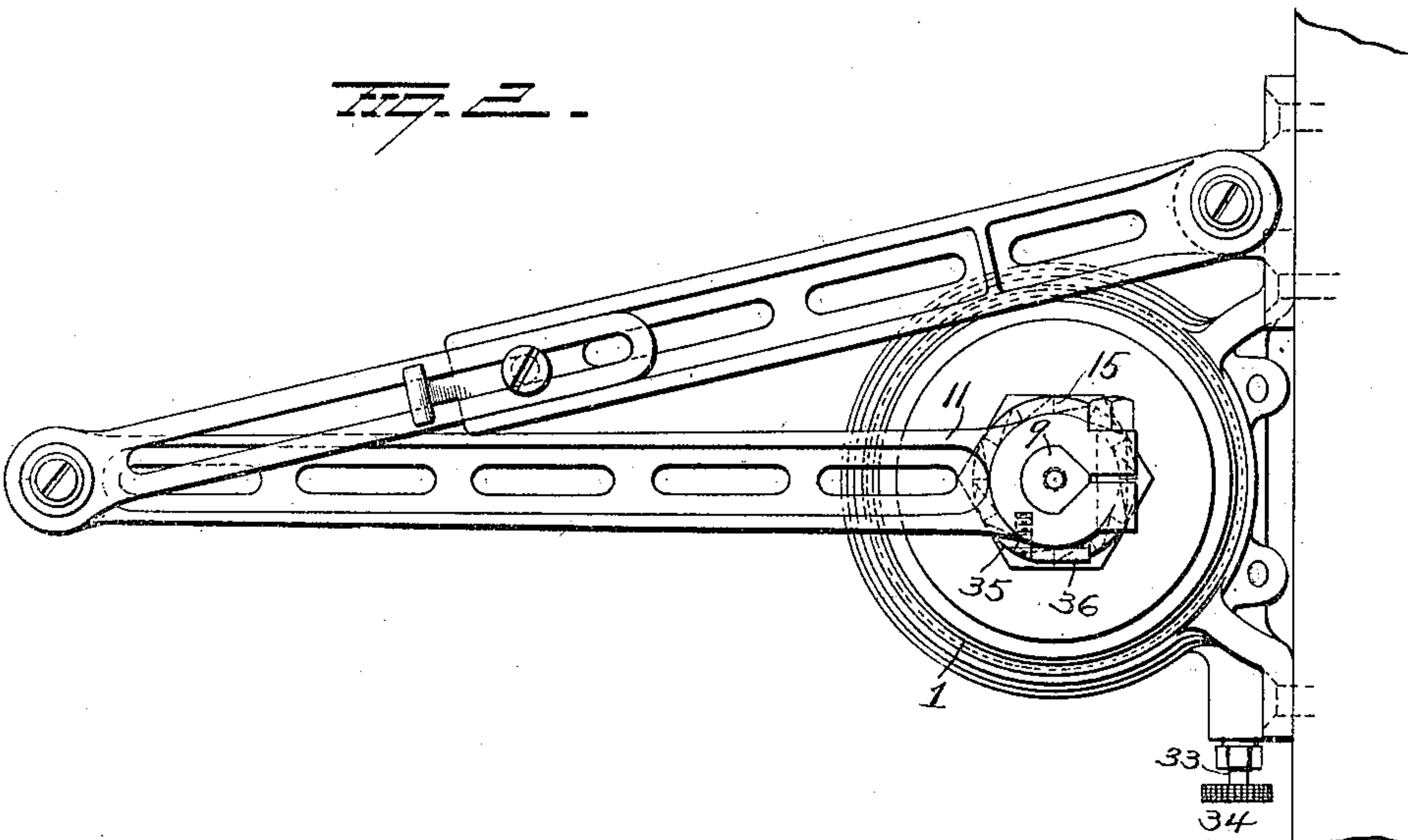
