No. 609,209. Patented Aug. 16, 1898.

W. PAINTER.

MACHINE FOR APPLYING CORKS AND SEALS TO BOTTLES.

(Application filed Apr. 22, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

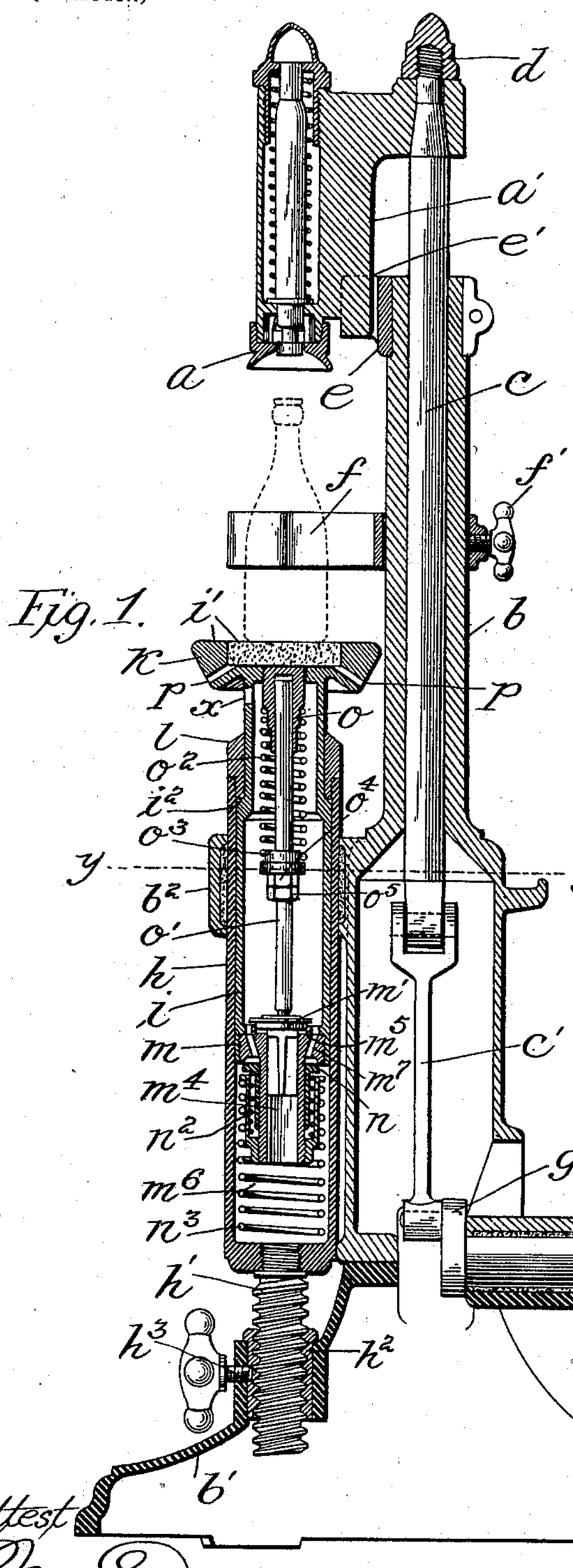
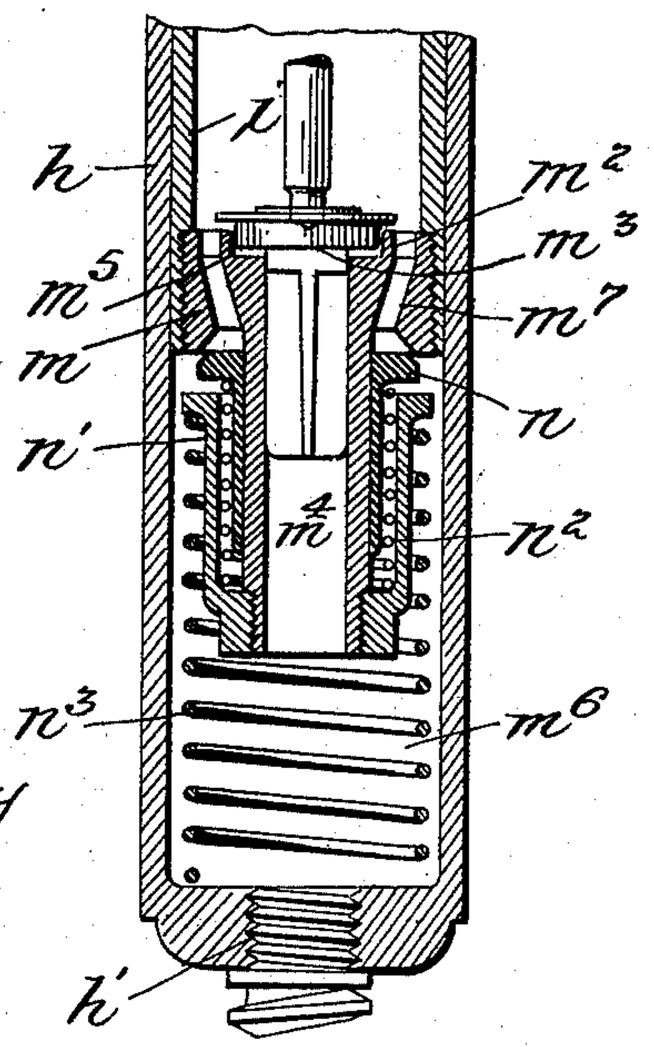


