

DOOR CHECK.

Patented Sept. 13, 1910.

**970,445.**

2 SHEETS—SHEET 1.

Fig. 1.

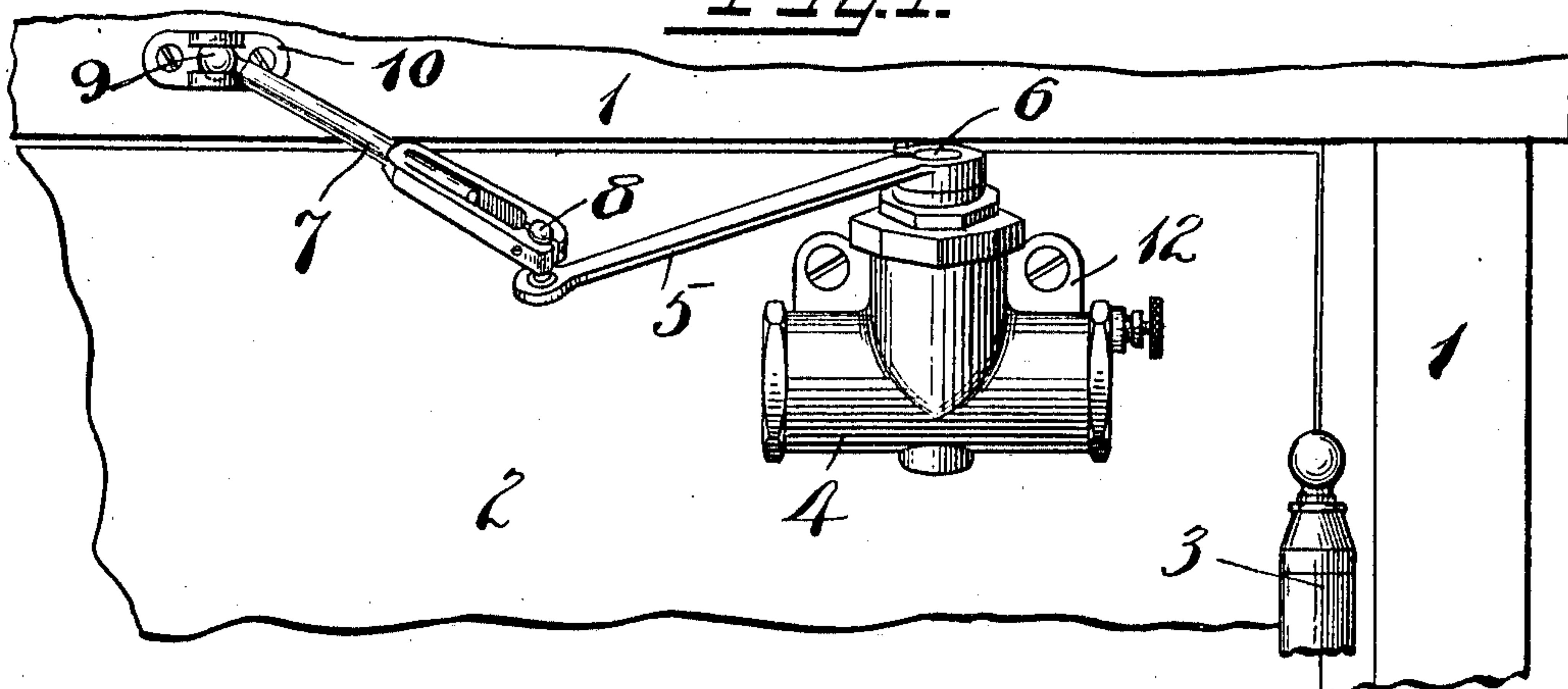


Fig 2.

