T. MOONEY.

DOOR CHECK AND CLOSER.

APPLICATION FILED AUG. 21, 1912.

1,167,778.

Patented Jan. 11, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

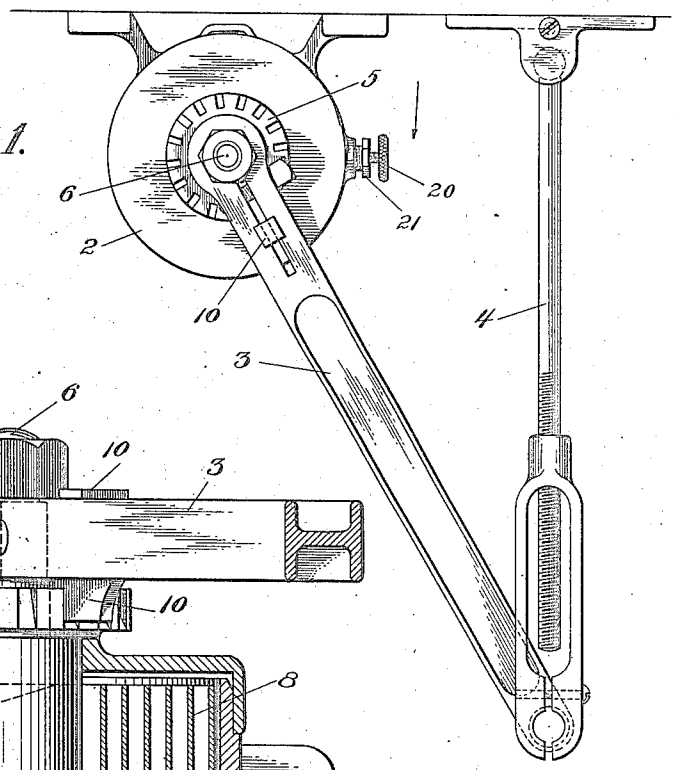


Fig. 2.

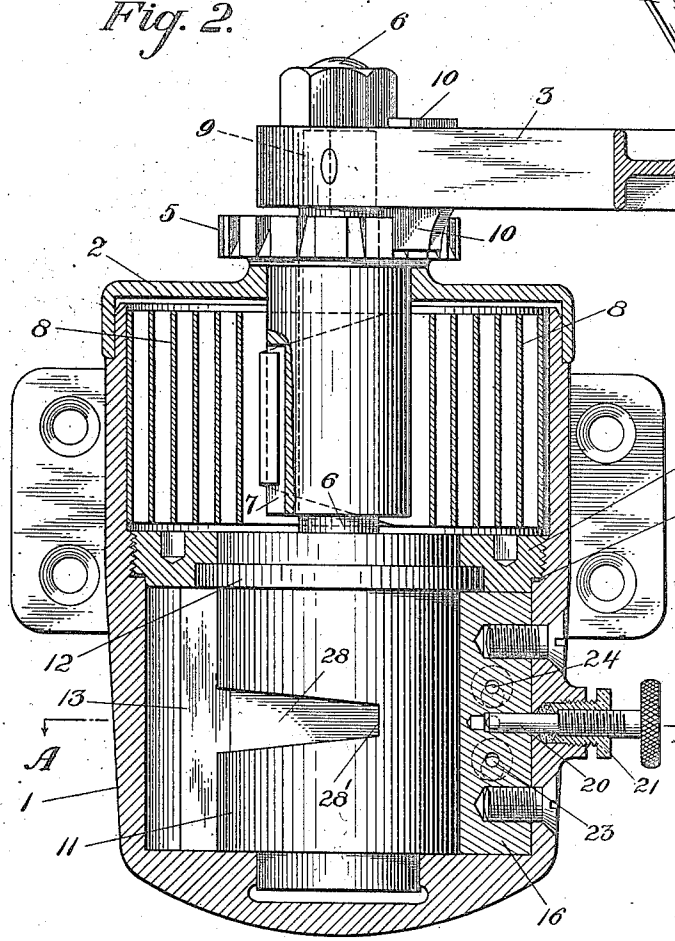
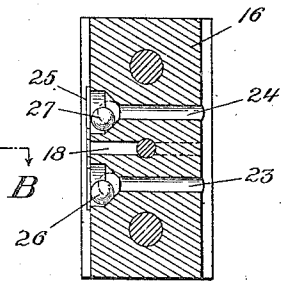


Fig. 8.



