

No. 678,339.

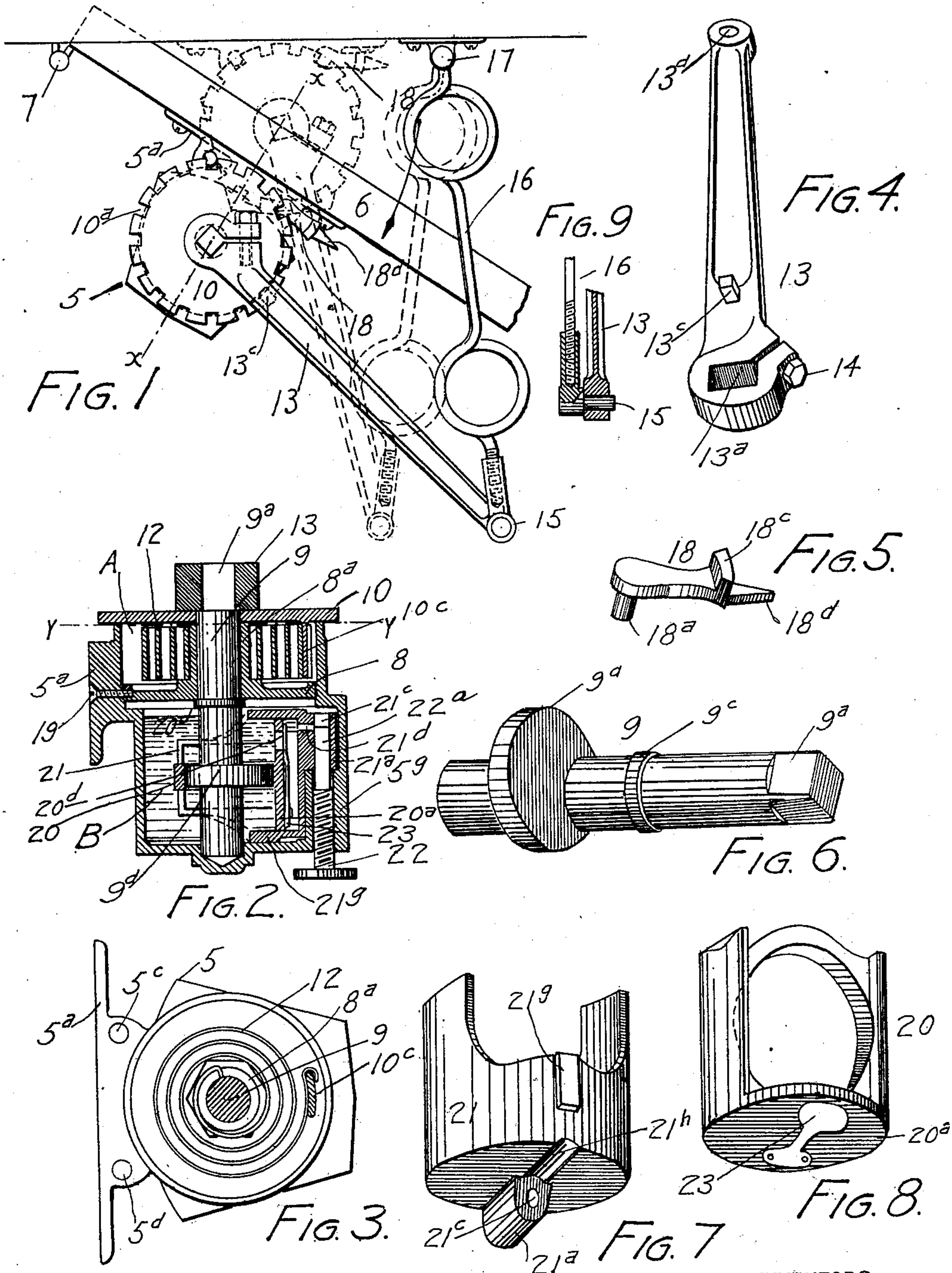
Patented July 9, 1901.