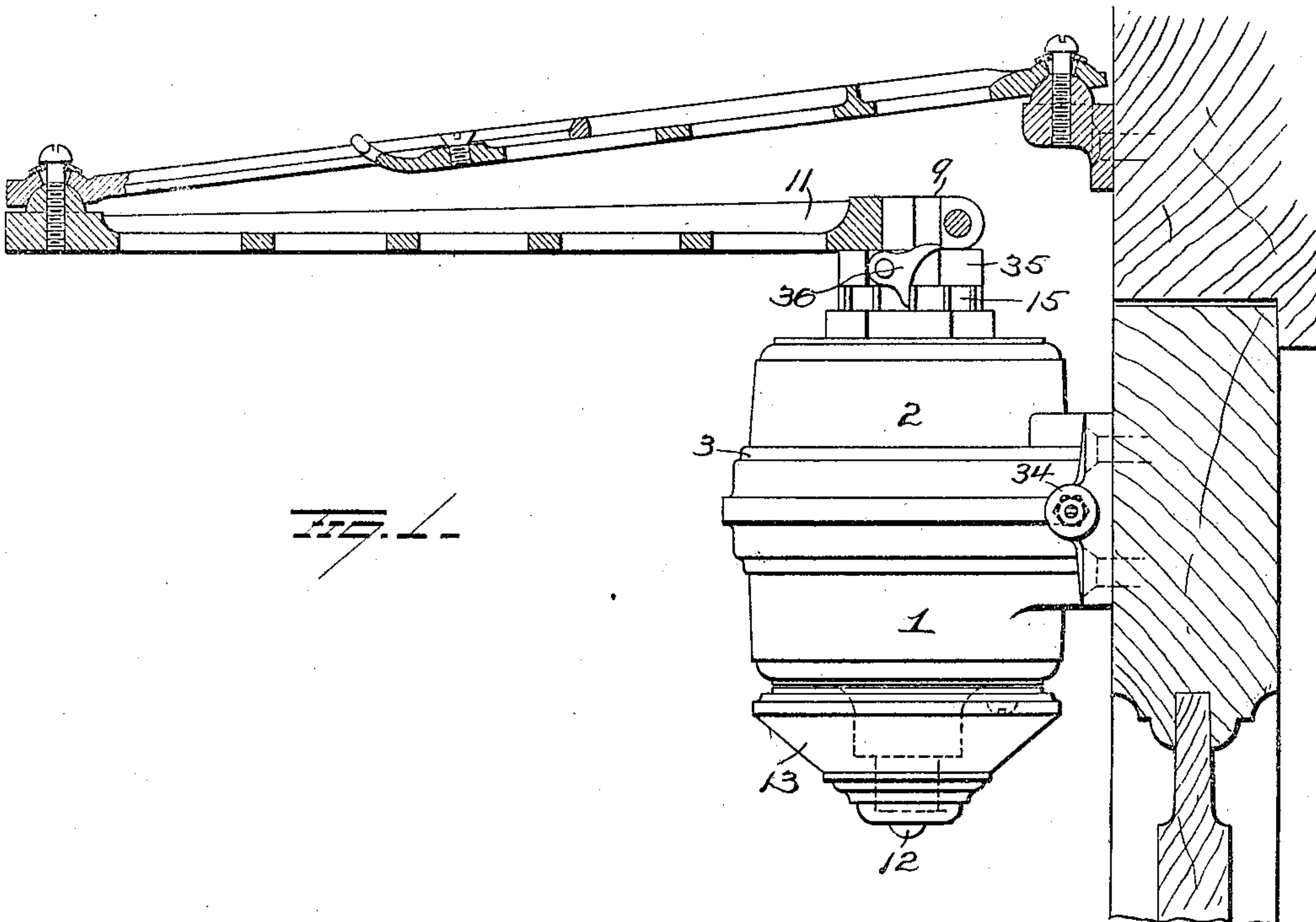


