(No Model.)

A. A. PAGE.

FLUID DOOR CHECK.

No. 539,236. Patented May 14, 1895.

Fig. 1

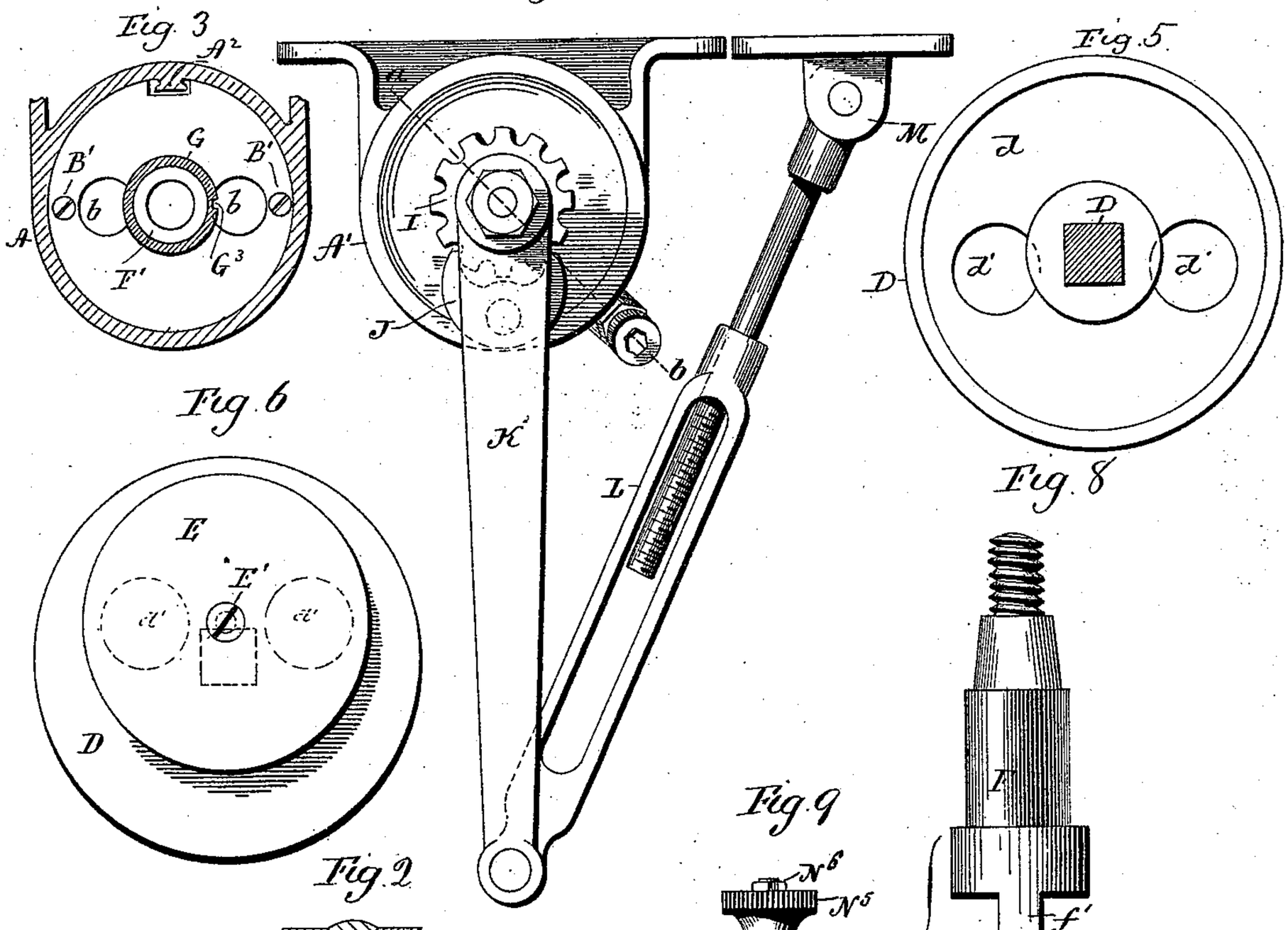


Fig. 3

Fig. 5

Fig. 6

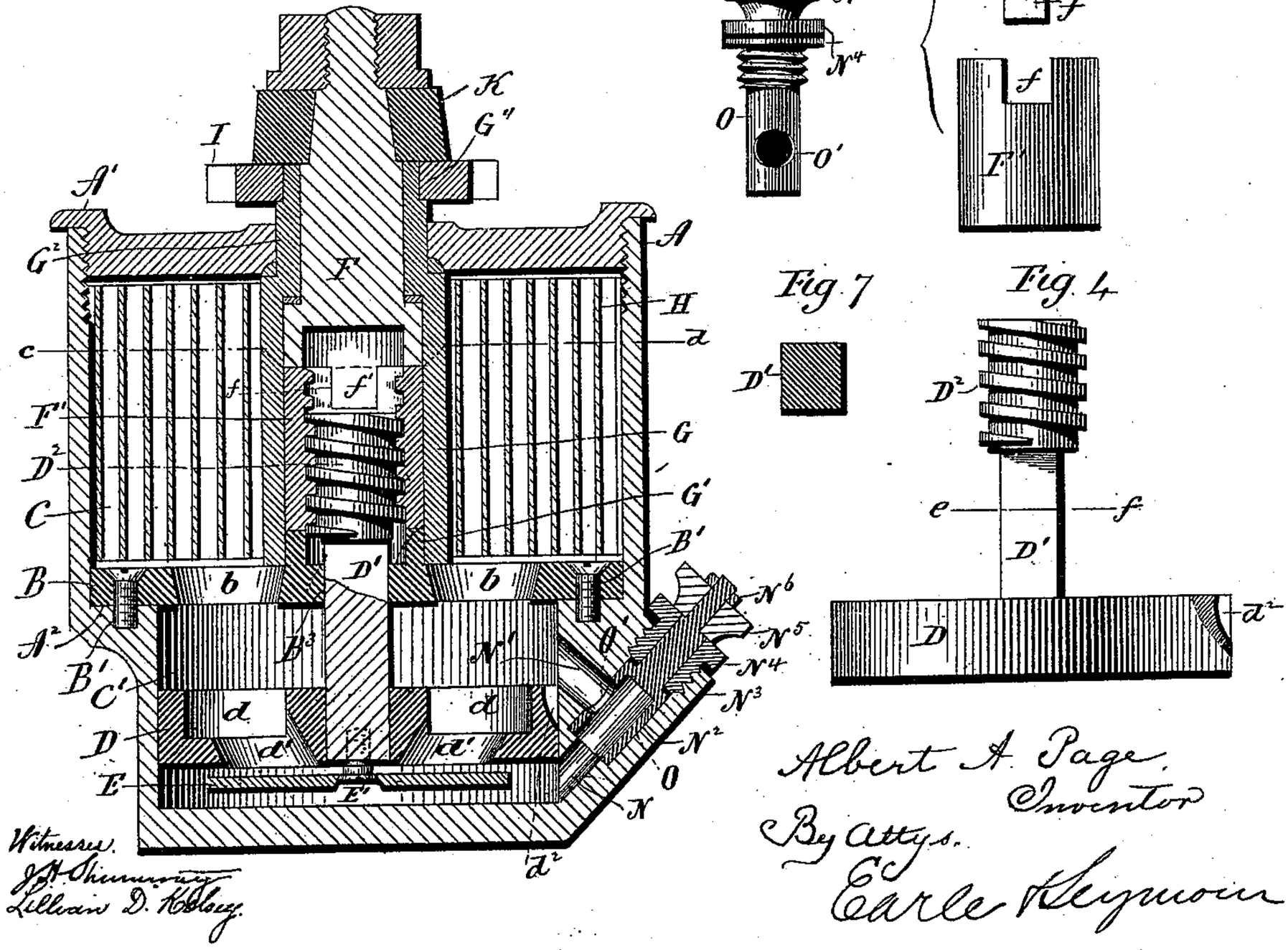
Fig. 8

Fig. 2

Fig. 9

Fig. 7

Fig. 4



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FLUID DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 539,236, dated May 14, 1895.

Application filed November 26, 1894. Serial No. 529,975. (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 Fluid 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 plan view of one form which a door-check constructed in accordance with my invention may assume; Fig. 2, a full-size view in vertical central section on the line *a b* of Fig. 1; Fig. 3, a view of the case in horizontal section on the line *c d* of Fig. 2, showing the spring removed; Fig. 4, a view in side elevation of the plunger; Fig. 5, a plan view thereof with its stem in section; Fig. 6, a reverse plan view thereof, showing the plate-valve and the twofold function of the screw in securing the valve to the plunger and preventing the latter from rotating on its stem; Fig. 7, a view in transverse section on the line *e f* of Fig. 4, showing the stem of the plunger; Fig. 8, a detached view of the spindle, showing its internally-threaded section disconnected from its main upper portion; Fig. 9, a detached view in elevation of the vent-valve.

My invention relates to an improvement in fluid door-cheeks, which are that class of door-checks in which the restrained or controlled movement of a body of fluid is used to prevent the slamming of the door.

The object of my present invention is to produce a simple, durable device, composed of few parts, and constructed with particular reference to compactness and to making use of the superior effect of a direct thrust of the plunger over a spiral thrust thereof, available.

