

No. 632,291.

Patented Sept. 5, 1899.

H. G. VOIGHT & N. B. HURD.

DOOR CHECK.

(Application filed Feb. 4, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

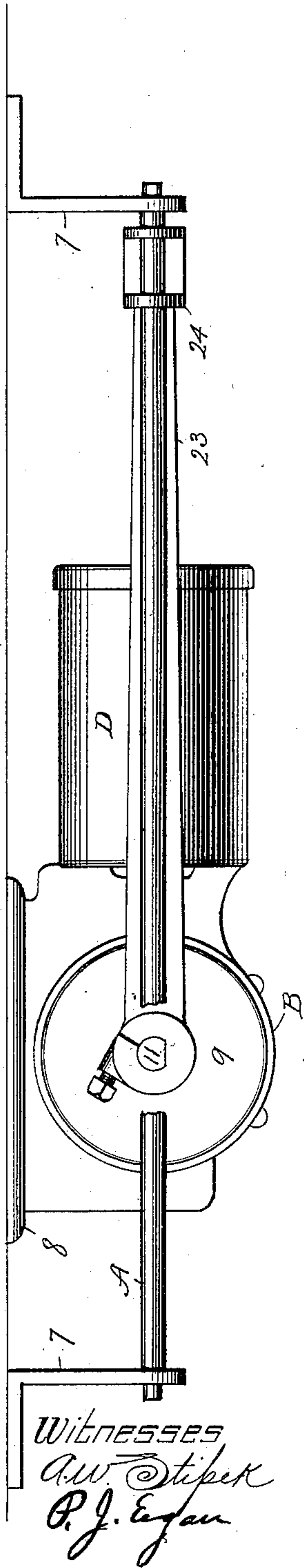
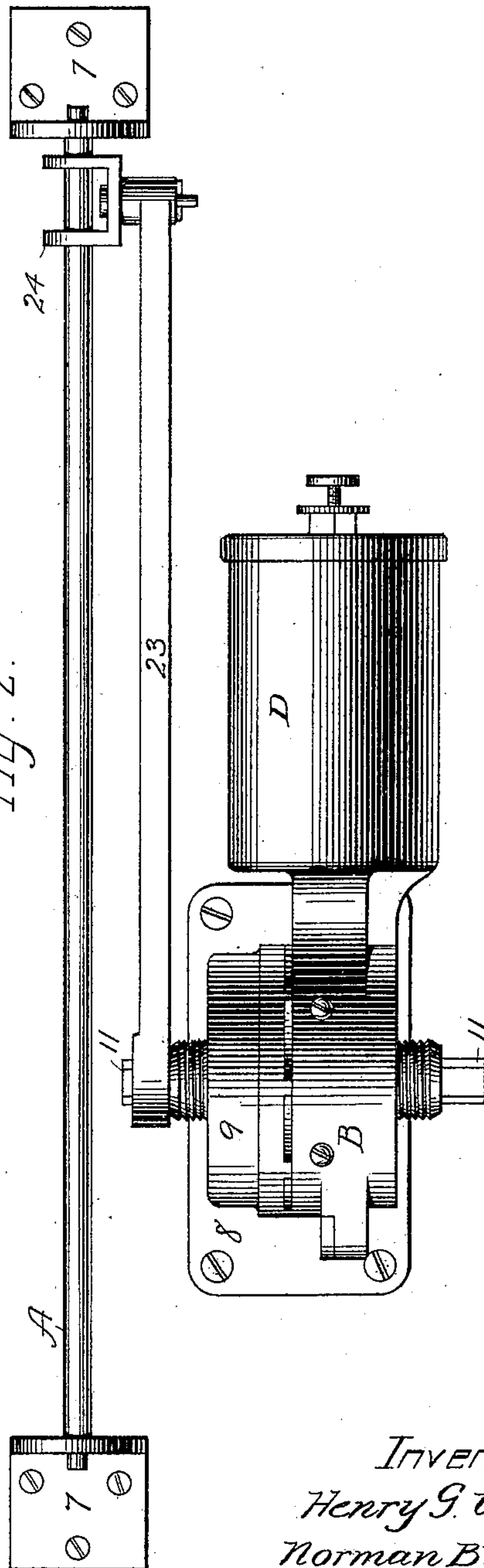


Fig. 2.



