

No. 711,591.

Patented Oct. 21, 1902.

F. H. ROLFE.
DOOR CHECK AND CLOSER.

(Application filed Aug. 16, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

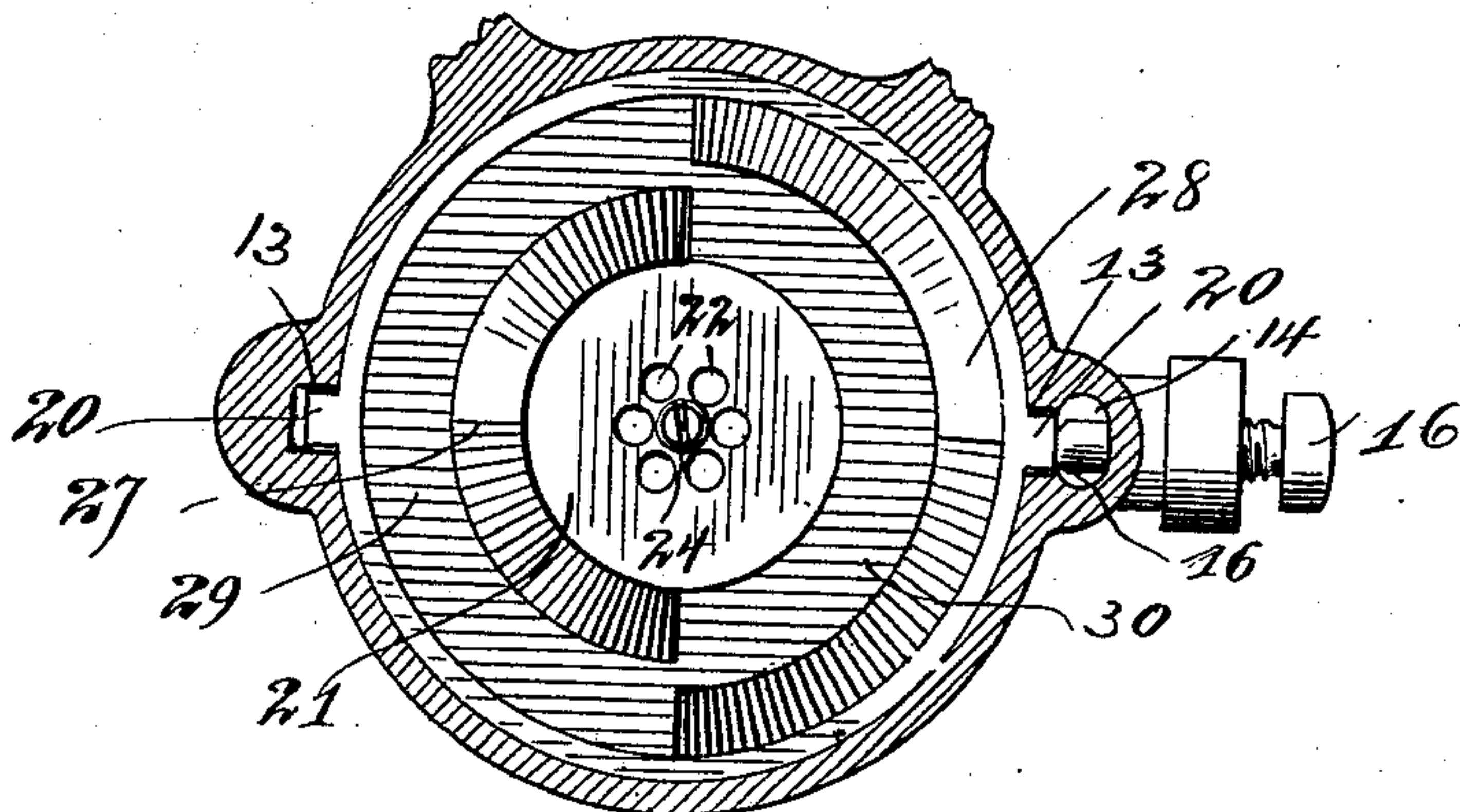
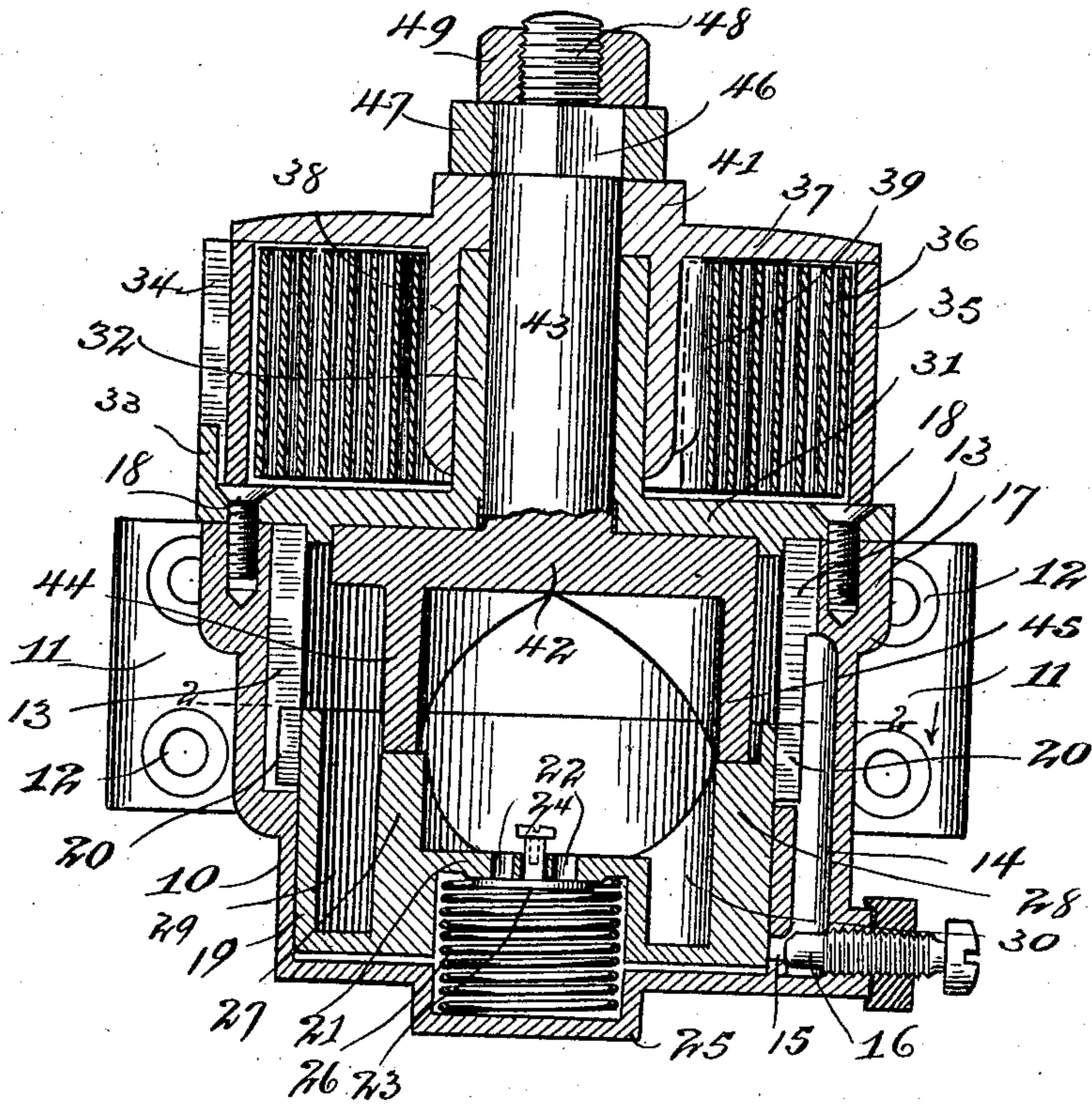


Fig. 2.

Witnesses,
J. M. Mann
S. H. Pond.

