985,141.

A. CALLESON.

BOTTLE CAPPING MACHINE.

APPLICATION FILED AUG. 31, 1908.

Patented Feb. 28, 1911.

4 SHEETS—SHEET 1.

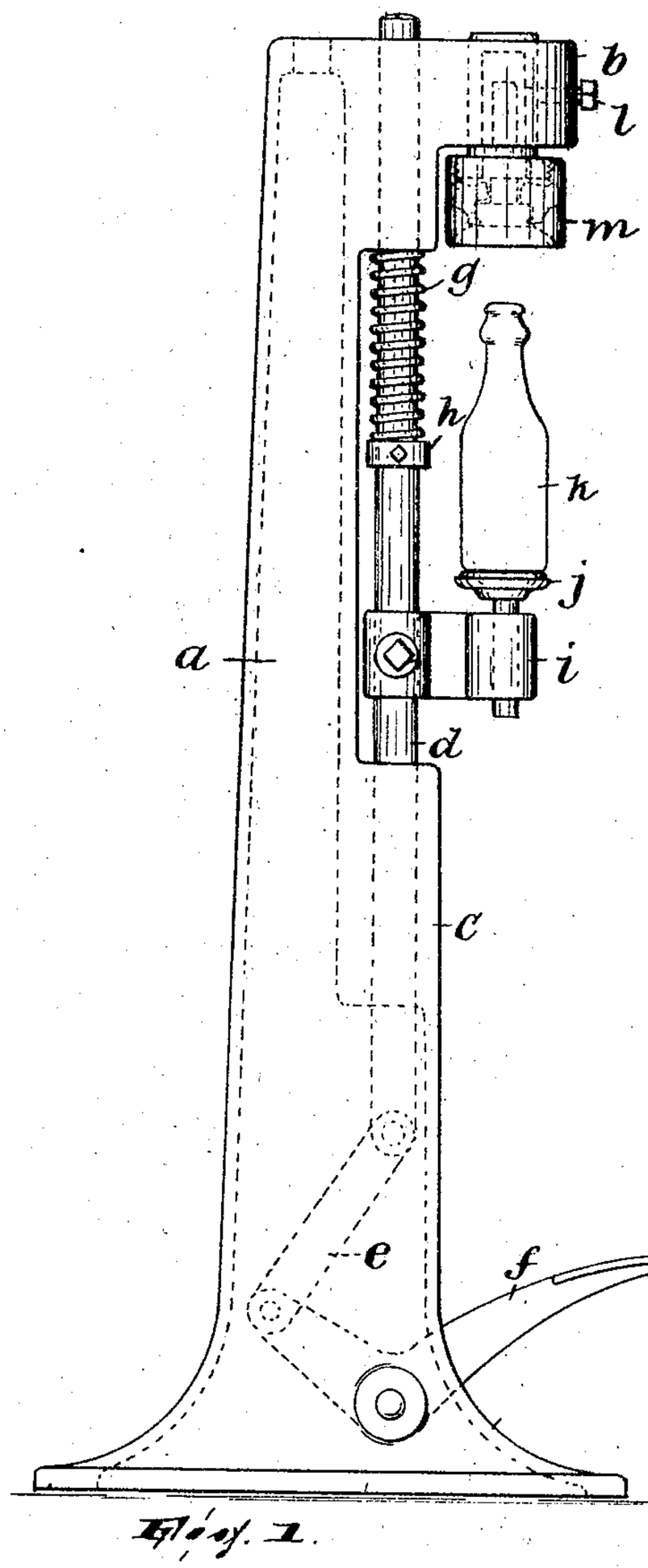

Fig. 1.

