E. A. OLIVER.

BOTTLE CAPPING MACHINE.

APPLICATION FILED JAN. 24, 1919.

1,310,960. Patented July 22, 1919.

5 SHEETS—SHEET 1.

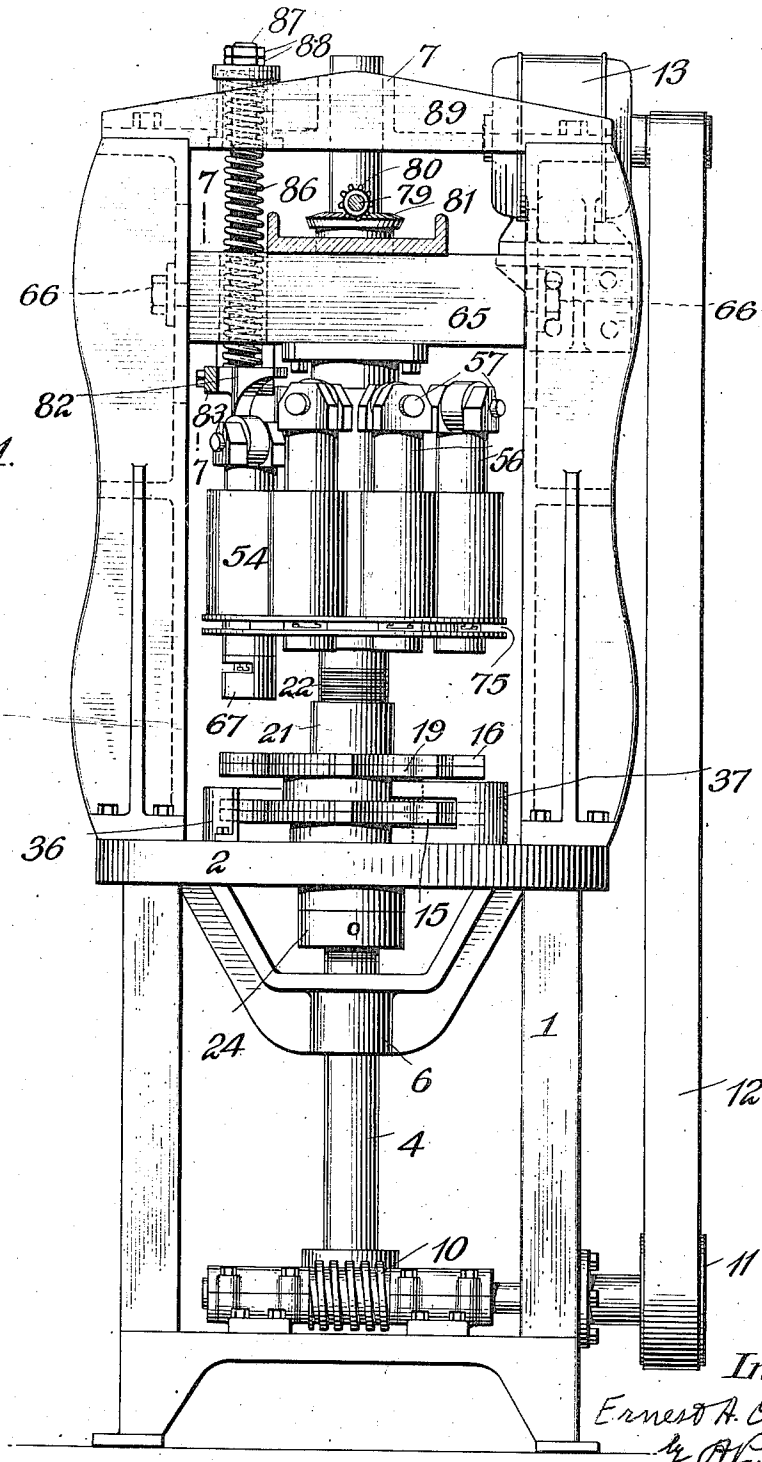

Fig. 1.

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5 SHEETS—SHEET 2.

Fig. 2.