Inventor,
Frederick H. Rolfe,
By *Offield, Fowler & Luthicum*
Attys.

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2 Sheets—Sheet 2.

Fig. 3.

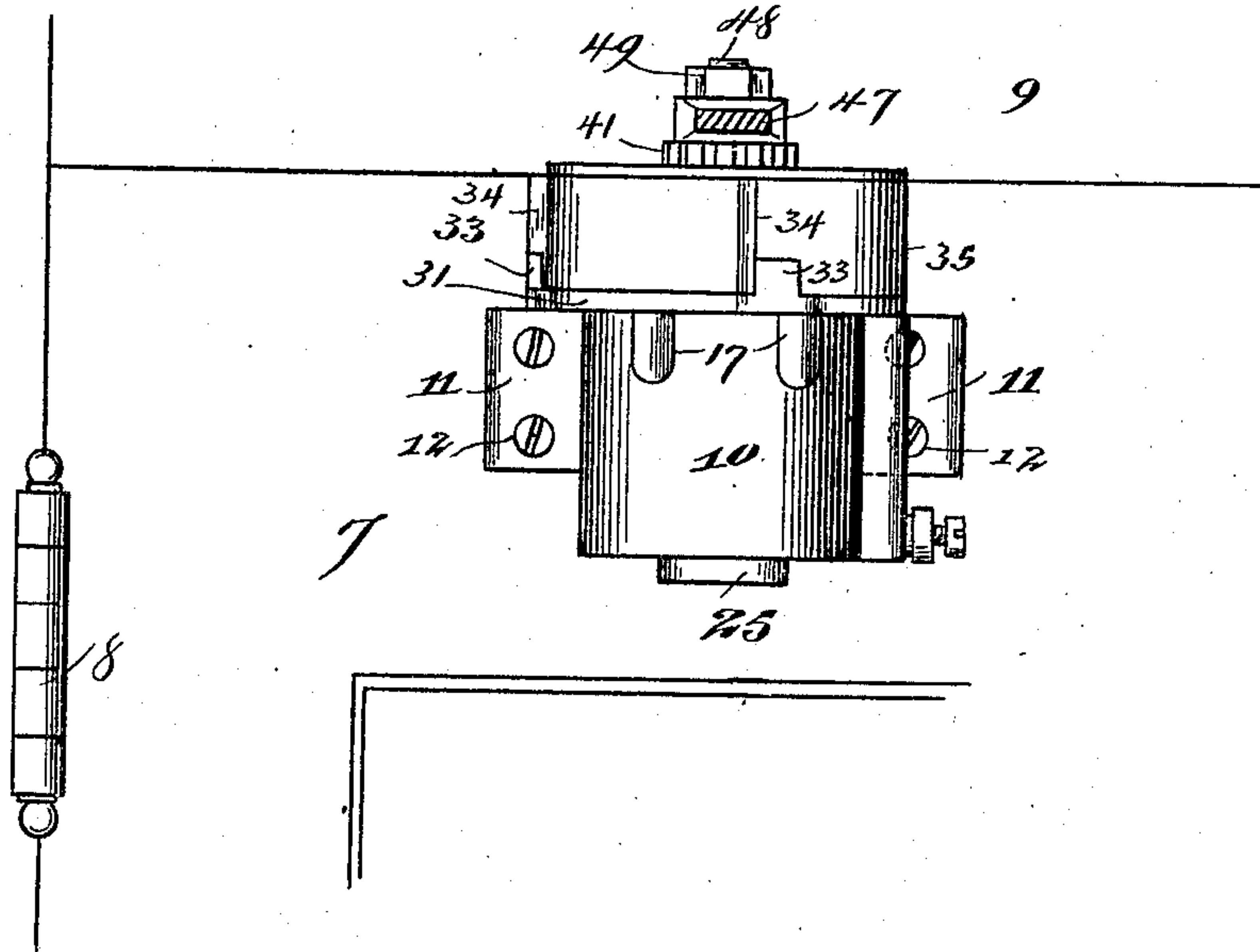


Fig. 4.