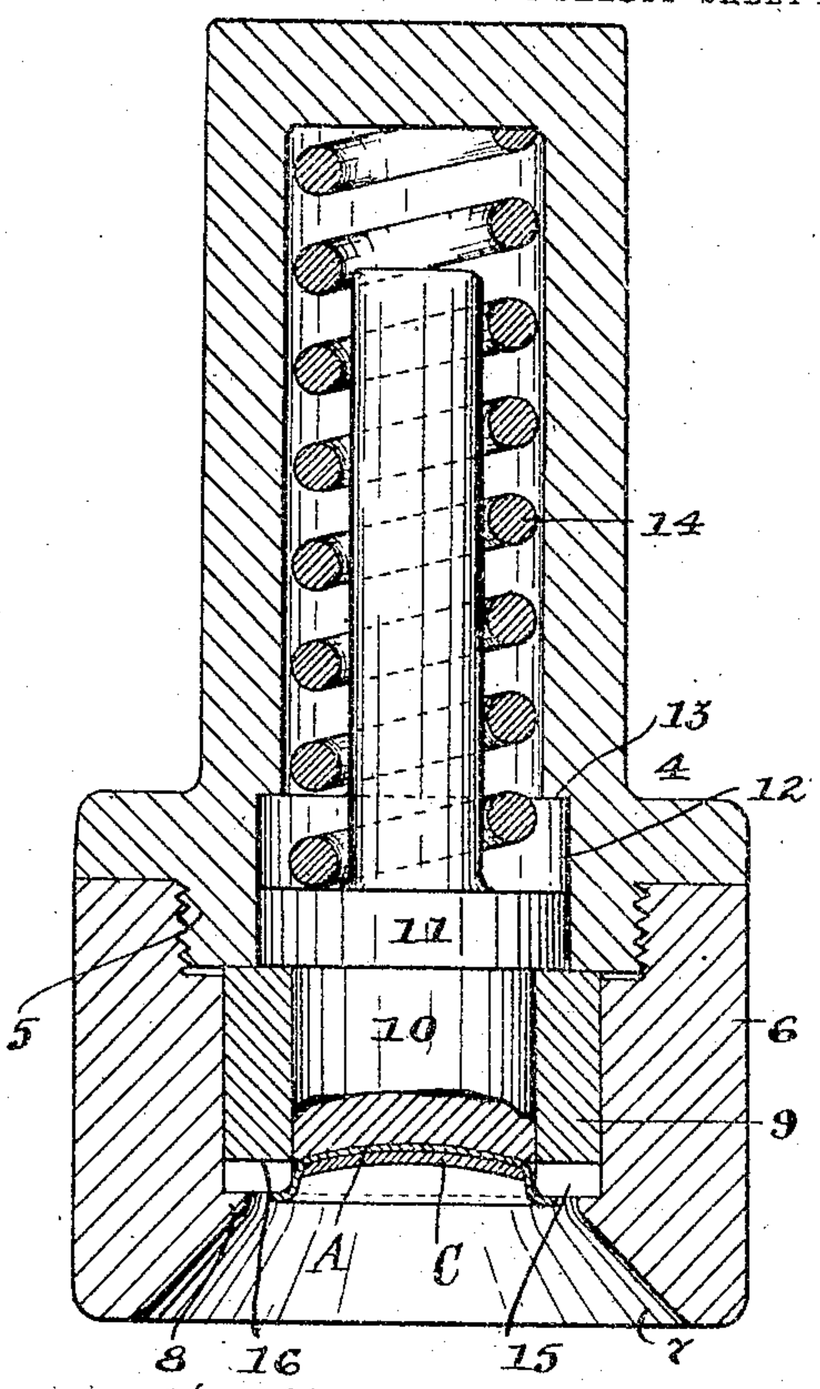

Fig. 7.

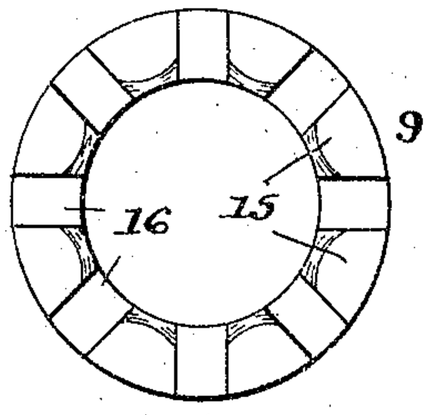

Fig. 8.

WITNESSES

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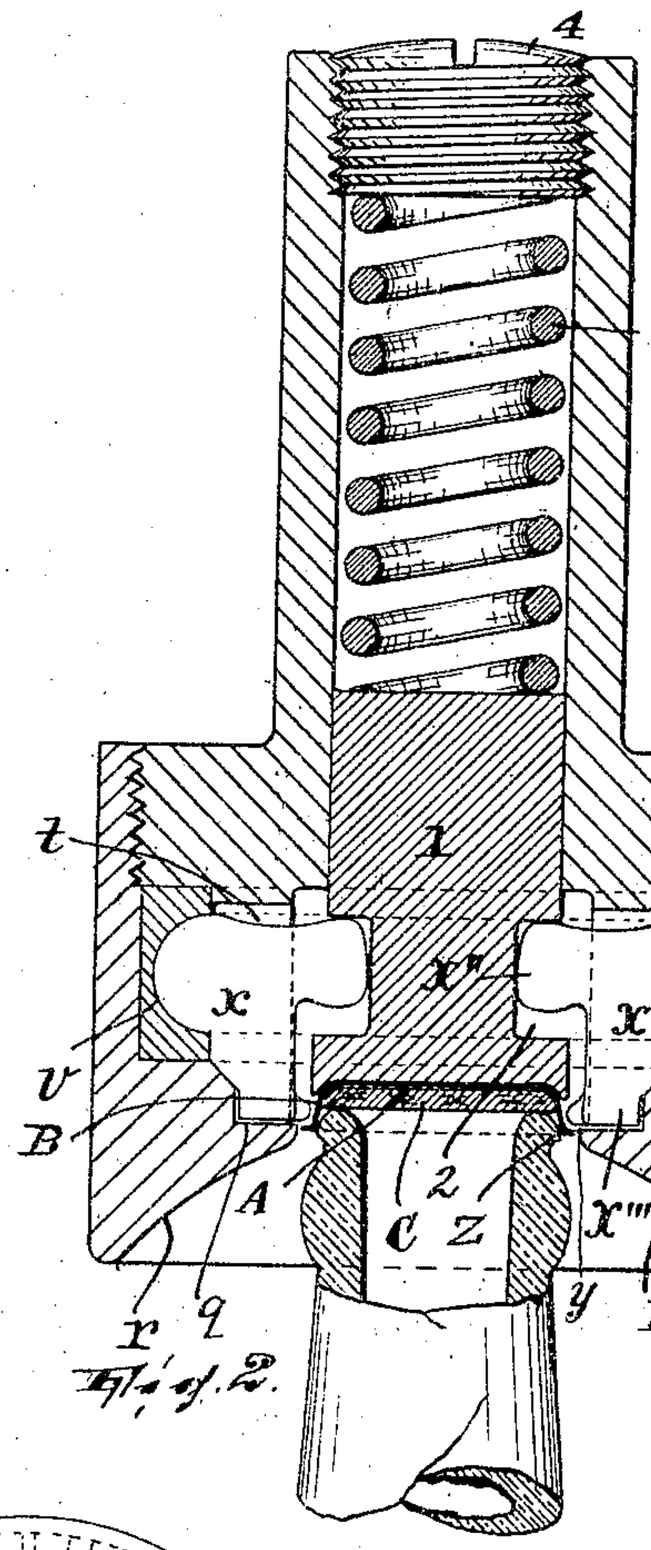

Fig. 2.

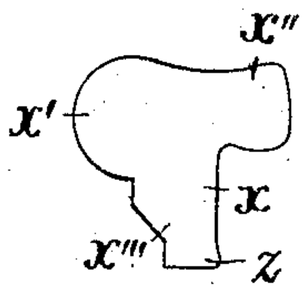

Fig. 5.

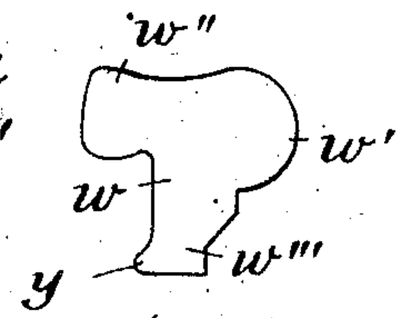

Fig. 6.