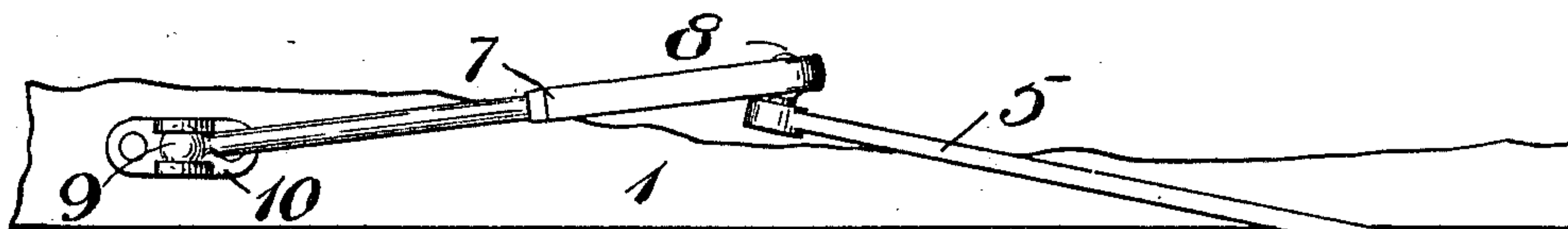
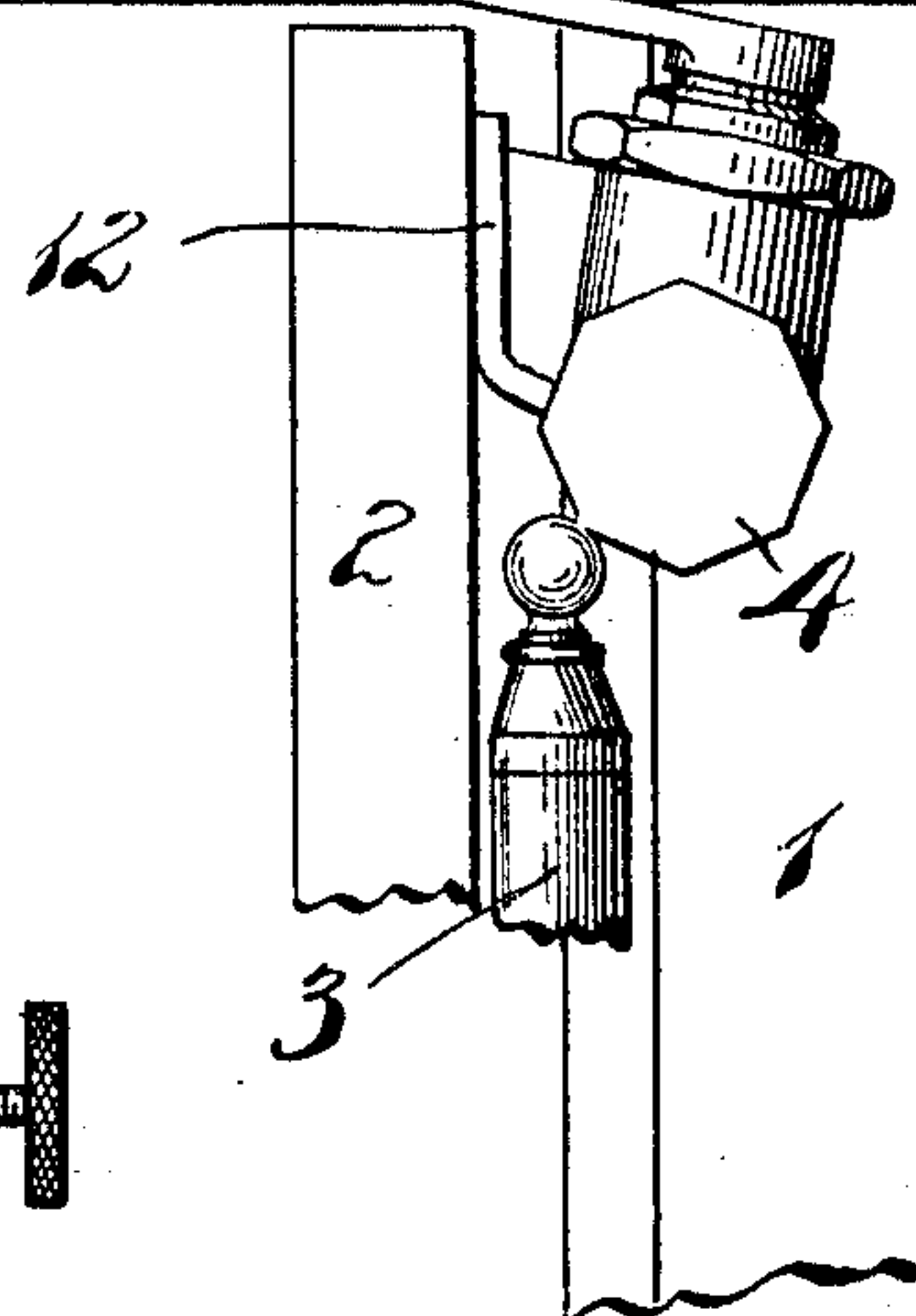
