No. 627,828 Patented June 27, 1899.

A. A. PAGE.

LIQUID DOOR CHECK.

(Application filed Dec. 9, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1

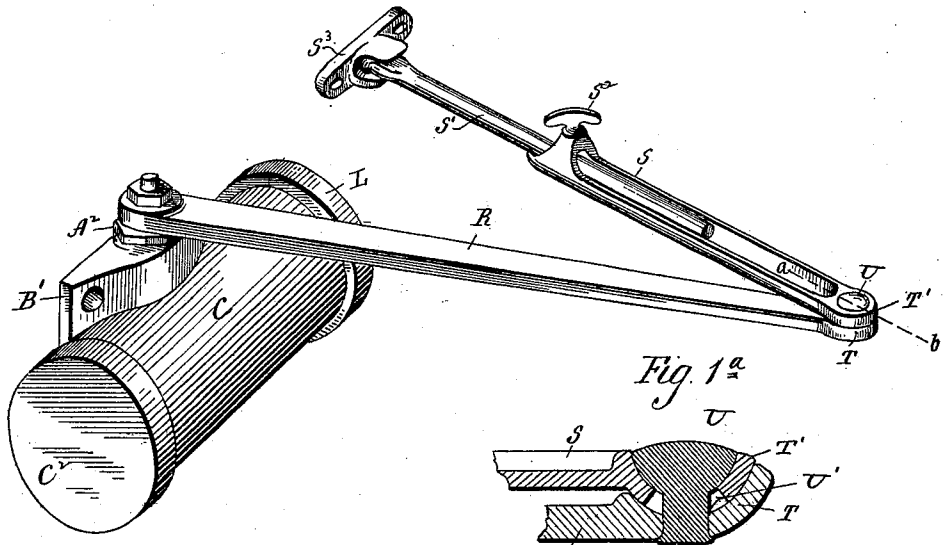


Fig. 1a

Fig. 2

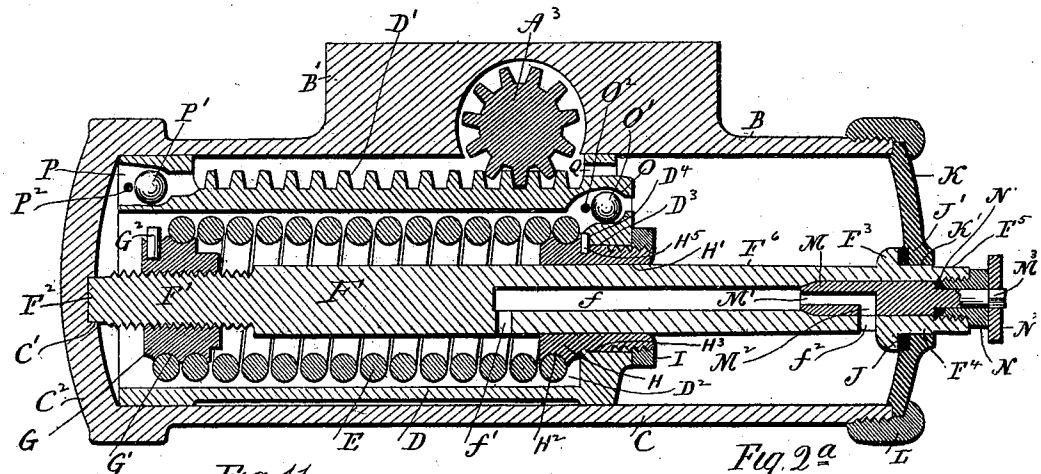


Fig. 11

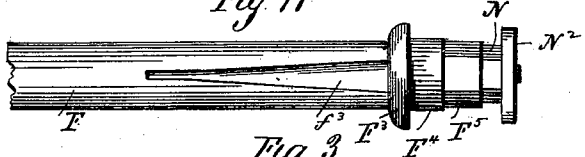
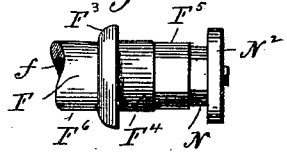


Fig. 3



Fig. 2a



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(No Model.) 2 Sheets—Sheet 2.