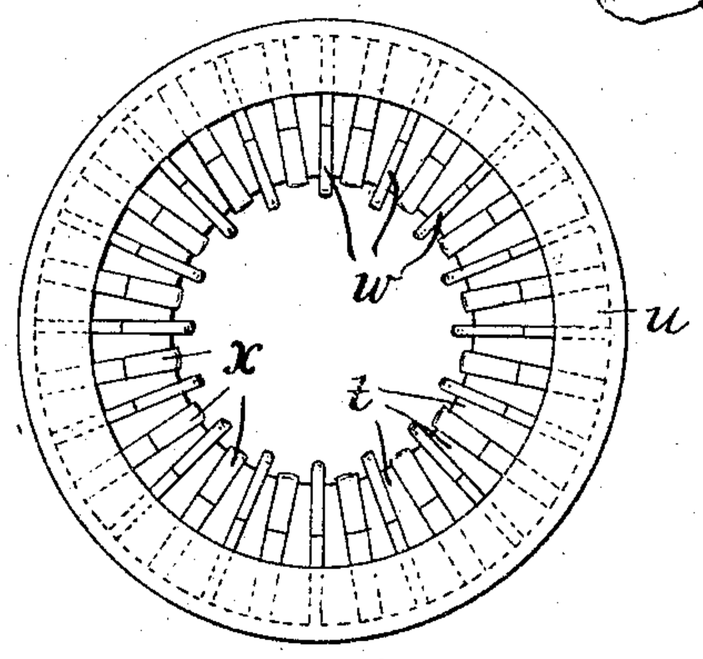

Fig. 3

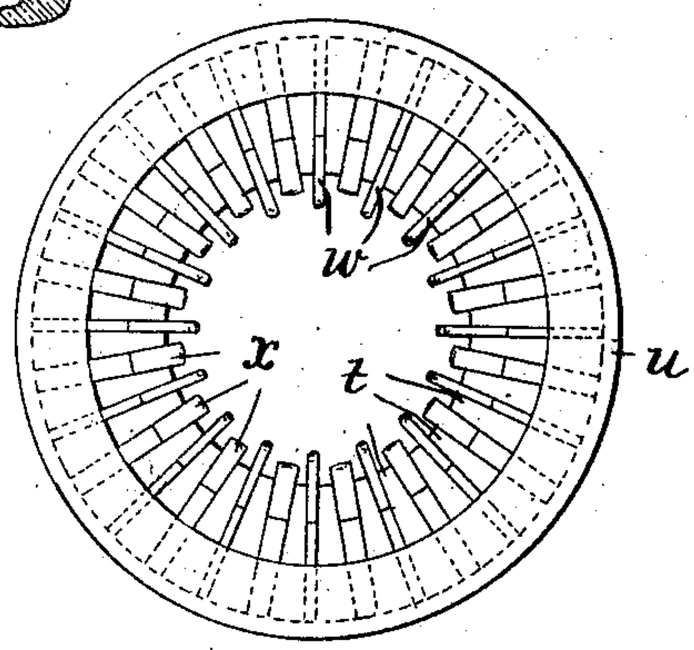

Fig. 4.

WITNESSES

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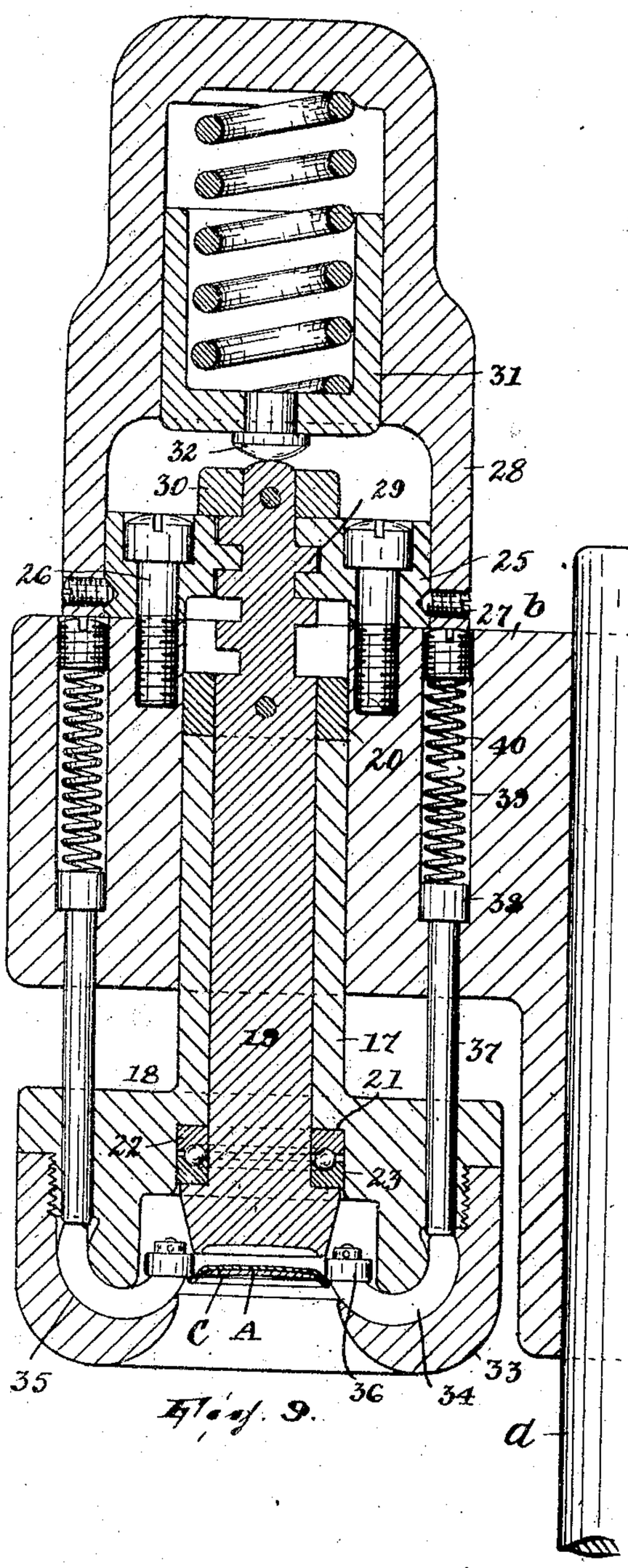

Fig. 9.