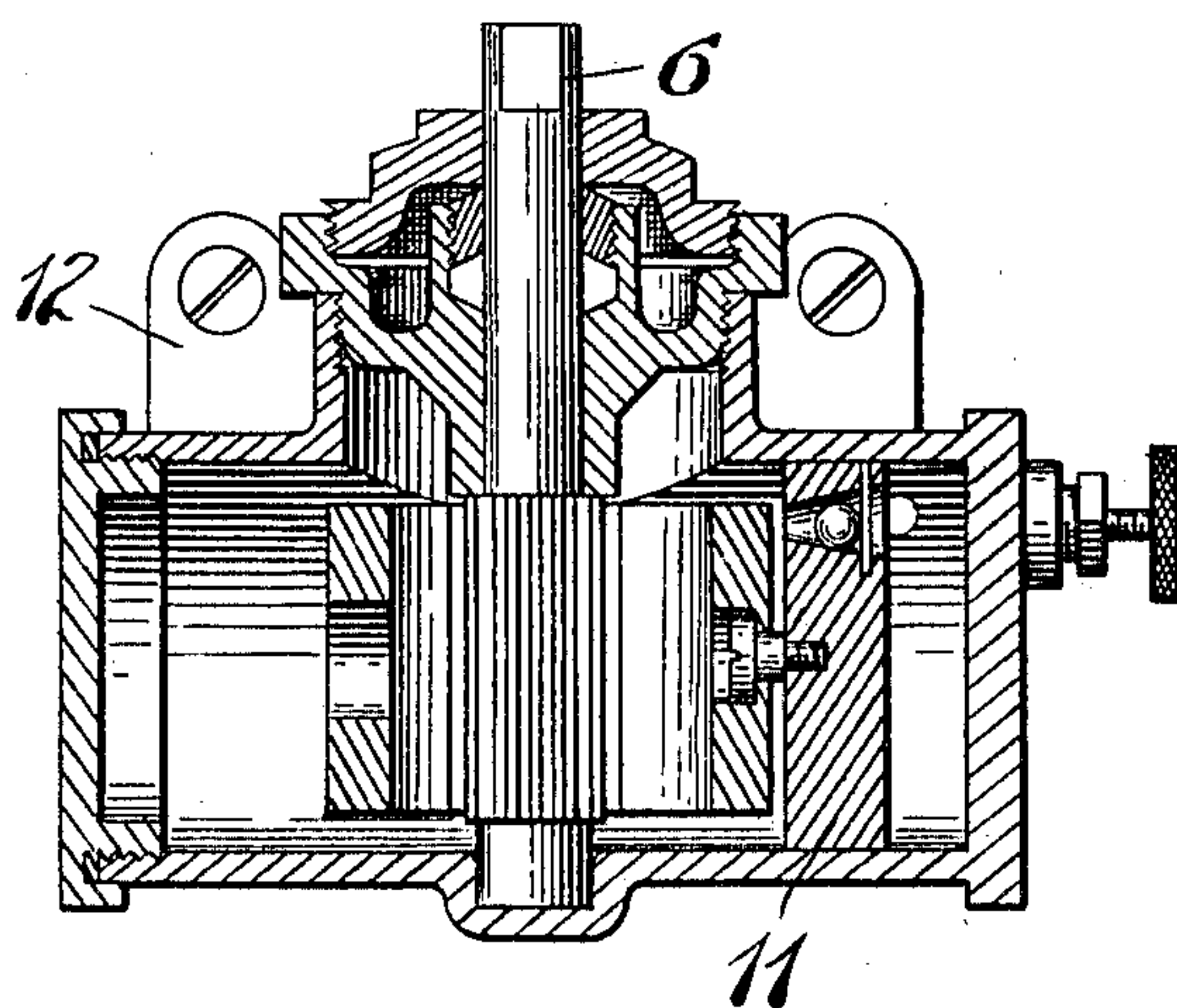


