May 10, 1932. E. BOMMER 1,857,133

DOOR CHECK AND CLOSER

Filed April 17, 1930 2 Sheets-Sheet 1

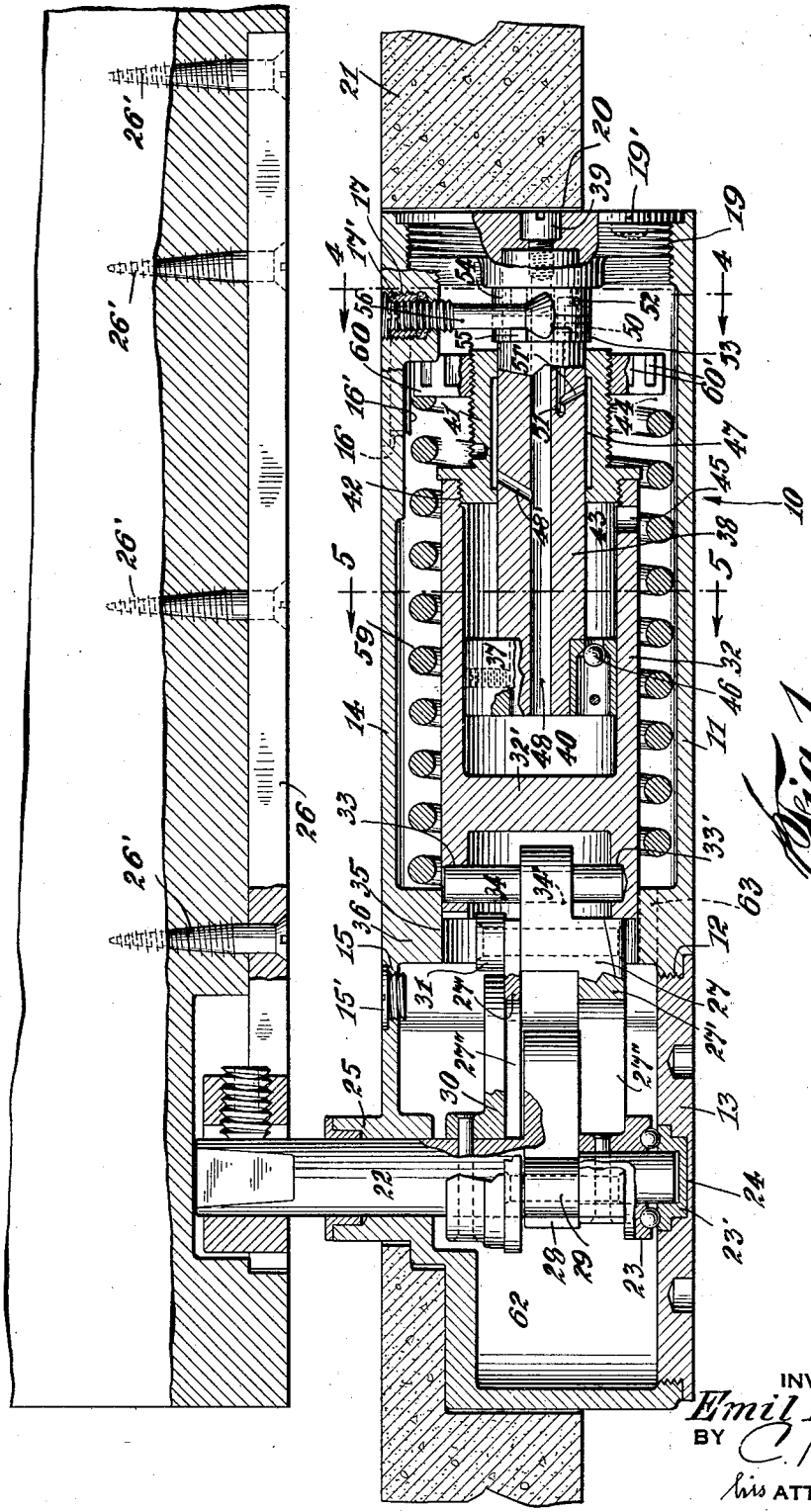


Fig. 1.