Fig. 4

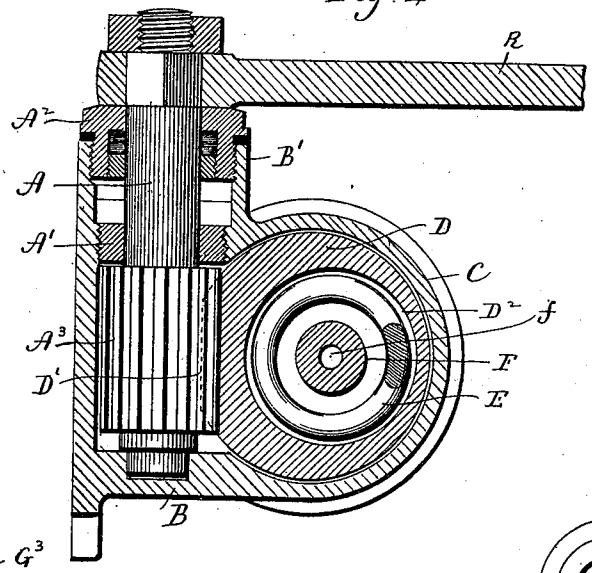


Fig. 7

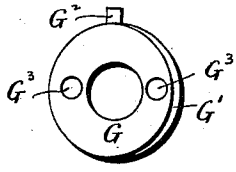


Fig. 9

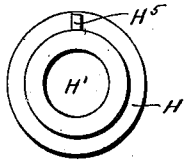


Fig. 6

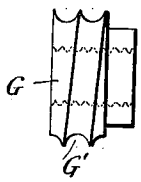


Fig. 5

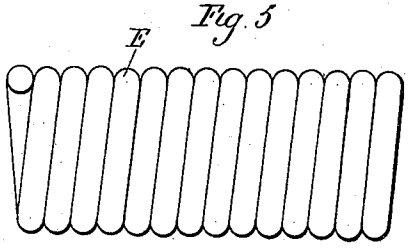


Fig. 8

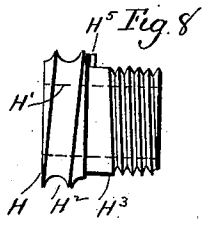
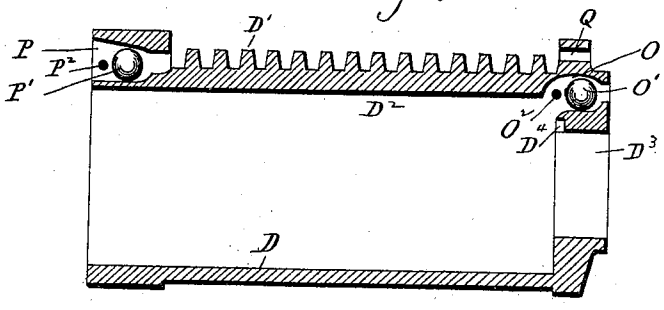


Fig. 10



Witnesses
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UNITED STATES PATENT OFFICE.

ALBERT A. PAGE, OF EAST HAVEN, CONNECTICUT, ASSIGNOR TO THE SARGENT & COMPANY, OF NEW HAVEN, CONNECTICUT.

LIQUID DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 627,828, dated June 27, 1899.

Application filed December 9, 1898. Serial No. 698,722. (No model.)

To all whom it may concern:

Be it known that I, ALBERT A. PAGE, of East Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Liquid Door-Checks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a perspective view of a liquid door-check embodying my invention; Fig. 1ª, an enlarged broken view, in vertical section, on the line *a b* of Fig. 1 and showing the universal-joint connection between the outer end of the main or door lever and the outer end of the chambered arm of the adjustable jamb-lever; Fig. 2, a view in vertical longitudinal section through the cylinder of the check, showing the plunger in its normal position, which is taken to be the position due to it when the door is closed; Fig. 2ª, a detached broken plan view of the outer end of the adjusting-rod; Fig. 3, a detached reverse plan view of the adjusting-plug; Fig. 4, a view of the check in transverse section through the cylinder and through the housing containing the spindle, which is shown in elevation; Fig. 5, a detached view, in side elevation, of the extension-spring; Fig. 6, a detached view, in side elevation, of the inner spring-supporting head; Fig. 7, a corresponding end view thereof; Fig. 8, a detached view, in side elevation, of the outer spring-supporting head; Fig. 9, a corresponding end view thereof; Fig. 10, a detached view, in central longitudinal section, of the plunger stripped of all its associated parts except its ball-valves; and Fig. 11, a broken view of one of the modified forms which the adjusting-rod may assume.

My invention relates to an improvement in that class of liquid door-checks in which the spindle is located at a right angle to the cylinder and formed with a pinion meshing into a rack located upon the plunger which contains the spring through which the liquid is free to circulate, the object of my present invention being to produce a simple and compact check constructed with particular reference to security against leakage, to provision for adjusting the tension of the spring, and to regulating the transfer of the liquid from one side of the plunger to the other under pressure.