Fig. 4.



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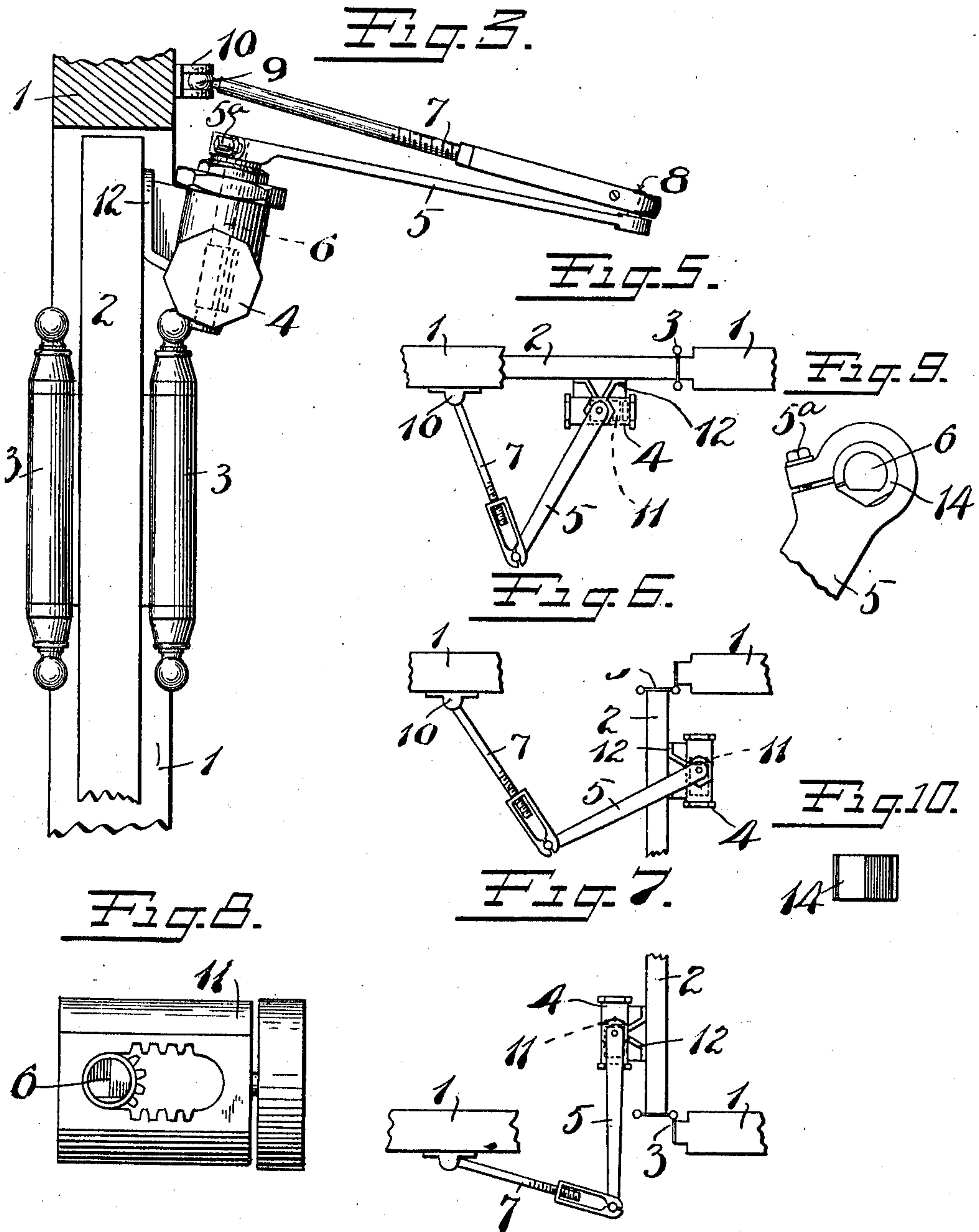
DOOR CHECK.