Fig. 4.



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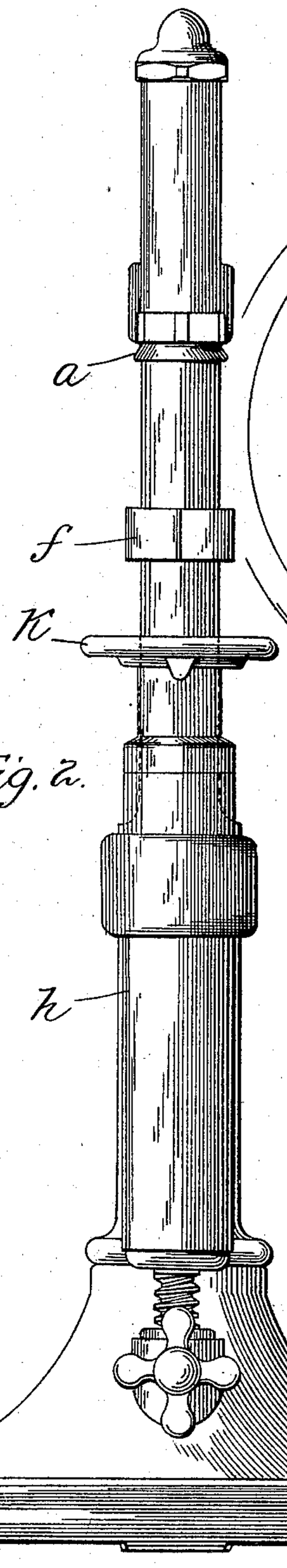

Fig. 2.