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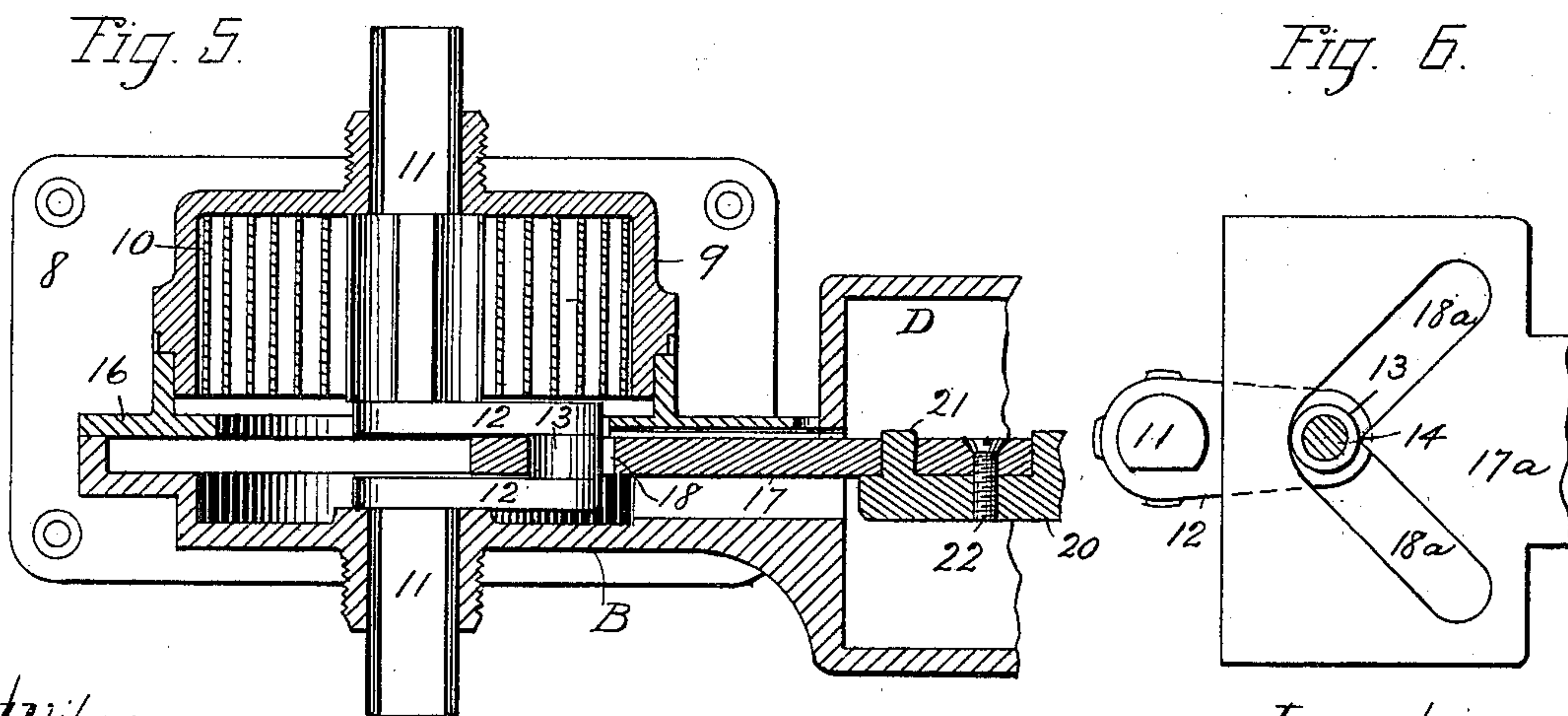
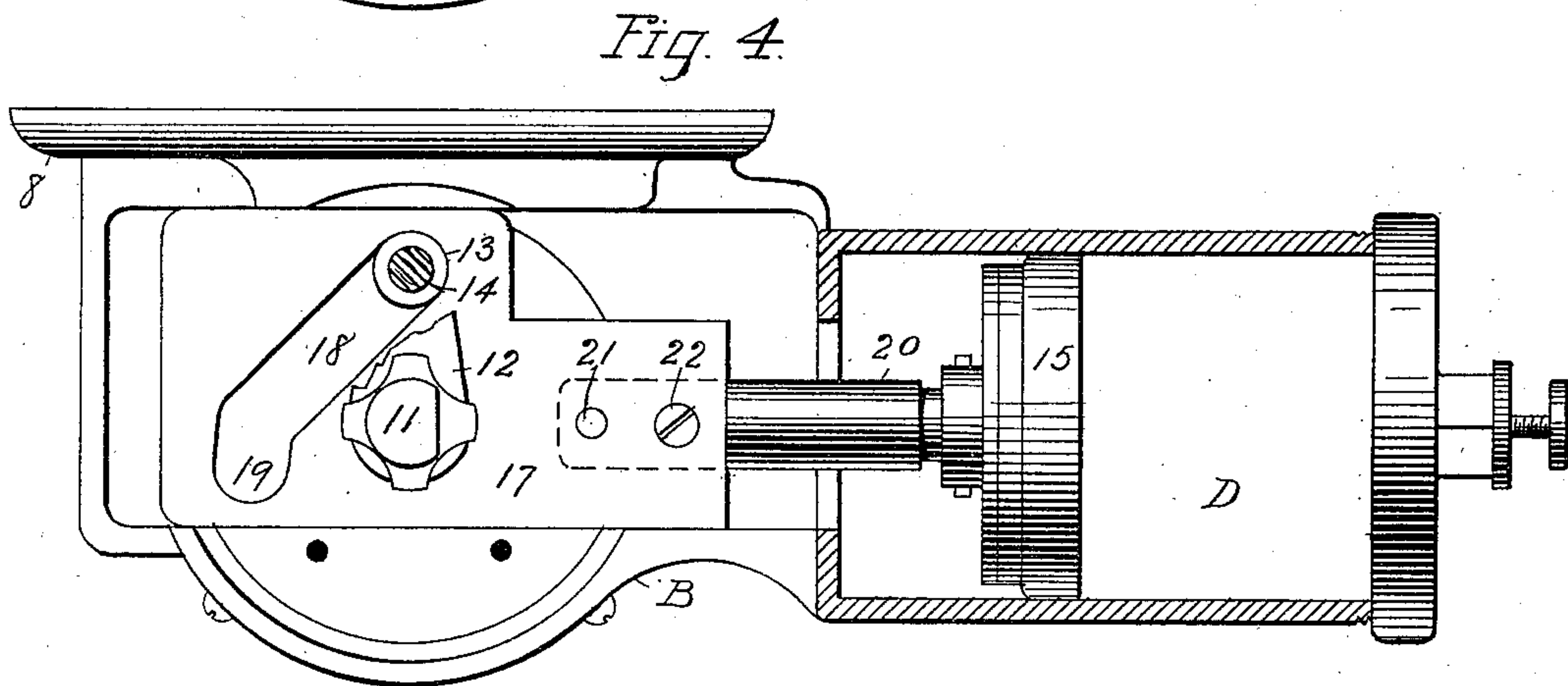