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2 SHEETS—SHEET 2.



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## DOOR-CHECK.

970,445.

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Application filed May 10, 1910. Serial No. 560,526.

To all whom it may concern:

Be it known that I, WILLIAM K. HENRY, a citizen of the United States, residing at New Britain, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Door-Checks, of which the following is a full, clear, and exact description.

My invention relates to improvements in door checks, the object of the same being to provide an improved check which is particularly useful in connection with double-swing doors, said checking mechanism being so arranged and associated therewith that although connected to the door and located on one side thereof it will operate effectively upon either swing of the door to check the same on its closing movement.

Another object is to provide a construction which avoids unnecessary complication in the employment of auxiliary ports and valves and other parts, by which the checking action is made uniform on each swing of the door.

In the drawings Figure 1 is a front elevation of the upper part of a double swing door and door casing, with my improved checking mechanism applied thereto and as it would appear in use, the door being closed. Fig. 2 is a similar view, the door being open on one hand at 90°, which, it may be assumed, is the fully open position. Fig. 3 is an end view of Fig. 1 looking from left to right. Fig. 4 is a longitudinal section of the checking element on a relatively enlarged scale, and partially retracted. Fig. 5 is a diagrammatic plan view on a reduced scale, of the parts as shown in Fig. 1. Fig. 6 is a similar view of the parts as shown in Fig. 2. Fig. 7 is a similar view of the parts when the door has been opened to a position directly opposite to that shown in Fig. 6. Fig. 8 shows the relative position of piston and spindle when the door is closed. Fig. 9 is a plan view of the upper end of the spindle where the lever arm is connected thereto and showing the intermediate bushing. Fig. 10 is a side elevation of the bushing.

1 is a door casing.

2 is a door, in this instance connected thereto by a double acting self closing spring hinge 3.

4 is the cylinder of a fluid door check.

5 is a lever arm carried by the door check spindle 6.

7 is a link connected at one end, preferably by a ball joint 8, to the end of the lever 5 and at the other end by a ball joint 9 to a bracket 10, said bracket 10 being secured to the overhead part of the door casing 1. The link 7 is preferably made adjustable as to length, although in a broad sense this is not material, and no especial claim is made thereto, since adjustable links of this type are well known and hence need not be illustrated or described herein.