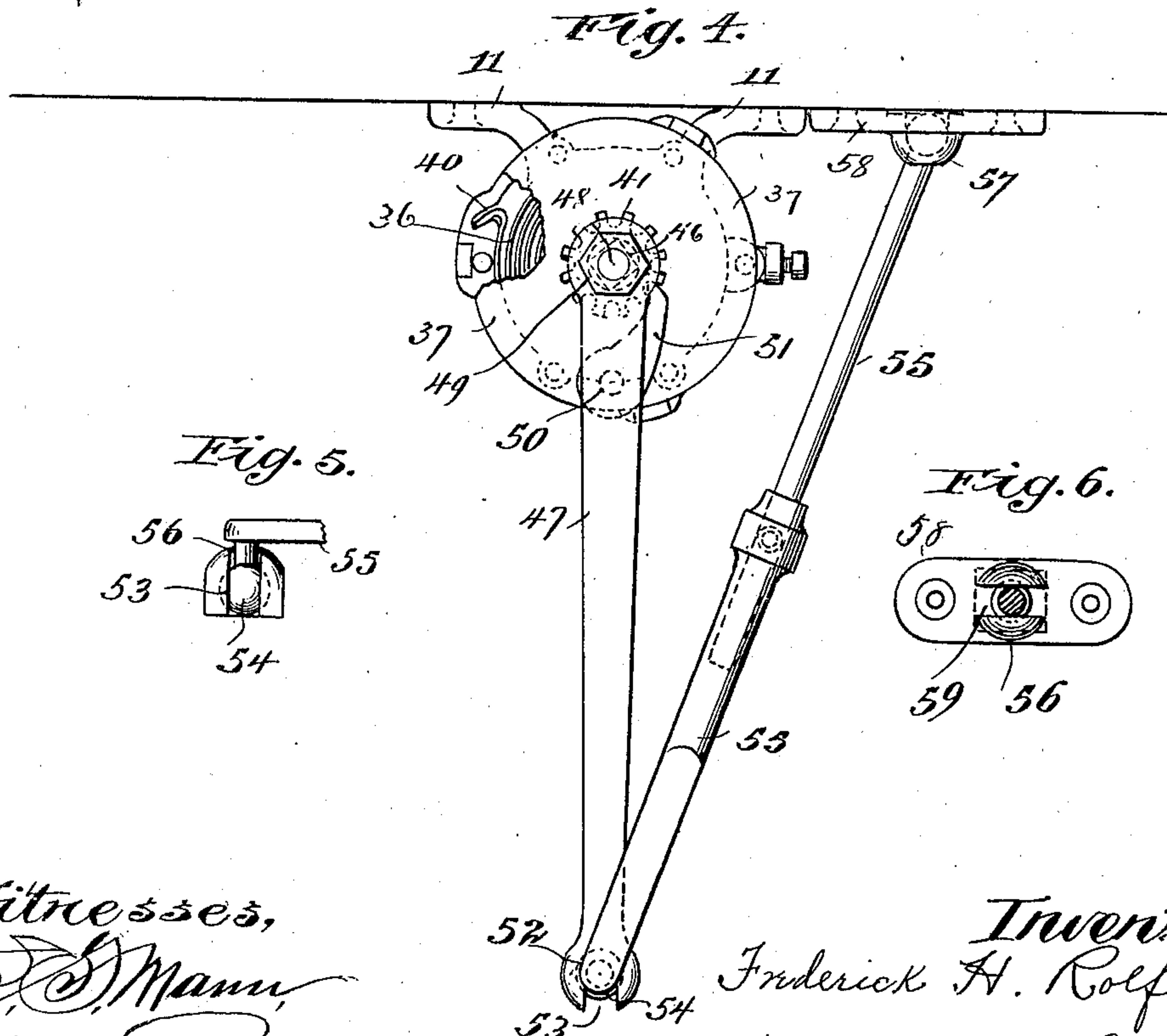


Fig. 5.

