No. 727,051. PATENTED MAY 5, 1903.

W. T. ADAMS.

DOOR CHECK.

APPLICATION FILED SEPT. 2, 1902.

NO MODEL.

Fig. 1.

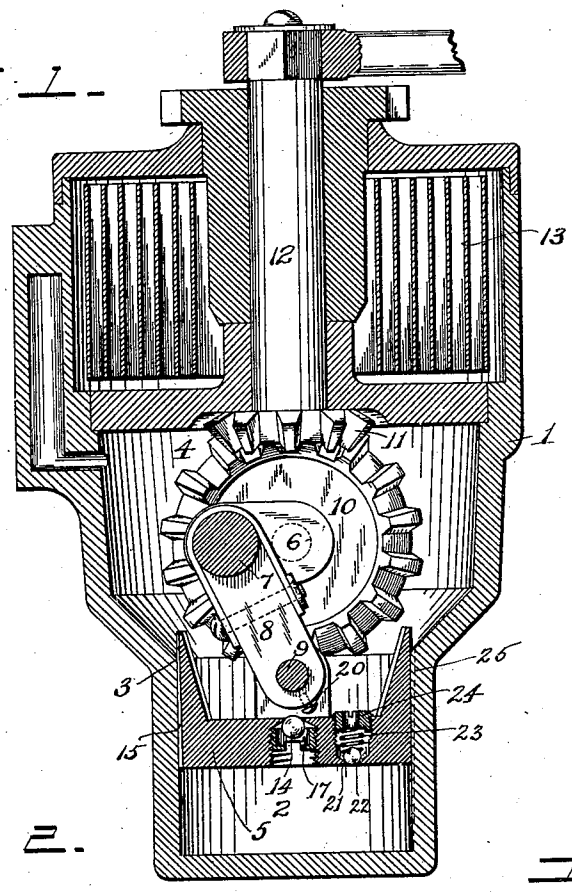


Fig. 2.

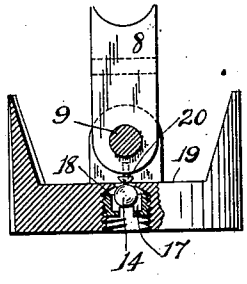
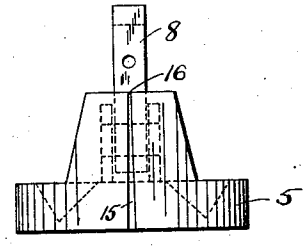


Fig. 3.



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No. 727,051. Patented May 5, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM T. ADAMS, OF READING, PENNSYLVANIA.

DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 727,051, dated May 5, 1903.

Application filed September 2, 1902. Serial No. 121,822. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. ADAMS, a citizen of the United States of America, and a resident of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Door-Checks, of which the following is a specification.

My invention relates to fluid door-checks; and it consists in certain improvements for more perfectly regulating the flow of liquid from the pressure side of the piston in order to meet various conditions of service.

The closing movement of the door at all points depends upon the provision made for permitting the flow of liquid under pressure past the compressing piston, and this provision should vary automatically to provide for different conditions and requirements. For instance, the ordinary passage-way through or by the piston commonly provides for a comparatively rapid flow during the first portion of the closing movement of the door and the later checking of the flow to prevent a slamming action. This normal passage of the liquid under pressure I provide for in my improved construction. In addition thereto, however, I provide for special passage-ways to meet requirements other than the ordinary, but of considerable practical importance. Even in ordinary service the doors are often subjected to abormal closing strains caused by drafts or misuse, which are liable to break the check mechanism or tear loose its connections, and when used in connection with electric door-openers provision must be made to properly overcome without violence the additional resistance then offered to the final closing of the door. My improvements provide also for satisfactorily meeting these conditions. They are fully described in connection with the accompanying drawings, and the novel features are specifically pointed out in the claims.

Figure 1 is a sectional elevation showing a well-known form of door-check having my improvements applied thereto in preferred form. Fig. 2 is a similar detached view of the piston, showing the toggle-lever in practically the position it assumes when the piston is at one end of its movement and the check-valve forced from its seat. Fig. 3 is a side elevation of the detached piston, showing the tapered groove passage-way formed therein.

The general construction of the particular form of check indicated forms no part of my invention and may be briefly referred to. The check-casing 1 is formed at its lower portion with a cylinder 2, which enlarges at a point 3 into a communicating chamber 4, located above the piston 5, and in which is located the crank-shaft 6 7, pivotally connected by the toggle link or lever 8 to the piston at 9. This crank-shaft is turned to reciprocate the piston through bevel-gears 10 and 11 by the central shaft 12, to which latter the door-frame levers and the spring 13 are connected, as usual. In operation a suitable liquid is supplied to the chamber 4. The opening of the connected door raised the piston 5, (shown in midway position in the drawings,) the liquid passing through the then open check-valve 14 to the space below the piston. The door when released is closed by the action of the spring 13, controlled, however, by the resisted movement of the piston against the confined liquid beneath it, the escape of which to the opposite side of the piston determines the character of the movement. My invention relates to the provision made for so regulating this escape as to secure the movement desired at different times under different conditions, and I will now proceed to describe the same.