The checking cylinder 4 contains a suitable checking piston 11, for example, such as shown in Letters Patent No. 960,641, granted to me on June 7th, 1910. This piston 11 is operable by the movement of the spindle 6 in either direction from a neutral point. The movement of the spindle in one direction is resisted to the desired degree by a suitable fluid, preferably liquid, while in an opposite direction said piston moves with relative freedom, the arrangement being such that when the door is opening in either direction the free movement occurs, the checking action occurring when the door is closing. To secure the proper results it is obvious that the checking resistance should be uniformly applied on either hand. In other words, the action of the checking action of the piston should be uniform when the door is closing from the right hand or the left hand, so that said door will always stop at the intended closed position, which should be directly in line with the overhead part of the casing. To secure this result the action of the piston should be what is termed "square," that is, when the door is moved from the closed position to the open position on one hand or the other to the same degree, the piston should move back the same distance irrespective of the direction of opening the door, hence, when the door is closing the piston will move in a reverse direction precisely the same distance irrespective of the direction of swing of the door. I have found that this so-called "square" action may be effectively secured by so setting the check that when the door is closed the lever arm 5 will stand at approximately 30° off from a line at right angles to the door although this may be varied within reasonable limits. I have also found that a proper



clearance can be effected for the check and the levers by pitching the spindle 6 at an angle relatively to the door. To that end it will be seen that the mounting should be so arranged as to secure this proper angular position for the various parts.

In the drawings I have shown a preferred construction in which the cylinder 4 is provided with a bracket 12, the back of which is angularly disposed relatively to the spindle 6 (see Fig. 3), so that said spindle will be pitched outwardly when the checking cylinder 4 is secured to the door as shown. It will be observed that the lever 5, being at right angles to the spindle 6, inclines downwardly when the door is closed. The check should be so adjusted on the door that the highest part thereof (in this instance the upper part of the hub of the lever 5) is slightly below the lower edge of the upper part of the door casing 1.

In operation: Assuming the parts stand in the position shown in Figs. 1 and 5, the door may be swung from this position to the position indicated in Fig. 6, since, of course, the lever 5 and link 7 move in a plane that will clear the upper edge of the door on said movement. When the door is opened in an opposite direction, in other words, opened to the position indicated in Fig. 7, the highest part of the check proper will first clear underneath the upper part of the door casing. As the door continues to be opened in said direction, the lever arm 5 (although approaching a horizontal position) will not reach said position until after the door has been opened to its fullest extent, hence the lever arm 5 will remain below the overhead part of the door casing. It will thus appear that by reason of the pitch of the spindle 6, the door may be fully opened on either hand.

It is now important to observe the action of the piston. In Figs. 5 and 8, the piston 11 is shown in the position assumed when the door is fully closed. As before indicated, it is important that the piston should be moved back to the same extent when the door is opened to the same extent on either hand. For example, when the door is fully opened, as shown in Fig. 6, the piston should be approximately at the limit of its retracted movement. So, also, when the door is fully opened in an opposite direction, as shown in Fig. 7, the piston should have moved back to the same extent. I accomplish this by causing the lever arm 5 to start from a position which is approximately that shown in Figs. 1 and 5, namely, approximately 30° off from a line at right angles to the face of the door. Starting from this point, if the door is opened 90° from the position shown in Fig. 5 to that shown in Fig. 6, the lever arm 5 will move in an arc (relatively to the path of movement of the piston) substantially 120°, this

range of movement being sufficient to move the piston back from its normal or idle position substantially one full stroke. So also in swinging the door to an opposite position, namely, from that shown in Fig. 5 to that shown in Fig. 7, the lever 5 will move in an arc (relatively to the plane of action of the piston) substantially 120°, thus imparting to said piston substantially the same full stroke, even though the door itself in each case has moved only 90°. This action of the lever arm 5 and the piston will be readily apparent from an inspection of the diagrammatic views in Figs. 5 to 7, and by it will be clearly understood what is meant by the term "square action" of the piston. By reason of this action, all occasion for auxiliary valves or passages for the control of the piston is avoided, and the apparatus is reduced to its simplest form.