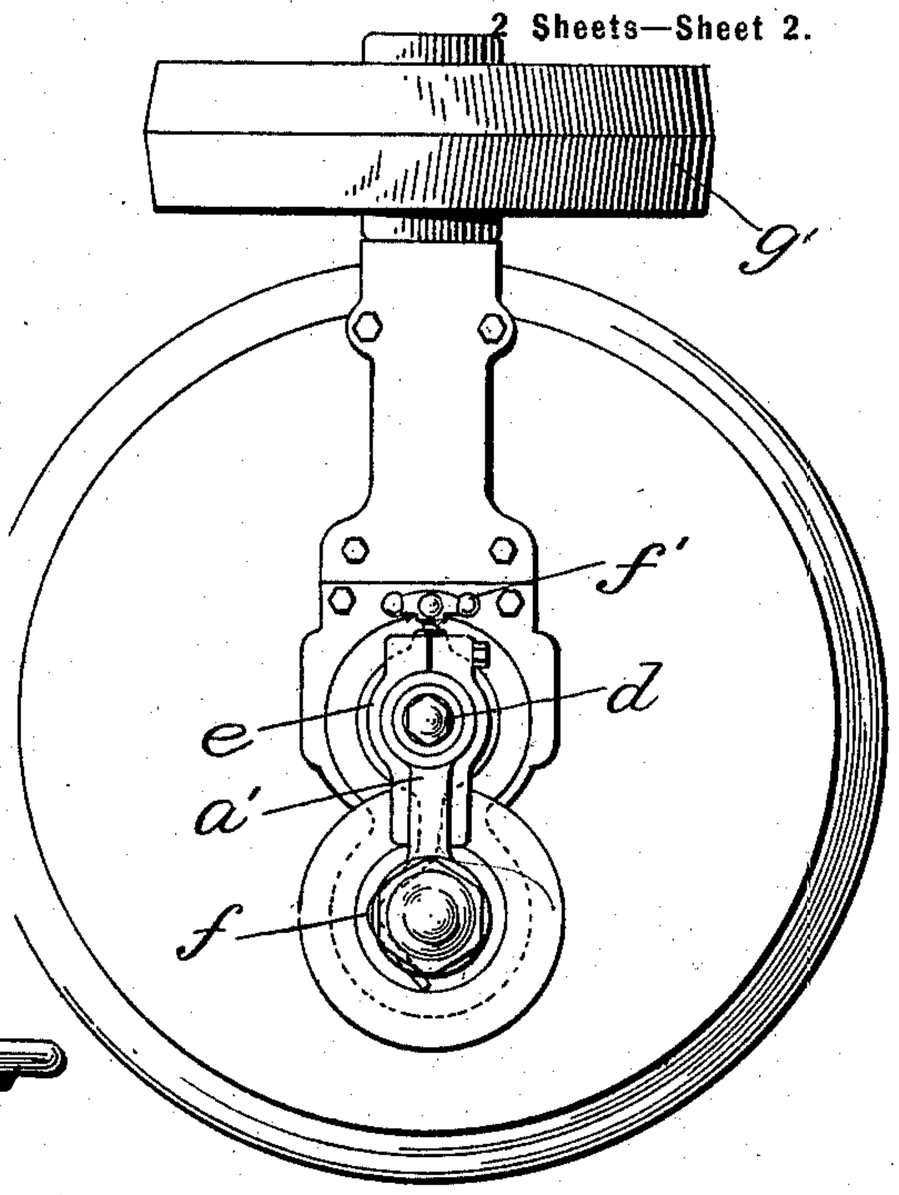

Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM PAINTER, OF BALTIMORE, MARYLAND, ASSIGNOR TO THE CROWN CORK AND SEAL COMPANY, OF SAME PLACE.

MACHINE FOR APPLYING CORKS AND SEALS TO BOTTLES.

SPECIFICATION forming part of Letters Patent No. 609,209, dated August 16, 1898.

Application filed April 22, 1898. Serial No. 678,531. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PAINTER, a citizen of the United States, residing at Baltimore, Maryland, have invented certain new and useful Improvements in Machines for Applying Corks and Seals to Bottles, of which the following is a specification.

My invention relates to machines for applying that form of closure to bottles known as the "crown-cork," in which a metallic flanged cap or crown containing a compressible sealing-disk is affixed over the mouth of the bottle by having its flange bent or set into intimate contact with a locking-shoulder on the outside of the bottle-head, the affixing operation being performed under pressure, so that the sealing-disk held within the flanged cap will be pressed firmly on the lip of the bottle and there held tightly by the cap to make a perfect seal.