With these ends in view my invention consists in a door-check having certain details of construction, as will be hereinafter described, and pointed out in the claims.

In carrying out my invention, as herein shown, I employ a spindle A, journaled in a housing B, formed upon the inner face of and at a right angle to the cylinder C of the check. A foot B′, formed integral with the housing and constituting longitudinal extensions thereof, provides for the attachment of the check to the door. The said spindle is secured in place within its housing B by means of a bearing-nut A′ and packed by a packing-nut A^2. The said spindle is provided with a pinion A^3, which may be mounted upon it or formed integral with it, my preference being for the formation of a "cut-leaf" pinion upon the spindle. This pinion meshes into a rack D′, formed by facing down and transversely cutting a portion of the exterior face of the plunger D, located within the cylinder C, in which the plunger is moved back and forth by the rotation of the spindle. The plunger itself is traversed by a relatively large longitudinal opening or chamber D^2, located to one side of its axial center, as shown in Fig. 4, so as to leave the stock required for cutting away a portion of its surface and forming the rack before mentioned. Within this plunger I locate a heavy extension-spring E, and I may here explain that by "extension-spring" I mean a spring in which the coils lie close together and which operates by contraction after extension instead of by extension after compression. I call particular attention to the fact that this spring is smaller in its exterior diameter than the interior diameter of the chamber D^2 within the plunger. Under this construction the spring never engages with the walls of the chamber, so as to create any friction or produce any noise. The said spring is mounted upon a heavy rod F, extending throughout the length of the cylinder and located a little to one side of the axial center thereof. This rod I shall hereinafter

call an "adjusting-rod," on account of the function it performs in adjusting the tension of the spring. It also forms a liquid conduit for transferring the liquid under pressure from one end of the cylinder to the other.

For the purpose of mounting the spring upon the rod F, I employ two spring-supporting heads G and H. The said head G is interiorly screw-threaded for the reception of the screw F′, formed by reducing and threading the inner end of the rod F. The threads of the said screw terminate within its extreme end, so as to form a bearing F^2, which enters a step or recess C′, formed in the inner face and to one side of the center of the integral head C^2, which forms the pressure end of the cylinder C. The said head G is formed upon its periphery with a spiral groove G′, adapted to receive one or more of the inner coils of the spring. I may here explain that the head G is made a trifle larger than the internal diameter of the spring, which must be opened a little to receive the head, which is thus gripped by the spring. A radially-arranged stop-pin G^2 is mounted in the head in position to be abutted against by the extreme inner end of the spring, which is thus prevented from rotating upon the head when the spring is in normal operation or being adjusted. This head is also formed with two openings G^3 G^3 for the reception of an ordinary spanner-wrench, by means of which the head is screwed into and out of the spring. The spring-supporting head H is traversed by a smooth bore H′, through which the adjusting-rod F passes and in which the said rod turns. The inner end of this head is formed upon its exterior face with a groove H^2, which receives one or more of the coils at the outer end of the spring, which is made enough smaller than the head so as to grip the same, as already explained for the head G. This head H is formed with a bearing H^3, which rests within a bearing-opening D^3, formed within the outer end of the plunger. This bearing merges into an exteriorly-threaded hub H^4, which projects forward through the bearing-opening D^3 for the reception of a binding-nut I, which bears against the outer face of the outer end of the plunger and firmly secures the head H therein. For the purpose of preventing the head H from rotating within the outer end of the plunger I form it with a radially-arranged stop-pin H^5, which enters a notch D^4, formed to receive it and leading out of the bearing-opening D^3.

The outer end of the rod F is formed with a flange or shoulder F^3, which supports a packing-washer J, entering a recess J′, formed to receive it, in the removable cap K, which is secured to the open outer end of the cylinder C by means of a threaded collar or ring L, as shown in Fig. 2. The said cap is formed to one side of its center with a bearing-opening K′, receiving a bearing F^4, formed upon the rod F at a point just outside of the flange F^3. The projecting end of the rod is made hexagonal, as at F^5, for the reception of a wrench for turning it in the adjustment of the spring E, as will be described later on.