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

In carrying out my invention, as herein shown, I employ a heavy case or cylinder A, adapted in the usual manner to be applied to a door, furnished at its upper end with a threaded cap A′, and formed with an integral closed bottom. The said case is shaped to form within it an annular shoulder A^2, which provides a support for a diaphragm B, which is secured in place by means of screws B′, passing through the edge of the diaphragm, and into the shoulder, the said diaphragm virtually dividing the case into a spring-chamber C, and a fluid-chamber C′. These chambers have, however, communication with each other through openings *b*, formed in the diaphragm, for it is to be understood that the fluid, whatever may be employed, is not strictly confined to circulation in the fluid chamber. Within the said fluid chamber I locate a disk-shaped plunger D, having a smooth periphery, which fits closely against the inner walls of the fluid chamber, but not so closely but what the plunger is free to move up and down therein. The said plunger is rigidly secured to the lower or inner end of a square stem D′, which passes through a squared opening B^3, formed to receive it in the center of the diaphragm, which holds the stem against rotation without interfering with its longitudinal reciprocation. The particular construction of the diaphragm and stem to effect this result, may obviously be greatly varied. Thus the stem may be of any non-cylindrical shape in cross-section, and the opening in the diaphragm shaped to correspond, or, the stem might be made cylindrical and furnished with lugs or wings playing in slots leading out of a circular opening formed in the diaphragm to receive the cylindrical part of the stem. Or, the plunger and case might be constructed to prevent the rotation of the former without interfering with the reciprocatory movement thereof. The projecting upper or outer end of the stem has a screw-threaded enlargement or head D^2, but this is not essential, as the threads might be formed upon the said end of the stem without enlarging the same. As shown, the outer end of the stem terminated within the spring-chamber, but it may be extended through and projected beyond the same.

The upper face of the plunger D has a deep annular recess *d*, and the plunger is constructed with two oppositely located passages

d' d' leading out of the bottom of this recess, and opening through the bottom of the plunger. Working against these passages and closing them during the descent of the plunger, is a circular plate-valve E, retained in place by means of a screw E′, the head of which is constructed to permit a slight movement of the valve toward and away from the lower face of the plunger. As herein shown, this screw has the additional function of securing the plunger against rotation on the lower end of the square stem D′, which it does by taking into the stem for a little distance, key-fashion, as illustrated in Fig. 3. The plunger is raised and lowered without spiral movement, by the rotation of the spindle F, which is furnished at its lower end with an internally threaded sleeve-like section F′, which receives the threaded head D^2, formed at the upper end of the stem D′, carrying the plunger. As herein shown, this section is constructed with coupling slots f, receiving coupling-lugs f' formed integral with the spindle proper.

It is not essential that the threaded section F′ should be made independent of the spindle, but I find that construction much the most convenient to manufacture. The said spindle and its coupled section F′, are located within a long sleeve or bushing G, the lower end of which fits down over a hub G′, formed in the center of the upper face of the diaphragm B, while its upper end, which is somewhat reduced in diameter to form a bearing G^2, fits in an opening formed in the center of the cap A′. The exterior face of this sleeve has a longitudinal groove G^3, shown in Fig. 3, for the reception of the inner end of the door-spring H, the outer end of which is engaged with a rib, projecting into the spring chamber C. The projecting upper end of the sleeve is faced to form a nut G^4, which receives and holds against rotation the notched hub or wheel I, the notches of which are taken into by a pawl J, mounted upon the lower face of the inner end of the door-lever K, the inner end of which fits over the squared outer end of the spindle. The outer end of the said sleeve is connected with a two-part adjustable casing-lever L, provided at its outer end with a bracket M, adapted to be attached to the door casing. It will be understood that when the plunger D is lifted, the plate valve E, drops away from its lower face by the action of gravity, within the limit of movement allowed it by the head of the screw E′, thus permitting the fluid to flow freely through the plunger, down into the lower portion of the fluid-chamber C′.

I may remark here that the fluid at the beginning of the up stroke of the plunger, may be located entirely within the upper portion of the fluid-chamber, or a portion of it may extend into the spring-chamber, which has free communication with the fluid chamber through the passages b b in the diaphragm B. When the plunger begins to move downward, which it does at the beginning of the closing movement of the door, the plate-valve impinges against the fluid in the lower portion of the fluid chamber, and is at once lifted so as to close the passages d' d' in the plunger, whereby the return of the fluid through the said passages is cut off. Just as soon therefore, as the plate valve is closed, the downward movement of the plunger places the fluid in the lower portion of the fluid chamber under great pressure, so that the fluid resists the described movement of the plunger, and hence the rotation of the spindle which is coupled with the plunger, and hence the closing movement of the door, which is connected with the spindle, and can only close as the same rotates and allows it to. The resistance of the confined fluid is now slowly relieved by means of two vent-passages N and N′, the inner ends of which respectively open into the lower and upper ends of the fluid chamber, while their outer ends intersect a small valve-chamber N^2, formed in a projection N^3, cast integral with the lower portion of the case A, the said valve-chamber receiving a hollow vent valve O, open at its outer end for communication with the passage N, and containing an opening O′, for communication with the passage N′. This valve is held in place in the chamber by means of a retaining nut N^4, and is furnished at its projecting outer end with an operating-button N^5, held in place by a small nut N^6.

