

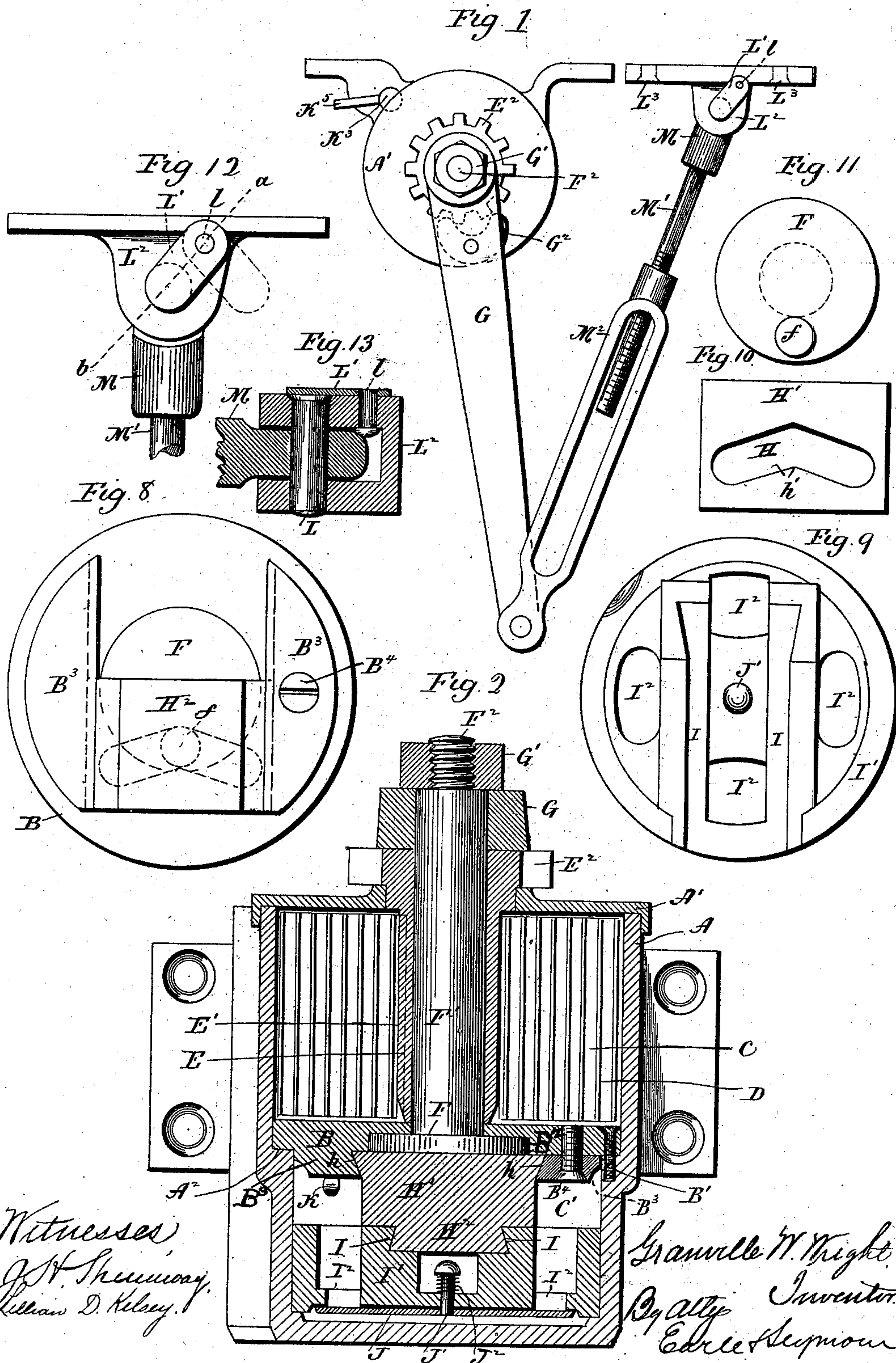
(No Model.)

2 Sheets—Sheet 1.

G. W. WRIGHT.
LIQUID DOOR CHECK.

No. 559,156.

Patented Apr. 28, 1896.