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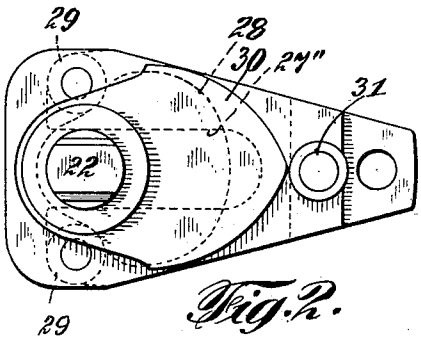


Fig. 2.

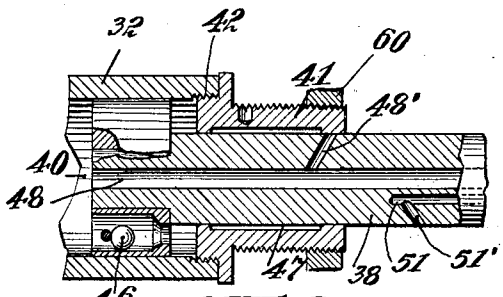


Fig. 3.

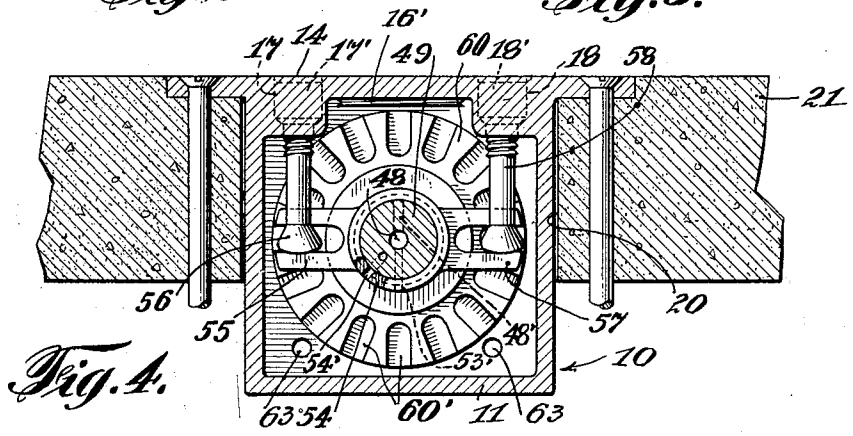


Fig. 4.

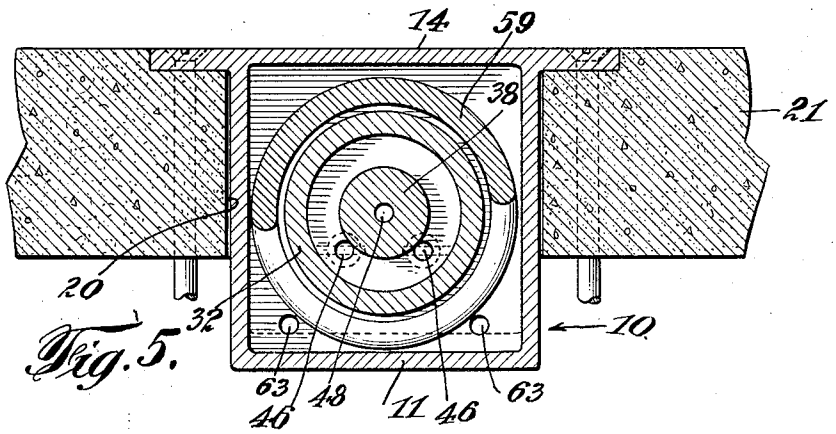


Fig. 5.

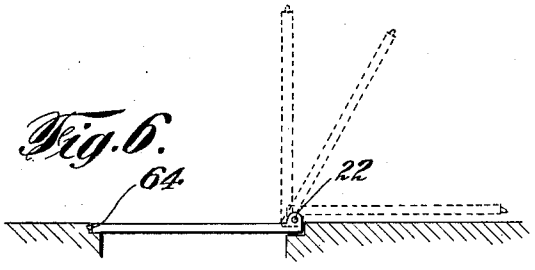


Fig. 6.