It will be readily understood that by rotating the valve by means of its operating button N^5, the opening O′ of the valve may be brought into full or partial coincidence with the passage N′, which will thus be virtually contracted, or enlarged so as to offer more or less resistance to the passage of the fluid from the lower to the upper part of the fluid chamber, and thus give more or less relief to the operation of the plunger. As herein shown, the edge of the plunger is constructed with a clearance slot d^2, arranged in alignment with the vent passage N′, and permitting the free escape of fluid therefrom at the beginning of the downward movement of the plunger.

It is thought it will not be necessary to further describe the operation of the door check than to say that when the door is closed, the plunger is located at the bottom of the fluid chamber. During the opening movement of the door, the plunger is lifted directly upward without rotary movement, the fluid being allowed to flow freely through it, inasmuch as at this time the plate-valve is open. At the beginning of the closing movement of the door, the plunger begins to descend, whereupon the plate-valve at once closes, so that the fluid in the lower part of the chamber is placed under great pressure, and resists the downward movement of the plunger, and the closing of the door, which then takes place only as rapidly as the relief passage allows the fluid to work back into the upper portion of the fluid chamber.

I would call particular attention to the fact that the pressure of the fluid is exerted downward against the integral bottom of the case, so that no leakage through the case can take place.

It will also be observed that my improved device secures a direct thrust of the piston which is not rotated, whereby I secure better results than with a piston which combines reciprocal and rotary movement.

My device is particularly adapted to door-checks designed to be used with doors opening from right to left, but may be adapted to doors opening the other way by reversing the direction of the screw-threads upon the head D^2 of the sleeve, and within the sleeve-like lower section F′ of the spindle, that is to say, by replacing the parts mentioned by corresponding parts oppositely threaded.

In view of the changes and modifications suggested, I would have it understood that I do not limit myself to the exact construction shown and described, but hold myself at liberty to make such alterations as fairly fall within the spirit and scope of my invention. Thus, the door-spring and its several connections might be widely varied in construction and arrangement without altering the action of the plunger. If the stem should be extended through the top of the case, it might co-act with a nut-like instrumentality taking the place of the spindle, and connected with the door-spring, and the door-lever. This construction is thought not to require illustration.

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

1. In a fluid door-check, the combination with a case containing a fluid chamber, of a diaphragm located in the said case, a non-rotatable plunger located in the fluid chamber in which it moves back and forth, a non-rotatable stem passing through the said diaphragm, rigidly connected at its inner end with the said plunger, and having its projecting outer end screw-threaded, and a rotatable spindle threaded to coact with the threaded end of the stem, whereby the plunger is moved back and forth, substantially as described.

2. In a fluid door-check, the combination with a case containing a fluid chamber, of a diaphragm located in the said case, a non-rotatable plunger located in the fluid chamber in which it moves back and forth, a stem passing through the said diaphragm, connected at its inner end with the plunger, and having its projecting outer end screw-threaded, and a rotatable spindle comprising an internally threaded lower section receiving the threaded outer portion of the stem, and rotating with the body of the spindle, substantially as set forth, and whereby the plunger is operated back and forth in the fluid chamber, substantially as described.

3. In a fluid door check, the combination with a case, of a diaphragm located therein and dividing it into a spring chamber and a fluid chamber, a door spring located in the fluid chamber, a non-rotatable plunger located in the fluid chamber, in which it moves back and forth, a stem rigidly connected at one end with the said plunger and at its other end projecting through the said diaphragm and furnished at its projecting end with screw-threads, and a rotatable spindle entering the spring chamber and furnished with a removable, internally-threaded, tubular section, receiving the threaded, projecting end of the stem and interlocked with the body of the spindle for rotation thereby in either direction, substantially as set forth.

4. In a fluid door-check the combination with the case thereof, of a diaphragm located in the said case and dividing the same into spring and fluid chambers, a non-rotatable plunger located in the fluid chamber in which it moves back and forth, a stem passing through the said diaphragm, rigidly connected at its inner end with the said plunger, and having its projecting outer end threaded, a spindle internally threaded to receive the threaded outer end of the stem, a sleeve or tube inserted into the spring-chamber, resting upon the diaphragm therein, and inclosing and forming a bearing for the spindle, and a door-spring connected at one end with the said tube, and at the other end with the case or cylinder, substantially as described.

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.