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 COMBINED DOOR CHECK AND CLOSER.  
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999,542.

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3 SHEETS—SHEET 1.



WITNESSES  
 E. Nottingham  
 G. F. Downing

INVENTOR  
 A. F. Bardwell  
 By H. A. Seymour  
 Attorney

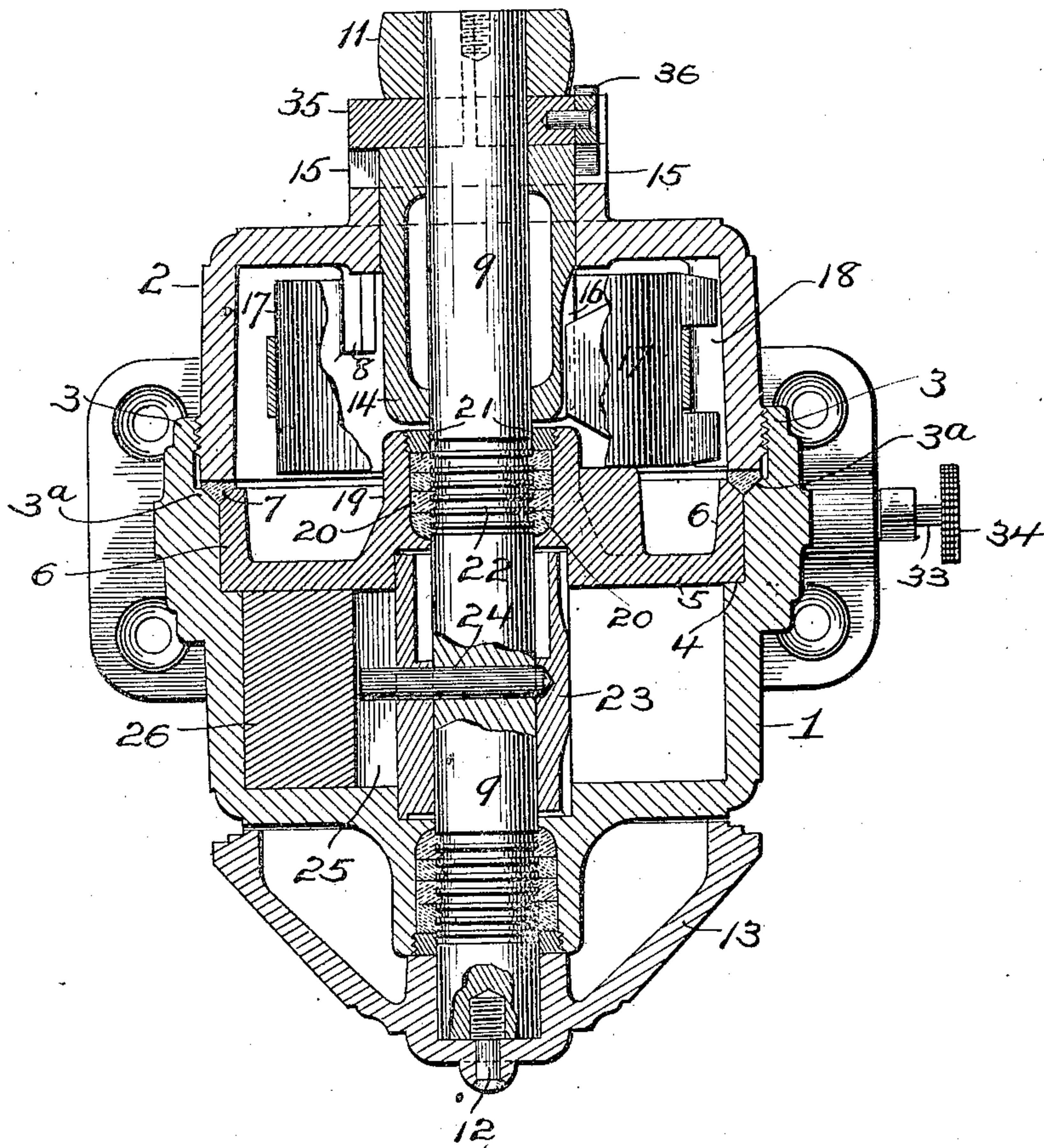
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Fig. 3.