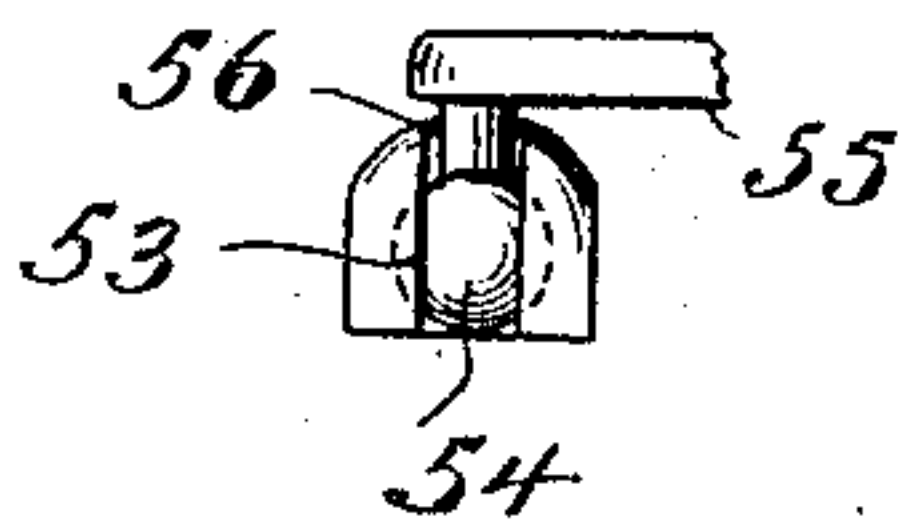
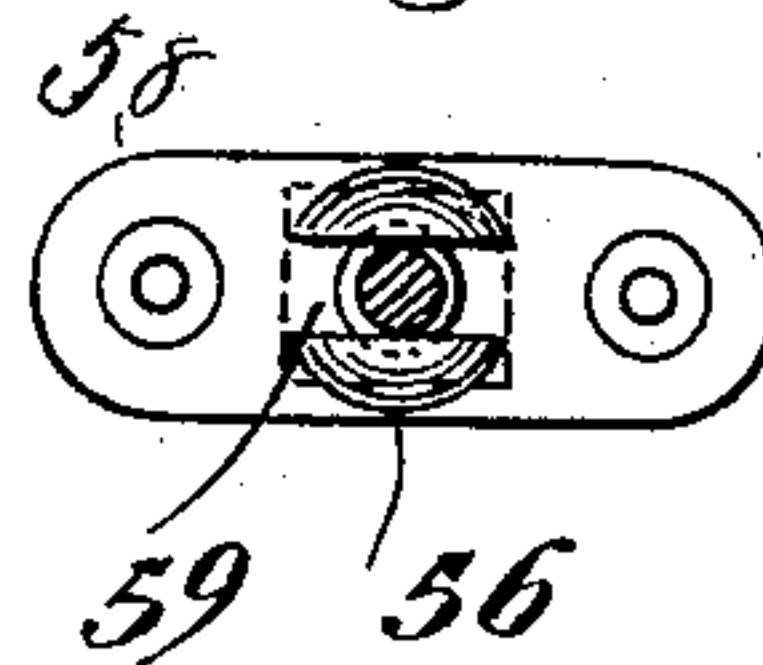


Fig. 6.



Witnesses,
J. S. Mann,
S. N. Pond.

Inventor,
Frederick H. Rolfe.
Field, Fowler & Luthicrum
Atty's.

UNITED STATES PATENT OFFICE.

FREDERICK H. ROLFE, OF CHICAGO, ILLINOIS.

DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 711,591, dated October 21, 1902.

Application filed August 16, 1901. Serial No. 72,212. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. ROLFE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Door Checks and Closers, of which the following is a specification.

My invention relates to door checks and closers of the type employing a powerful coiled spring for effecting the closing of the door, the action or operation of which spring is regulably controlled by the passage of a body of liquid from one side to the other of a movable plunger contained within the casing of the check; and among the principal objects of my invention are, first, the provision of a novel form of plunger and new and improved means for operating the same; second, improved means for reversing the closing-spring, so as to enable the device to be applied to doors opening either to the right hand or left hand without disturbing the coiled condition of the spring, and, thirdly, a new and improved construction of operating-arm designed to afford a certain amount of play between the members thereof in other than a horizontal plane and further designed to facilitate the ready assembling or separation of the parts or elements when the device is being set up or taken down.