Witnesses
J. H. Thompson
Lillian D. Kelsey

Granville W. Wright
Inventor
By Atty
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

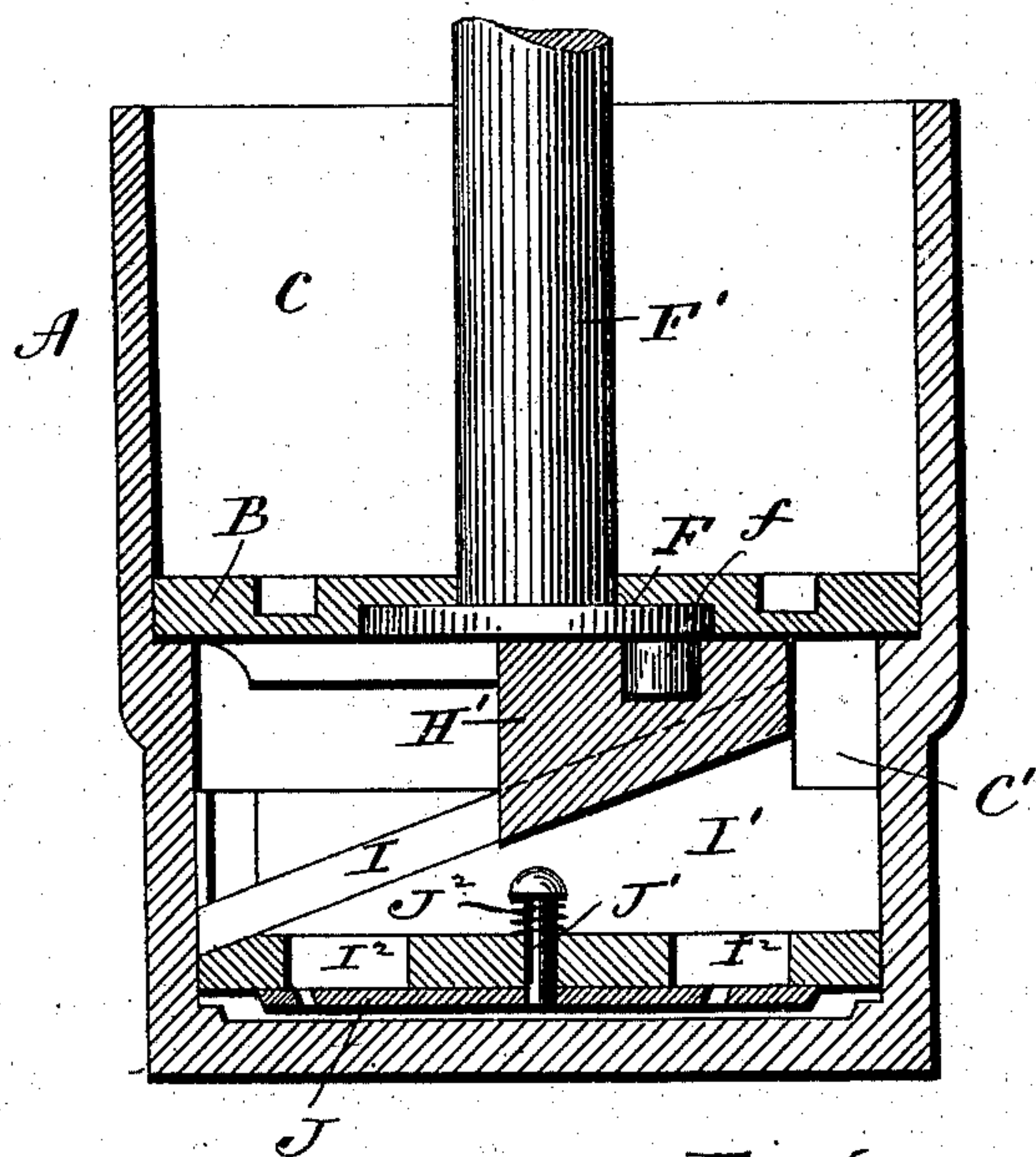


Fig. 4.