The pressure to compress the sealing-disk for a perfect sealing effect and to bend or close the flange of the cap into locking contact with the shoulders on the bottle can be very nicely determined for any given size of bottle; but it is found that in a lot of bottles of a supposedly equal volume and length there are unavoidably small variations in the length, and the pressure which will effect perfect capping and sealing of one bottle will be disastrous when applied to a slightly-longer bottle, resulting in the breakage of the same and loss of its contents.

I aim to provide means for compensating for these variations in the lengths of the bottles, so that when the predetermined pressure is reached necessary to do the sealing and capping no more will be applied, notwithstanding the fact that the bottles of the given lot may vary somewhat as to lengths. In Letters Patent of the United States No. 473,776, granted to me April 26, 1892, I disclose a foot-power machine by which this capping and sealing is done. In this machine the effort required to compress the sealing-disk upon the top of the bottle-head and affix the cap by bending its flange into contact with the locking-shoulder is readily graduated by the operator, so as to avoid breaking of the bottle, the machine being so proportioned in its various parts as to keep the maximum pressure capable of being transmitted from the operator to the pressure device or head well within the limits of safety.

While the foot-power machine performs the capping and sealing with perfect results, it is desirable, in order to secure rapid production of the work and to economize labor, to provide a machine capable of being run by steam or any other desired power, and in such a machine it is indispensable to provide a limit beyond which the pressure will not increase.

It is therefore one of the objects of my present invention to provide a machine operated by steam or other extraneous power and having means for automatically limiting the pressure exerted in the sealing and capping operation to a predetermined degree, the said limit of pressure not being affected or changed by slight variations in the length of the bottles.

I further aim to provide certain means of adjustment whereby the limited pressure may be applied to different lots of bottles—such, for instance, which vary as to their cubic contents, as for pints, quarts &c., and which vary too greatly in their lengths to be compensated by the automatic pressure-limiting means.

My invention includes a capping head or plunger and a holder or table for the bottle, one of which is movable relatively to the other for securing the desired pressure, combined with means whereby when the pressure exerted reaches the desired or predetermined degree a release of one of the parts from its sustaining force is effected and said part is allowed to yield in order to prevent the application of further pressure to the bottle-head.

My invention includes also various features of construction and arrangement hereinafter fully described and specifically claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view of the machine. Fig. 2 is a side view, and Fig. 3 is a plan view, of the same. Fig. 4 is a partial sectional view of the valve mechanism enlarged to show the parts more clearly.

The bottle to which the crown cork or seal is to be applied is placed upon a thick rubber disk i', located in a recess of the table K. It is centered, so as to be axially in line with the movable sealing-head a, by a guide bracket or arm f, adjustably secured by a set-screw f' to the standard b. The bracket, as shown in Fig. 3, is of V shape, and the bottle is positioned properly by bearing against the sides of the V-shaped portion.

The sealing-head a is substantially the same in construction as that disclosed by me in my prior patent, above referred to, and needs no particular description herein further than to state that it is secured firmly to the rod c by a nut d and is provided with a web or rib a', which passes between fork-arms e' of a bracket e, said bracket being secured to the reduced upper end of the hollow standard b. The rod c reciprocates vertically through this standard and is operated from a crank g^2 on the shaft g through a link c'. The shaft g is journaled in the framework and carries a pulley g', through which the power may be applied to the machine. Through this driving mechanism for the head it will be noticed that the length of stroke given to the sealing-head will be uniform and invariable, and therefore variations in the length of a quantity of bottles supposed to be of equal length would result in breakage of the longer bottles unless some provision is made to avoid this. Such provision I have made by sustaining the supporting-table K firmly and immovable in one position up to the point where the pressure applied to the bottle exceeds a certain predetermined degree, when this sustaining means will be released and the table permitted to yield sufficiently to prevent rupture of the bottle. For this purpose the table is sustained by a confined volume of liquid, preferably oil, in a cylinder h, supported in a bracket b^2, projecting from the main standard b, the said confined liquid supporting a piston i, with which the table K is connected at its upper end. This piston or stem of the table is fitted nicely to the interior of the cylinder h to slide therein, and it is limited in its upward movement to hold the table at a given position by a shoulder i^2, which abuts the flange of a hollow nut l, screwed into the upper end of the cylinder and fitted to the interior of the reduced upper end of the piston or stem. This nut is made in two parts in order to get it in place about the piston.