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DOOR CHECK AND CLOSER

Application filed April 17, 1930. Serial No. 444,971.

This invention relates to a door check and closer, particularly adapted to a double or a single acting hinge and check for use in connection with either right and left hand doors intended to be opened in either direction and from an initial latched position; and the invention has for its object and purpose the provision of an improved construction of this character for insertion in a recess or cut in the floor, and one which will embody therein certain desired features of simplicity, efficiency and convenience.

An object of the invention is the provision of a construction which will eliminate leakage of the checking medium. To attain this object, my invention involves the provision of an organization in which the parts are so constructed and arranged that they are capable of being assembled for operation within a hollow one-piece casting furnished with openings for the introduction, assembly and adjustment of the parts, and with screw plugs for closing and sealing the openings. In carrying out my invention in its preferred form of construction, the parts of the organization are so arranged that two of the plugs will each carry a screw pin by which, from the exterior of the casting, to regulate the degree of liquid compression.

An important object of the invention lies in the provision of a construction for releasing practically all resistance to the return spring a little before the door contacts with the door latch to assume its closed and latched position, the provision in this regard being such as to allow the spring to exert substantially its full power so that the closing door will be sure to exert upon the latch bolt power sufficient to cause withdrawal of the latch bolt and thereby to insure that the door will be pressed past the latch bolt into fully closed position.

With the foregoing and other objects in view, the invention resides in the improved door check and closer, and in the form, construction and relative arrangement of parts, as will be hereinafter more fully set forth and subsequently defined in the subjoined claims.

The invention will be best understood by referring to the accompanying drawings, forming a material part of this application, and in which:

Figure 1 represents a longitudinal sectional view through a door check and closer embodying my invention, this view also showing a fragmentary sectional view of the lower portion of a door;

Fig. 2 represents a top plan view of the yoke and cams associated with the pintle;

Fig. 3 is a fragmentary sectional view, showing the relative positions of the cylinder and by-pass chamber when the door is in open or approximately open position;

Fig. 4 is a cross section taken on the line 4—4 of Fig. 1;

Fig. 5 is a cross section taken on the line 5—5 of Fig 1; and

Fig. 6 represents a diagrammatical view illustrating the movement of the door to approximately 180° from initial or latched position.

Referring with more particularity to the accompanying drawings, it will be seen that the case which contains the working parts of the check and closer consists preferably of an elongated one-piece casting 10. In the rear portion of the bottom wall 11 of the casting is provided a circular threaded opening 12 which is closed and sealed by means of a screw plug 13. In the top wall 14 are provided four threaded openings designated by the characters 15, 16, 17 and 18, and these are closed and sealed by the respective plugs 15′, 16′, 17′ and 18′. In the front end of the casting there is a threaded opening 19 which is closed and sealed by a screw plug 19′. These various threaded openings are located in such manner that the working parts of the device may be installed within the casting, assembled and connected therein, and adjusted as occasion requires. In accordance with the usual practice, the casting is preferably set in a cut 20 in a concrete floor 21, although manifestly it may be placed in a suitable cavity in any kind or type of floor construction.

22 denotes the pintle whereby to support the door for swinging movement. Con-

nected with the lower portion of this pintle is an anti-friction device 23, one portion 23′ of which is fitted in a suitable central bearing 24, provided for the purpose in the screw plug 13. In the top wall of the casting, the pintle is operatively supported in a bearing 25. The pintle extends, as shown, a suitable distance above the casting for connection in any well-known or approved manner with a bar 26 set in a mortise cut in the bottom edge of the door and which is rigidly connected with the door by means of screws 26′ or equivalent instrumentalities. Within the casting, the pintle has associated therewith a yoke 27 whose spaced arms 27′ are provided in well-known manner with elongated slots 27″. The pintle extends vertically through the slots and has fixed thereto a cam 28 which operates between the yoke arms and cooperates with right and left hand rollers 29. Said cam 28 cooperates with the rollers 29 in well-known manner so that when the door is opened from its initial or at-rest position, it will be held open at the position desired, for instance, at a position approximately 90° from its initial position, or, when desired, at some suitable position beyond 90°. To those familiar with the art, it will, of course, be understood that the precise shape and form of the cam will determine the position at which the door will be held open. The pintle 22 also carries a large guide cam 30 just above the upper arm of the yoke, which cam cooperates with a front roller 31 so as to permit the pintle to be given a complete revolution in order to adapt the check and closer for double or single action use in connection with either right-hand or left-hand doors.