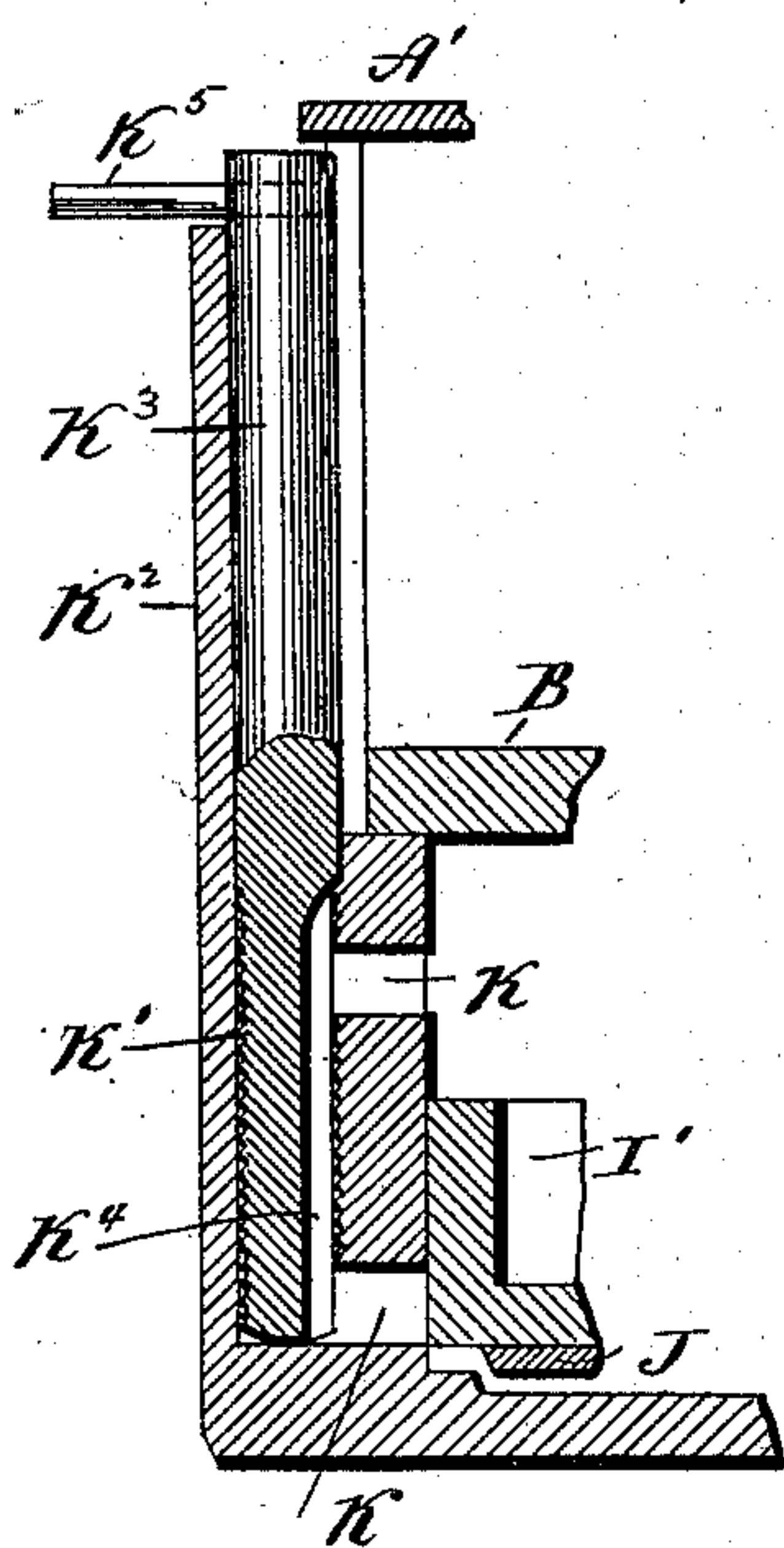


Fig. 5