To adapt the rod to perform its function of a conduit, it is formed with an axial passage *f*, which extends inward from its outer end to about its center and terminates at a point within the plunger in a lateral inlet-port *f*, which opens into the plunger and provides for the inlet of the liquid into the passage *f*, which is formed near its outer end with a lateral outlet-port f^2, opening directly into the outer end of the cylinder. For the purpose of regulating the virtual size of the outlet-port f^2 I employ an adjustable vent-plug M, having an axial passage M′ and a lateral passage M^2, the former being in line with the passage *f* and the latter with the outlet-port f^2. It will of course be understood that by rotating the plug M within the rod the outlet-ports M^2 and f^2 are brought into full or partial registration, whereby the virtual size of the outlet-port f^2 may be controlled as desired. The vent-plug M is secured in place by means of a nut N, which is threaded into the projecting outer end of the rod and screwed down upon a packing-ring N′, while the plug is turned by means of a button N^2, applied to the squared outer end of a stem M^3, forming an extension of the plug and projecting outward through the nut N.

For the purpose of permitting the liquid to be transferred with little or no resistance from the outer to the inner end of the cylinder when the door is being opened I form the outer end of the plunger with an opening O, receiving a ball-valve O′, held in place by a pin O^2. The inner end of the plunger is formed with a corresponding opening P, receiving a ball-valve P′, held in place by a pin P^2. These openings O and P lead into and out of the interior of the plunger. Preferably, though not necessarily, I also form a small opening Q in the outer end of the plunger, so as to lead into the chambered housing B around the pinion A^3 and into the space in which the rack D′ is located. This opening Q provides for equalizing the pressure in the spaces just mentioned and prevents the formation of any back pressure therein.

For the adjustment of the extension-spring E in tension after the check has been assembled the adjusting-rod F is turned in one direction or the other by a wrench applied to its hexagonal outer end F^5. To increase the tension of the spring, the rod is turned so as to force the spring-supporting head G outward upon the rod F toward the head C^2 of the cylinder, whereby the coils of the spring are slightly opened and the spring placed under tension. On the other hand, by turning the rod in the opposite direction the head will be caused to move inward and lessen the tension upon the spring. In this way the tension of the spring may be regulated to the exact requirements of the work to be done

and entirely through the outer end of the cylinder, which is not the end of the cylinder where the heavy pressure of the liquid occurs. This construction is therefore to be preferred over any construction which contemplates the adjustment of the spring through the inner or pressure end of the cylinder.

The spring having been adjusted in tension to meet the requirements of the door to which the check is applied, it may be assumed that the door is closed, in which case the plunger will be located in the inner end of the cylinder and the major part at least of the liquid in the outer end thereof. Now when the door is opened and the plunger is started in its movement from the inner to the outer end of the cylinder the ball-valves O′ and P′ will immediately open, so as to allow the liquid to gush through the ports O and P and therefore into and out of the plunger, the liquid being in this way transferred to the inner end of the cylinder, where practically all of it will be located when the door is fully opened. Now when the door begins its closing movement the ball-valves O′ and P′ will be immediately closed and the liquid placed under heavy pressure, which will be sustained until the door is closed. During the closing of the door the liquid is very slowly transferred from the inner to the outer end of the cylinder through the inlet-port f', the passage f, and the outlet-port f^2, the size of the outlet-port f^2 being regulated as provided for.

Under the construction described the liquid will be regularly transferred and the door will close at a uniform speed. In order, however, to provide for having the door close rapidly until nearly shut, so as to save time in closing it, I may, if desired, form the outer end of the rod with a taper F^6, as clearly shown in Fig. 2. Under this construction the liquid will be transferred not only through the inlet-port f', the passage f, and the outlet-port f^2, but will escape also through the bore H′, formed in the spring-supporting head H, until cut off by the movement of the said head inward to a point where its bore H′ is so nearly closed by the rod that little or no liquid will escape between them. The same result might be accomplished by forming a tapering groove or recess directly in the outer end of the rod without tapering the same, as shown in Fig. 11, which represents the rod as provided with a tapering recess f^3.

With my improved check I may employ any suitable means for connecting its spindle A with the door-jamb. As herein shown, I employ a main or door lever R and a jamb-lever composed of a chambered arm S and a bracket-arm S′. These two arms are fitted together so as to be contracted or extended in length and held in any adjustment by means of a thumb-piece S^2. The bracket-arm is connected with a bracket S^3, adapted to be secured to the door-jamb in the usual manner. The chambered arm S and the main or door lever R are connected together not only pivotally, but also flexibly, to compensate for inequalities in the opening movement of the door by a connection of the universal-joint type, which I have improved.