The lower head of the piston i comprises a casting m, screwed into the lower end thereof and having a depending extension with an opening m^4 therethrough, which forms the escape-passage for the liquid from the lower chamber m^6 of the cylinder h to the interior of the piston i at the time that the pressure on the bottle is to be relieved or prevented from increasing beyond the predetermined degree. This escape-passage is controlled by a valve m', which fits over the same and rests upon a seat m^5 on the cast head m, said valve having a guide-stem projecting down into the passage m^4 and being fitted to the seat, which is made within the flange m^2 on the head.

The rim m^2 is made of slightly-larger interior diameter than the outside diameter of the valve m', so that when the valve m' is slightly raised by pressure from beneath on the smaller area m^3 the pressure will act upon the whole or larger area of the valve m' and quickly raise it above the annulus m^2 for a quick discharge of the liquid through it and a quick release of the pressure on the bottle. So long as this valve is maintained on its seat the normal volume of liquid will be maintained in the chamber m^6 below the piston i, and said piston will be sustained immovably to hold the table, with the bottle, in one position; but when the valve is open the liquid below the piston will be free to flow up through the escape-passage m^4 into the interior of the piston i, and said piston can then move down, retracting the table and relieving the pressure. The valve is held seated by the rod o', having its lower end reduced and stepped into a socket in the valve, while its upper end is free to slide in a hollow guide o, screw-threaded into and projecting down from the table K within the hollow piston. This guide is shouldered on its outer side to afford a bearing for the upper end of a spring o^2, the lower end of which bears on a collar o^3, which may be adjustably located on the rod o' by the nuts o^4 o^5. The tendency of the spring is to force the rod down and to close the valve on its seat to keep the volume of liquid confined below the movable piston or stem in order to rigidly sustain the same, and by means of the adjustable collar and nuts the pressure of this spring may be regulated so that the valve will be held tightly closed to maintain the volume of liquid below the piston for any predetermined pressure on the bottle; but as soon as this pressure is exceeded the upward pressure of the liquid will overcome the pressure of the valve-spring o^2, and thus the valve will be opened and the table will yield to prevent the excessive pressure on the bottle. The quantity of liquid used is such as to cover the valve at all times, and the level of the liquid may be up to the line y y.

An air-hole is formed at x at the upper part of the piston. The piston, with the table, is returned upward to normal position after being depressed by a spring n^3 in the lower chamber of the cylinder, said spring acting upon a flange of a cup or sleeve n', which is screwed to the lower end of the depending extension of the piston-head. The force of this spring is light and just sufficient to return the parts to normal position, and it offers no substantial resistance to the yielding of the table when the pressure on the bottle exceeds the given degree, for as compared with the pressure necessary to complete the oper-

ation of sealing or capping the pressure of this spring is inconsiderable and need not be taken into account.

For the purpose of allowing the liquid which flows into the interior of the piston *i* to flow back into the chamber m^6 of the cylinder *n* I provide drain-openings m^7, extending through the cast piston-head *m* outside of the seat of the valve *m'*. These openings are controlled by a conical valve *n*, fitted to a conical valve-seat on the lower face of the piston-head. The valve is of ring form, fitted to the exterior of the piston-head extension, and it has a hollow cylindrical portion also fitted to said extension to be guided thereby. It is pressed up by a light spring n^2 to close the ports, and it is kept firmly closed by the upward pressure of the liquid in the chamber m^6. When the piston and table move upward, however, this valve opens, owing to the weight of the liquid in the hollow piston and the suction from below, which is caused by the tendency to form a vacuum in the chamber m^6 when the piston rises.