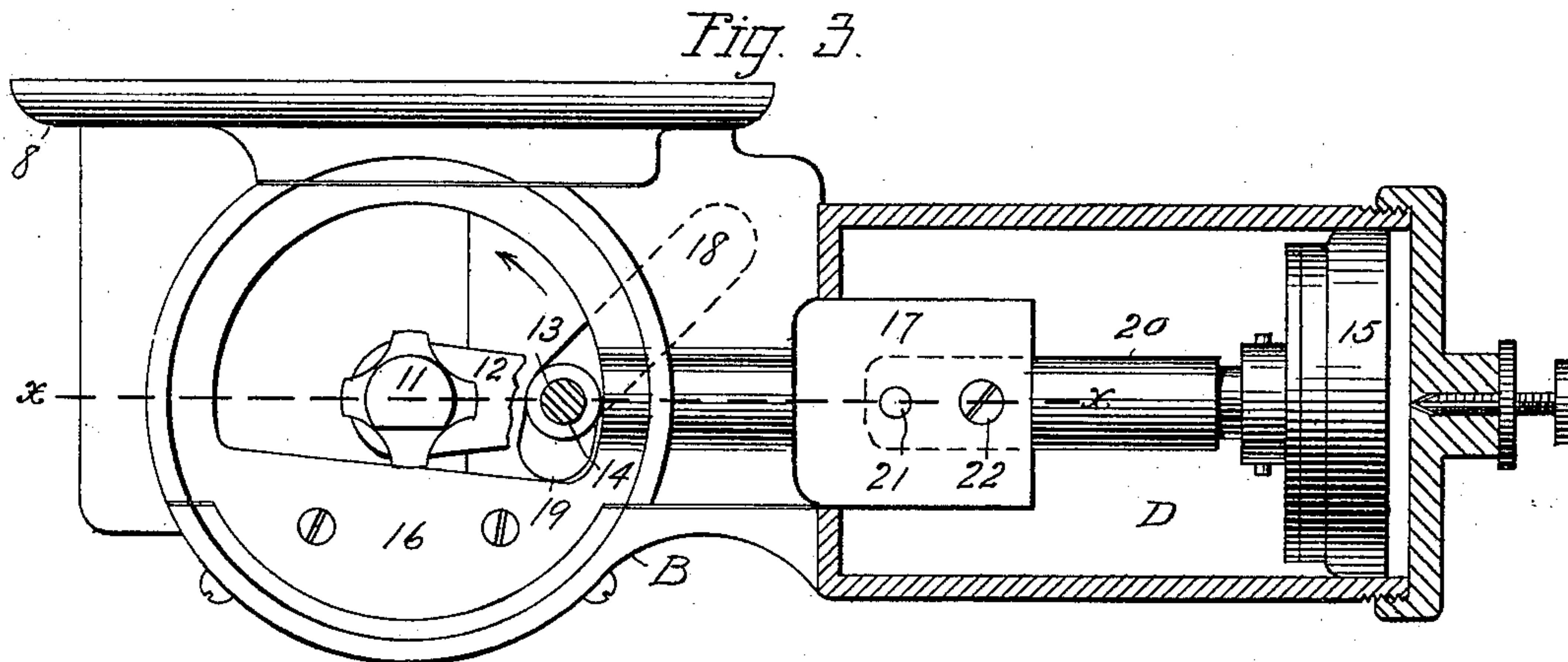
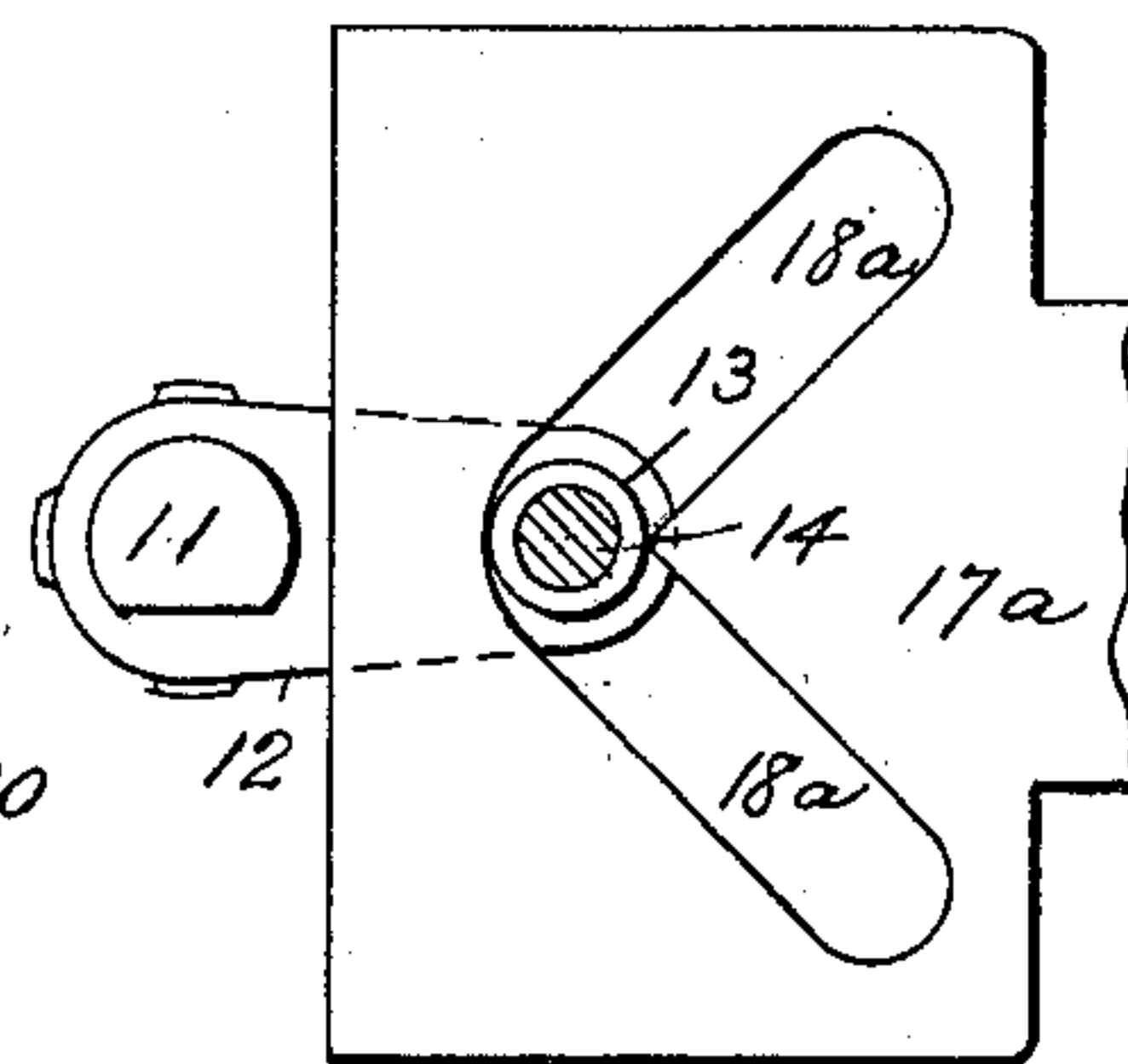