R. C. HILLS & A. M. SOUTHARD  
DOOR CHECK AND CLOSER.

(Application filed Aug. 29, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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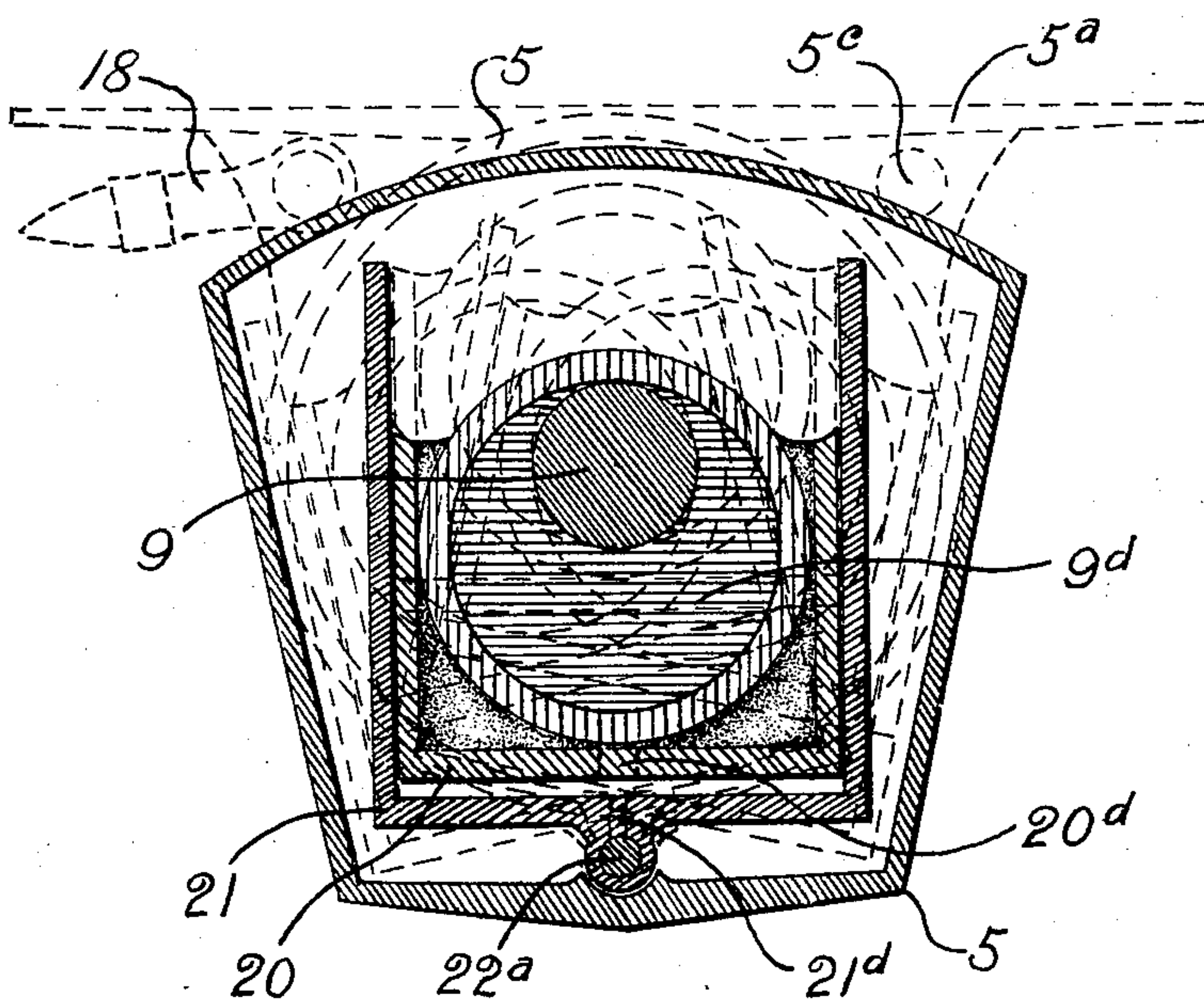


FIG. 10.

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# UNITED STATES PATENT OFFICE.

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## DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 678,339, dated July 9, 1901.

Application filed August 29, 1900. Serial No. 28,482. (No model.)

*To all whom it may concern:*

Be it known that we, RICHARD C. HILLS, a subject of the Queen of Great Britain, and ABRAHAM M. SOUTHARD, a citizen of the United States of America, both residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Door Checks and Closers; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in door checks and closers; and it consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of our improvement, the door being shown partly open., Fig. 2 is a vertical section taken through the device on the line *xx*, Fig. 1. Fig. 3 is a horizontal section taken on the line *yy*, Fig. 2. Figs. 4, 5, 6, 7, and 8 are perspective views in detail, showing parts of the mechanism on a larger scale. Fig. 9 is a fragmentary view, partly in section, showing the lever-arm and connecting-rod. Fig. 10 is a horizontal section taken through the compartment B of the casing, cutting the cylinder, plunger, and spindle, the parts above being indicated by dotted lines.