Through the employment of the yoke, rollers and cam devices described, the check and closer of my invention is adapted with equal facility to permit either a right-hand or a left-hand door to be opened through an angle of 180° and to be held open at the position which may be determined by the form of the cam 28.

32 designates a cylinder closed as at 32′ near its rear end and provided rearwardly of the closed portion 32′ with an aperture 33 directly opposite a seat 33′. This cylinder is coupled to the yoke 27 by means of a coupling pin 34 which is passed through the aperture 33, an aperture 34′ in the yoke and thence engaged in the seat 33′. By means of this coupling, the cylinder is caused to reciprocate with the backward and forward movements of the yoke produced by the pintle, cams and rollers consequent upon the opening and closing movements of the door. The cylinder, at its rear end, reciprocates in a bearing 35 formed in a vertical partition 36 which is produced integral with the casting. Within the cylinder and slidably embraced thereby is the head end or valve portion 37 of a stem body 38 which is secured at its forward end by means of a screw 39 threaded centrally through the screw plug 19′ and thence into the front end of the stem body. The head 37 and stem body 38 form in conjunction with the cylinder 32 an end chamber 40 wherein the checking liquid is subjected to pressure forces on the closing movement of the door, that is to say, on the movement of the cylinder towards the screw plug 19′. A sleeve 41 slidably embraces the stem body and is screw threaded at 42 to the forward end of the cylinder. The stem body 38 with its head 37 and the cylinder 32 with its sleeve 41 form together an intermediate annular liquid chamber 43 into which the liquid passes from the main liquid chamber 44 through one or more suitable inlets as 45, provided in the circumferential wall of the cylinder. The head 37 is provided with suitable ball check valves as 46 which operate to permit the liquid to flow from the chamber 43 into the end chamber 40 when the latter-named chamber is expanded owing to the movement of the cylinder rearwardly consequent upon the opening movement of the door, and which, conversely, operate to prevent a return flow of the liquid from the end chamber 40 into the chamber 43 when said end chamber 40 is contracted owing to the movement of the cylinder forwardly toward the screw plug 19 consequent upon the closing movement of the door.

According to an important feature of my invention, the sleeve 41 is provided with a by-pass chamber 47 which surrounds the periphery of the stem body 38. This by-pass chamber is of a longitudinal dimension substantially equal to the stroke of the cylinder. A channel 48, which is in communication with the end chamber 40, extends forwardly through the stem body to a point beyond the forward end of the sleeve where, in a reduced portion 49 of the stem body, it communicates with a lateral duct 50 which opens into the main liquid chamber 44. Said channel 48 has a branch or port 48′ which is adapted to communicate with a by-pass chamber 47. In the stem body there is also provided a by-pass channel 51 having at its rear end a branch or port 51′, adapted to communicate with the by-pass chamber 47. Said by-pass channel 51 extends forwardly into the reduced portion of the stem body where it connects with a lateral duct 52 which opens into the main liquid chamber 44.