Fig. 6.



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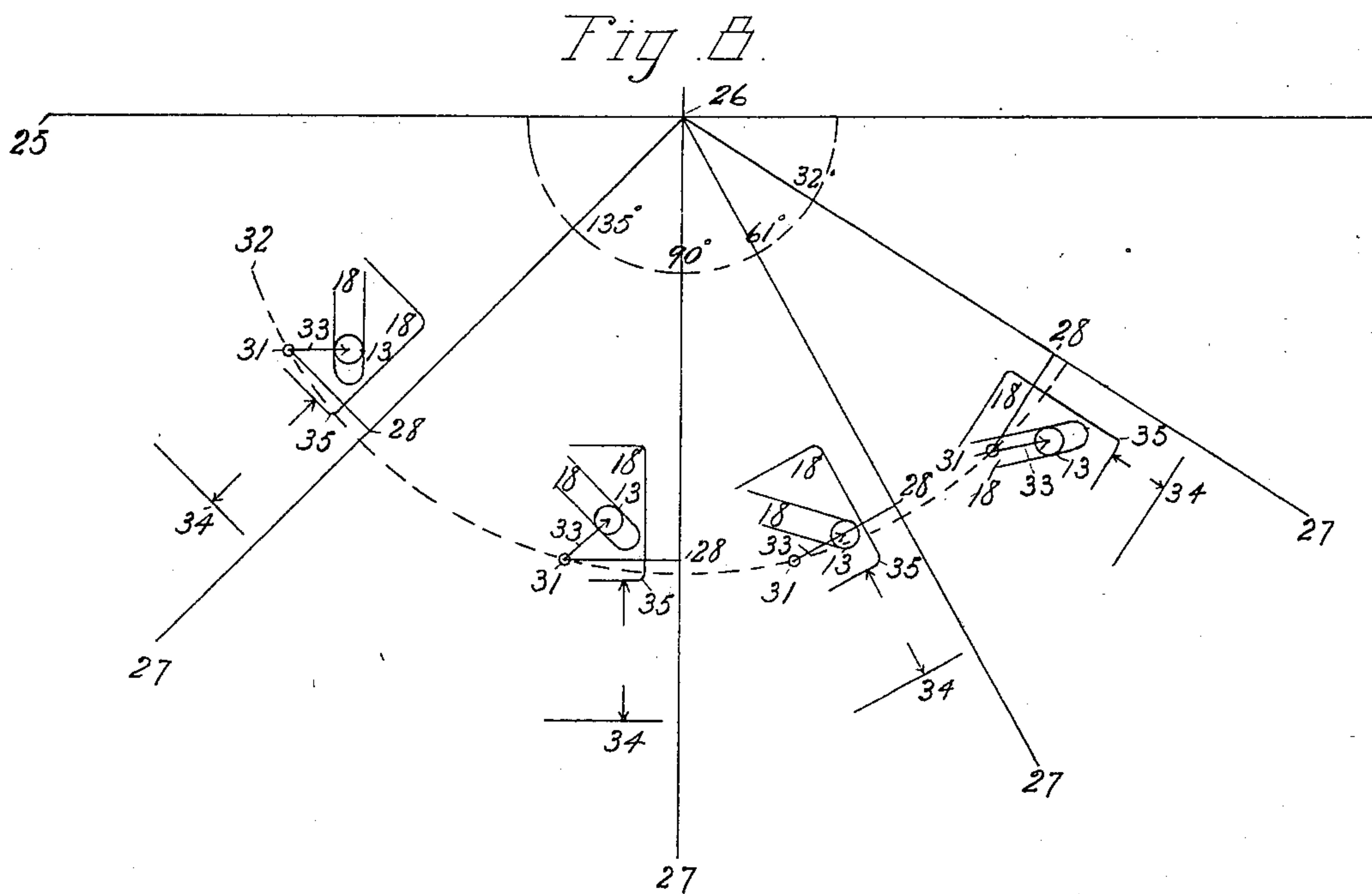
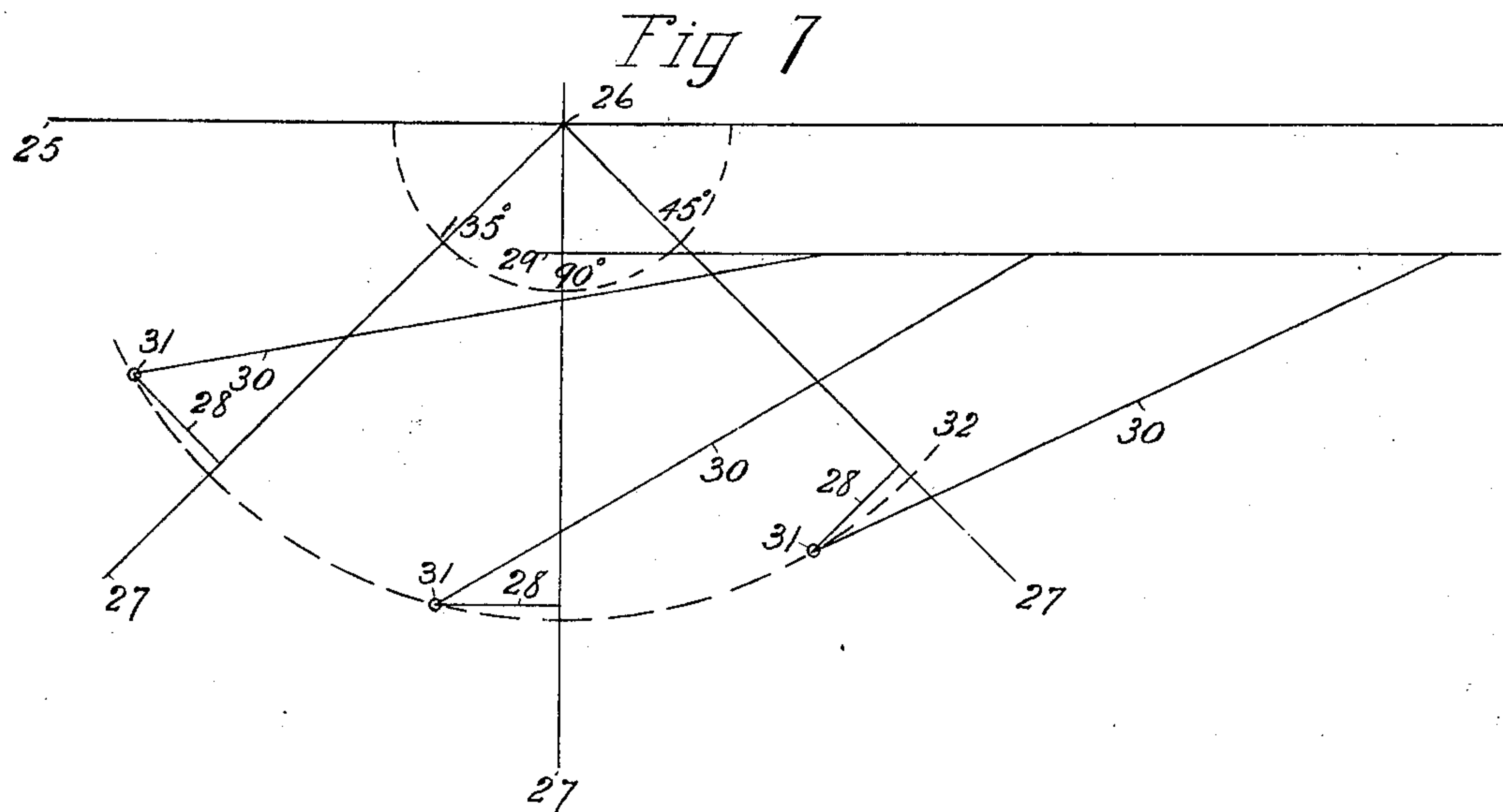
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(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