The same reference characters indicate the same parts in all the views. Let the numeral 5 designate the casing provided with a bracket 5<sup>a</sup>, adapted to be attached to a door 6, hinged to a stationary support at 7. The chamber of the casing is divided into upper and lower compartments A and B by a horizontal partition 8, screwed into the casing, which is suitably threaded for the purpose. This partition is provided with an upwardly-projecting sleeve 8<sup>a</sup>, which, as shown in the drawings, is formed integral with the partition. A spindle 9 is journaled at its lower extremity in a socket formed in the bottom of the casing, its upper portion being journaled in the

sleeve 8<sup>a</sup>. The upper extremity 9<sup>a</sup> of this spindle protrudes from the casing and is angular or polygonal in cross-section. The casing is provided with a cap 10, having an opening in the center through which the spindle also passes and in which it is journaled. This cap is loose on the casing, and its periphery is provided with notches 10<sup>a</sup> for the purposes hereinafter explained. This cap is also provided with a depending projection 10<sup>c</sup>, which is engaged by a hook formed on the outer extremity of the spring 12, located in the compartment A and coiled around the spindle, its inner extremity being provided with a hook which engages the slot formed in the sleeve 8<sup>a</sup>. (See Fig. 3.) A lever-arm 13 is provided with a socket 13<sup>a</sup>, adapted to fit the extremity 9<sup>a</sup> of the spindle. This arm is divided at its socket extremity to form a clamp, which is regulated by a set-bolt 14, whereby the arm may be tightened on the spindle or loosened for purposes of removal, as may be desired.

The lever-arm 13 is provided with a depending lug 13<sup>c</sup>, adapted to fit the notches 10<sup>a</sup> of the cap 10. This lug permits the regulation of the normal tension of the spring through the instrumentality of the arm 13 and the cap 10. By means of the lug on the arm and the notches in the cap the two parts are locked together, whereby as the door is opened the normal tension of the spring is increased. The outer extremity of the arm 13 is provided with an opening 13<sup>d</sup>, adapted to receive a pin 15, adjustably attached to the outer extremity of a rod 16, hinged to a stationary support adjacent the door, as shown at 17. In order to adapt the mechanism for different conditions, whereby it may be necessary to hinge the rod 16 at points whose positions vary with reference to the location of the door, the outer extremity of the rod is threaded and enters a threaded opening in the sleeve of the pin 15, whereby the position of the latter on the rod may be adjusted at pleasure.

The door may be locked from further movement at any stage of the closing operation by a dog 18, provided with a depending pin 18<sup>a</sup>, adapted to enter a socket 5<sup>c</sup>, formed in the bracket 5<sup>a</sup> of the casing. This socket is so located that the pivoted extremity of the dog is located beneath the outer edge of the cap



10, thus preventing the dog from removal while the cap is in place, but permitting the dog to be lifted out of its position as soon as the cap is removed from the casing. This dog is provided with a lug 18<sup>c</sup>, adapted to enter any notch 10<sup>a</sup> of the cap 10. The dog which is normally disengaged from the cap (see Fig. 1) may be thrown into position to engage a notch 10<sup>a</sup> at any time.

To facilitate the adjustment of the dog 18, its outer extremity 18<sup>d</sup> is pointed and extends beyond the lug 18<sup>c</sup>, whereby the dog may be shifted into and out of engagement with a notch 10<sup>a</sup> of the cap by any instrument of sufficient length. This dog is detachable and may be inserted in a similar socket 5<sup>d</sup>, formed in the bracket on the opposite side for use when the device is used on a door opening in the opposite direction.

To prevent the partition-disk 8 from turning during the opening operation of the door, whereby the spring is placed under tension, a screw 19 is passed from the rear into an opening formed in the bracket 5<sup>a</sup> and enters a registering opening formed in the disk. (See Fig. 2.)