For regulating the discharge of liquid under pressure through the lateral ducts 50 and 52, there are mounted upon the reduced portion of the stem body two ring valves 53 and 54, of which the first-named has a duct 53′ adapted to register with the lateral duct 50, while the last-named has a duct 54′ adapted to register with the lateral duct 52. The ring valve 53 has a crank in the form of a yoke 55 between the arms of which is engaged the

head of a screw pin 56 carried by the screw plug 17'. Similarly, the ring valve 54 is provided with a crank arm in the form of a yoke 57 between the arms of which works a screw pin 58 carried by the screw plug 18'. These ring valves 53 and 54 have turning fit upon the reduced portion of the stem body. Under this arrangement, the ring valve 53, controlled by the adjusting screw 56, regulates the flow of checking liquid through the channel 48, while the ring valve 54, controlled by the adjusting screw 58, regulates the flow of checking liquid through the by-pass channel 51. It will be noted that both of the adjusting screws 56 and 58 are carried by their respective plugs so as to be accessible from the outside of the casting for regulating their corresponding ring valves.

59 designates a coiled return spring for effecting the closing movement of the door. This spring encircles the cylinder 32 and is imprisoned between the casting partition 36 and a stop disk 60 which is screw-threaded upon the sleeve 41. Manifestly, by adjusting the stop disk 60 upon the sleeve 41, the return spring 59 can be given the degree of tension desired. Said stop disk 60 is preferably provided around its periphery with spaced openings 60' adapted to receive the end of a suitable tool by which readily to effect the adjustment of the stop disk upon the sleeve and against the tension of the return spring. The tool for adjusting the stop disk 60 may conveniently be manipulated through the opening 16.

The main chamber 44 as well as the rear chamber 62 is filled with oil or other suitable checking liquid, there being, as best illustrated in Figs. 4 and 5, suitable apertures 63 in the partition 36 to allow the circulation of the checking liquid from one chamber to the other. During the opening movement of the door, when the yoke, through the turning of the pintle and through the cooperation of the cams and rollers, is moved rearwardly in the chamber 62, the cylinder and attached sleeve are both drawn rearwardly in accompaniment with the yoke. The rearward movement of the cylinder manifestly results in expanding the chamber 40 into which the oil will rush. The rearward movement of the cylinder under the opening movement of the door also results in compressing the return spring 59, since the stop disk 60 is also drawn rearwardly in accompaniment with the cylinder. On opening the door a slight distance, the sleeve 41 moves rearwardly beyond the port 51' so that no oil can be discharged from the by-pass chamber 47 through the by-pass channel 51. When the door is released for closing movement, which is effected under the expansion of the return spring 59, the checking oil escapes through the channel 48 and lateral ports 50 and 53', and it will be understood in this connection that the degree of resistance which the checking oil offers to the action of the return spring may be controlled by adjusting the ring valve 53. As the door approaches closely to its initial or closed position, that is to say, to the position in which it will be secured by the customary latch bolt as 64 (Fig. 6) which it carries, the sleeve 41 advances forwardly past the port 51' so that the oil will have an additional escape through the by-pass channel 51. By this arrangement, when the closing door comes into close proximity to latch-closing position, the resistance of the checking liquid is suddenly diminished so that the return spring can exert more power whereby to give the door a sudden impulse to overcome the resistance of a latch bolt as 64, thereby permitting the door to assume a fully closed and latched position.

In the device of my invention, the yoke serves in the capacity of a reciprocable connecter between the operating pintle and the cylinder which is constantly urged in a forward direction by power means in the form of the coiled spring. This yoke connecter in combination with the cam 30 which turns on the front roller 31, and the cam 28 which turns on the rear right and left-hand rollers 29 (according to whether the pintle is turned to the right or left), is important in that it permits the pintle and hence the connected door to be moved either to the right or left through a full circle of 360°. The yoke connecter is moved backwardly or rearwardly from its initial or at-rest position as shown in Figs. 1 and 2 for a distance substantially equal to the length of the longitudinal slots 27'' during the turning of the pintle through 180°. This backward or rearward movement of the connecter takes place against the action of the power means or spring. As the pintle is turned beyond 180° to complete the full circle of movement, the yoke connecter moves forwardly to its initial position along with the urge of the power spring. Manifestly, also, reverse movement of the pintle to its initial position from any position to which it may have been moved, will result in forward movement of the connecter to its initial position. Under this arrangement, the device of my invention cannot get out of order or the parts thereof be smashed, regardless of the extent or direction of movement of the pintle and consequently of the door.