WITNESSES  
E. J. Nottingham  
G. J. Downing

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Attorney

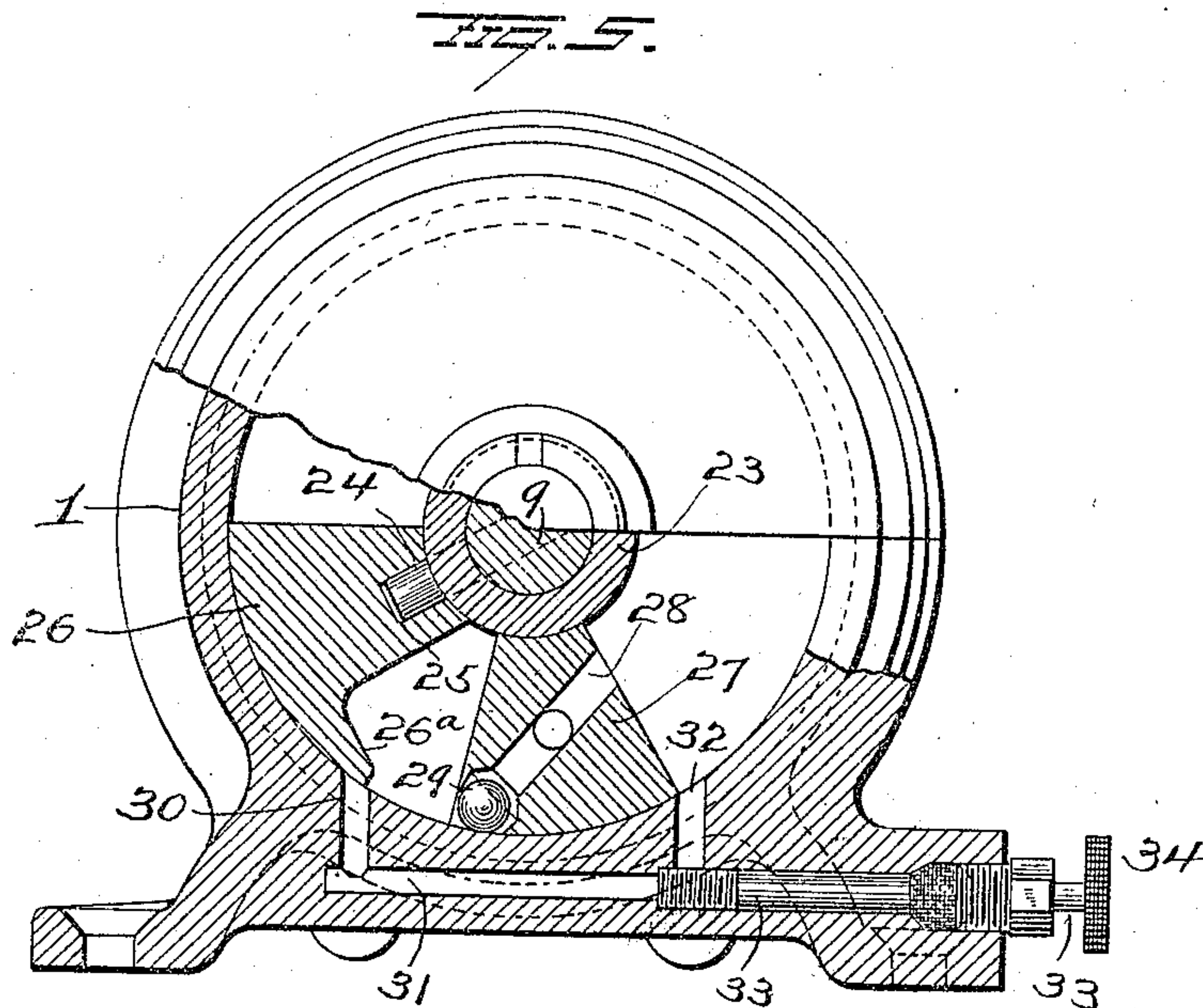
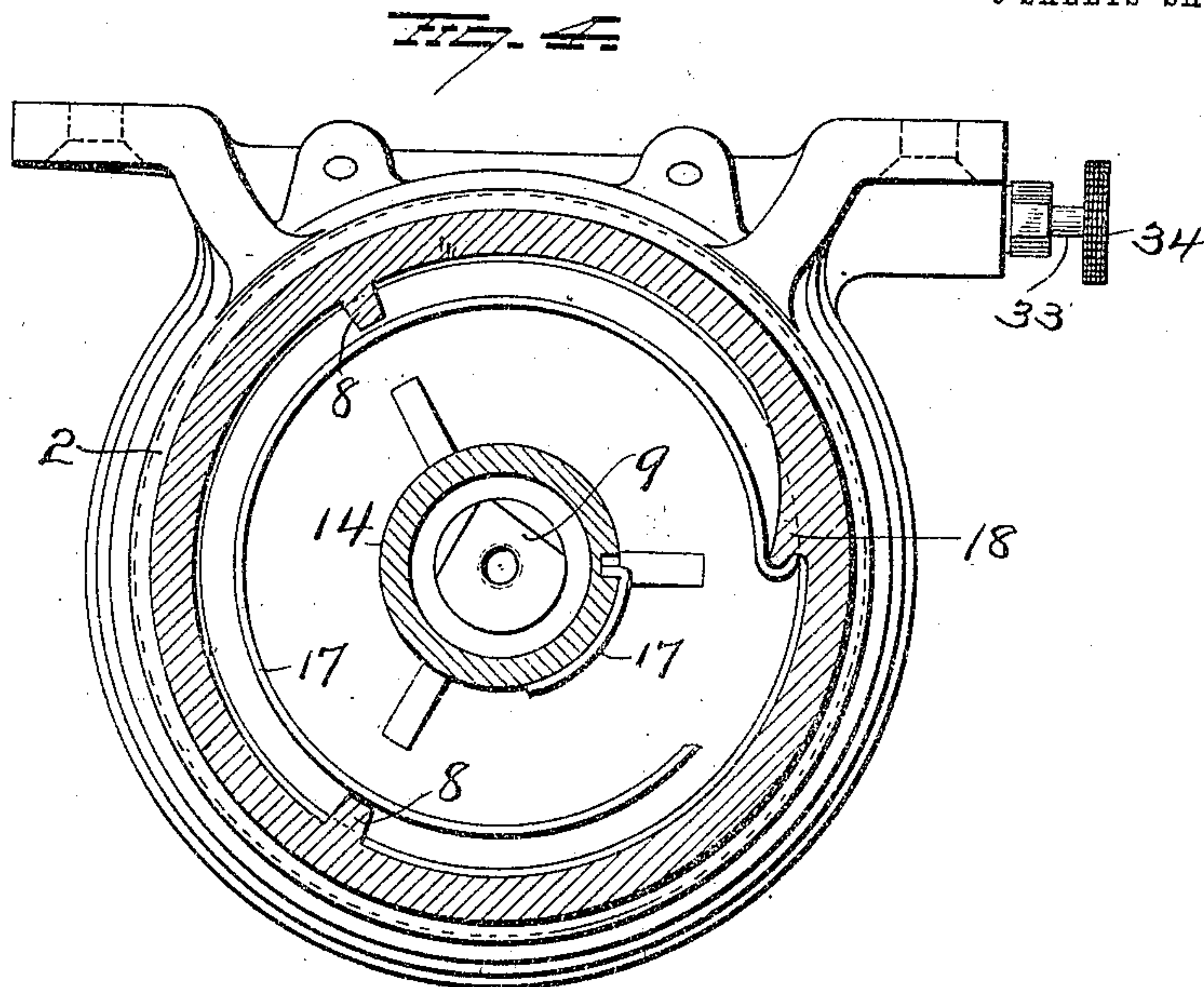