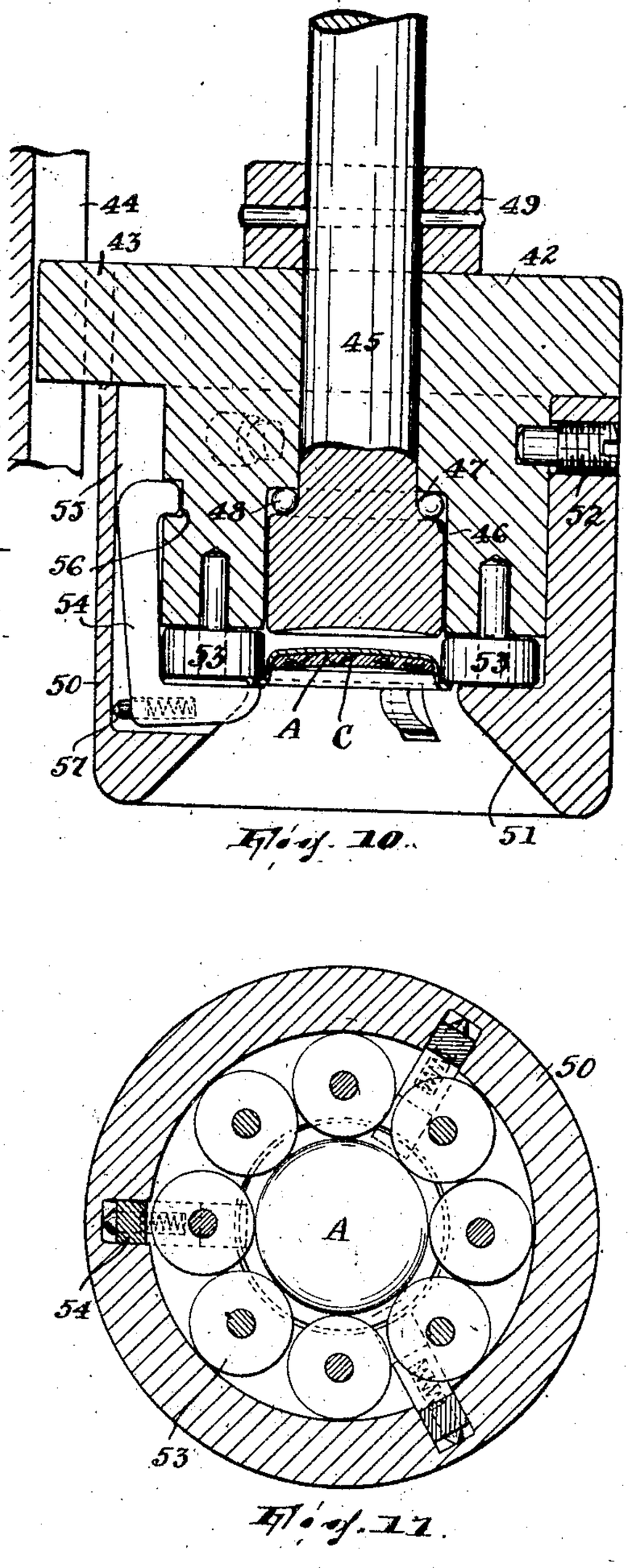

Fig. 10.

Fig. 11.

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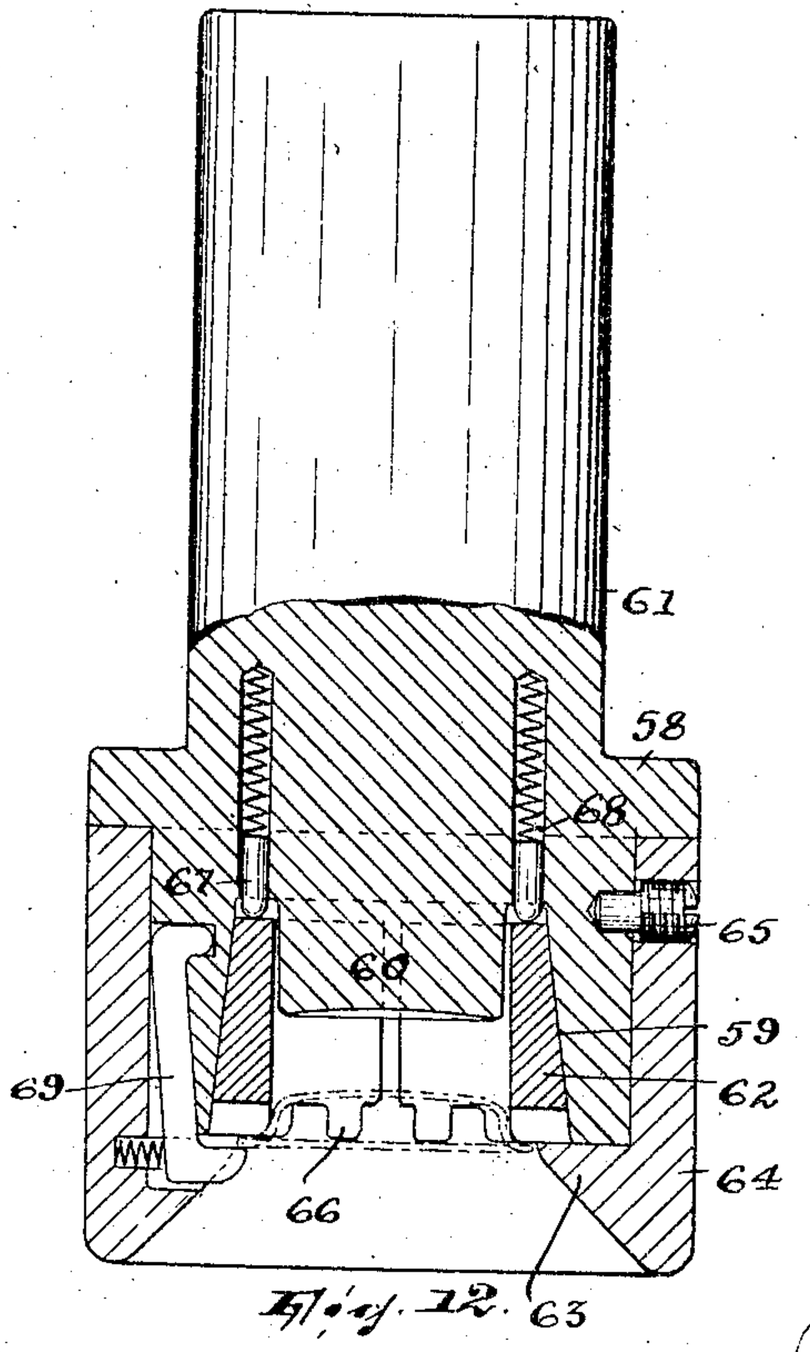