The spindle 9 is provided with a collar 9<sup>c</sup>, which engages the lower surface of the disk 8. Below the collar 9<sup>c</sup> the spindle is provided with an eccentric 9<sup>d</sup>, adapted to engage a counterpart opening or ring formed in a piston or plunger 20, arranged to reciprocate horizontally in a cylinder 21, swiveled to oscillate on the plain portion 22<sup>a</sup> of a screw 22, whose threaded portion engages a threaded opening formed in a lug 5<sup>g</sup>, projecting upwardly from the bottom of the casing. The cylinder 21 is provided with a lug 21<sup>a</sup>, adapted to occupy a position in the chamber B above the lug 5<sup>g</sup> and having a plain opening 21<sup>c</sup>, into which the plain portion 22<sup>a</sup> of the screw 22 projects. The opening 21<sup>c</sup> is in free communication with the body of the chamber B. A port 21<sup>d</sup> leads from the cylinder-chamber 45 to the opening 21<sup>c</sup>, whereby the liquid in the cylinder-chamber may be forced out through said port by the action of the piston. The passage of liquid through this port may be regulated by the screw 22, since the mouth 50 of the port lies in the path of the screw whose range of adjustment is sufficient for the purpose. The head 20<sup>a</sup> of the plunger 20 is provided with a valve 23, arranged to control a port 20<sup>d</sup>, formed in the said head. The port 55 21<sup>d</sup> in the cylinder-chamber is small as compared with the port 20<sup>d</sup> of the piston, since the liquid of the chamber B must enter the cylinder-chamber much faster than it is allowed to escape therefrom in order to properly carry out the door-checking function.

From Fig. 10 it will be observed that the lower part of the casing or that surrounding the compartment B of the chamber has the shape of the keystone of an arch, the extremity in which the cylinder is pivoted being narrowest, the chamber increasing in size toward the opposite extremity to permit the

cylinder to oscillate as the eccentric 9<sup>d</sup> turns in the ring of the plunger. In Fig. 10 four positions of the eccentric and plunger-ring are indicated, one being in full lines and the others in dotted lines. The dotted-line position indicates the quarter and half turn positions of the eccentric in both directions—that is to say, toward the right and left, as when used on right and left hand doors. The same positions would of course be reached if the eccentric were turned entirely around in one direction, in which event the dotted-line positions would indicate the quarter, half, and three-quarter turn of the eccentric. The corresponding positions of the cylinder and plunger will be readily understood. The cylinder is in the same position whether the plunger is in the forward position, as indicated by full lines, or in the rearward position, as indicated by dotted lines, and corresponding with the half-turn position of the eccentric. In Fig. 10 the web connecting the eccentric-ring with the plunger is differently shaded from the other parts to make the ring conspicuous. The two large dotted circles in this view indicate the position and shape of the upper casing part inclosing the chamber-compartment A.

When the device is in use, the chamber B is filled with a suitable liquid, preferably oil. The parts are so arranged that as the door 6 is opened the spring 12 is placed under tension. During this operation the door, and consequently the casing 5, is turning in the direction indicated by the arrow in Fig. 1, while the lever-arm 13 is turning in the opposite direction. Also during the opening operation of the door the spindle 9 is turned to move the plunger 20 outwardly or toward the left (see Fig. 2) through the agency of the eccentric 9<sup>d</sup>. During this movement of the plunger the valve 23 opens and allows the liquid to pass through the port 20<sup>d</sup> into the cylinder-chamber behind the plunger. As soon as the door is released the recoil of the spring has a tendency to close the door immediately; but before the door can close the plunger 20 must move into its cylinder-chamber a distance corresponding with the outward movement during the opening of the door, and this inward movement toward the right (see Fig. 2) is resisted by the liquid in the cylinder-chamber, which liquid must be forced out through the port 21<sup>d</sup>, since the valve 23 is held closed during this movement of the plunger. The passage of the liquid through the port 21<sup>d</sup> may be controlled at pleasure, as heretofore explained, and consequently the closing of the door may be as gradual as desired.

The lower part of the cylinder 21 is provided with a small bearing 21<sup>g</sup>, which engages the bottom of the casing as the cylinder oscillates with the piston, the latter being actuated by the eccentric, as heretofore explained. The forward or front end of the cylinder is provided with a recess 21<sup>h</sup>, which



fits the adjacent surface of the lug 5<sup>s</sup> of the casing.

Our improved mechanism may be applied to doors which open either to the right or left, the only difference being that in changing from one door to another door opening in an opposite direction the spring 12 is turned over and the dog 18 is placed in the opposite socket of the bracket 5<sup>a</sup>.