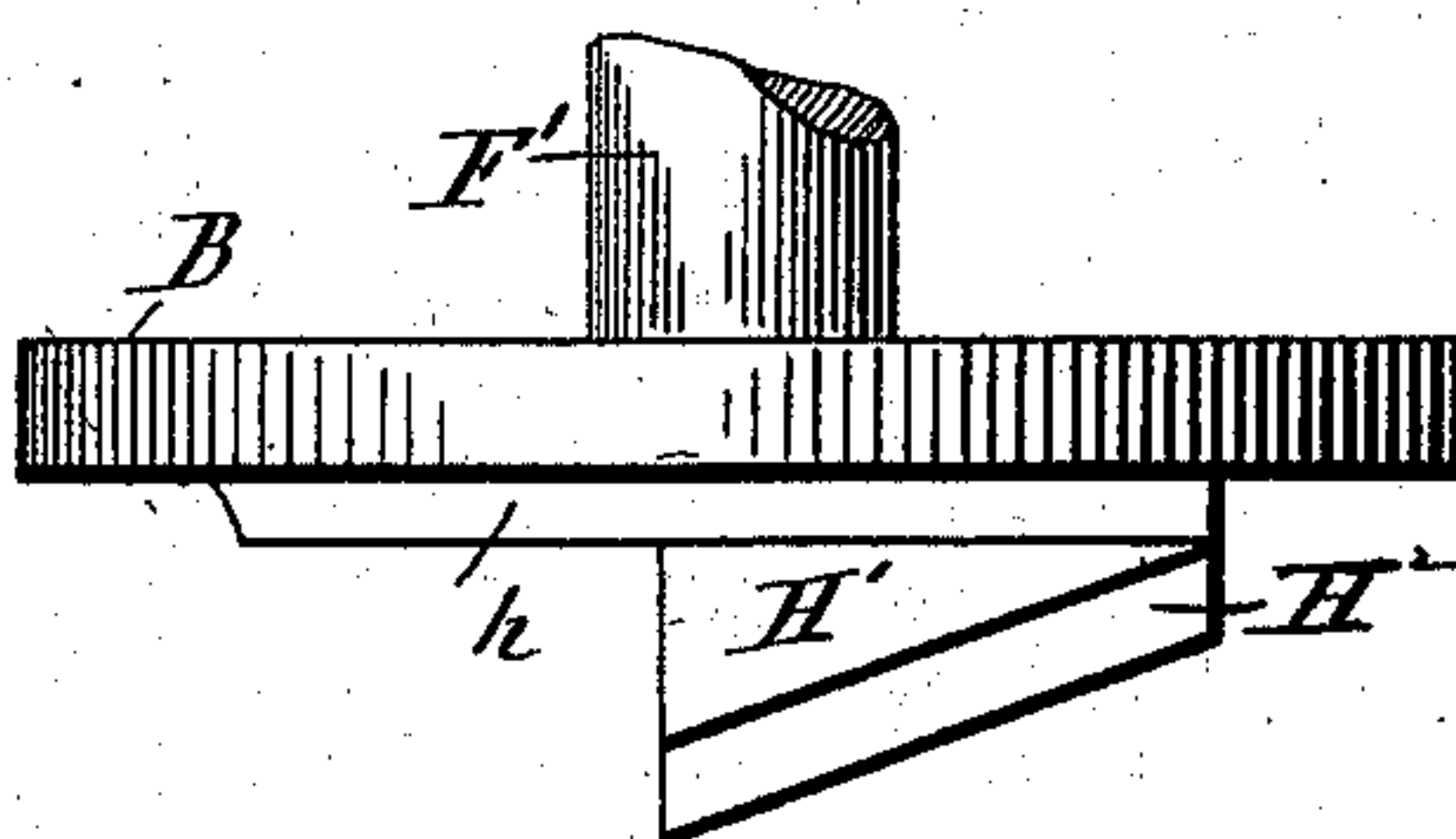


Fig. 6.