Fig. 12.

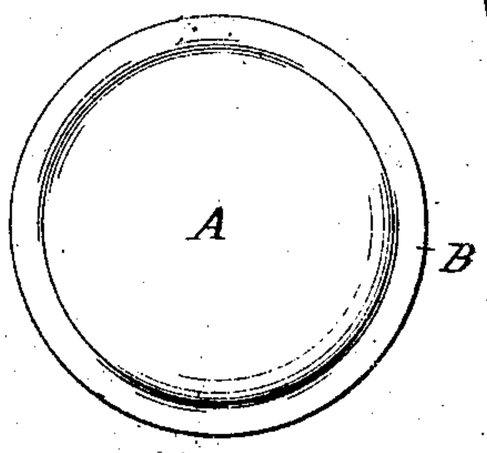

Fig. 14.

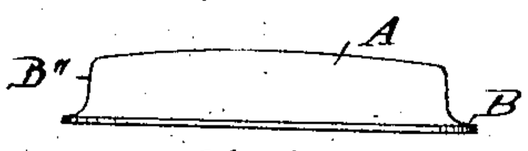

Fig. 15.

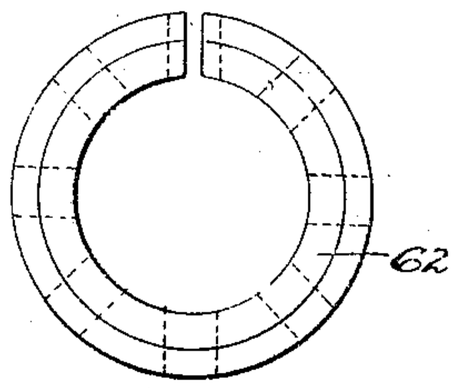

Fig. 13.

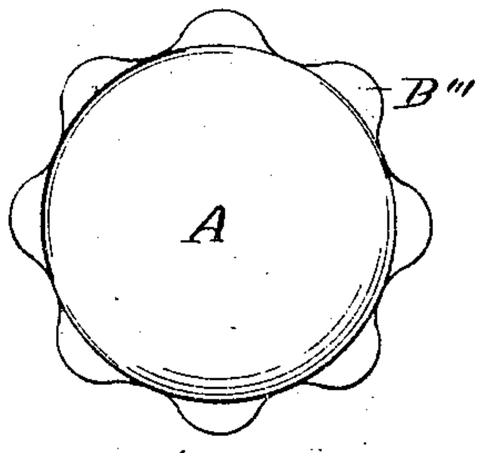

Fig. 16.

Fig. 17.

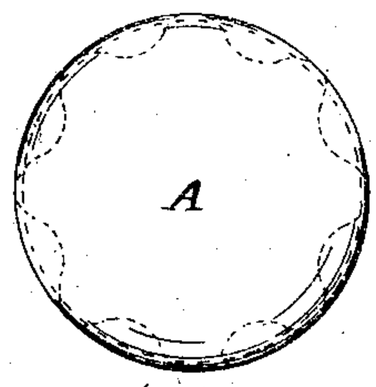

Fig. 18.

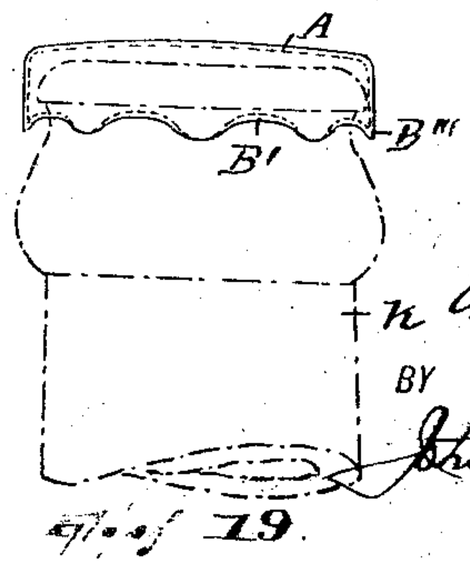

Fig. 19.

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UNITED STATES PATENT OFFICE.

AMOS CALLESON, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO BENJAMIN ADRIANCE, OF BROOKLYN, NEW YORK.

BOTTLE-CAPPING MACHINE.

985,141. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed August 31, 1908. Serial No. 450,929.

To all whom it may concern:

Be it known that I, AMOS CALLESON, a citizen of the United States, residing in Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Bottle-Capping Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to means for applying caps to bottles, jars and the like and it consists in certain improvements whereby the caps are made to be secured in sealing relation to the container in substantially the following way: The cap, in superimposed position on the container, is first so acted upon that spaced portions of the edge part of its flange are first bent downwardly, said edge part initially standing more or less in a laterally projecting relation whereby to be conveniently impinged by the bending means under a vertical thrust, whereupon the remaining or intermediate spaced portions are bent downwardly, the result being the inward displacement of the portions first bent down and their consequently assuming a locking engagement with the shoulder on the container. An advantage of this manner of applying caps to bottles and the like is that the edge part, made sinuous after the first bending-down operation, possesses resilience and elasticity so that, although the movement of the bending tool is constant and, particularly in the case of plain uncorrugated flanges, might otherwise break the heads of the containers or fail to secure a proper locking engagement of the caps therewith where the heads varied appreciably in diameter, the yield thus afforded compensates for such irregularities of diameter in the container heads and makes a substantial sealing, without danger of breaking the heads, possible.