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WITNESSES

*E. Nottingham*  
*G. J. Downing*

INVENTOR

*A. F. Bardwell*  
*Cyrt. A. Seymour*  
Attorney



# UNITED STATES PATENT OFFICE.

ARTHUR F. BARDWELL, OF STAMFORD, CONNECTICUT, ASSIGNOR TO THE YALE & TOWNE MANUFACTURING COMPANY, OF STAMFORD, CONNECTICUT.

## COMBINED DOOR CHECK AND CLOSER.

999,542.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed June 24, 1909. Serial No. 504,140.

*To all whom it may concern:*

Be it known that I, ARTHUR F. BARDWELL, of Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Combined Door Checks and Closers; and I do hereby 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.

My invention relates to an improvement in combined door checks and closers of the wing piston type. Heretofore in this type of check and closer, the wing piston which moves in a plane around and concentric with the shaft, has been secured rigidly to the shaft.

The object of the present invention is to provide means whereby the piston acts as a brake, thus reducing the pressure of the liquid within the check, and permitting the use of larger escape openings thereby obviating to a large extent, the danger of derangement, due to clogging of the by-pass ports.

A further object is to provide simple and effective means for preventing the escape of liquid from the liquid chamber around the shaft.

A further object is to provide a device of the character described, of substantially the same shape at both ends, with the shaft thereof projecting at both ends, so that it may be used for either end up, and for right or left hand doors.

A further object is to so connect the shaft and piston, that deflection of the shaft does not bind the piston in its cylinder.

With these and other objects in view my invention consists in the parts and combination of parts, and in the details of construction as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation showing the check and closer applied to a door, the connecting arms being in section. Fig. 2 is a view in plan of same. Fig. 3 is a view in vertical section of the check and closer. Fig. 4 is a view in horizontal section through the

spring chamber, a portion only of the spring being shown, and Fig. 5 is a view in plan and partly in section through the piston or liquid chamber.

The shell or casing, is composed of two sections 1 and 2, the section 1 having a seat 3<sup>a</sup> and a threaded flange 3 at its open end, to receive and engage the threaded open end of the section 2, and is provided with a seat 4 on which the cylinder head 5 rests. This cylinder head is provided at its periphery with a flange 6 terminating in the plane of the seat 3<sup>a</sup>, so that a single packing 7 introduced between seat 3<sup>a</sup>, flange 6 and end of section 2 of the casing, serves to pack not only the joint between the cylinder head 5 and section 2, but also the joint between the sections 1 and 2 of the shell or casing.

Section 2 of the casing contains the spring, and is provided internally with lugs 8 which operate to hold the spring concentric with the shaft 9, while assembling the parts, while the wing piston 26 rests, and has a circular movement within the cylinder in section 1 concentric with the shaft 9. Shaft 9 passes through the outer end of section 2, through head 5, and through the outer end of section 1, and projects at each end sufficiently for the attachment of the lever arm, the two ends of the shaft being made angular as shown for the rigid attachment of the lever arm 11, and each is also provided in its end with a screw hole to receive the screw 12 of the cap 13, which latter is designed to be secured to the downwardly projecting end of the shaft, and cover and inclose the latter and add to the finish and appearance of the device. Passing through the outer end of section 2 and embracing the shaft 9, is the sleeve 14, provided at its outer end with the ratchet wheel 15 the teeth of which are so formed as shown in Fig. 2, as to positively prevent the application of any power to the spring through sleeve 14 except in a direction to wind up or increase the tension of the spring, and is also provided with a groove 16 for the attachment of the inner end of the spring 17, the outer end of the latter engaging the lug 18 on the inner face of section 2 of the casing.



The cylinder head 5, is provided with a hub 19 through which the shaft 9 passes, and in which is located the packing 20. This packing may be leather, fiber or other washers coated or saturated with a sealing compound, and held in place by the externally threaded nut 21 which latter closely embraces the shaft 9 and is screwed to the hub 19, the portion of the shaft 9 within the hub being provided with a series of peripheral grooves 22, into which the packing is forced and compressed by the nut 21. This construction absolutely prevents the leakage of any liquid around the shaft. The end of the shaft passing through the outer end of section 1 of the shell is also packed in the same way.