Witnesses:
M. L. Smith
Frank Curry

Inventor
Thomas Mooney
By his Attorney
Edward C. Davidson

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3 SHEETS—SHEET 2.

Fig. 3.

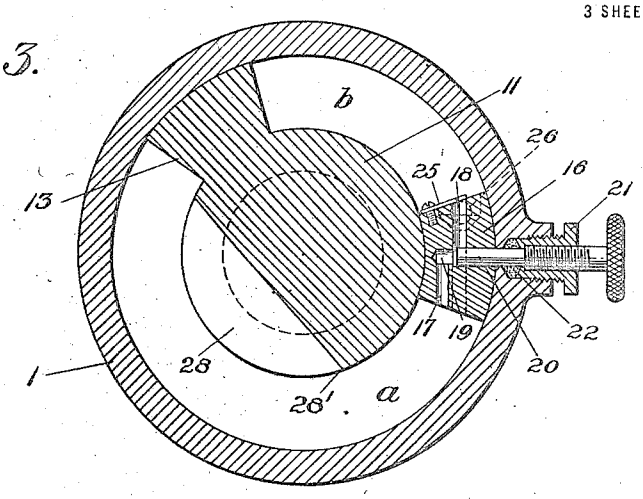


Fig. 4.

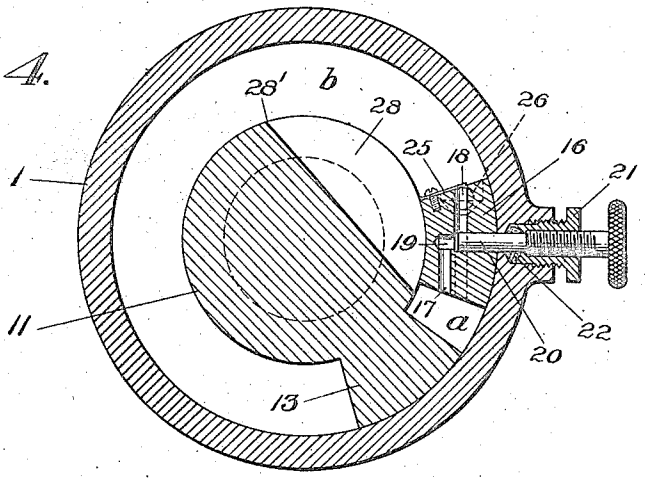
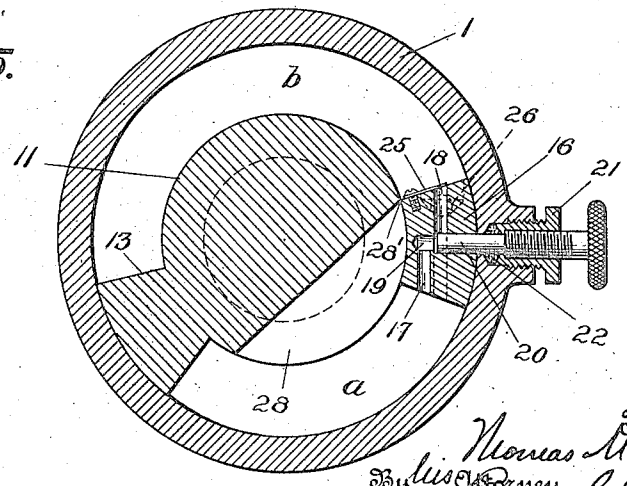


Fig. 5.