In order to set the hydraulic pressure-controlling means described to suit different classes and sizes of bottles—such, for instance, as the pint size, the quart size, &c.—the whole cylinder *h*, with the table and piston, is vertically adjustable through the bracket b^2 by means of a screw *h'*, threaded through a bushing h^2, held in a bearing on the base *b'*. By turning the cylinder it, with the table, can be adjusted up and down and set in any desired position by the set-screw h^3. Drain-holes *p* are formed through the table K, inclining outwardly, so as to discharge any waste away from the parts beneath.

The shaft *g* may be given a continuous rotary movement at a slow enough rate to permit of the removal and replacing of the bottle in the period of either one revolution or two or more. I do not wish to limit myself, however, to a continuously-moving shaft *g*, as any known clutch mechanism (not necessary to show) may be employed by which the revolution of the shaft and the movement of the head may be stopped while the bottle is being removed and a fresh one placed in position, such clutch being controlled by a suitable foot-lever.

I do not wish to limit myself to the arrangement described, in which the pressure-head is the movable part as obviously this arrangement, may be reversed, and the hydraulic cylinder, with the table and attached parts, may be made movable. In either case the action would be the same.

While I have stated that the machine is adapted for applying the crown-cork and seal form of stopper, I do not, of course, limit myself in this respect, as the principles of my invention may be embodied in machines adapted to work with other forms of stoppers.

Having thus fully described my invention and in what manner it may be carried into effect, what I claim is—

1. In combination in a bottle-sealing machine, a pressure-applying head, a table or rest for the bottle, means for moving one of said parts relatively to the other to obtain the desired pressure, and means for automatically limiting the application of pressure when a predetermined degree is reached, irrespective of the length of stroke of the movable part, substantially as described.

2. In combination in a bottle-sealing machine, a pressure-applying head, a table or rest for the bottle, means for moving one of said parts relatively to the other to obtain the desired pressure on the sealing medium and hydraulic controlling means for automatically limiting the application of pressure when a predetermined degree is reached, to compensate for variations in the length of the bottles.

3. In combination in an automatically-operating bottle-machine adapted to be driven by steam or like extraneous power, a pressure-head, a table or rest for the bottle, one of said parts having a movement toward and from the other of uniform stroke and hydraulic controlling means for automatically limiting the application of pressure when a predetermined degree is reached, irrespective of the point in the stroke at which this is attained, substantially as described.

4. In combination in a bottle-sealing machine, a pressure-head, a table or rest for the bottle, means for moving one of said parts toward and from the other to obtain the sealing pressure and a fluid controlling means for limiting the application of pressure when a predetermined degree is reached, said means comprising a cylinder and piston supported by a confined volume of fluid therein, one of said parts being connected with and exposed to the pressure from the sealing device and a valve confining said volume of fluid held under a determined pressure to release said volume of fluid when the predetermined pressure is exceeded at the sealing device whereby the connected controlling part will yield to relieve the pressure at the sealing device, substantially as described.

5. In combination in a bottle-sealing machine, a pressure-head, a table or rest for the bottle, means for giving one of said parts a relative movement, the piston connected with the table, the cylinder containing a confined volume of fluid supporting the piston to hold the table unyieldingly and a valve with means for applying a determined pressure thereto to allow said valve to open when the pressure transmitted from the pressure-head and table to the piston and the volume of fluid supporting it exceeds a predetermined degree whereby the said table may yield to limit the application of the sealing pressure without regard to the length of stroke of the machine, substantially as described.