The rod 16, as shown in the drawings, is provided with two spring-coils, whereby it is allowed to yield both vertically and endwise, as well as laterally. The vertical movement of the rod incident to the springs allows the rod to work perfectly when its hinged extremity is either too high or too low with reference to the casing 5 or when for any reason the parts are not perfectly adjusted. Also the endwise movement permitted by the springs relieves the jar to which the door and the mechanism mounted thereon would be subjected in case of an attempt to close the door suddenly or in any case where the rod is given either an endwise or a lateral thrust.

Having thus described our invention, what we claim is—

1. In a door-check, the combination with a liquid-containing chamber, of a spindle journaled therein and provided with an eccentric, a cylinder mounted to oscillate in the chamber, and a plunger provided with a ring engaged by the spindle-eccentric which fits therein and operates the plunger as the spindle is turned, the plunger having a valve-controlled port allowing the liquid to enter the cylinder freely as the plunger is withdrawn, the cylinder-chamber being provided with an outlet for the escape of the liquid, the size of the outlet being such as to cause the liquid to resist the normal movement of the plunger, whereby the travel of the latter is regulated and controlled.

2. The combination of a spring-restored spindle and a liquid-containing chamber through which the spindle passes and in which it is movable, of a cylinder mounted to oscillate in said chamber, a piston or plunger arranged to reciprocate in said cylinder, and an eccentric mounted on the spindle and fitting in a ring in the piston which is operated thereby, the piston being provided with a valve-controlled port allowing the liquid to enter the cylinder as the piston is withdrawn, but preventing the escape of the liquid there-through as the piston moves inwardly, the cylinder being provided with an outlet-port through which the liquid must be forced by the inwardly-moving piston, the size of the said port being such as to cause the liquid to retard the piston's normal inward movement.

3. The combination with a casing having a liquid-containing chamber, and a spindle journaled therein, of a cylinder mounted to oscillate in the liquid-chamber and provided with an outlet, means for regulating the passage of liquid through said outlet, a piston

arranged to enter the cylinder and provided with a valve-controlled inlet-port, the spindle being provided with an eccentric, and the piston with a ring in which the eccentric fits, whereby as the spindle rotates the piston is reciprocated.

4. The combination of a casing having a liquid-containing chamber provided with a lug having a threaded opening, a cylinder located in said chamber and provided with a lug having an opening registering with the opening of the casing-lug, the cylinder having an outlet-port communicating with said opening, a screw inserted in the threaded opening of the casing-lug, and having a plain portion projecting into the opening of the cylinder-lug, forming the pivot upon which the cylinder oscillates, and also being arranged to control the passage of the liquid through the cylinder-port, a piston arranged to reciprocate in the cylinder and having a valve-controlled port, the piston being also provided with a ring and a spindle journaled in the casing and provided with an eccentric fitting in the ring of the piston for operating the latter.

5. The combination with a casing, a partition dividing the inclosed space into a spring and a liquid chamber, and a spring-restored spindle journaled in the casing, of a piston located in the liquid-chamber and provided with a valve-controlled port, a cylinder mounted to oscillate in the liquid-chamber and provided with a relatively small outlet-port, and an eccentric mounted on the spindle and fitting a ring formed in the piston for operating the latter.

6. The combination with a casing, a spindle journaled therein and a spring having one extremity attached to the casing, of a cap having notches in its outer edge, the other extremity of the spring being connected with said cap, a lever-arm connected with the spindle and provided with a lug or projection adapted to enter a notch of the cap, and a dog detachably mounted on the casing and adapted to engage a notch of the cap, whereby the cap and lever-arm are locked against movement, and the door positively locked in a predetermined position.

7. In a combined door check, closer and stop, the combination with a casing fast on the door and containing two distinct chambers, one of which contains liquid, a cap having notches in its outer edge and normally movable on the casing, a spring located in one of the casing-chambers, one of its extremities being connected with the casing and the other with the cap, a spindle journaled in the casing, a lever-arm connected to move with the spindle and having a projection engaging a notch in the cap, and a rod connecting the lever-arm with the stationary part adjacent the door, of a dog detachably mounted on the casing and adapted to engage a notch of the cap, and means located



in the liquid-chamber for checking the closing action of the door.

5 8. In a door check and closer, the combination with the operating mechanism and an arm connected therewith, of a rod connecting the arm with a suitable support, said rod being provided with a spring-coil for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

RICHARD C. HILLS.  
ABRAHAM M. SOUTHARD.

Witnesses:

DORA C. SHICK,  
MARY C. LAMB.