Witnesses:
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Frank Curry

Inventor
Thomas Mooney
By his Attorney
Edward C. Davidson

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3 SHEETS—SHEET 3.

Fig. 6.

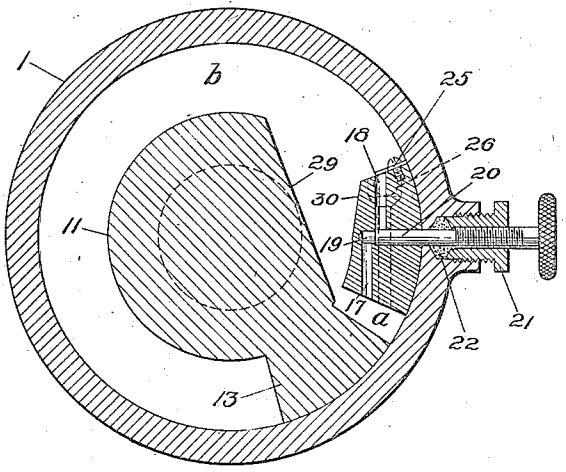
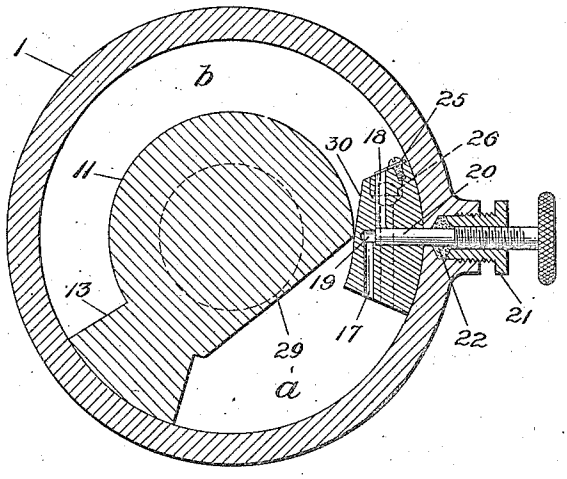


Fig. 7.



Witnesses:
M. L. Smith
Frank Curry

Inventor
Thomas Mooney
By his Attorney
Edward C. Davidson

UNITED STATES PATENT OFFICE.

THOMAS MOONEY, OF DOUGLASTON, NEW YORK.

DOOR CHECK AND CLOSER.

1,167,778. Specification of Letters Patent. Patented Jan. 11, 1916.

Application filed August 21, 1912. Serial No. 716,179.

To all whom it may concern:

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

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

One object of the invention is to provide novel mechanism which 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.

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 my improved door check and closer attached to a door; Fig. 2 is a sectional elevation; Fig. 3 is a section taken on line A—B of Fig. 2 with parts in door-closed position; Fig. 4 is a similar section with parts in door-open position; Fig. 5 is a similar section with door partly closed; Fig. 6 is a section taken on line A—B of Fig. 2 showing a modified form of the parts with the door in open position; Fig. 7 is a similar view with parts in a different position; and Fig. 8 is a sectional elevation of an abutment.

Referring to the drawings, the improved mechanism is shown equipped with the usual devices for attaching it to a door and door frame, 1 being the main casing, 2 the cover plate, 3 the operating lever, 4 the adjustable connection between the operating lever and the door frame, 5 the spring tension head with sleeve extending around shaft 6 into the spring chamber and provided with slot 7 to receive the inner hooked end of motor spring 8, shaft 6 being provided with a square shank 9 fitting into lever 3, and 10 a locking piece on the lever to hold it and shaft 6 in fixed relation to the tension head 5, all as provided in usual 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 mechanism next to be described.