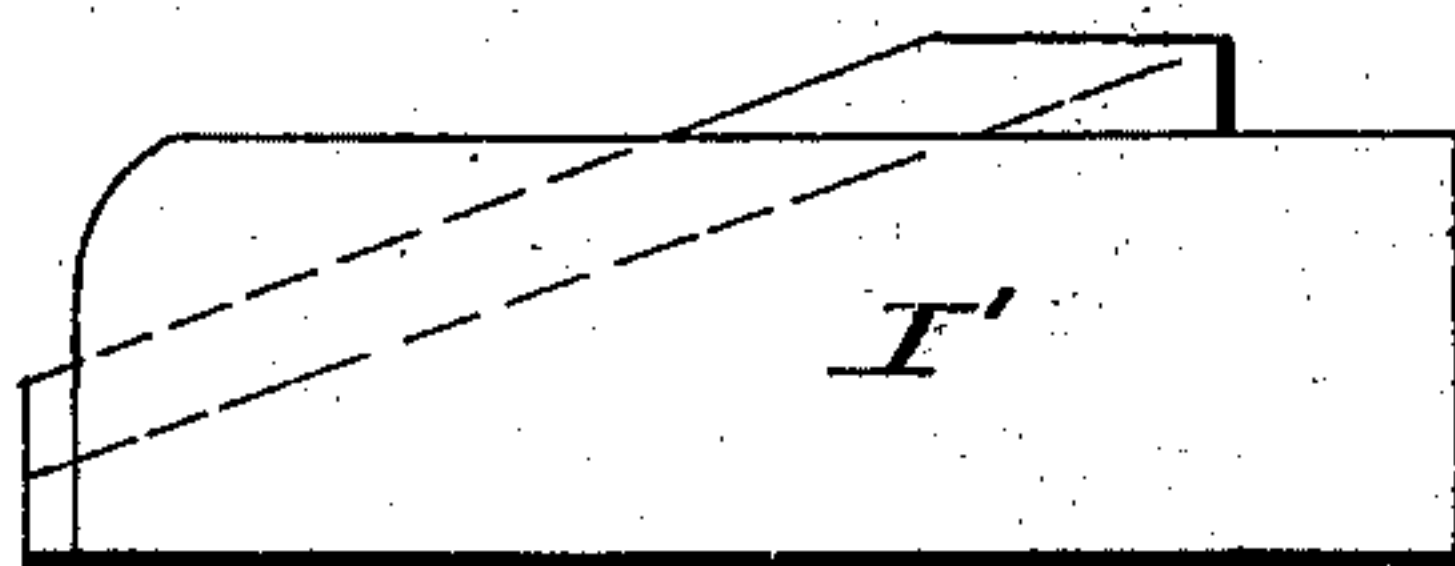


Fig. 7



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UNITED STATES PATENT OFFICE.

GRANVILLE W. WRIGHT, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO
THE SARGENT & COMPANY, OF SAME PLACE.

LIQUID DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 559,156, dated April 28, 1896.

Application filed April 1, 1895. Serial No. 544,027. (No model.)

To all whom it may concern:

Be it known that I, GRANVILLE W. WRIGHT, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Liquid 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 a check constructed in accordance with my invention; Fig. 2, a view in vertical central section of the case or cylinder of the check, taken transversely through the sliding block; Fig. 3, a similar but less comprehensive view taken longitudinally through the sliding block; Fig. 4, a broken sectional view designed with particular reference to showing the plug-valve and the vents with which it coöperates; Fig. 5, a detached view in side elevation of the diaphragm and sliding block; Fig. 6, a detached side view of the plunger; Fig. 7, a detached view in transverse section of the plug-valve; Fig. 8, a detached reverse plan view of the diaphragm; Fig. 9, a detached plan view of the plunger; Fig. 10, a detached plan view of the sliding block; Fig. 11, a reverse plan view of the spindle, showing the disk at the lower end thereof and the crank-pin mounted in the said disk; Fig. 12, a broken plan view showing the bracket receiving the screw of the casing-lever; Fig. 13, a sectional view on the line *a b* of Fig. 12.

My invention relates to an improvement in liquid door-checks, the object being to produce, at a low cost for manufacture, a simple, compact, strong, durable, and effective device composed of few parts and constructed with particular reference to being used on right or left hand doors without modification or change except reversing the spring.

With these ends in view my invention consists in a liquid 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 I employ a case or cylinder A, having a solid bottom and

furnished with a removable cap A'. From such a case there can be no leakage, as there are no joints in it. Within this case I locate a diaphragm B, which has bearing upon an inwardly-projecting annular shoulder A², formed integral with the case and to which the diaphragm is secured by one or more screws B', whereby the same position of the diaphragm within the case is assured. The said diaphragm divides the case into a spring-chamber C and a liquid-chamber C', the former receiving a door-spring D, the outer end of which is connected with the case in any suitable manner, while its inner end is hooked into a longitudinal slot E, formed in a sleeve E', the inner end of which bears upon the upper face of the diaphragm, while its outer end projects through the cap A', in which it has bearing, and is furnished with a ratchet-wheel E². The lower face of said diaphragm is constructed with a central annular recess B², receiving a disk F, located at the inner or lower end of the spindle F', which has bearing in the sleeve E' before mentioned and projects through the ratchet-wheel E², its projecting end being irregular in form and receiving the inner end of the door-lever G, the lower face of which bears upon the ratchet-wheel E² and which is held down thereupon by a nut G', bearing upon the upper face of the lever and applied to a threaded stud F², located at the extreme upper end of the spindle.