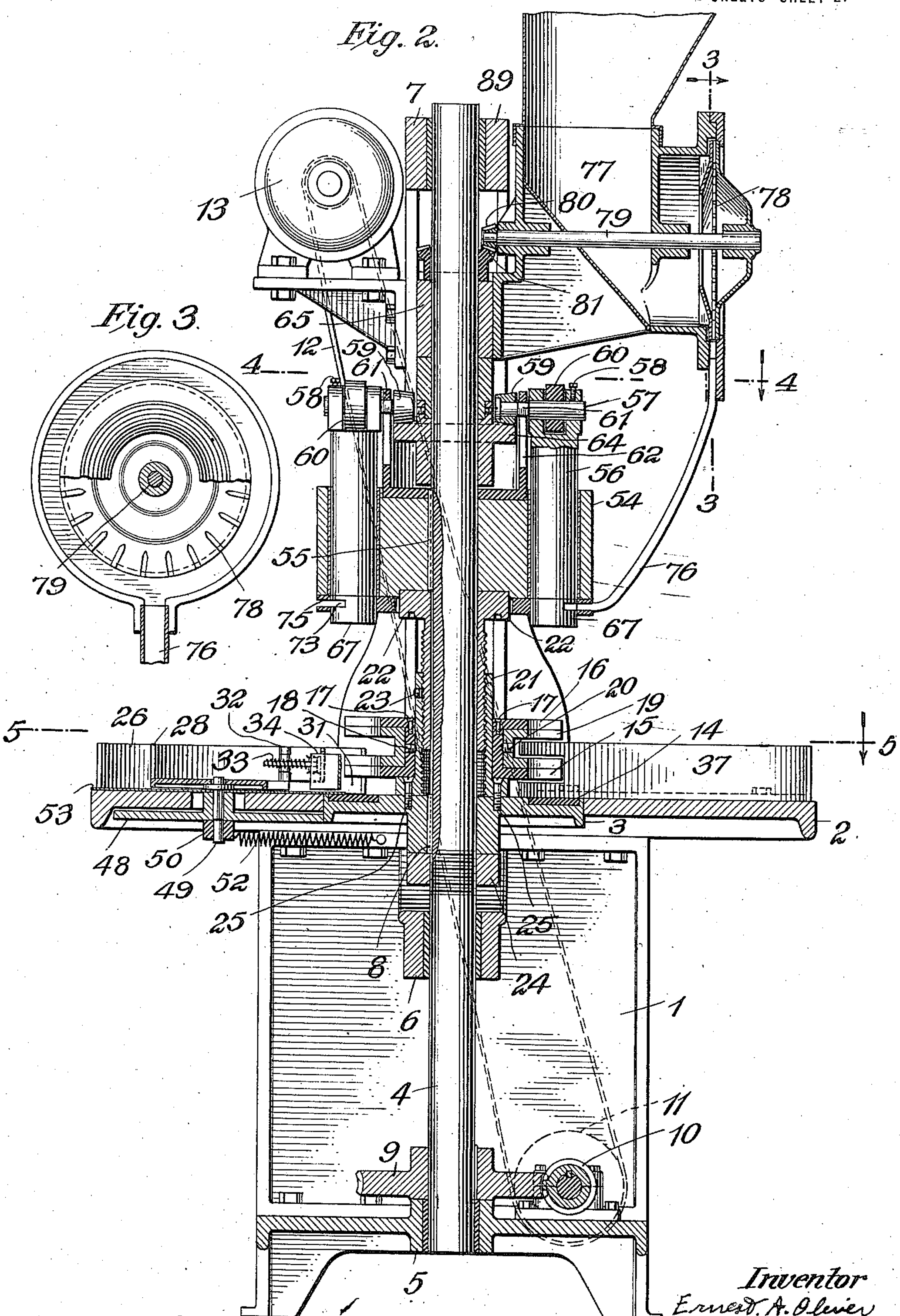

Fig. 3.

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5 SHEETS—SHEET 3.