6. In combination with the pressure-head, a table or rest for the bottle, means for giving one of said parts a movement toward and

from the other, the piston connected with the table, a cylinder containing a confined volume of fluid supporting the piston to hold the table unyieldingly and a valve held under a predetermined pressure, carried by the piston and controlling the volume of the fluid to release the same when the desired maximum pressure is exceeded at the sealing device, whereby the table may yield to limit the application of pressure, substantially as described.

7. In combination with the pressure-head, the table, with operating means for said pressure-head, the cylinder containing a confined volume of fluid, a piston connected with the table and maintained in normal position by resting on said confined volume of fluid, an automatic valve carried by the piston for releasing the confined volume of fluid when the pressure transmitted from the table exceeds a predetermined amount, whereby the fluid may pass from the lower to the upper side of said piston, means for returning the piston to its upper position and the automatic return-valve to permit the fluid to flow to the lower side of the piston when it is moved upwardly to normal position, substantially as described.

8. In combination, the sealing-head, the table, the piston connected thereto, the cylinder, the valve *m'* controlling a discharge-port in the piston-head, the hollow extension on the piston-head, the return-valve and spring therefor surrounding said extension and controlling return-ports through the piston-head and the spring in the cylinder for moving the piston upwardly to normal position, substantially as described.

9. In combination, the sealing-head, the table, the piston connected thereto, the cylinder, the valve *m'* controlling a discharge-port in the piston-head, the hollow extension on the piston-head, the return-valve and spring therefor surrounding said extension and controlling return-ports through the piston-head, the cup-shaped sleeve inclosing the spring and the spring in the cylinder for moving the piston upwardly to normal position, said spring bearing upon a part of the cup-shaped sleeve, substantially as described.

10. In combination, in a bottle-sealing machine, a sealing-head, a table or rest for the bottle with means for moving one of said parts toward and from the other and a hydraulic device for automatically limiting the application of pressure at the sealing-head, consisting of a hollow cylinder partially filled with oil or other liquid, a hollow piston having closed upper and lower ends connected with the table and spring-controlled valve mechanism at the lower end of the hollow piston adapted to open a passage for the escape of the liquid from the cylinder into the hollow piston when a given maximum pressure upon the bottle is reached and upon the release of said pressure to permit the liquid to flow back into the lower part of the cylinder, the said piston being returned to its normal position by a spring, substantially as described.

11. In combination in a bottle-sealing machine with the table and the sealing-head, a hydraulic controlling device for limiting the application of pressure when a predetermined degree is attained, consisting in a cylinder having a volume of liquid therein, a hollow piston connected with the table and moving in said cylinder, the lower head of said piston having a valve opening upward and a second valve opening downward and controlling respectively a port for the flow of the liquid from the cylinder into the hollow piston and return-ports for the flow of the liquid from the hollow piston into the cylinder, a spring controlling the upper valve reacting against the upper closed part of the piston, a spring for controlling the lower valve reacting against an extension of the lower piston-head and a spring for returning the piston and the table to normal position reacting against the lower end of the cylinder, substantially as described.

12. In combination in a bottle-sealing machine, a sealing-head, a table for supporting the bottle with means for moving one of the said parts in relation to the other, and a hyhydraulic controlling means for limiting the application of pressure of the sealing device when a predetermined pressure is reached, said means comprising a piston and a cylinder with an automatic release-valve and adjusting devices for setting the table relatively to the sealing-head to suit different grades of bottles, substantially as described.

13. In combination, the sealing-head, a table or rest for the bottle, a hydraulic controlling device for limiting the application of pressure when a predetermined degree is reached consisting of a piston connected with the table, a cylinder holding a confined volume of fluid upon which the piston rests, a valve for automatically controlling said volume of fluid to allow the piston and table to recede when the predetermined pressure is exceeded and means for adjusting the hydraulic controlling means together with the table toward and from the sealing-head, substantially as described.

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

WILLIAM PAINTER.

Witnesses:

JOHN T. HAWKINS,

W. H. WHEELER.