Surrounding that portion of the shaft 9 within the liquid chamber is the sleeve 23, seated at one end against the cylinder head 5, and at its other end against the outer end of section 1, and is secured to the shaft by the pin 24, which latter projects outwardly beyond the sleeve, and rests loosely in the vertical groove 25 formed in the wing piston 26. This sleeve and pin hold the shaft against endwise movement, and the sleeve is grooved on its outer side at both ends as shown in Fig. 3 and is also provided at one end with a counterbore forming an air chamber and also a chamber into which the oil forced during the closing movement may escape to the opposite side of the piston. During the closing movement of the door, if any liquid between the piston and abutment should leak over the sleeve and into the counterbore in the latter, it will be free to pass around to the opposite side of the abutment, upon which side there is no pressure, and escape through the groove, and thereby eliminate all pressure upon the packing around the shaft. If any liquid should leak under the sleeve it is free to pass around to the opposite side of the abutment and escape through the lower groove. The piston 26 is substantially triangular in horizontal section; is concaved at its inner end to conform to the surface of the sleeve 23, and is convex at its outer end to conform to the inner wall of the piston chamber. The outer enlarged end of the piston is provided at its outer front edge with the lip 26<sup>a</sup>, against which the liquid is compressed when the door is released and permitted to close under the influence of the spring, whereby the piston, which as before explained is loosely connected to shaft 9 by pin 24, is forced against the wall of the cylinder or liquid chamber and acts as a frictional brake.

By loosely connecting the piston to the shaft, a flexible action is obtained between the shaft and piston which permits the piston to conform to the cylinder at all

times and under all conditions. It also provides for inequalities in the manufacture and wear, and at all times provides a perfect joint between the cylinder and piston. The principal advantage however, of the loose or floating piston, is that the pressure of the liquid forces the piston against the cylinder thus causing friction, which acts as a brake and prevents the free action of the spring against the liquid thus considerably reducing the pressure of the liquid. This reduction in pressure permits of the use of larger bye-pass openings, thus avoiding to a large extent the danger of clogging. Again by employing a loose connection between the piston and shaft, the piston will not bind, or be cramped by any deflection of the shaft.

The abutment 27 is fixed within the cylinder, and is provided with a port 28 having a ball valve 29, which latter is retained in place by the wall of the cylinder and which is closed by the pressure of the liquid against same while the piston is moving toward the pressure side of same, as when the door is closing, and which opens to permit of the free passage of liquid to the front of the piston, as the latter moves away from the pressure side of the abutment, as when the door is being opened. This ball valve may be seated in the piston instead of in the abutment as shown. As the door closes, the liquid under pressure between piston and abutment, passes out through the port 30 into by-pass 31 and out through port 32 to a point in rear of the abutment and also in rear of the piston.

The size of the by-pass opening is regulated in the well known manner by the valve 33 the stem which is provided with a thumb disk 34 by which it is turned to increase or decrease the size of the escape passage.

By making the casing alike at its ends, and projecting the shaft at both ends, the device can be converted from a right hand closer and check, to a left hand closer and check; and vice versa, by simply inverting it and connecting the lever arm 11 to the upper end of the shaft.

The disk 35 carrying the pawl 36 has an angular opening to fit the angular end of the shaft, and the pawl is so constructed, preferably by beveling or concaving its bearing face, so as to cause it to take under the tooth of the wheel, so that when in engagement with a tooth of the ratchet, it will be positively held in contact by the tension of the spring 17, hence when the casing is inverted from the position shown in Fig. 3, so as to bring the disk 35 at the bottom, there is no danger whatever of the pawl being disconnected from the toothed wheel by gravity.



It is evident that many slight changes might be resorted to in the relative arrangement of parts shown and described without departing from the spirit and scope of my invention hence I would have it understood that I do not wish to confine myself to the exact arrangement of parts shown and described but,

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 cylinder, an abutment therein, a shaft and a lever arm secured to the latter, of a wing piston having an extended bearing against the wall of the cylinder and a loose connection with the shaft, whereby when the door is released and permitted to close under the influence of the spring, the piston will be forced by the pressure of the liquid away from the shaft and against the wall of the cylinder.

