T. MOONEY.

LIQUID DOOR CHECK.

APPLICATION FILED AUG. 21, 1912.

1,067,618.

Patented July 15, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

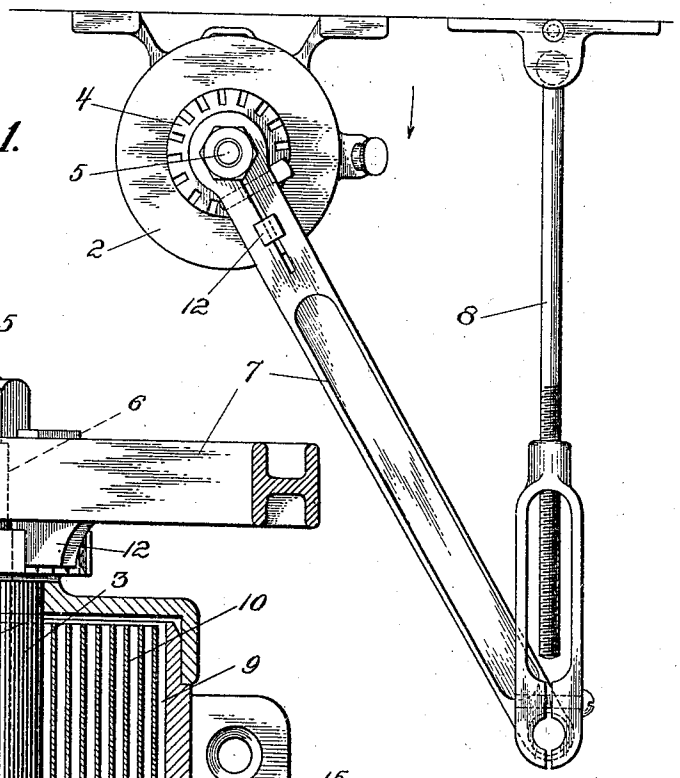


Fig. 2.

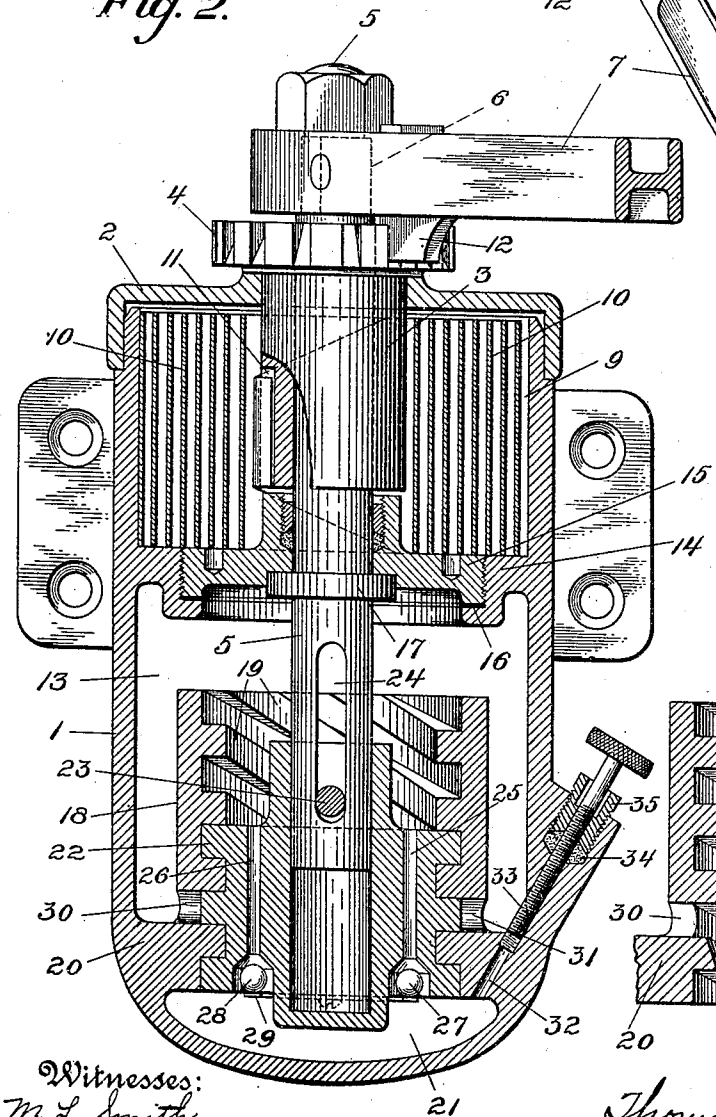
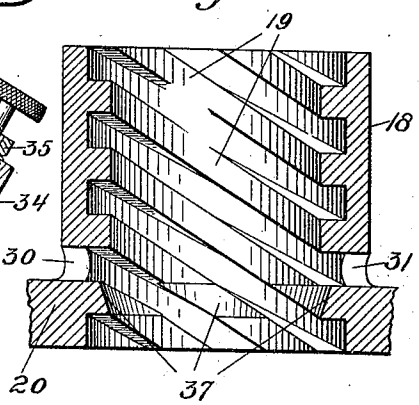


