is employed. This spring is held horizontally in a box 50 on the top of the column 19 and bears against the cam-roll 51, the bearings of which are elongated to allow sufficient movement of the roll. To the top of the buffer 2 is linked the cam-rocker 52 which is fulcrumed between lugs 53 on the top of the column 19. The rocker 52 is provided at its free end with a cam face, which bears against the cam-roll 51; and as the buffer yields to the pressure as the bottle and plunger are carried upward, the linked end of the lever 52 is forced upward and the cam-face rolls down over the roll 51 forcing it inward against the spring 49. Inasmuch as the distance which the roll is forced inward by the lever is constant, the resistance of the spring is uniform. This resistance can be increased or diminished as desired by the screw 54 in the end of the spring-box opposite the cam-roll 51.

During the operation of the machine the spinning-head is kept constantly spinning by a belt which passes under the idler 55 on the back of the column 19 and thence around the pulley 3.

First, the bottle, with a cap set on, is placed on the rest 14 against the gage 15 and the rest is adjusted to the desired height, according to the height of the bottles to be capped. The treadle is then pressed down and, as the clutch engages the pulley 29, the shaft 23 is rotated and the crank-pin 22, acting in the slot 24, raises the plunger and the top of the bottle presses against the buffer 2 and forces it upward, thus elevating the spinning-head. The fingers 7 mount the cone 4 and the rollers 1 are forced in, as previously described, and spin on the cap in the well known manner. The angle of the cone 4 is sufficiently small to force the rollers very slowly into contact with the bottle-head as the spinning-head begins to rise, and the spinning operation is continued for a comparatively long time. The parts which raised the bottle now descend, and the operator removes the bottle and places another in its place. Meanwhile, having released the treadle, he again presses it down and the same operation is repeated.

It is obvious that various modifications may be made in the construction shown and above particularly described within the principle and scope of my invention.

I claim:

1. A bottle-capping machine comprising a capping-head and a relatively yieldable pressure member therein, a complementary pressure head, driving mechanism connected to cause the two heads to approach each other and produce pressure on a bottle between them, and a pressure-limiting device operated by the yielding of the capping-head pressure member under the pressure on the bottle, such device comprising a relatively movable coöperative cam and axially movable roller, and resilient means for opposing the axial movement of the roller.

2. A bottle-capping machine comprising a spinning head and a buffer, a reciprocating plunger to bring the bottle in contact with the buffer, a driving shaft, and means actuated thereby for reciprocating the plunger and holding it at its upward limit during the capping operation.

3. A bottle capping machine comprising a spinning head and a buffer, a reciprocating plunger to bring the bottle in contact with the buffer, adjustable means for holding the buffer in uniformly yielding contact with the bottle during the capping operation, a driving shaft, and means actuated thereby for reciprocating the plunger and holding it at its upward limit during the capping operation.

4. A bottle-capping machine comprising a spinning head and buffer, means for holding the buffer in uniformly yielding contact with the bottle during the capping operation, screw-adjusting means for varying the tension of the yielding holding means, and a reciprocating plunger to bring the bottle in contact with the buffer.

5. A bottle-capping machine comprising a spinning-head and buffer, a reciprocating plunger to bring the bottle in contact with the buffer, means for holding the buffer in uniformly yielding contact with the bottle during the capping operation, screw-adjusting means for varying the tension of the yielding holding means, a driving shaft, and means actuated thereby for reciprocating the plunger and holding it at its upward limit during the capping operation.

6. In a bottle-capping machine, a stationary pressure head, a reciprocating pressure head movable to and from the stationary pressure head, and driving mechanism connected to reciprocate the reciprocating head, such driving means including a coöperating pin and slot, a portion of the slot being shaped to hold the reciprocating pressure head at its limit of approach to the stationany pressure head during the capping operation.

7. A bottle-capping machine comprising a capping-head and a relatively yieldable pressure member therein, a complementary pressure head, driving mechanism connected to cause the two heads to approach each other and produce pressure on a bottle between them, and a pressure-limiting device operated by the yielding of the capping-head pressure member under the pressure on the bottle, such device comprising a rocking cam-faced lever, an axially movable roller adapted to roll against the cam face, and adjustable resilient means arranged to hold the roller in contact with the cam face.

8. A bottle-capping machine comprising a buffer, a rotary member mounted to rotate

in concentric relation to the buffer, a plurality of spinning rolls carried by the rotary member, resilient means for allowing axial play of the spinning rolls, a part for pressing the spinning rolls slowly in engaging relation to the buffer-head as the buffer is forced backward to retracted position, adjustable means for holding the buffer in uniformly yielding contact with the bottle during the capping operation comprising a rocking cam-faced lever operatively connected to the buffer, an axially movable roller adapted to contact with the cam face and resilient means arranged to hold the roller in contact with the cam face; and a reciprocating plunger to bring the bottle in contact with the buffer.

9. In a bottle-capping machine, a buffer and adjustable means for holding the buffer in uniformly yielding contact with the bottle during the capping operation, such means comprising a thrust spring, an adjusting screw to vary the tension thereof, a roller bearing against the spring, and a lever linked to the buffer and having a curved face bearing against the roller.

10. In a bottle-capping machine, a reciprocating plunger having a slot, and a crank adapted to enter the slot and actuate the plunger, a portion of the slot being curved to the arc of the crank whereby the plunger is held stationary during a substantial part of the rotation of the crank.

11. A bottle-capping machine comprising a spinning-head and buffer, adjustable means for holding the spinning-head in uniformly yielding contact with the bottle during the capping operation, a reciprocating plunger to bring the bottle in contact with the buffer, the plunger being provided with a slot, and a crank adapted to enter the slot and actuate the plunger, a portion of the slot being curved to the arc of the crank whereby the plunger is held stationary during a substantial part of the rotation of the crank.

12. In a bottle-capping machine, in combination with a yieldable pressure member, means for bringing the pressure member in contact with the bottle to produce pressure on the bottle, and means for holding the pressure members in uniformly yielding contact with the bottle during the capping operation, such means comprising a rocking cam-faced lever movable by the yielding of the pressure member, a roller mounted in movable bearings and adapted to roll against the cam face, and adjustable resilient means arranged to hold the roller in contact with the cam face.

13. In a bottle-capping machine, a stationary pressure head, a reciprocating pressure head movable to and from the stationary pressure head, and driving mechanism connected to reciprocate the reciprocating head, such driving means comprising a pitman having a slot therein and a driven crank member engaging in the slot, the slot having a portion curved to substantially the arc described by the crank member, whereby the reciprocating pressure head is held at its limit of approach to the stationary pressure head during that part of the rotation of the crank member.

In testimony whereof I have affixed my signature in presence of two witnesses.

HERBERT E. MARSHALL.

Witnesses:
VICTOR D. BORST,
WM. ASHLEY KELLY.