Fig. 6

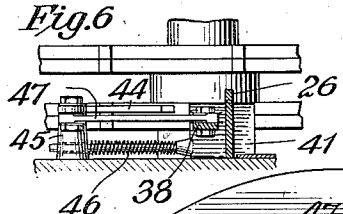
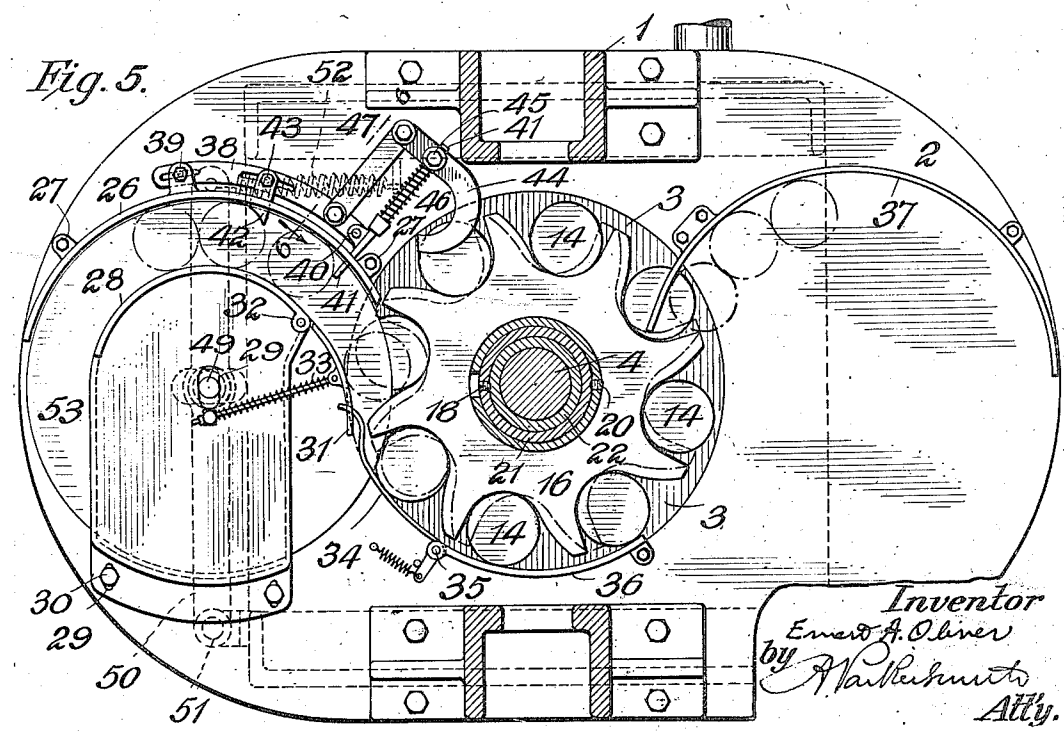


Fig. 4.

Fig. 5.



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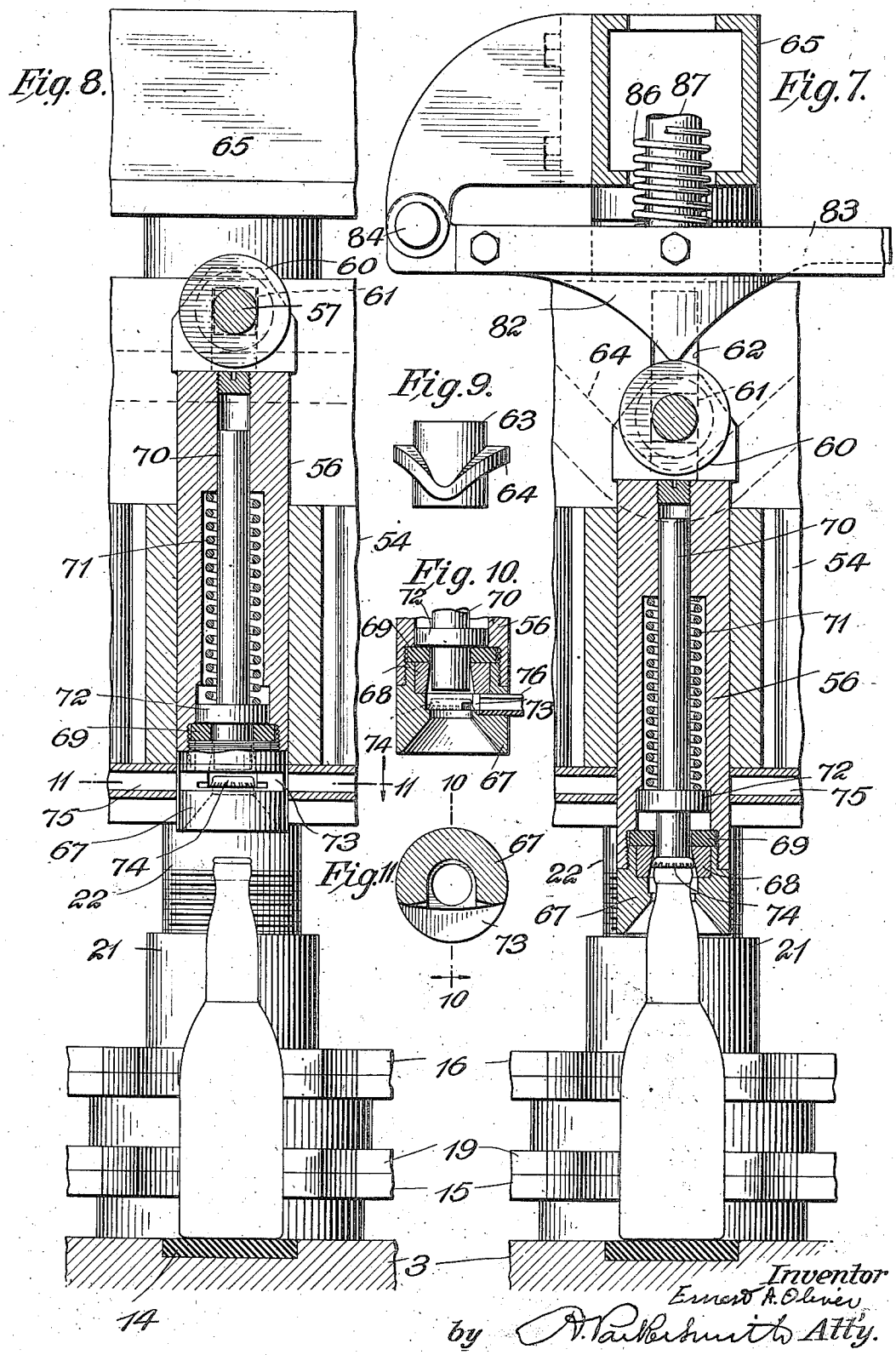
5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