Integral with or fixed to shaft 6 is a cylindrical oscillating valve member 11 fitted with a collar 12, a radial piston 13, and at its lower end has a reduced cylindrical extension fitting into a corresponding counterbore in the case 1. A horizontal partition plate 14 is screwed into the casing 1 and divides the liquid or valve chamber from the spring chamber, a suitable washer 15 forming a liquid tight packing. A radial partition or abutment 16 having a concave inner face is rigidly attached to the inner surface of the valve chamber, by screws as shown or in other suitable manner, and forms a close-fitting partition between the walls of the chamber and the periphery of the cylindrical valve member 11. It will be noticed that in this construction the chamber is divided by the valve member 11, piston 13 and abutment 16 into two spaces which are filled with a suitable liquid, such as glycerin, alcohol and water. Provision must be made for the passage of this liquid from one space to the other as the door is opened and closed and the piston 13 oscillated back and forth and this is done by providing the valve member 11 with a port 28 located in the periphery of the valve. This port coacts with the abutment 16 to permit the liquid to pass between them as the piston 13 moves through a part of its travel, as best shown in Figs. 4 and 5.

In Fig. 4 the parts are shown in the position they assume when the door is open. In closing the door, the piston 13 travels in a clockwise direction as shown in Fig. 5. It will be seen that during this part of the movement the liquid in space *b* is free to flow through port 28 into the space *a* as the piston 13 in its movement varies the sizes of the two spaces. This free movement of the liquid allows the spring 8 to move the door quickly during the greater part of its

travel; but, as shown in Fig. 5, when the port 28 is cut off by abutment 16, the liquid can no longer flow through this port and a check is given to the movement of the door. This cut-off operates so quickly that a great shock would be imparted to the device were it not for the special form which is given to the port 28. Referring to Fig. 2 it will be seen that this port is tapered down to the point of cut-off 28′ so that the cross-sectional area of the port 28 is constantly reduced up to the point of complete cut-off shown in Fig. 5. The door is thereby given a soft, easy cushioning check and the mechanism is not subjected to any great and sudden strain.

The piston 13 has a still further movement before the door is wholly closed and as at this point the port 28 is wholly closed, other means are provided to permit the flow of the liquid. This means includes a by-pass 17, 18 communicating with a channel 19 controlled by an adjustable valve stem 20 having a stuffing box and gland 21 and packing 22, this by-pass being located in the abutment 16. 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 doorspring 8 has lost much of its power, and the door having little or no 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 its latch. This means is best shown in Fig. 8 and comprises one or more passages 23, 24 located in the abutment 16 which are controlled by ball check valves 26, 27 placed on the space *b* side of the abutment and retained by a clip 25 in the enlarged ends of passages 23, 24. In the first part of the movement of piston 13 the pressure and velocity of the liquid in space *b* holds the balls 26, 27 against their conical seats and closes passages 23, 24. When the door is almost wholly checked however, the difference of pressures in spaces *a* and *b* is not sufficient to hold the balls to their seats and they drop downward of their own weight and open up the additional passages 23, 24 so that additional power of the spring 8 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 from *a* to *b* opens the check valves 26, 27 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 by the present invention, as shown in Fig. 2. The main casing 1 is formed into a cup-like vessel which has no joints below the level of the liquid, and the valve member 11 is provided with the collar 12 which fits closely to a bearing in the partition 14. Because of this construction a greater area of the moving member is exposed to the upward pressure of the liquid than to the downward pressure, so that the one joint liable to leakage is automatically packed as the greater the pressure of the liquid, the tighter the collar 12 is held to its seat. It will be noticed that this method of packing by means of the unbalanced valve member 11 is correlated with the means already described for securing a gradual cut-off action by the form of port 28. The checking mechanism as described operates without the creation of any sudden or extremely high pressures of the liquid, so that in this mechanism there is no sudden or violent upward thrust of collar 12 against its bearings.