Since, in order to secure the proper "square" action of the piston I arrange the lever arm when it is in its normal or idle position with the door closed at 30° from a line at right angles to the surface of the door, it is apparent that provision should be made to permit said initial angle to be easily secured whether the check is applied to one surface of the door or the other, or is adapted to a right hand door or a left hand door, hence to accomplish this in a simple and effective manner I provide an intermediate bushing 14 between the hub of the lever arm and the end of the spindle. As shown in Fig. 9, this bushing 14 surrounds the upper end of the spindle, said parts being suitably keyed or otherwise held together in any well known manner, so as to prevent independent rotation. In this particular instance, the upper end of the spindle is slabbled off on one side and the bore of the bushing is shaped thereto. In this instance also the said bushing is split so that when the lever arm is applied it may be clamped tightly on the spindle. The outer surface of the bushing is provided preferably with two slabbled off portions arranged at the proper angle to each other, so that the lever arm may be applied for either a right or a left hand door or applied to the opposite sides of the same door. As shown, the end of the lever arm surrounds the spindle and has a flat part arranged to rest against the slabbled off surface of the bushing 14. The hub of the lever arm is preferably split so that it may be secured by a clamp screw 5<sup>a</sup> tightly upon the bushing which in turn will collapse sufficiently as the said screw 5<sup>a</sup> is drawn up to rigidly and firmly embrace the spindle 6, thus positively uniting the lever arm with the spindle at the desired angle. Obviously, by this arrangement a quick adjustment may be made. It is also apparent that only one internal slabbled off surface or locking posi-



tion is absolutely required upon the bushing, since it is perfectly plain that with the slabbed off surfaces, external and internal, shown in the drawings, one slabbed off surface of the bushing may be placed at two different angles, simply by inverting the bushing on the spindle.

From the foregoing it will be seen that it is my desire and intention to claim broadly a construction which will permit the lever arm to be placed at an initial angle relatively to and on either side of a plane at right angles to the plane of the door, whereby the said check may be conveniently applied to a door hinged at either edge or to the opposite sides of a door.

What I claim is:

1. In a door check for double swing doors, a checking element, a spindle for operating the same, means for holding said spindle at an angle relatively to the door, a lever connected to said spindle and standing at approximately right angles thereto and means to connect said lever to the door casing.

2. In a door check for double swing doors, a checking element, a spindle for operating the same, means for holding said spindle at an angle relatively to the door, a lever secured to said spindle at approximately right angles thereto, and a link for securing said lever to the door casing.

3. In a door checking mechanism for double swing doors, a reciprocable piston, a container therefor, a rotatable spindle for moving said piston in the same direction away from a normal or idle position by rotation of said spindle in either direction, means to hold said spindle obliquely relatively to the door to which said mechanism is applied.

4. In a door checking mechanism for double swing doors, a piston, a container therefor, a spindle for moving said piston in the same direction away from a normal or idle position by rotation of said spindle in either direction, means to hold said spindle obliquely relatively to the door to which said mechanism is applied, and a lever arm carried by said spindle at substantially right angles thereto, whereby said lever arm will swing in a plane obliquely to the plane of said door when said door is opened and closed.

5. In a door checking mechanism for double swing doors, a piston, a container therefor, a spindle for moving said piston in the same direction away from a normal or idle position by rotation of said spindle in either direction, means to hold said spindle obliquely relatively to the door to which said mechanism is applied, and a lever arm carried by said spindle at substantially right angles thereto, said lever arm being inclined obliquely to said door and standing at an angle to the face of the door when the spin-

dle and piston stand in the aforesaid idle position, the angular position of said lever arm relatively to the face of the door being approximately thirty degrees when the door stands in its closed position.

6. In a door checking mechanism for double swing doors, a piston, a container therefor, a spindle for moving said piston in the same direction away from a normal or idle position in which the door is closed by the rotation of said spindle in either direction, means to mount said spindle obliquely relatively to the door to which the mechanism is applied, a lever arm carried by said spindle at substantially right angles thereto, whereby said lever arm will be inclined obliquely to the plane of the door when the latter is closed, and means to connect said lever arm to the door casing at such an angle relatively thereto that the piston will partake of the same movement when the door is opened to the same degree on either side of its closed position.