My invention consists, briefly stated, in a cap-bending head, or sealing-head, having an open cap contracting cavity of less normal diameter than the portion of the cap to be thereby operated upon when forced thereinto, the cap-surrounding portion of said cavity having its internal diameter in substantially its lowest part approximately as little as any relatively higher internal diameter thereof and being composed of cap-edge bending devices spaced from each other. A sealing-head, thus constructed, is adapted to perform what I hereinafter term the "first operation" in the attaching of a cap with such effect on the cap that the portions of the edge of the latter first bent down (*i. e.*, by the spaced devices) may each assume a position approximating a right angle with relation to their original position; although it should be understood that such a sealing head would not be incomplete for performing not only the first but the second operation, since by properly adapting the spaced devices to the purpose they may be made to ride over the portions of the cap not first bent down (and standing between them after the first operation) upon imparting rotary movement either to the sealing-head or to the bottle and cap, as will hereinafter appear.

The invention will be found fully illustrated in the accompanying drawings, wherein,

Figure 1 is a side view of a machine embracing one type of a mechanism constructed in accordance with this invention; Fig. 2 is a vertical sectional view, on a larger scale, of the essential parts of the improved mechanism as comprised in Fig. 1; Figs. 3 and 4 are underneath views of what is shown in Fig. 2, the first showing the working parts of the mechanism expanded and the second showing them contracted and both omitting a certain sleeve *o;* Figs. 5 and 6 show details of said mechanism; Fig. 7 shows another form of said mechanism in vertical section; Fig. 8 is an underneath view of the cap bending tool shown in Fig. 7; Fig. 9 shows still another form of said mechanism in vertical section; Fig. 10 shows a slight modification of what is seen in Fig. 9, the view being also a vertical sectional one; Fig. 11 is a horizontal sectional view of what is shown in Fig. 10 taken in a plane coincident with that of its bending rolls; Fig. 12 is a vertical sectional view of still another form of said mechanism; Fig. 13 is an underneath view of the cap bending tool shown in Fig. 12; Figs. 14 and 15 are plan and side views of the cap before, and Figs. 16 and 17 similar views of the cap after, the first bending operation; and, Figs. 18 and 19

are plan and side views of the cap in its finished form, Fig. 19 showing the bottle head in dotted outline.

a is a pedestal having a head *b* and base *c* in which slides vertically a shaft *d* whose weight acts through a link *e* to raise the free end of the operating treadle *f*; to cushion the upward thrust of this shaft, a spring *g* is coiled about it and interposed between head *b* and a collar *h* on shaft *d*.

i is a bracket on shaft *d* and *j* a bottle support which may be revoluble, for instance, where such a closing means as that shown in Figs. 9, 10 and 11 is used.

k is the bottle.

A set-screw *l* secures a socket *m*, open at the bottom, in the head *b* in alinement with support *j*, said socket having a threaded flange *n* onto which is screwed a sleeve *o* having its lower end provided with an enlargement *p* formed internally thereof and having the internal rabbet *q* and the mouth *r*; the lower cylindrical end of the socket projects into the rabbet of the sleeve and is sawed radially to form the ribs *t* serving to maintain in proper spaced relation the bending devices, to be described. In the sleeve, fixed between its enlargement and the flange *n* of the socket, is arranged the annular bearing-piece *u*, the same having an internal endless groove *v*.

w designates the bending devices of one set and *x* the bending devices of the other. Referring to Figs. 5 and 6 it will be seen that the bending devices are alike except with respect to their cap-engaging portions; each is in the form of a flat lever of the first class having the curved-edge fulcrum portion *x'* (*w'*) adapted to fit the groove *v*, its power end-portion *x''* (*w''*) projecting laterally and its working end *x'''* (*w'''*) projecting downwardly. The working or cap-engaging end-portions of said levers are formed with the toes *y* and *z*, that (*y*) of the levers *w* being slightly more prominent than that (*z*) of the others. These bending devices are arranged in the slits existing between the ribs *t* in the manner shown in Fig. 2, their toes projecting inwardly; in their normal positions they abut against the enlargement *p*, as shown.

A plunger 1 is arranged to slide vertically in the socket, its lower end-portion having the annular groove 2 and projecting into the sleeve; the groove receives the end-portions *w''* *x''* of the bending devices and has such width as to allow some vertical movement of the plunger without its actuating the bending devices. The plunger normally holds the bending devices in the position shown, being under the influence of a compressed spring 3 interposed between the plunger and an adjusting screw 4 fitted into the top of the socket. The lower end of the plunger is recessed, as shown, to receive a bottle cap A and in order to hold the cap in position until the latter is impinged by the bottle head, the plunger may be magnetized.

In the operation, a bottle *k* is placed on support *j* and a cap A being introduced into mouth *r* and there held by the magnetism of the plunger 1 the treadle *f* is depressed, thereby raising the bottle until its mouth impinges against the cork lining disk C and, said disk being annularly compressed by the bottle mouth to form therewith the seal and hence allowing some incidental downward displacement of the cap relatively to the bottle, raises the cap, causing its flange B to be forced past the toes *y* of levers *w*; at this time both sets of levers *w* and *x* are held against outward movement by abutting against the enlargement *p* but, as only the toes of the former engage the cap flange, the latter has spaced portions B' thereof drawn downwardly. The downward displacement of the cap relatively to the bottle, due to the yielding of the disk C, has brought the edge-portion of the cap in a plane below the shoulder Z on the bottle. Continued upward movement of the bottle and cap causes the cap to clear the toes *y* of levers *w* and, eventually, the portion of the plunger 1 below its groove to impinge against the levers *w* and *x* and cause their lower or acting ends to assume a contracted relation, so that the toes *z* of lever *x* now engage the portions B''' of the edge-portion of the cap flange and, forcing them downwardly into substantial alinement with the upper part B'' of the cap flange, turn the whole edge-portion bodily inwardly so that the spaced portions B' first bent down engage under the bottle shoulder and lock the cap in sealing relation to the bottle. At this time the toes *y* are inactive because they have cleared the cap and stand below the shoulder, although it will be understood that they might, according to the material being operated upon, be made to partake somewhat in the final inward displacement generally of the edge-portion of the flange. When the pressure of the treadle is released, the downwardly moving plunger 1 engages, with its part above its groove, the levers *w* and *x* from above, so that their working ends now assume the expanded relation, allowing the free withdrawal of the capped bottle and ready for the next operation.