2. In a door check and closer, the combination with a casing made of two separable sections, one for the spring, and the other the liquid section, the open end of one section resting and secured within the open end of the other section, of a head loosely mounted on a seat adjacent the open end of one of said sections and held on said seat by the open end of the other section, and a packing intermediate the two sections of the casing and the removable head.

3. The combination with a casing having a spring chamber and a liquid chamber or cylinder, of a shaft passing through said chambers and provided on opposite sides of the liquid chamber with peripheral grooves, packing located within the shaft openings in the cylinder head, and nuts for compressing the packing into the grooves in the shaft.

4. In a door check and closer the combination with a casing made in two parts secured together intermediate the ends of the casing, the two ends of the casing being substantially alike, of a removable head located within the casing and clamped between the two sections of the latter, the said head dividing the casing into two chambers and forming a central bearing for the shaft, a shaft passing through both ends of the casing and through the head, and packing for the shaft in the end of the lower section of the casing and in said head.

5. The combination with a casing, a spring, a shaft projecting through both ends of the casing, and a piston, of a sleeve carrying a toothed wheel and connected with one end of the spring, disk fixed to one projecting end of shaft, a pawl pivotally mounted on said disk and adapted to engage the toothed wheel, and a lever arm adapted to be attached to either projecting end of the shaft.

6. The combination with a casing, a spring, a piston and a shaft, of a sleeve embracing the shaft, connected to one end of the spring, and provided with a toothed wheel, and a disk fixed to the shaft and a pawl pivotally mounted on said disk and adapted to engage the teeth of the wheel, the engaging face of the pawl being concaved or beveled so as to underlap the teeth of the wheel and be firmly in contact therewith by the spring.

7. In a door check, the combination with a cylinder, an abutment therein, a shaft and a lever arm secured to the shaft, of a wing piston mounted in the cylinder and having a loose connection with the shaft, and provided at its outer end with a forwardly projecting lip whereby the pressure of the liquid against the lip will force the piston away from the shaft and against the wall of the cylinder.

8. In a door check, the combination with a liquid cylinder and a piston therein, of a sleeve surrounding that portion of the shaft within the liquid chamber and counterbored and grooved to permit liquid forced between the sleeve and shaft to escape.

9. The combination with a shaft having peripheral grooves, and a flexible packing surrounding the grooved portion of the shaft, of means for forcing said packing into the grooves.

10. In a door check, the combination with a cylinder a piston and an abutment toward which the piston moves during the closing movement of the door, of a ball valve, held in place by the wall of the cylinder and adapted to open for the free passage of the liquid to the front of the piston during the opening movement and close during the closing movement.

11. In a door check, the combination with a cylinder, an abutment therein, a shaft and a lever arm secured to the latter, of a wing piston having a grooved inner end, and a forwardly projecting lip at its outer end, whereby the pressure of the liquid against the lip will force the piston away from the shaft and against the wall of the cylinder, and a pin secured to the shaft and resting in the groove in the piston.

12. In a door closer, the combination with a casing made of two separable sections, one for the spring, and the other the liquid section, the open end of one section resting and secured within the open end of the other section, of a head loosely mounted on a seat adjacent the open end of one section and held on said seat by the open end of the other section.

13. In a door check and closer, the combination with a two part casing and a cylinder head therein, the said cylinder head resting on a shoulder on one part of the casing and



held in place by the lower open end of the  
other part, of a single packing interposed  
between the two parts of the casing and also  
between the casing and the cylinder head  
5 and held in place by the portion of the cyl-  
inder casing which holds the head in place.

In testimony whereof, I have signed this

specification in the presence of two subscrib-  
ing witnesses.

ARTHUR F. BARDWELL.

Witnesses:

WARREN H. TAYLOR,

ELLIS H. JONES.