7. In a device of the character described for controlling the swing of one part relatively to a complementary part to which it is hinged, a checking element arranged to be carried by one of said complementary parts, a spindle associated with and arranged to operate said checking element, said checking element having a normal or idle position corresponding with the normal position of the complementary parts to be controlled, the hinged part being capable of a swinging movement in either direction away from said normal position, and means to hold said spindle oblique to a plane intersecting the axis of the swinging part.

8. In a device of the character described for controlling the swing of one part relatively to a complementary part to which it is hinged, a checking element arranged to be carried by one of said complementary parts, a spindle associated with and arranged to operate said checking element, said checking element having a normal or idle position corresponding with the normal position of the complementary parts to be controlled, the hinged part being capable of a swinging movement in either direction away from said normal position, and means to hold said spindle oblique to a plane intersecting the axis of the swinging part, a lever and link connection between the spindle and one of the parts to be controlled, said lever being arranged at substantially right angles to the spindle, whereby the same will be inclined downwardly at an angle relatively to the face of the hinged part when the latter is in its neutral position.

9. In a device of the character described for controlling the swing of one part relatively to a complementary part to which it is hinged, a checking element arranged to be carried by one of said complementary



parts, a spindle associated with and arranged to operate said checking element, said checking element having a normal or idle position corresponding with the normal position of the complementary parts to be controlled, the hinged part being capable of a swinging movement in either direction away from said normal position, and means to hold said spindle oblique to a plane intersecting the axis of the swinging part, a lever and link connection between the spindle and one of the parts to be controlled, said lever being arranged at substantially right angles to the spindle, whereby the same will be pitched at an angle relatively to the face of the hinged part, said lever being also arranged at an angle oblique to a plane at right angles to the face of the hinged part when all of said parts are in their normal or idle position.

10. In a door check for double swing doors, a checking device arranged to be secured to the door and including a rotatable spindle arranged for rotation in opposite directions by movement of the door in opposite directions, means to hold said spindle obliquely to said door at all times said checking mechanism operating to resist the return of the spindle to a position intermediate the extremes of its rotative movement, a lever and link connected to said spindle and operating to connect the same to the door casing, said checking device and lever being arranged to move underneath the door casing when the door is swung open in one direction, said lever and link being arranged to move over the upper edge of the door when the latter is swung open in an opposite direction, said lever swinging in a plane oblique to a horizontal plane.

11. In a door check, a casing arranged to be secured to a door at a definite angle, a

spindle carried by said casing, a lever arm arranged to be secured to said spindle obliquely to a vertical plane at right angles to the plane of the door, and means to permit said lever arm to be secured on said spindle at a corresponding angle on the opposite side of said vertical plane, said means including a bushing intermediate the hub of the lever arm and the spindle and means to hold said parts against unintentional disengagement, said bushing having an internal and an external holding surface arranged on different radii to interlock respectively with said spindle and lever hub.

12. In a door check, a casing arranged to be secured to a door at a definite angle, a spindle carried by said casing, a lever arm arranged to be secured to said spindle obliquely to a vertical plane at right angles to the plane of the door, means to permit said lever arm to be secured on said spindle at a corresponding angle on the opposite side of said vertical plane, said means including a bushing intermediate the hub of the lever arm and the spindle, said bushing and the hub of said lever arm being split, and a clamp screw for securing the split end of the lever arm hub.

13. In a door controlling device for double swing doors, a controlling element, a spindle for operating the same, means for holding said spindle at an angle relatively to the door to which the apparatus is to be applied, a lever connected to said spindle and arranged to swing in a plane oblique to a horizontal plane, and means to connect said lever to the door casing.

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