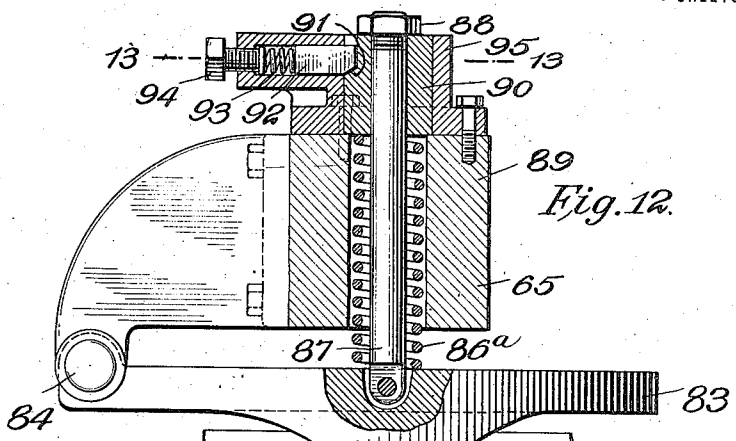

Fig. 12.

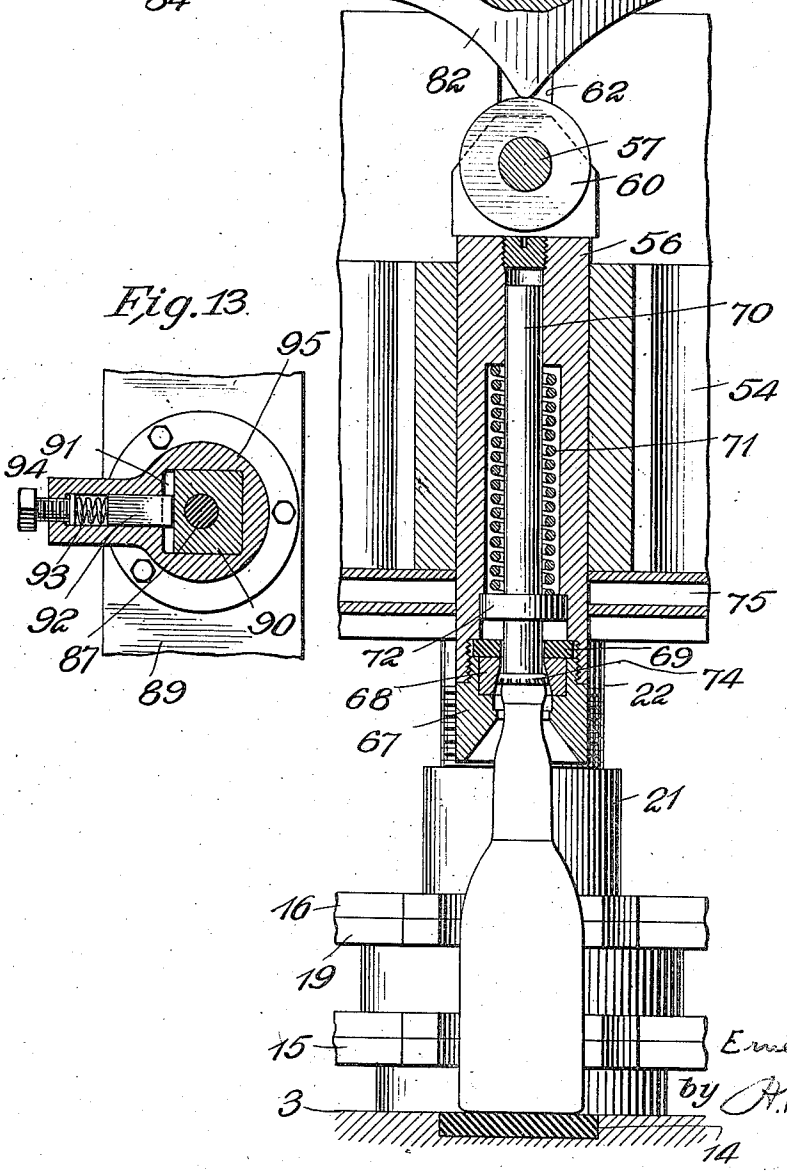

Fig. 13.