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 3.

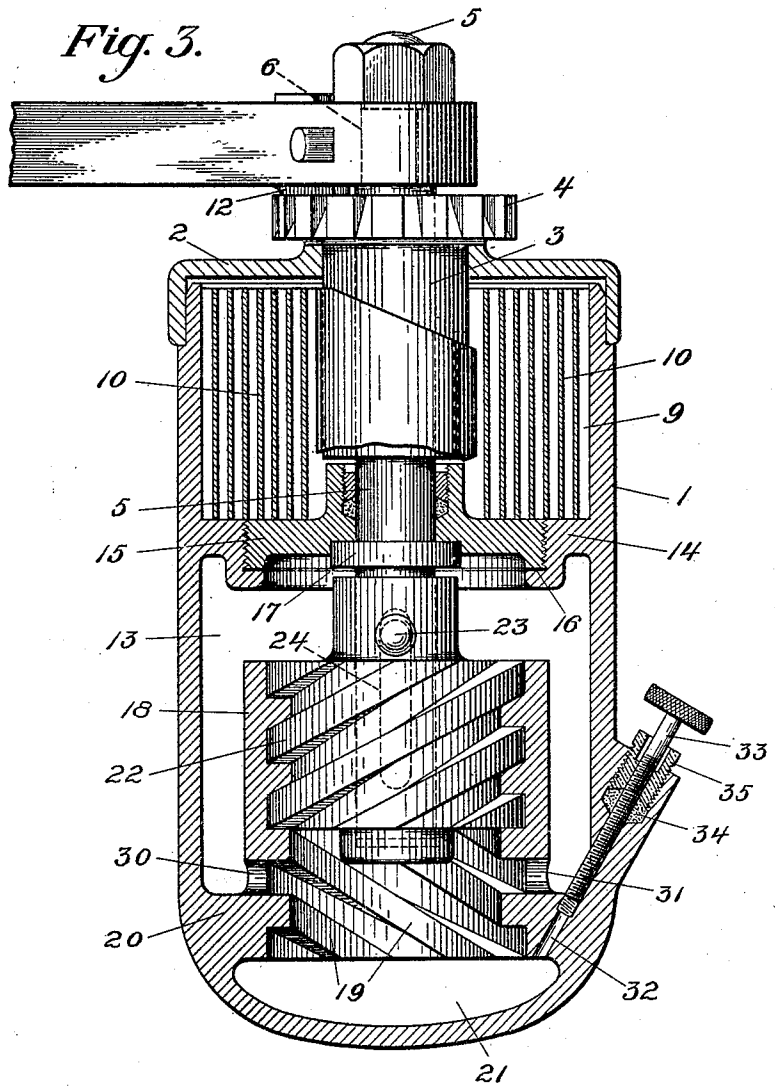
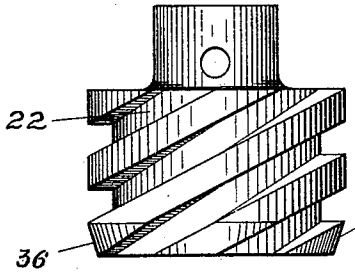


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS MOONEY, OF DOUGLASTON, NEW YORK.

LIQUID DOOR-CHECK.

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Application filed August 21, 1912. Serial No. 716,180.

To all whom it may concern:

Be it known that I, THOMAS MOONEY, a citizen of the United States of America, residing in Douglaston, county of Queens, Long Island, State of New York, have invented a certain new and useful Liquid Door-Check, of which the following is a specification.