HENRY G. VOIGHT AND NORMAN B. HURD, OF NEW BRITAIN, CONNECTICUT,
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SAME PLACE.

DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 632,291, dated September 5, 1899.

Application filed February 4, 1899. Serial No. 704,474. (No model.)

To all whom it may concern:

Be it known that we, HENRY G. VOIGHT and NORMAN B. HURD, citizens of the United States, residing in New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Door-Checks, of which the following is a specification.

Our invention relates to improvements in door-checks; and the objects of our improvements are simplicity and economy in construction and efficiency in operation.

In the accompanying drawings, Figure 1 is a plan view of our door-check with a portion of the guide-rod broken away. Fig. 2 is a front elevation of the same. Fig. 3 is a horizontal section of the cylinder with a plan view of the case and parts within the same, the crank-arm and spring-box being removed. Fig. 4 is a like view of the same with the cap-plate removed and the crank turned a quarter-revolution to bring the piston near the rear end of its stroke. Fig. 5 is a vertical section of a portion of our check on the line $x x$ of Fig. 3. Fig. 6 is a plan view of the crank and a piston-slide for a double-acting check for use on a door that swings both ways. Fig. 7 is a diagrammatical view illustrating the various positions of the connecting crank-lever and the door. Fig. 8 is a diagrammatical view illustrating the movement of the piston-slide under the various positions of the crank-shaft.

A designates a straight guide, preferably in the form of a rod, supported on brackets 7 7, which may be secured to the face of the casing over the top of the door. The case B of the door-check is provided with a bracket-plate 8, which is designed to be secured to the door. As shown, they are arranged for a door that has one broad side about flush with the face of the casings surrounding the door, the straight line at the top of Fig. 1 indicating the plane of the said faces of the door and its casings.

The case B is provided with a cylinder D, a spring box or chamber 9, spring 10, and crank-shaft 11, having a double-crank arm 12, which may be provided with a friction-roller 13 on its pin 14. The said crank-shaft, spring-box, and spring are of an ordinary con-

struction. The cylinder D and piston 15 are also of an ordinary construction, and other ordinary constructions can be substituted for any of these ordinary features. Intermedi-ately between the spring-box 9 and body of the case is a cap-plate 16, shown in place in Figs. 3 and 5, but removed from Fig. 4. Between said cap and the side of the case-body is the piston-slide 17, having the oblique crank-pin slot 18, which stands at about forty-five degrees to the axis of the piston, and when designed for a single-acting check is preferably provided with the angular extension or let-off 19. As the name "crank-pin slot" implies, the crank-pin or crank-pin roller is received in the said slot. The piston-slide is rigidly connected to the piston-rod 20 of the piston 15 in any proper manner. We prefer to slab off a portion of the piston-rod and in doing so mill down an integral stud 21, leaving it on the slabbled-off portion, as shown. We form two holes in the front end of the piston-slide, one to receive the said integral stud and the other to receive the screw 22, the piston-rod being bored and threaded to receive said screw, whereby the slide may be firmly connected to the piston-rod by means of the one screw, as shown in Figs. 3, 4, and 5.