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UNITED STATES PATENT OFFICE.

ERNEST A. OLIVER, OF FLUSHING, NEW YORK, ASSIGNOR TO VICTORY BOTTLE CAPPING MACHINE CO., INC., A CORPORATION OF NEW YORK.

BOTTLE-CAPPING MACHINE.

1,310,960. Specification of Letters Patent. Patented July 22, 1919.

Application filed January 24, 1919. Serial No. 272,805.

To all whom it may concern:

Be it known that I, ERNEST A. OLIVER, a citizen of the United States of America, residing at Flushing, county of Queens, State of New York, have invented certain new and useful Improvements in Bottle-Capping Machines, of which the following is a specification.

My invention relates to that type of bottle capping machines in which a rotating table and star wheel present an advancing line of bottles one by one to the capping mechanism. In such machines it is necessary that the bottles shall be delivered to the star wheel feeding device at accurately determined moments of time, and that means shall be provided to relieving the cap-affixing plungers from any excessive pressure such as is ordinarily created when a plunger engages an unusually long bottle. My present invention meets these requirements and possesses other advantages which will be apparent to those skilled in the art. The best form of apparatus at present known to me embodying my invention is illustrated in the accompanying five sheets of drawings, in which:

Figure 1 is a front view of the machine with the cap feeding mechanism removed.

Fig. 2 is a vertical central section on line 2—2 of Fig. 4.

Fig. 3 is a detail view of the cap feeder in section and with parts broken away on the plane of lines 3—3 of Fig. 2.

Fig. 4 is a plan view on line 4—4 of Fig. 2.

Fig. 5 is a plan view on line 5—5 of Fig. 2.

Fig. 6 is a detail side elevation and vertical section on line 6—6 of Fig. 5, showing a part of the mechanism for operating the gate for the bottle feed.

Fig. 7 is an enlarged detail vertical section taken on line 7—7 of Fig. 1, showing a bottle in position and the capping plunger head forced down by action of the pressure cam, parts being broken away.

Fig. 8 is a similar view showing the plunger head up, while it is out of engagement with the pressure cam.

Fig. 9 is a detail of the plunger-lifting cam.

Fig. 10 is an axial section through the lower end of the plunger head shown in Fig. 8, taken on a plane at right angles to that of Fig. 8.

Fig. 11 is a cross section of the plunger head on line 11—11 of Fig. 8.

Fig. 12 is a view similar to Fig. 7, showing a modified plunger-relief mechanism, and

Fig. 13 is a cross section on line 13—13 of Fig. 12.

Throughout the drawings like reference characters indicate like parts. 1, represents the main frame of the machine on which is supported an approximately oval shaped table 2 (see Figs. 1, 4 and 5). This table has a rotating section 3, located in a cylindrical opening at the center of the main table and this rotating table section is mounted on a vertical shaft 4, journaled in bearings 5, 6 and 7, carried by the main frame, the bearing 5, being a step bearing to support the shaft. The rotating table section 3, is keyed to shaft 4, by key 8, and supported and vertically adjusted by means of the nut 24, threaded on shaft 4, and these parts are rotated by the worm wheel 9, on shaft 4, engaging the worm 10, which is part of the shaft of pulley 11. The pulley is driven by belt 12, from the electric motor 13, carried by the machine frame or, in any other convenient manner.

The rotating table 3, has a series of pads 14, 14, set in its upper surface equally spaced about the table center of the proper size to receive the bottoms of a series of bottles. These pads are made of some elastic material so as to yield slightly when downward pressure is applied to the bottles. Over the rotating table 3, is the usual star wheel employed in machines of this type which as shown is composed of a lower portion 15, and upper portion or plate 16, fastened to the sleeve on the lower portion by plate screws 17, 17, the latter being fastened to the supporting sleeve 21, by set screw 18. A second portion 19, of the star wheel consists of a ring with radial arms together constituting an outer section of the star wheel adjustable on the first described section and fastened in any particular adjustment by set screw 20. The sleeve 21, which is on shaft 4, has a flange on its lower end through which pass screws 25, for fasten-

ing the sleeve to the table section 3. By this construction the two sections of the star wheel may be adjusted angularly on the shaft so as to hold the bottles received between its arms over the pads 14, and the two parts of the star wheel can be angularly adjusted to closely hold the bottles of different diameters, as indicated in dotted lines in Fig. 5.