This invention relates to door checks and closers of the liquid type which include a spring or other means to close the door and in which the closing force is restrained or controlled by the forced driving of the liquid through a restricted passage.

One object of the invention is to provide a mechanism that will move the door rapidly during the greater part of the closing movement; which will then check the movement to prevent slamming; and which will offer no resistance to the latching of the door at the time it is almost wholly closed.

Another object is so to construct such mechanism that the changes from quick to slow movement of the door may take place without great or undue shock upon the device.

Still another object is the provision of means to prevent the leaking or escape of the liquid used in the structure; and still other objects will appear in the following description and claims.

In the drawings, Figure 1 is a plan view of the device attached to a door; Fig. 2 is a sectional elevation showing the position of parts when the door is closed; Fig. 3 is a similar view showing the position of parts with the door open; Fig. 4 is an elevation of the piston; and Fig. 5 is a sectional elevation of the cylinder in which the piston works, somewhat modified.

Referring to the drawings, the improved mechanism is shown equipped with the usual devices for attaching it to the door and door frame, 1 being the main casing, 2 the cover plate, 3 a sleeve carrying the spring tension head 4, and surrounding shaft 5, the shaft being squared at 6 to receive the end of operating lever 7 which in turn is connected to the adjustable arm 8 attached to the door frame. The spring chamber 9 has attached to it the outer end of spring 10, the inner end of which is attached at 11 to the sleeve 3. A locking piece 12 is movable upon lever 7 and serves to hold the lever 7 in fixed relation with the tension head 4. All of this mechanism is similar to that provided in well known constructions.

Two very desirable features in a device of this character are that the door should be permitted to close quickly during the greater part of its movement, and that the checking of the door when nearly closed should not be so sudden that a heavy shock will be applied to the mechanism. These features are secured by the following mechanism: The shaft 5 is carried from the spring chamber 9 through a partition 14 of the casing and a cap 15 screwed into the partition, the letter carrying a stuffing box through which the shaft passes, and a collar 17 upon the shaft aiding to make a liquid tight seal. The lower part of the casing is divided into two chambers by a cylinder 18 inclosing a position 22, and a partition 20, the upper chamber 13 being an overflow chamber, and the lower, 21, a pressure chamber. The cylinder is internally threaded with multiple threads of coarse pitch 19, 19, and the piston is externally threaded in the same way. The piston further is cored out to receive the lower end of shaft 5 and is fitted with a pin 23 engaging a slot 24 located in the shaft. A suitable liquid, such as glycerin, alcohol and water, or oil, is contained in the casing. By this construction the rotation of shaft 5 causes the rotation of the piston, and the rotation of the piston causes it to move downwardly in the cylinder 18, this movement being permitted by the pin and slot connection 23, 24, with shaft 5. This movement of the piston corresponds with the opening and closing of the door and operates to drive the liquid from one chamber to the other. This movement of the liquid is provided for by ports 30, 31 located in the cylinder 18.

In Fig. 3 the parts are shown in the position they assume when the door is open. In closing the door the piston moves downward, and during the first part of the movement the liquid is free to flow through the ports 30, 31, so that little resistance is offered to the quick closing of the door during the greater part of its travel; but, as shown in Fig. 2, when these ports are cut off by the piston 22 acting as a valve, the easy movement of the liquid is prevented and a check is given to the movement of the door. This cut-off operates so quickly that a severe shock would be imparted to the device were it not for the special provision

made to eliminate it. In the present instance this takes the form of a tapered thread either on the lower end of the piston, as shown at 36 in Fig. 4, or on the lower end of the cylinder, as shown at 37 in Fig. 5. By means of this device, the flow of liquid through ports 30, 31 is gradually terminated rather than cut off abruptly, and the door is thereby given a soft, easy cushioning check, and the mechanism is not subjected to any great and sudden strain. The piston has a further downward movement after the ports 30, 31 are entirely cut off, as the door is not then wholly closed, and other means are provided to permit the flow of the liquid. These means include a by-pass 32 in the partition 20 controlled by an adjustable valve stem 33 having a stuffing box and gland 34, 35. It will be noticed that this arrangement permits a further movement of the door, but a very slow one, the retardation at this point being to prevent the slamming of the door. By this time also the door spring 10 has lost much of its power, and the door having little or no remaining momentum, it is necessary to provide means to withdraw the resistance still offered by the check in order that there may be sufficient power available to close the door fully against the pressure of the latch. This means is shown in Fig. 2 and comprises one or more passages 25, 26 located in the piston 22, which are controlled by ball check valves 27, 28 in the lower face of the piston and retained by a clip 29 in the enlarged ends of the passages 25, 26. During the earlier part of the downward movement of the piston, pressure of the liquid in chamber 21 holds the balls against their conical seats and closes the passages 25, 26. When the door is almost wholly checked, however, the pressure in chamber 21 has so lowered that the balls drop downward of their own weight and open up the additional passages 25, 26 so that additional power of the spring 10 may be applied to latch the door. When the door is opened, a movement reverse of that described takes place, and in this case, the liquid, flowing into the pressure chamber, opens the check valves 27, 28 as soon as the door begins the opening movement.