In Figs. 6 and 7 a modified form of the main valve is shown. The valve instead of being provided with a tapered port is flattened as at 29, and the gradual reduction of the passage between spaces *a* and *b* is effected by the beveled face 30 on the abutment 16.

In both preferred and modified forms, the port 28 is located on the periphery of the valve member 11, and the contact with the abutment 16 is peripheral only. This permits the longitudinal movement of the valve due to its unbalanced condition, and such movement will not interfere in any way with the seal or port between the valve and the abutment.

The abutment, as shown in Figs. 3 to 5, is formed with a concave face which has a bearing contact with the periphery of the oscillating member 11 which being ported, as before described, operates as a valve to open and close communication between the fluid chambers on opposite sides of the abutment. It will be observed that the widest or largest part of the port 28 is nearest the piston and the port gradually decreases in area from this point so that as the door closes the flow of liquid from one side of the abutment to the other is gradually reduced and after that the ported portion of the oscillating member separates from the abutment and communication is established through the passage in the body of the abutment.

What is claimed:

1. In a liquid door check, a cylindrical casing, an abutment having a concave face located within and attached to the casing, an oscillating member mounted within the casing with its periphery in sealing and bearing contact with the abutment, a radial piston carried by the said member, and a

port located between the abutment and said member, the cross-sectional area of the port varying in accordance with the angular position of the oscillating member.

2. In a liquid door check, a cylindrical casing, an abutment having a concave face located within and attached to the casing, an oscillating valve member mounted within the casing with its periphery in sealing and bearing contact with the abutment, a radial piston carried by the said member, and a port located between the said member and abutment, the said port having as its walls the inner end of the abutment and a peripheral channel in the oscillating member, and the cross-sectional area of the port varying with the angular position of the said member.

3. A door check and closer, comprising a cylindrical casing inclosing a liquid-containing chamber, a fixed abutment within the chamber having a fluid passage through it, an oscillating piston-carrying member within the fluid chamber which with the abutment divides the chamber into two parts and which is provided with a tapered port widest near the piston and narrowest at the point of cut-off for the flow of liquid past the abutment during a portion of the time when the door is closing and for the gradual reduction of said flow as the closing of the door continues, and an automatic valve in the fluid passage of the abutment which opens when the flow through the said tapered port is stopped to facilitate in the latching of the door.

4. In a liquid door check, a cylindrical casing, an abutment having a concave face located within and attached to the casing, an oscillating member mounted within the casing with its periphery in sealing and bearing contact with the abutment, a radial piston carried by the said member, a port of variable cross-sectional area located between the abutment and the periphery of said member, and a port and valve located in the abutment and controlled by the pressure of the liquid.

5. In a liquid door check, a cylindrical casing, an abutment having a concave face located within and attached to the casing, an oscillating member mounted within the casing with its periphery in sealing and bearing contact with the abutment, a radial piston carried by the said member, a port of variable cross-sectional area located between the abutment and the periphery of said member, and an adjustable valve located in the abutment.

6. In a liquid door check, a cylindrical casing, an abutment having a concave face located within and attached to the casing, an oscillating member mounted within the casing with its periphery in sealing and bearing contact with the abutment, a radial piston carried by the said member, a port of variable cross-sectional area located between the abutment and the periphery of said member, and a plurality of by-passes through the said abutment, one of which is controlled by the pressure of the liquid, and one by an adjustable valve.

7. In a liquid door check, a casing having an aperture, an abutment having a concave face located with and attached to the casing, an oscillating member mounted within the casing and having a sealing and bearing contact with the abutment, a radial piston carried by the said member, a port located beween the abutment and the said member and having a varying cross-sectional area, the rotary member forming a sealing joint with the aperture wall and adapted to be thrown out of balance by the pressure of the liquid whereby the pressure of the sealing joint will be increased.

In testimony whereof, I have hereunto subscribed my name.

THOMAS MOONEY.

Witnesses:
S. A. Story,
M. L. Smith.