The check, as shown, is reversible. As the crank-arm 12 is double both ends of the crank-shaft 11 are adapted to receive the crank-lever 23, and the case containing said crank-shaft may be placed on the door either side up, as heretofore, for a right or left handed door. In the present case we employ a straight crank-lever, and at its outer end we pivotally secure the swivel-guide 24, which is perforated with round holes to let the guide-rod A pass through it, thereby pivoting the said crank-lever to the guide-rod, so that the said lever may both swing and slide relatively to the said straight guide or rod A. We prefer to make the brackets 7 7 for the guide-rod A of such length relatively to the position of the crank-shaft as the check is secured to the door to bring the said guide-rod directly over the axis of the crank-shaft, all as shown in Figs. 1 and 2, in which the hinge of the door is on the left-hand side—that is, at the bottom of the Sheet 1 of the drawings.

Before the check is applied to the door the

crank-pin roller extends into the let-off or angle 19 of the oblique slot 18 and carries the crank-lever 23 beyond a position parallel to that of the piston-rod and permits the spring to expand. In putting the parts in place this lever is forced into its parallel position, as shown, or nearly into the said position, thereby putting the spring under a greater tension when the parts are in the position they have with the door closed, as shown in Figs. 1 and 3. The let-off 19 also serves to make the crank-pin carry the piston to a definite point without having the movement of the crank-pin checked by coming in contact with a positive stop.

In Fig. 6 we have shown the same crank-shaft, arm, pin, and crank-pin roller in connection with a piston-slide 17^a, having a double inclined slot 18^a for use in a double-acting check for the purpose of showing and claiming such generic features as it has in common with the check shown in Figs. 1 to 5; but the specific construction thereof or such features as it does not have in common with the check shown in Figs. 1 to 5 will be made the subject of a companion application, Serial No. 704,620, filed February 6, 1899.

While we prefer the operating or connecting devices illustrated in Figs. 1 and 2 on account of smoothness and ease of action, it is evident that the crank-shaft and piston-slide would remain the same if operated by different connecting devices. With this operating device the check may be placed on the door with the axis of its crank-shaft seven and one-half inches from the axis of the door-hinges. For illustrating the action of our operating or connecting device it may be observed that when so applied and the door is opened to forty-five degrees to the casing the crank-lever is at one hundred and fifty-five, when the door is at ninety degrees the crank-lever is at one hundred and fifty, and when the door is at one hundred and thirty-five degrees the crank-lever is at one hundred and seventy. This is illustrated in the diagrammatic view Fig. 7. The line 25 indicates the face of the door-casing, the face of the door being flush therewith when the door is closed. The hinge-axis is indicated at 26, and the lines 27 radiating therefrom at the angles forty-five, ninety, and one hundred and thirty-five degrees, respectively, represent corresponding positions of the door when opened. The short lines 28 at right angles to the door represent the position of the check on the door at seven and one-half inches from the hinge-axis. The small circle 31 at the end of the said short line represents the crank-shaft axis, while the curved broken line 32 indicates the path described by the said crank-axis. The line 29, parallel to the line 25, represents the line of the guide-rod, and the three lines 30 represent the position of the crank-lever in the several different positions of the door there illustrated.

In Fig. 8 is a diagrammatic view showing

the movement of the piston-slide relatively to the rotation of the crank-shaft, and also the angle at which the door stands to the casing when the crank-shaft is in the several positions shown, providing the connections and mounting are the same as those herein shown and described. In this view the reference-numerals 25, 26, 27, 28, 31, and 32 indicate the same parts as in Fig. 7, and in addition thereto a portion of the piston-slide 17, the oblique slot 18 therein, the crank-pin roller 13, a straight line 33 to indicate the crank-arm and an index or zero line 34, which registers with the edge 35 on the piston-slide when the door is closed. The distance between the points of the darts at zero 34 and the edge 35 represent the distance the piston-slide has traveled in opening the door to the various positions shown.