It may be remarked here that in assembling my improved check and closer, the pintle and associated yoke and cam parts are inserted through the opening 12 to which the screw plug 13 is applied. The return spring, and then the cylinder with the sleeve and stem body are inserted through the front opening 19, the cylinder being entered axially of the spring and introduced into the bearing 35. The cylinder and yoke are then manipulated

so as to bring the seat 33′, aperture 34′ and aperture 33 all in alignment with the opening 15 for the application of the coupling pin 34. The stock disk 60 is then applied to the sleeve and the spring placed under tension, and then the ring valves as well as the adjusting screws therefor are applied and adjusted. Finally, the screw plug 19′ is applied and the stem body secured thereto by the screw 39. When the checking oil has been introduced into the casting and the screw plugs applied and sealed, there is no leakage of the checking fluid under the churning action thereof due to the working of the parts within the casting.

While I have devised my invention for use more particularly in connection with double doors and single acting doors of the kind which are automatically latched when closed, it is to be understood that the invention is not confined to such particular use.

While the invention has been illustrated and described in considerable detail, it is realized that in practice various changes and alterations may be made therein, and further that the invention is capable of embodiment in many different constructions. It has been sought herein to illustrate only such an embodiment as will suffice to exhibit the character of the invention. Reservation is, therefore, made to the right and privilege of changing the form of the details of construction or otherwise altering the arrangement of the parts without departing from the spirit or scope of the invention or the scope of the appended claims.

I claim:—

1. A device of the character described having, in combination, a case, a stationary stem body, a movable cylinder slidably embracing the stem body and therewith forming a liquid checking chamber, an extension on the cylinder forming a by-pass chamber in conjunction with the stem body, a passage for liquid leading through the stem body from said chamber to the interior of the case, and by-pass connections in the stem body, with which said by-pass chamber is adapted to establish communication to provide a branch outlet from said passage to the interior of the case.

2. A device of the character described having, in combination, a case, a stationary stem body, a movable cylinder slidably embracing the stem body and therewith forming a chamber, a passage leading through the stem body from said chamber to the interior of the case, a by-pass including two independent ports in said stem body, one in communication with said passage and the other in communication with the interior of the case, said cylinder having a part with a connecting by-pass adapted, when the cylinder is in one position, to provide communication between said independent ports.

3. A device of the character described having, in combination, a case, a stationary stem body, a movable cylinder slidably embracing the stem body and forming a chamber therewith, said stem body having therein a passage leading from the chamber and discharging into the interior of the case through a port, and having therein a by-pass branched from said passage and discharging into the interior of the case through a port separate from the passage port, said cylinder having an extension with a chamber adapted to form part of said by-pass, said extension being movable with the cylinder and operating in the capacity of a valve for opening and closing said by-pass, and independent regulating valves on the stem body for said ports.

4. A device of the character described having, in combination, a case, a stationary stem body, a movable cylinder slidably embracing the stem body and forming a chamber therewith, a passage in the stem body extending from the chamber and discharging into the interior of the case through a port, a by-pass in the stem body connected with the passage and discharging into the interior of the case through a port separate from the passage port, said cylinder having therein a chamber adapted to form part of said by-pass and functioning in the capacity of a valve for opening and closing said by-pass, a valve on the stem body for each of said ports, and means accessible from the outside of the case for independently regulating said valves.

5. In a device of the character described, consisting of a hollow case and a pintle operated cylinder therein, a stem body slidably embraced by the cylinder and forming therewith an end chamber and a by-pass chamber, said stem body having a passage leading from the end chamber to the interior of the case, said passage having a port adapted to discharge into said by-pass chamber, and a by-pass channel in the stem body leading to the interior of the case and having an inlet port adapted to communicate with said by-pass chamber when the cylinder is in one position.

6. In a device of the character described, consisting of a hollow case and a pintle operated cylinder therein, a stem body slidably embraced by the cylinder and forming therewith an end chamber and a by-pass chamber, two separate channels in the stem body, both arranged to discharge into the interior of the case, one of said channels being a main channel and leading from the end chamber, the other of the channels being a by-pass channel having a port adapted to communicate with the by-pass chamber, and a port in connection with the main channel adapted to communicate with the by-pass chamber, to provide from the main channel and separate from the main channel a through by-pass to the interior of the case.