An eccentrically-arranged crank-pin *f* depends from the disk F and enters into the double-path cam-slot H, formed in the flat upper face of a sliding block H', the said upper face of which bears directly against the said disk and against the lower face of the diaphragm, which is flush with the said face of the disk. The said sliding block H' has beveled upper edges *h h*, which fit under gibs B³ B³, located upon the lower face of the diaphragm, one of these gibs having the form of a removable plate and secured in place by a screw B⁴, to permit it to be removed and replaced as desired. The sliding block is thus connected with the diaphragm for sliding movement in a plane parallel with the plane thereof. It is immaterial whether the other gib is removable or not, and it might be formed

as an integral feature of the diaphragm. The lower face of the said block H' is inclined and cut away upon its opposite sides to form a wide inclined dovetail rib H², Fig. 2, the undercut edges of which take into a wide inclined dovetail groove I, formed in the upper face of a plunger I', which is located in the liquid-chamber C', before mentioned, whereby the block is connected with the plunger so as to have sliding movement therein in an inclined plane, the pitch of which determines the longitudinal movement of the plunger in the liquid-chamber.

As herein shown, particularly in Fig. 9, the plunger is constructed within its circular edge or flange with an inclined platform, in which the groove I is located; but the particular construction of the plunger in this respect may be varied. The said plunger is constructed with four passages or ports I², which lead down through it, these passages being normally closed by means of a large disk-shaped plate-valve J, bearing directly against the lower face of the plunger and secured to a central upwardly-projecting stem J', which passes upward through the center of the plunger and receives a light spiral spring J², which exerts a constant effort to lift the valve against the bottom of the plunger. Out of the said liquid-chamber lead two vents K K, formed transversely in the lower portion of the case A and intersecting at their outer ends the lower end of a long cylindrical valve-chamber K', which is formed in a projection K², located upon the outside of the case and parallel with the longitudinal axis thereof. This chamber K' receives a plug-valve K³, the lower end of which is threaded to take into the threaded lower end of the said chamber, as shown in Fig. 4. The threaded lower end of the plug-valve has a longitudinal slot K⁴ formed in it, Fig. 7, which is made long enough to connect the two vents K K, as shown in Fig. 4. By turning the valve so that its slot will be squarely presented to the two vents the freest possible passage will be made between the upper and lower ends of the liquid-chamber so far as the said vents are concerned, the said passage being reduced in size by turning the valve in one direction or the other from the said position. At its upper end the valve is furnished with a transversely-arranged pin K⁵, threaded at its inner end and providing for turning it in one direction or the other and hence effecting its adjustment.

In assembling the device the plug-valve is first screwed down into position, after which the pin K⁵ is inserted into its upper end. The said pin then prevents the valve from being removed from the case, which it strikes when moved in one direction or the other, thus preventing a complete rotation of the valve. This will be understood by reference to Fig. 1.

In carrying out the second part of my invention I employ a removable pivot L, which is headed at its upper end, and a pivotal re-

taining-plate L' for engaging with the headed upper end of the pivot and holding the same in place in the casing-bracket L², which is provided with screw-holes L³ L³, located in its opposite ends and designed to receive screws for the attachment of the bracket to the door-casing, the said plate L' being pivotally connected with the upper face of the bracket by means of a pin l. The pivot L passes through the vertically-perforated head M of the screw M' entering the socket M² of the door-casing lever, the outer end of the said socket being pivotally connected with the door-lever G. The said door-casing lever is composed, it will be understood, of the screw M' and the socket M². By swinging aside the retaining-plate L' and removing the pivot L the screw M' is readily disconnected from the bracket for being turned one way or the other in the socket M², so as to increase or decrease the length of the door-casing lever, as may be desired. After the screw has been turned as required it is very readily connected with the bracket again. By disconnecting the screw from the bracket I may fold the two levers together, as it were, and employ both as an instrument for winding up or letting down the door-spring. I do not, however, limit myself to using a bracket having a removable pivot and a retaining-plate therefor in connection with the other features of my improved check, and vice versa, as obviously the two features of my invention may be used separately as well as in combination.