Referring, now, to Figs. 7 and 8, 4 is a socket adapted to be secured in the machine in the same manner as the socket *m*. Onto its threaded extension 5 is screwed a sleeve 6 having a conical mouth 7 and an internal shoulder 8, the sleeve inclosing an annular bending tool 9 jammed between the shoulder and extension. 10 is a plunger fitting the tool 8 and having its lower face concave to receive the cap A; this plunger has a flange 11 movable therewith in the enlarged por-

tion 12 of the socket and adapted to abut against the shoulder 13 in the socket and the tool to limit the movement of the plunger vertically. A spring 14 coiled about the plunger and interposed between the flange thereof and the upper end of the socket normally holds the plunger with its flange abutting against the tool. The tool 9 has its lower face formed with a series of segmental projections 15 spaced from each other and each having its inner lower corner rounded off slightly so that it will slip over the flange-edge of the cap in the drawing operation, as hereinafter described. In the normal position of the parts, the lower face of the plunger is preferably so high above the lower faces of the projections 15 that a cap placed in the recess produced will impinge against the plunger at its top and against the projections at its flange edge-portion. When the treadle is depressed, the cap being already placed in position against the plunger 10 (the plunger being magnetized to hold it there), the bottle mouth impinges against the cap and raises it and the plunger; the first effect of this is to draw downwardly the spaced portions B′ of the edge-portion of the cap flange, the rounded edges of the projections 15 allowing the latter to slip freely over the portions B′. The intermediate portions B‴ are left substantially in their original positions during this part of the operation, but as the pressure on the treadle is continued, the faces 16 of the tool (existing between its projections) impinge against the portions B‴ of the cap flange and draw them downwardly; the flange edge-portion of the cap being, by this operation, now contracted or turned in bodily, the cap is substantially wholly received within the tool, its portions B′ being locked under the shoulder on the bottle. When the pressure is now relieved, the plunger presses downwardly and causes its capped head to clear the tool.

Figs. 9, 10 and 11 show constructions in which the operation of turning the flange edge-portion into locking engagement with the shoulder on the bottle by applying pressure against the portions B‴ of the cap flange is effected by means operating transversely of said portions B‴.

In Fig. 9 the head *b* of the pedestal has a bore in which slides the hollow stem 17 of a socket 18, the latter being penetrated by a mandrel 19 limited against vertical movement in socket 18 by a thrust collar 20 bearing against the upper end of the stem and by a shoulder 21 abutting against an anti-friction bearing device 22 located in a cavity 23 of the socket. The lower end of the mandrel is concave to receive the cap. Head *b* has a nut 25 secured to it by screws 26, and to the nut is secured, by screws 27, a dome 28. The mandrel has its upper end threaded, at 29, and working in the nut 25 and it carries a stop-collar 30. A spring pressed cup 31, having a hardened bearing-piece 32 engaging the mandrel, is arranged in the dome and normally forces the mandrel down; when the mandrel is raised, its threaded connection with the nut will cause it to rotate, as will be obvious. Screwed to the socket is a cap 33 acting to hold in place radial arc-shaped segments 34 arranged in correspondingly shaped grooves 35 formed radially in socket 8 and each carrying a roll 36. The rolls form the bending tool in this instance, and they normally stand in contact with the lower end of the mandrel, as shown, being held in this position by pins 37 penetrating the socket and the head *b* and having heads 38 arranged in countersinks 39 in the latter, the pins being pressed downwardly by springs 40 interposed between them and adjusting screws 41 tapped into head *b*. The diameter of the circle outlined by the inner or acting portions of the rolls approximately equals that of the body of the cap A, so that when the cap is placed in position, its flange will abut against the under faces of the rolls, being there held by the rolls, which may be magnetized. In closing a bottle with this type of mechanism, the first part of the operation is substantially the same as in the first two types, the mandrel resisting at first the upward pressure thereon of the cap, whose flange, through the rolls, tends to displace it upwardly; spaced portions B′ of the cap flange are therefore drawn downwardly, leaving intermediate spaced portions substantially as they were. At the end of the operation of drawing downwardly the portions B′ the bottle and cap exert a pressure on the mandrel which is at first sufficiently yielding, owing to the resilience of the disk C, to bring the edge-portion of the cap flange in a plane below the shoulder on the bottle, but ultimately positively displaces the mandrel upwardly, which then rotates and rotates with it the bottle and cap: one effect of this rotation is to cause the rolls to ride over the portions B‴, and, by turning them down, displace the edge-portion of the cap flange bodily inward into locking engagement with the shoulder on the bottle. A further effect may be to augment the locking action between the cap and bottle head, because the upward movement of the socket following that of the mandrel increases the degree of compression of springs 40, with the result that the rolls spin the flange edge-portion into more or less continuous contact with the bottle head.