7. In a device of the character described, consisting of a hollow case and a pintle operated cylinder therein, a stem body slidably

embraced by the cylinder and forming therewith an end chamber, an annular chamber and a by-pass chamber, there being an inlet opening between the annular chamber and interior of the cylinder and an inlet controlled by a check valve between the annular chamber and end chamber, two separate channels in the stem body each discharging through its own port into the interior of the case, one of said channels being a main channel which leads from the end chamber and the other being a by-pass channel with which the by-pass chamber can establish communication, a branch from the main channel with which the by-pass chamber can establish communication, and two independently regulatable ring valves upon the stem body, there being one for regulating the discharge through each of the discharge ports thereof.

8. A device of the character described comprising, with a liquid containing case having a fixed stem body therein and a cylinder slidably embracing the stem body, and forming an end chamber therewith, a sleeve movable with the cylinder upon the stem body and forming a by-pass chamber with the stem body, an abutment on the sleeve, a spring imprisoned between the case and abutment to force the cylinder toward a terminal of movement, said stem body having a main channel therein leading from the end chamber through an outlet port to the interior of the case, a port for said main channel adapted to discharge into said by-pass chamber, a by-pass channel in the stem body having an inlet port with which the by-pass chamber communicates as the cylinder comes in proximity to its terminal of movement, said by-pass channel having an outlet port in communication with the interior of the case, and valves controlling the main channel outlet port and by-pass channel outlet port.

9. In a device of the character described, the combination of a liquid containing casting, a stem body fixed therein and having a main discharge channel and a by-pass discharge channel, the main channel having a lateral outlet port intermediate the ends of the stem body and the by-pass channel having a lateral inlet port intermediate the ends of the stem body, a pintle operated cylinder in the casting slidably embracing the stem body and forming therewith a liquid checking chamber in communication with the main channel and also a by-pass chamber with which said lateral outlet and inlet ports are adapted concurrently to communicate when the cylinder is in one position of movement.

10. In a device of the character described, the combination with a liquid containing casting and a cylinder therein urged by a spring toward a terminal of movement, of a stem body fixed within the casting and slidably embraced by said cylinder, the stem body forming a liquid checking chamber with the cylinder and having a main outlet discharge channel leading from the liquid checking chamber and a by-pass discharge channel, a sleeve slidably embracing the stem body and adjustably attached to the cylinder, said sleeve forming a by-pass chamber with the stem body, a lateral by-pass discharge port for the main channel, a lateral inlet by-pass port for the by-pass channel, said sleeve being movable with the cylinder and said by-pass chamber being of a length to establish communication concurrently with said lateral discharge and inlet ports when said cylinder is in close proximity to its spring urged terminal of movement.

11. A device of the character described having a case, a stem body part and a cylinder part mounted within the case, one of said parts being mounted for reciprocation relatively with respect to the other part, said cylinder part embracing the stem body part and therewith forming a liquid checking chamber, a main liquid passage in the stem body part leading from the checking chamber to the interior of the case, a by-pass branched from said main passage and having communication with the interior of the case, and means under the control of the reciprocatory part for interrupting said by-pass during movement of the reciprocatory part in one direction and for re-establishing said by-pass during its reverse movement.

12. A device of the character described, having, in combination, a case, a stem body, a cylinder slidably embracing the stem body and therewith forming a liquid checking chamber, said cylinder being mounted for reciprocation and adapted on movement in one direction to expand the checking chamber and on reverse movement to contract the same, a main passage for liquid leading through the stem body from the checking chamber to the interior of the case, a by-pass branched from said main passage and having communication with the interior of the case, and means connected to and movable with the cylinder for interrupting said by-pass during movement of the cylinder in a direction to expand the checking chamber and for re-establishing said by-pass during reverse movement of the cylinder to contract said checking chamber.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

EMIL BOMMER.