Having now described the construction of my improved check, I will proceed to set forth the mode of its operation; but preparatory to such description I will note that, by preference, the check will be constructed so that the door-lever will normally stand at a right angle to the door when the same is closed, and so that at the same time the crank-pin f' will be at its dead-point or directly opposite the apex h', Fig. 10, of the path cam-slot H. In setting the check, when so constructed, calculations will be made on the basis of regarding the door-lever, when located at a right angle to the door in the closed position thereof, as the "unit of position," as it were.

It is to be understood that by suitably adjusting the door-casing lever the check may be set so that when the door is closed the door-lever will stand either at a right angle to the door or be inclined slightly toward the door-hinge or toward the outer edge of the door, the position given to the door-lever in setting the check depending on the conditions under which the check is to operate. Suppose, for instance, the check to be set with the door-lever inclined slightly toward the door-hinge when the door is closed, the setting of the door-lever as described will cause the pin f', which is rigidly connected with the door-lever through the medium of the disk F and the spindle F', to correspondingly move away from its dead-point opposite the apex of the path cam-slot and in the opposite direction

from the direction it will take when the door is opened. Now when the door is opened and the spindle is rotated it will act, through the medium of the crank-pin f and sliding block H' , to lift the plunger, whereby the liquid above the same will be placed under sufficient pressure to overcome the tension of the spring J^2 and force the large plate-valve J open, so that the liquid may run freely through the openings I^2 in the plunger into the bottom of the liquid-chamber with so little restraint that its retardation of the upward movement of the plunger and the opening of the door will not be appreciable. When the door reaches its fully-open position, the plunger will be at the top of the chamber and all of the liquid in the lower portion thereof. Now when the door begins to close the spindle will be rotated in the opposite direction and will act, through the pin f and sliding block H' , to force the plunger to descend, at which time, as I may here mention, the crank-pin will ride upward from the outer end of the arm of the path cam-slot, in which it moves, toward the apex of the said slot. At the very beginning of the downward movement of the plunger pressure will be placed upon the liquid in the chamber with the immediate effect of tightly closing the plate-valve J , so as to prevent any liquid from rushing back into the upper portion of the liquid-chamber through the openings I^2 in the plunger itself. The liquid will therefore be forced to escape into the upper portion of the chamber through the lower vent K , the groove K^4 in the plug-valve K^3 , and through the upper vent K , the rapidity of its passage from the lower to the upper end of the liquid-chamber being controlled by the position of the plug-valve. Then just before the door closes the pin reaches the apex of the cam-slot, after which the movement of the plunger stops entirely, so that the pressure is removed from the liquid below it and the spring left unrestrained in latching the door. In other words, during the closing movement of the door the resistance secured by the liquid is maintained until just before the door closes and then let off altogether by the passing of the pin beyond the apex of the cam-slot into its position of rest, which is in the arm of the slot opening out of the arm thereof, in which it mainly travels. This avoids wrenching the hinges of the door.

If there is a strong wind blowing against the door to be taken into account, the check must resist not only the power of the spring, but also the power of the wind, and it will be desirable under such circumstances to set the door-lever so that it will incline slightly toward the outer edge of the door, thus locating the crank-pin just one side of the apex h' of the path cam-slot when the door is in its closed position and within the arm thereof in which it travels. In other words, by setting the check so that the door-lever will incline slightly toward the outer edge of the door the

crank-pin will be correspondingly moved away from its dead-point opposite the apex of the path cam-slot and in the direction in which it will be moved in the opening of the door, which it may be said to be given the start of, and when the check is thus adjusted the opening of the door, as described, causes the pin to move to the outer end of one arm of the slot, and when the door closes the check resists the spring up to the time that it is entirely closed and latched, for the pin cannot rise quite to the apex of the path cam-slot, and the check therefore cannot let off, for it is plain that the inward and outward excursion of the pin will not vary and that it cannot return beyond the point from which it started; but as long as there is any movement of the door there is a corresponding downward movement of the plunger to maintain the pressure upon the liquid. I wish also to mention that when the door-lever is set as described, with its outer end inclining slightly toward the outer edge of the door, it facilitates the opening of the door, inasmuch as the conditions of leverage are such that the two levers resist the opening of the door less than when the door-lever is set to stand at a right angle to the door when the door is closed or set to incline toward the door-hinges, as also described.