In Figs. 10 and 11 the rolls have no movement except on their own axes, and cap holding fingers are provided. The mandrel is controlled by parts (not shown) substantially the same as the parts 25 to 32

controlling mandrel 19 and adapted to rotate the latter upon upward displacement thereof. The socket 42 has a lug 43 projecting into a vertical groove 44 in the head and preventing the socket from turning. 45 is the mandrel, 46 a shoulder thereon between which and a shoulder 47 in the socket are arranged ball-bearings 48, and 49 a collar fixed on the mandrel and coacting with shoulder 47 to prevent its vertical movement relatively to the socket. An internally flanged cap 50, whose flange forms a conical mouth 51 to receive the bottle head, is secured on the socket by the screws 52; the flange of the cap retains in place rolls 53 journaled in the socket in circular arrangement. 54 denote cap holding fingers arranged in recesses 55 in the socket, their upper ends being fulcrumed in notches 56 and their lower inturned ends being normally held in the position shown by the spring-pressed pins 57. The operation of this form of the mechanism is somewhat similar to that shown in Figs. 9 and 10, the first part of the operation being the downward displacement of the spaced portions B′ of the cap flange until the can engages the mandrel, after which the lining disk C first yields sufficiently to allow the cap edge-portion to assume a lower plane than the bottle shoulder Z and then the mandrel and socket yield unwardly, the former rotating and thereby rotating the bottle and cap and thus causing the rolls to turn down the portions B‴ of the cap and thus inwardly displace the whole edge-portion thereof until the cap is properly interlocked with the bottle head.

In Fig. 12 means for assuming the upward thrust of the cap is eliminated, the bending tool alone assuming this thrust through t the full operation; as the principal fu on of a special means of this nature is to cause the cap to clear the tool when the closing operation is complete, I make the tool in this instance capable of expansion and contraction. The socket 58, having a conical cavity 59 and an integral boss 60 therein, is secured in the head *b* by its stem 61; the bending tool 62 is a split annulus, likewise conical, exteriorly, and it is arranged in the cavity of the socket, being held therein by the flange 63 of the sleeve 64 secured to the socket by screws 65. The tool has spaced projections 66, similar to the projections of the tool in Figs. 7 and 8, and it is normally pressed against flange 63 by spring-pressed pins 67 guided vertically in bore 68 in the socket. Spring-pressed fingers 69 may be employed for holding the cap in position, as indicated in dotted outline in Fig. 12, or the tool magnetized. When the bottle, the cap being in position in the tool, is raised against the cap, the projections of the tool first bend down the portions B′ of the edge thereof until the cap rises sufficiently so that the portions B‴ engage the tool in the spaces between the projections, whereupon said portions are likewise bent down and the edge part of the cap bodily turned inwardly into interlocking engagement with the shoulder on the bottle; meanwhile the disk C has of course yielded sufficiently so that the cap assumes the necessary depressed position to allow the edge-part of the cap to engage under the bottle shoulder. During these operations, the tools yields upwardly somewhat and in doing so contracts, so that by the time the bottle is properly closed the cap has been slightly reduced in diameter; when the pressure on the bottle is now relaxed, its mouth withdraws from the tool, which returns into engagement with the flange 63, expanded, and allows the bottle head to clear it unimpeded.

In all the forms herein described there is a cap-contracting cavity of less normal diameter than the cap to be operated upon when forced thereinto, the cap-surrounding portion of said cavity having in each instance its internal diameter in substantially its lowest part (in the plane of the toes *y* in Fig. 2, in the plane of the bases of the projections 15 and 66 in Figs. 7 and 12, respectively, and in the plane of the bottoms of the rollers 36 and 53 in Figs. 9 and 10, respectively) approximately as little as, if not less than, any higher internal diameter of the said cap-surrounding portion of the cavity. Thus a straight-down bending or drawing action may be the result of the first operation, assuming that the cap, as herein shown, has its top wall properly adapted in point of diameter to the cavity, which straight-down bending or drawing action could not be effected if there were a relatively appreciable restriction of the cap-surrounding portion of the cavity above its lowest part. And when spaced portions of the cap-edge are bent or drawn substantially straight-down in the first operation (see B′ in Fig. 17), the edge of the cap is given such a shape, as will be obvious, as most perfectly conduces on the second operation, to a thoroughly effective locking of the cap to the bottle and to other advantages already mentioned.

It will be observed that in all the forms means is provided for affording from above a yielding pressure on the rising bottle and cap during the final part of the closing operation, at least. Thus, while the work is raised by the elevating means positively against the bending tool, the proper compensation for varying heights of bottles is afforded and the work is kept well under the control of the operator until the closing operation is completed and the head of the bottle free of the bending tool.

Claims for the method which may be per-

formed by the use of any of the several mechanisms herein set forth have been embodied in an application for Letters Patent of the United States bearing the Serial Number 399,525.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is:

1. A sealing-head for bottle closing machines having an open cap-contracting cavity of less normal diameter than the portion of the cap to be thereby operated upon, the cap-surrounding portion of said cavity having its internal diameter in substantially its lowest part approximately as little as any relatively higher diameter thereof and comprising cap-edge bending devices spaced from each other, substantially as described.

2. A sealing-head for bottle closing machines having an open cap-contracting cavity of less normal diameter than the portion of the cap to be thereby operated upon, the cap-surrounding portion of said cavity being internally substantially cylindrical and comprising cap-edge bending devices spaced from each other, substantially as described.

3. A sealing-head for bottle closing machines having an open cap-contracting cavity of less normal diameter than the portion of the cap to be thereby operated upon, the cap-surrounding portion of said cavity being internally substantially cylindrical and comprising cap-edge bending devices spaced from each other, said cap-surrounding portion being internally substantially continuous above said bending devices and having bending faces 16 between said devices, substantially as described.

4. In a sealing-head for a bottle closing machine or the like, the combination of a suitable support, and an annular bending tool having spaced downward projections and a continuous smooth interior acting surface immediately above said projections, substantially as described.

5. In a sealing-head for a bottle-closing machine or the like, the combination of a contractible annular member having spaced downward projections, and a thrust member bearing against the first member laterally thereof, one of said members being movable in the direction of the length of the bottle and one of said members having the face thereof which is engaged by the other oblique, substantially as described.

6. In a sealing-head for a bottle-closing machine or the like, the combination of a contractible annular member having spaced downward projections, and a thrust member having embracing contact with the first member, one of said members being movable in the direction of the length of the bottle and one of said members having the surface thereof engaged by the other conical, substantially as described.

In testimony, that I claim the foregoing, I have hereunto set my hand this 28th day of August, 1908.

AMOS CALLESON.

Witnesses:
JOHN W. STEWARD,
ANTONIO BUONO.