Above the table and star wheel is a rotating spider 54, which is keyed to the shaft 4, by a key 55, so as to rotate synchronously with the table and this spider is further supported by the upper section 22, of the vertical sleeve, which screws into the lower section 21, and is held in any desired position of adjustment therein by set screw 23.

For feeding bottles to the table 3, and star wheel, I employ a rotating carrier disk 53, which is mounted in and over an opening in the table 2, to the left of the rotating table section 3, looking at Figs. 4 and 5. A series of bottles is delivered to the outer edge of this carrier disk by any feed mechanism, not here shown, and pass in between the outer curved feed guide 26, and the inner curved feed guide 28. Outer guide 26, is fastened on the stationary part of table 2, as by bolts and lugs 27. The inner guide 28, consists of an oblong plate with a curved raised inner edge concentric with the outer guide 26, and the horizontal portion of this plate preferably has slots 29, which engage the pins 30, set in table 2, and vertical shaft 49, on which carrier disk 53, is mounted. As a result the inner guide 28, is adjustable toward and from outer guide 26, so as to accommodate bottles of different diameters. To the inner end of the vertical, curved portion of the inner guide 28, is pivoted the relief gate 31, by the hinge 32. This gate 31, is normally held in position by spring 33, which presses against a fixed stud on the horizontal portion of guide plate 28, shown in Figs. 2, 4 and 5. On the table 2, may be mounted a stationary guide 36, practically concentric with the edge of the rotating table 3, and the space between it and the relief gate 31, is then bridged by the spring controlled fingers 34, pivoted at 35. The foregoing parts constitute a set of adjustable guides, yielding at points for relief purposes, coöperating to deliver the series of bottles to the star wheel and rotating table 3, and accurately centering said bottles in the star wheel recesses. After the bottles have been capped they are discharged by the action of the ejector guide 37.

To accurately time the delivery of the bottles to the star wheel and rotating tables 3, I employ a double gate mechanism comprising a member 38, curved concentrically to the outer guide 26, having at one end a circumferentially adjustable pin and slot connection 39, to a lug on the guide 26, and at the other end pivoted at 40, to the gate finger 41. At an intermediate portion of its length the member 38, carries a clamp 42, adjustably mounted on it by means of the set screw and slot mechanism 43. This clamp 42, has a much broader end or working face than does the pointed gate or finger 41, and is curved approximately to the curvature of the bottle surface so that it will grasp and clamp a bottle against the guide 28, in any one of a number of positions within certain limits. On the other hand, the gate finger 41, pushes in front of any bottle which it may encounter during its stroke across the guide passage and accurately places that bottle (held against it by the friction of the carrier disk 53) in a definite position. The preferred means for operating this gate comprise a cam lever 44, pivoted at 45, on the table 2, and adapted to be struck and moved by the rotating star wheel. The other end of the cam lever is connected by link 47, to the member 38. The gate finger 41, is guided at one end in a slot in the outer guide 26, and at the other end by passing through a perforation in the stationary pivot 45. The gate finger and connected parts are normally forced into the guide passage, (when the cam lever 44 is disengaged from the star wheel) by the spring 46, coiled around the shank of finger 41, and confined between pivot 45 and the head of gate finger 41, as shown in Figs. 4, 5 and 6.

The carrier disk 53 is rotated by means of the driving disk 48, bearing against the circumference of rotating table section 3, the driving disk 48, and carrier disk 53, being both rigidly mounted on vertical shaft 49. Driving disk 48, is held in frictional contact with the rotating table 3, by reason of the fact that its supporting shaft 49, is mounted on a lever 50, pivoted to table 2, at 51, at one end, while the other end is pulled toward the rotating table by the tension spring 52.

The rotating spider 54, carries a series of capping plunger heads 56, which are vertically movable in the spider. These plungers have transverse stub shafts set in their upper ends and held therein by set screws 58. These shafts are arranged radially to the main shaft 4, and on their inner ends carry beveled anti-friction rollers 59, resting on stationary beveled cam 64, which is carried by casting 63, from the cross head 65, which is vertically adjustable in the main frame by means of the bolt and set screw attachments 66, to said main frame. These short shafts 57, also carry antifriction cylindrical rollers 60, and have intermediate flattened sections 61, which move up and down in slots 62, in an upwardly projecting sleeve from spider 54. As a result the capping plunger heads 56, are prevented from rotating on their axes and the beveled anti-

friction rollers 59, are maintained in proper relation to the cam 64, on which they rest, thereby supporting the capping plunger heads. The lower portions of these plunger heads 56, are composed of internally cored, outwardly flaring guide sections 67, which are screwed into the lower ends of the plungers and thereby confine dies 68, between them and supporting washers 69, seated against shoulders in the internal recesses of the plungers. In these internal recesses and above the dies are mounted ejector plungers 70, normally forced down by springs 71, pocketed in the recesses of the plungers 56 and bearing against the collars 72, on ejector plungers 70.