It will be readily understood from the foregoing that by adjusting the screw M' of the two-part door-casing lever so as to cause the door-lever G to stand at an angle other than a right angle with the door when the same is closed the resisting action of the check may be shortened or prolonged according to the conditions under which any particular door operates.

If the check is set for operation with its door-lever at a right angle to the door when the same is closed, which is its normal position, the resistance of the plunger and liquid to the action of the spring in closing the door is not removed until the door is fully closed.

I should also explain that the crank-pin always moves up and down in the same arm or member of the path cam-slot, which is made double to adapt the device to be employed on doors opening either to the right or to the left, which requires no more change of the device than to reverse the door-spring.

In view of the changes already suggested and of others which may obviously be made, 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 changes and alterations as fairly fall within the spirit and scope of my invention.

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

1. In a door-check, the combination with a case containing a spring-chamber and a liquid-chamber, of a spring located in the spring-chamber, a plunger located in the liquid-chamber, a spindle connected with the spring

and provided with a crank-pin, a horizontally-movable sliding block interposed between the spindle and the plunger, having inclined sliding connection with the latter and constructed with a cam-slot to receive the said crank-pin, and means for supporting the said block independently of the plunger so as to permit it to have horizontal sliding movement, substantially as set forth, and whereby the rotation of the spindle in one direction or the other slides the block horizontally and positively raises or lowers the plunger by reason of its inclined sliding connection therewith.

2. In a door-check, the combination with a case containing a spring-chamber and a liquid-chamber, of a spring located in the spring-chamber, a plunger located in the liquid-chamber, a spindle passing through the liquid-chamber, and furnished at its lower end with a crank-pin, a horizontally-movable sliding block having inclined sliding connection with the plunger and constructed with a double cam-slot to receive the said pin and permit the device to be used on right or left hand doors, and means for supporting the sliding block independently of the plunger, and so as to permit it to have sliding movement in a horizontal plane, substantially as set forth, and whereby the rotation of the spindle in one direction or the other slides the block horizontally and positively raises or lowers the plunger by means of the inclined sliding connection therewith.

3. In a door-check, the combination with a case, of a diaphragm located therein and dividing it into a spring-chamber and a liquid-chamber, a spring located in the spring-chamber, a non-rotatable plunger located in the liquid-chamber, a spindle connected with the spring, extending downward through the spring-chamber and diaphragm and provided at its lower end with a crank-pin, a horizontally-movable sliding block containing a cam-slot to receive the said crank-pin, and having sliding connection in an inclined plane with the plunger, and means for connecting the said sliding block with the lower face of the diaphragm so as to permit it to have horizontal sliding movement thereupon under the action of the crank-pin, substantially as set forth.

4. In a door-check, the combination with a case containing a diaphragm dividing it into a spring-chamber and a liquid-chamber, and constructed upon its lower face with two gibs, one of which is removable, of a spring located in the spring-chamber, a plunger located in the liquid-chamber, a spindle passing through the spring-chamber and constructed at its lower end with a crank-pin, and a sliding block constructed with a cam-slot to receive the said pin and with beveled edges to coact with the said gibs, whereby the block is connected with the diaphragm for sliding movement in the plane thereof, and the said block being also connected for sliding movement in an inclined plane, with the plunger, which is therefore raised and lowered as the block is slid back and forth under the action of the pin, substantially as set forth.

5. In a door-check, the combination with the case thereof, containing a liquid-chamber having vents leading out of its upper and lower ends into a valve-chamber, of a plunger located in the liquid-chamber and movable up and down therein, and a plug-valve located in the valve-chamber and containing a groove forming a passage between the two vents and also forming a simultaneous cut-off for both of the vents, substantially as set forth.

6. In a door-check, the combination with a case containing a liquid-chamber, from the upper and lower ends of which vents lead into a long cylindrical valve-chamber arranged lengthwise with the case upon the outer face thereof, of a plunger located in the liquid-chamber and movable up and down therein, and a plug-valve located in the said chamber, threaded for its adjustment therein, containing a longitudinal groove forming a passage between the said vents and provided at its upper end with an adjusting-pin, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GRANVILLE W. WRIGHT.

Witnesses:

WILLIAM S. HASTINGS,
FRANK W. WILLOUGHBY.