The normal passage-way for the escape of the pressure liquid to the opposite side of the piston I provide by merely forming a longitudinal groove 15 in the periphery of the piston extending the entire length thereof, said groove being tapering in form, so as to have an increasing cross-sectional area from the top edge 16 of the piston toward the bottom. When the door is wide open and the piston in fully-raised position, the latter extends considerably above the enlarging point 3 of the cylinder, which point determines the portion of the tapered groove passage-way 15, that really restricts the flow of liquid therethrough, the portion of said groove above the point 3 being in free communication laterally with the chamber 4. Thus the escape of liquid through said passage-way varies in different positions of the piston with the changing

cross-sectional area of the groove presented to the wall of the cylinder at the point 3, ordinarily allowing a comparatively free flow during the early downward movement of the piston corresponding with the earlier portion of the door-closing movement and a more restricted flow as the door nears its closed position, thus slowing up the movement of the latter. The depth or width of the groove may be readily made to provide the desired area of effective passage-way at any portion of the stroke. This passage-way 15 may thus be made to provide for the desired escape of the liquid under normal conditions of ordinary service. When, however, the check is used in connection with an electric door-opener, already referred to, an additional impulse is required when the piston is near the limit of its downward movement to effect the final closure against the opening-spring in such cases provided. To secure this effect, I utilize the check-valve 14, already referred to, without interfering in the least with its ordinary use. The chamber 17 for this valve is conveniently provided in the center of the piston, and the valve is normally pressed upward against its seat 18 during the downward movement of the position. As shown, I employ a ball-valve adapted when seated to project slightly above the upper piston-surface 19, and I provide the lower extremity of the toggle-lever 8 with an adjustable projection 20, so set as to come in direct contact with the ball as it approaches the vertical position indicated in Fig. 2, thus forcing the valve off its seat, as shown, and permitting an independent escape of liquid through the piston sufficient to relieve its resistance to the action of the spring 13 at the proper moment to effectively overcome the additional resistance incident to the use of the electric opener.

The injurious effects already referred to as resulting from abnormal strains are due to the fact that the capacity of the normal liquid-escape passage-way 15 or its equivalent is necessarily so limited as to allow of no substantial yielding when the door is subjected even to a momentary excessive strain. To avoid such effects, I therefore provide for a supplementary escape-passage adapted to open automatically as soon as a certain maximum and unsafe strain upon the apparatus occurs and to close again automatically as soon as such excessive strain is removed, so as to resume the normal action. This result I attain by simply providing an independent escape-passage 21, which is normally closed by means of a safety-valve 22, held to its seat by a spring 23, the tension of which is properly adjusted by means of a perforated screw-cap 24, so as to allow the valve to lift when the predetermined maximum pressure upon the piston occurs, thus providing a temporary escape for the liquid supplementing the normal escape-passage 15 and permitting of a temporary comparatively rapid closing movement of the door. This valve 22, however, is automatically closed again by the spring as soon as the pressure upon the same is reduced below the unsafe limit, and the normal action is simultaneously resumed.

The advantages secured by my improved liquid-escape regulation have already been made clear, and I desire to include in my invention modifications of the particular construction shown, which may be readily devised.

What I claim is—

1. In a fluid door-check the combination with the cylinder, of a door-operated piston therein provided with a fixed passage-way for the fluid under pressure and also with an emergency passage-way having a safety-valve therein arranged to open only at a regulated maximum pressure.

2. In a fluid door-check the combination with the cylinder and the piston therein having a passage-way for the liquid under pressure, of a reciprocating mechanism for said piston, a check-valve in the latter arranged to be normally closed by the fluid under pressure and means for automatically opening said check-valve at a predetermined point of the piston movement substantially as set forth.

3. In a fluid door-check the combination with the cylinder and the piston therein having a passage-way for fluid under pressure, of a reciprocating mechanism for said piston comprising a toggle-jointed lever pivoted thereto, and a check-valve in said piston arranged to be normally closed by the fluid under pressure, said lever being constructed to engage and open said valve at a certain point of the piston movement, substantially as and for the purpose set forth.

Signed at Reading, Pennsylvania, this 26th day of August, 1902.

WILLIAM T. ADAMS.

Witnesses:

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