73, is a side slot in the guide section 67, through which a bottle cap 74, may pass from the cap chute 76, which engages the circumferential slot 75, in the spider 54, and registers with the slot 73, in each capping plunger head as it comes opposite. The means for feeding bottle caps to this chute 76, comprise the hopper 77, supported on the upper portion of the machine, and having in its lower portion a rotating hollow cap-feeding wheel 78, supported on horizontal shaft 79, which is rotated by means of beveled pinion 80, meshing with bevel gear 81, on shaft 4. By the operation of this mechanism the rotation of the table and main shaft 4, conveys motion to the hollow cap-feeding wheel 78, which tumbles the caps over until they drop into the radial spaces shown in Fig. 3, in the right position to drop down the chute 76, when coming opposite thereto, so that they are delivered by this chute to the plunger heads 56 right side up.

As the machine operates, the plunger heads 56, are held up by reason of the beveled rollers 59, running on the higher portions of the cam 64, until any particular plunger approaches the pressure cam 82. The beveled roller then runs down into the depression in cam 64, shown in Fig. 9, so that the die 68, descends around the bottle mouth and forces the cap over the bottle mouth, as shown in Figs. 7 and 12, the die 68 crimping the edges of the cap down around the bottle mouth in the well known way. Normally this stage of operations occurs before the beveled roller reaches the bottom of the depression in the cam 64, and thereupon the pressure cam 82, comes into action and positively drives the plunger head down a little farther and the collar 72, on ejector plunger 70, having come to a bearing on a second shoulder on the interior of plunger 56, the top of the cap is simultaneously flattened out by the end of the said ejector plunger. Further motion of the table and spider 54, carries the whole assemblage of parts free from pressure cam 82, the plunger head 56, is lifted by cam 64, and the ejector spring 71, coming into action, drives down the ejector plunger 70, which clears the capped bottles from engagement with the die 68, so that the bottle remains free upon the rotating table 3, and is carried around until it engages the ejector guide 37, by which it is removed from the rotating section of the table.

Obviously to avoid possible breakage of bottles the downward pressure of cam 82, must be a yielding pressure, although a considerable one. In the construction shown in Figs. 1, 7 and 8, this pressure is primarily produced by the weight 85, on cam lever 83, said lever being pivoted at 84, so that it is free to rise and fall except as controlled by this weight or by the compression spring 86, which bears upon the top of the lever and is confined at its upper end by bearing upon the upper cross head 89, in a pocket of which the spring is seated. 87, is a tie-rod pivoted to the lever 83, movable through the cross head 89, and limited as to its downward movement by the adjustable lock nuts 88 (see Fig. 1). This tie-rod holds the cam lever 83, in its normal position when the same is free, but permits it to rise slightly when one of the rollers 60, on top of a capping plunger head comes under it and engages the cam 82, and tends to lift it with a force greater than the downward pressure of weight 85. The action of the described mechanism therefore is such that when a bottle of normal length comes under the cam 82, the weight 85, holds said cam down in operative position with sufficient force to produce the cap-crimping action above described, but if a bottle longer than usual is in position so that the cam 82, is lifted in spite of the holding action of the weight 85, the spring 86 yields, but with a constantly increasing resistance under compression, and the prompt return of the cam to normal position after the bottle passes is thereby insured. In the modification shown in Figs. 12 and 13, the weight 85, is omitted and the spring 86^a is made stronger than 86, having a resisting power under full compression equal to the resisting power of weight 85, and spring 86, or greater, but the necessary relief of the cam to prevent breaking of a long bottle is secured by means of the beveled friction latch or key 92, which is mounted in a horizontal slot in a housing 89, on the upper cross head and engages a beveled face or shoulder 91, on the side of a square trip-sleeve 90, which sleeve is mounted in a vertical passageway of square cross section in the housing 95, carried by cross head 89, and serves as the backing member or rest for the spring 86^a. Normally the beveled latch 92 is held in engagement in the position shown in Fig. 12, by means of the compression spring 93, which may be regulated by the adjusting screw 94, the spring being

held between the latch and the adjusting screw. When excess pressure is applied to spring 86ª above a predetermined amount, which is below the breaking pressure on a bottle, the latch spring 93, will yield and permit the latch 92, to slide back releasing the supporting sleeve 90, so that the same may jump upward and relieve the pressure on the cam 82.