Upon opening the door the swiveled guide 24 moves along the guide-rod to the left, and when the door, under the conditions before described, reaches a position at thirty-two degrees to the casing, as shown in the diagrammatic view Fig. 8, the crank-shaft has moved the first eighth of a revolution and stands at forty-five degrees to the door, while the piston-slide and piston have moved about one inch. When the crank-shaft has made its first quarter of a revolution and stands at ninety degrees to the door, the door stands at sixty-one degrees to the casing, and in reaching this position the crank-pin roller, moving in the direction indicated by the dart in Fig. 3, acts on the oblique slot to move the piston-slide and attached parts from the position shown in Fig. 3 to that shown in Fig. 4 when said roller reaches the end of the said slot. The position shown in Fig. 4 is also illustrated by the position in Fig. 8 that is marked "61." As the door is opened still farther the crank-shaft continues its movement in the same direction and the crank-pin roller moves away from the end of the oblique slot 18 and may carry the piston, &c., back until the rear end of the slide comes almost in contact with the rear end of the case; but after the crank-pin roller passes the end of the oblique slot and the crank-arm passes beyond ninety degrees to the door the movement of the piston-slide begins to be slower relatively to the revolution of the crank-shaft, so that in moving the door from sixty-one degrees to ninety the piston-slide moves only about three-eighths, and in passing from ninety degrees to one hundred and thirty-five degrees to the door the slide moves only about one-eighth of an inch, as illustrated in Fig. 8. The crank-pin roller when at about the position farthest to the left in Fig. 8 may move down the oblique slot while making about one-sixteenth of a revolution without any movement of the piston-slide, and if the movement of the shaft is still further continued the piston-slide moves forward slightly until the crank-pin roller comes into the let-off, which point it will reach when the crank-arm has described about one hun-

dred and eighty degrees. When the door is thus widely opened and the crank-pin roller is at the let-off end of the slot, the piston-slide will stand inwardly but a little farther than the position shown in Fig. 4. When the door is released, the spring will cause the parts to move in the reverse direction and return them to their former position.

By means of the crank-pin and piston-slide having an oblique slot at about forty-five degrees to the axis of the piston the movement of the slide is substantially uniform for a given movement of the crank-shaft during its first quarter-revolution in opening the door. In other words, the piston has its fastest movement relatively to the relation of the crank-shaft on the last quarter of a revolution of said shaft in closing the door, a very important matter in a pneumatic check. At the same time the connections with the door and casing are such that the crank-shaft moves much faster relatively to the movement of the door when the door is within forty-five degrees of its closed position than it does at any other part of its movement, whereby the combined action of the oblique slot and the connections give a desirable rapid closing-stroke. By means of the oblique slot and its let-off the spring need not be given its full initial tension until the check is properly connected with the door.

It is apparent that some changes from the specific construction herein disclosed may be made, and therefore we do not wish to be understood as limiting ourselves to the precise form of construction shown and described, but desire the liberty to make such changes in working our invention as may fairly come within the spirit and scope of the same.

We are aware that a prior patent shows and describes a liquid door-check having a single crank-arm with its pin arranged in a slot of the piston, which slot extends at right angles to the length of the piston, also that another patent shows and describes a liquid check having a single crank-arm with its pin in a doubly-inclined slot of a slide that moves at right angles to the movement of the piston, the angle of inclination of said slot being much nearer a right angle to the movement of the slide than it is to forty-five degrees thereto. All of said prior art is hereby disclaimed.

We claim as our invention—

1. The combination of a door-check case with the cylinder and piston, the piston-slide mounted within guides in the said case to

slide in the same longitudinal direction as the piston, rigidly connected to the said piston and having the oblique slot extending at an angle of about forty-five degrees to the axial line of the piston, the crank-shaft arranged at right angles to the said cylinder and having a crank-pin working within the said slot, and mechanism for operatively connecting the said crank-shaft with a door and casing, substantially as described.

2. In a door-check, the combination of a crank-shaft having a crank-pin, with the cylinder and piston, the piston-slide rigidly connected to the said piston and having the oblique slot and angular let-off within which slot and let-off the pin of the crank operates for reciprocating the said slide and attached piston and within which let-off the crank-pin may enter at either end of a half-revolution, substantially as described.

3. The combination of a door-check case having the cylinder, a piston within said cylinder, a piston-slide in the form of a plate having an oblique slot extending at an angle of about forty-five degrees to the axial line of the piston and arranged to slide in the said case in the same direction as the piston, and a crank-shaft mounted in the said case at right angles to the said cylinder with both of its projecting ends adapted to receive a crank-lever and having a double-crank arm with its two members arranged on opposite sides of the said slide and with its crank-pin extending through the said oblique slot, substantially as described.

4. The combination of the case of a door-check, the crank-shaft mounted therein, the crank-lever on said shaft, the swivel-guide pivoted to the outer end of said lever, and the guide-rod mounted on suitable brackets and forming a track for the swivel-guide to travel on, substantially as described.

5. The combination of a door-check case with the piston-slide having the oblique slot extending at an angle of about forty-five degrees to the axial line of the piston, a crank-shaft having a crank-pin working within the said slot, and a crank-lever mounted on the said crank-shaft by one end and having its other end arranged to both swing and slide on its connections, substantially as described.

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