My improvement consists in forming the outer end of the lever R with a cup-shaped bearing T, receiving a cup T′, formed at the outer end of the arm S. The lever and arm are connected by means of a ball-like rivet U, fitting into the cup T′ and passing downward into the cup-shaped bearing T, in which it is riveted, through an opening U′, formed in the bottom of the cup T′ and made enough larger than the stem of the rivet to permit considerable flexibility or play between the parts; but I would have it understood that I do not necessarily employ this particular form of connection in conjunction with the other features of my improved check, or vice versa.

In view of the changes suggested and of others which may obviously be made, I would have it understood that I do not limit myself to the precise construction herein shown, but hold myself at liberty to make such changes therein as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a liquid door-check, the combination with the cylinder thereof, of a plunger located therein, a single extension-spring arranged concentrically within the plunger, and means for supporting the said spring at its ends, and for adjusting it in tension, the said spring being extended by the opening of the door which is closed by the power exerted by the spring in contracting.

2. In a liquid door-check, the combination with a cylinder having its inner or pressure end closed by an integral head and having its outer end provided with a removable cap, of a chambered plunger located within the said cylinder, a single extension-spring located concentrically within the said plunger, means for supporting the said spring by its ends, and adjusting devices extending through the said cap for adjusting the said spring in tension through the medium of one of its end supports, the said spring being extended by the opening of the door, which is closed by the power exerted by the spring in contracting.

3. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, a single extension-spring arranged concentrically within the said plunger, means for supporting the spring by its ends, an adjusting-rod passing centrally through the plunger and spring, supported at its ends in the ends of the cylinder, and adjustably connected at its inner end with the support for the inner end of the spring for adjusting the same in tension, the spring being extended by the opening of the door, which is closed by the power exerted by the spring in contracting.

4. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, a spring located within the plunger, an adjusting-rod extending through the spring and plunger and supported at its ends in the ends of the cylinder, and spring-supporting heads mounted upon the said rod and entered into the opposite ends of the said spring which is adjusted in tension by the said rod through the medium of one of the said heads.

5. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, a spring located within the said plunger, an adjusting-rod passing through the spring and plunger, supported at its ends in the ends of the cylinder, and having its inner end formed with a screw, and a spring-supporting head entered into the inner end of the spring and mounted upon the threaded inner end of the rod by which it is moved back and forth when the rod is rotated for adjusting the tension of the spring.

6. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, a spring located within the plunger, an adjusting-rod extending through the spring and plunger, supported at its ends in the ends of the cylinder, and having its inner end formed with screw-threads, an inner spring-supporting head mounted upon the threaded portion of the rod and entering the inner end of the spring which it adjusts in tension when the rod is turned in one direction or the other, and an outer spring-supporting head entered into the outer end of the spring, and having bearing in an opening formed to receive it in the outer end of the plunger to which it is secured.

7. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, a spring located within the plunger, an adjusting-rod extending through the spring and plunger and supported at its ends in the ends of the cylinder, a spring-supporting head located upon the inner end of the rod by which it is moved for changing the tension of the spring, and a spring-supporting head mounted upon the rod, entering the outer end of the spring, and having bearing in the outer end of the plunger beyond which it projects, and a nut applied to the threaded projecting end of the said head for securing it to the outer end of the plunger.

8. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, an extension-spring arranged concentrically within the plunger, means for supporting the spring by its ends, an adjusting-rod extending centrally through the spring and plunger, supported at its ends in the ends of the cylinder, through the outer end of which the outer end of the rod projects, and formed with a liquid-passage having an inlet-port and an outlet-port, and an adjustable vent-plug located in the outer end of the said rod, and adjustable in position from the outside of the cylinder, and provided for regulating the outlet-port in the said rod.

9. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, an extension-spring located concentrically in the said plunger, means for supporting the spring by its ends, a rod extending centrally through the spring and plunger, supported at its ends in the ends of the cylinder, and having its forward portion constructed and adapted to permit the liquid to be discharged between its exterior surface and the forward end support of the spring during the closing movement of the door until the door is nearly closed, and then shut off.

10. In a liquid door-check, the combination with the cylinder thereof, of a chambered plunger located therein, an extension-spring located concentrically within the plunger, means for supporting the spring by its ends, and a rod passing centrally through the spring and plunger, supported at its ends in the ends of the cylinder, and having its forward portion tapered to permit the liquid to escape between it and the outer end support of the spring while the door is being closed, and until the door is nearly closed, at which time the taper stops and shuts off further escape of liquid between the said support and the exterior surface of the rod.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ALBERT A. PAGE.

Witnesses:
WILLIAM S. COOKE,
CHARLES L. BALDWIN.