The general method of operation of the machine is as follows: Bottles fed to the rotating friction disk pass by reason of its rotation between guides 26 and 28 and are stopped one by one by the gate. The gate finger holds each successive bottle in a position such that when the gate is withdrawn, by operation of the star wheel striking the cam lever coöperating with it, the bottle will move forward again just in time to fit into one of the star wheel recesses. At the same time the next bottle in line, which has been held by the clamp, is released from a position which enables it to travel forward to take its position against the gate finger before said finger is again withdrawn. The rotating table section 3, the star wheel and the spider 54, rotate continuously, a capping head 56, being held above each bottle held in the star wheel. Each capping head, after passing the cap chute, has a cap in it held over, in proper position, any bottle beneath it. Each capping head so equipped and having a bottle beneath it comes in its order under pressure cam 82, and is driven down to crimp the cap on the bottle as previously explained, the supporting cam having a depression in it to permit of this. As each head passes under and clears the pressure cam 82, it is lifted by the supporting cam, frees itself from the capped bottle, and passes on to the cap chute to receive another cap. The capped bottle remaining on the rotating table section 3, is carried around until it strikes the ejector guide by which it is led off on to the stationary table 2, and removed by an attendant.

Having described my invention, I claim:

1. In a bottle capping machine the combination, with the main frame, of a rotating table for carrying the bottles, a rotating spider located above the table, a series of vertically movable plunger heads mounted in said spider one over each bottle on the table, a stationary pressure cam located above the head and adapted to be engaged successively by the plunger heads, as the spider rotates, yielding means for holding said cam down in engagement with each plunger head coming under it, whereby said plunger head is forced down upon the bottle beneath, means for elevating the plungers after they are freed from the pressure cam, and means for synchronously rotating the table and spider and means for feeding a cap to each bottle carried by the table and holding same in position on the bottle during the downward motion of the plunger head above the bottle.

2. In a bottle capping machine the combination, with means for placing a cap on each bottle, of a plunger head for forcing the cap on the bottle, means for raising the plunger a cam adapted to engage the plunger head and force it down on the bottle, a spring backing for the cam, a movable member against which the spring rests, and a spring-held latch engaging said movable member, the engaging surfaces of the latch and member being so inclined that with a given spring pressure behind the latch it will not be forced back and thereby release the spring backing for the cam until a predetermined amount of pressure is exerted on the cam by the plunger head.

3. In a bottle capping machine, a rotating bottle capping mechanism combined with a bottle feeding apparatus comprising a pair of vertical guides, continuously moving friction means for advancing a series of bottles along between said guides, and a double stop apparatus for regulating the delivery of such bottles to the capping machine at regular intervals of time, which stop apparatus consists of a pointed gate projecting laterally through one guide near the delivery end and adapted to hold a bottle in a definite position against the advancing friction means, a broader faced clamp projecting through the guide and adapted to hold the next bottle in whatever position it may be caught, within limits, and means for simultaneously projecting said gates through the guide synchronously with the movements of the bottle capping mechanism.

4. A combination such as set forth in claim 3 in which the last named reciprocating means comprise a spring forcing the gates into the guide passage, and a cam lever operated by the bottle capping mechanism to retract the gates.

5. A combination such as set forth in claim 3, in which the means for reciprocating the gate and clamp comprise a fixed pin, a member outside the perforated guide pivoted at one end to the reciprocating gate, having a sliding connection with the fixed pin at its other end, and having the clamp adjustably mounted on it at an intermediate point, a spring normally tending to force the gate and clamp through the guide into the pathway of the bottles between the guides, and mechanism connected to the said member and periodically operated by the bottle capping mechanism to withdraw the gate and clamp against the opposition of the spring, and release them to be subsequently returned by the action of the spring whereby any bottle held by the gate will be released at the exact moment and distance to permit the friction advancing means to properly

deliver it to the bottle capping device at the proper time, and the next bottle in line will be released to advance up to engagement with the returning gate.

6. A structure such as set forth in claim 1, combined with a stationary supporting cam located centrally of the spider and having a depressed portion registering with the pressure cam, and a projection from each capping head engaging said supporting cam, whereby the capping heads are held up by the supporting cam until one comes under the pressure cam, and is then permitted thereby to drop down and place its contained cap on the bottle beneath preparatory to the crimping operation thereupon effected by the pressure cam.

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