One of the most serious objections to mechanisms of this general character in which a liquid is employed as a governing medium is the liability to leakage owing to pressure generated during the checking movement, and for other reasons. This defect has been remedied in the present invention by the provision of two chambers containing the liquid, designated respectively as the pressure chamber and the overflow chamber. In the construction shown and the mode of operation described, the greatest pressure of the liquid occurs in chamber 21 which is completely inclosed by partition 20, piston 22, and cylinder 18. Moreover should any leakage occur from this chamber, the liquid can only escape into the overflow chamber 13, so that it is of no consequence if such leakage should occur. The overflow chamber 13 is preferably only partly filled with liquid, the upper part containing air so that the packing in cap 15 about the shaft 5 is not subject to liquid pressure. Furthermore in the normal working of this mechanism no great pressure is ever created in the overflow chamber.

What is claimed is:

1. In a liquid door check, a casing having a pressure chamber and an overflow chamber, a cylinder communicating with each chamber and equipped with ports, and a rotary piston longitudinally movable in said cylinder and adapted to control said ports.

2. In a liquid door check, a casing, a partition separating the casing into a pressure chamber and an overflow chamber, a cylinder and a rotary and longitudinally movable piston located intermediate the two chambers, the cylinder being equipped with ports adapted to be controlled by the movement of the piston.

3. In a liquid door check, a casing, a partition separating the casing into a pressure chamber and an overflow chamber, a cylinder and a rotary and longitudinally movable piston located intermediate the two chambers, the said partition being equipped with a by-pass.

4. In a liquid door check, a casing, a partition separating the casing into a pressure chamber and an overflow chamber, a cylinder and a rotary and longitudinally movable piston located intermediate the two chambers, the cylinder being equipped with ports adapted to be controlled by the movement of the piston, and the said partition being equipped with a by-pass.

5. In a liquid door check, a casing having a pressure chamber and an overflow chamber, a cylinder communicating with each chamber and equipped with ports, and a rotary piston longitudinally movable in said cylinder and adapted to control said ports, the relative conformation of the piston and cylinder being such that the closing of the ports is gradual.

6. In a liquid door check, a cylinder having internal threads, a piston externally threaded to coact with the cylinder, ports located in the cylinder and adapted to be controlled by the piston, one set of the engaging threads being reduced in cross section to cause the gradual closing of the ports.

7. A spring impelled liquid door check including an internally screw threaded cylinder, a piston correspondingly screw thread-

ed fitted therein, means for rotating the piston and thereby causing it to reciprocate in the cylinder, an overflow chamber, and ports through the wall of the cylinder opening into the overflow chamber and controlled by the piston.

8. A spring impelled liquid door check including an internally screw threaded cylinder, a piston correspondingly screw threaded fitted therein and having the lower ends of the screw threads tapered, means for rotating the piston and thereby causing it to reciprocate in the cylinder, an overflow chamber, and ports through the wall of the cylinder opening into the said chamber and controlled by the piston.

9. In a liquid door check, a casing comprising a spring chamber, an overflow chamber, and a pressure chamber, all co-axially arranged, a cylinder concentric with and connecting the said overflow and pressure chambers and having internal threads, a threaded piston coacting with the cylinder, a spring in said spring chamber, a shaft rotatively driven by the spring and a sliding driving-connection between the piston and shaft, and ports connecting the overflow and pressure chambers and controlled by the piston.

In testimony whereof, I have hereunto subscribed my name.

THOMAS MOONEY.

Witnesses:
S. A. STORY,
M. L. SMITH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."