The preferred form in which my present improvements are embodied is illustrated in the drawings accompanying this description, in which—

Figure 1 is a central vertical section taken through the oil-chamber and its superposed spring-chamber. Fig. 2 is a horizontal section looking downwardly on the line 2 2 of Fig. 1. Fig. 3 is an elevation of the device shown as applied to a door. Fig. 4 is a top plan of the device as it appears in Fig. 3; and Figs. 5 and 6 are details illustrating, respectively, the manner of connecting the two members of the operating-arm and the connection of the latter with the lintel.

Referring to the drawings in detail, 7 indicates a door, hinged at 8, and 9 designates the lintel or top member of the door-casing above the same.

10 designates the principal casing of the device, constituting the oil-chamber and provided, as shown, with a pair of wings or

flanges 11, whereby it is secured to the door through screws 12. This oil-chamber 10, which is generally cup-shaped in form, is provided with a pair of diametrically opposite vertical grooves 13, cored in its walls, one of which grooves communicates freely with the upper portion of a vertical duct or passage-way 14, extending to the bottom of the chamber and communicating with the interior of the latter through a small horizontal port 15, controlled by an adjustable needle-valve 16, as shown. Integral lugs 17, disposed at suitable intervals around the upper and exterior portion of the oil-chamber 10, are internally screw-threaded to receive screws 18, whereby the cap or cover of the oil-chamber is screwed in place, as hereinafter more particularly described.

Within the oil-chamber 10 operates a vertically-reciprocable plunger 19, this latter being also substantially cup-shaped and provided with a pair of diametrically opposite outwardly-extending ears 20, which latter play in the slots or grooves 13 of the outer casing, and thus hold the plunger securely against any tendency to rotate. The bottom or working face of the plunger 19 has its central portion raised or struck up, as shown at 21, and this raised portion of the base is centrally perforated, as at 22, and provided on its outer face with a downwardly-opening disk valve 23, the opening movement of such valve being limited by a headed stem 24. The bottom of the outer casing is preferably centrally depressed, as shown at 25, directly opposite the raised portion of the base of the plunger, thereby providing a chamber for the reception and operation of a spring 26, the function of which latter is to raise the plunger 19 and maintain the same in an elevated position when it is not depressed by the plunger-operating means hereinafter described. On the upper face of the bottom or base of the plunger 19 are formed a pair of oppositely-disposed vertical V-shaped cams, (designated by 27 and 28, respectively.) These cams at their highest point extend nearly to the top of the plunger, are disposed at different radial distances with reference to the latter, and extend each about one-half the circumference of the plunger. Behind the cam 27 is formed a semicircular raceway 29, and in

front of the cam 28 is formed a similar semi-circular raceway 30, the former constituting, in effect, a horizontal continuation of the track or bearing-surface of the cam 28 and the latter forming a corresponding continuation of the track or bearing-surface of the cam 27. The relation of these raceways 29 and 30 to the cams 28 and 27, respectively, is best shown in the sectional plan view illustrated in Fig. 2.

The outer casing 10 is provided with a cover in the form of a circular disk or plate 31, resting at its periphery upon the top edge thereof and secured thereto in a removable manner by means of the screws 18, hereinabove referred to. This covering-plate 31 is provided with a central upstanding sleeve 32, designed to receive the stem or spindle of the plunger-operating device, and is further provided at suitably-spaced intervals on its periphery with a series (here shown as three) of upstanding lugs 33, designed to form abutments for a corresponding series of lugs or projections on the outer face of a removable ring 35, this latter ring containing a strong coiled spring 36, serving as the closing means for the door to which the check is applied. The ring 35 rests upon the upper face of the cap or cover 31, being of substantially the same diameter as the latter, and in its turn is provided with a suitable cap or cover in the form of a disk or plate 37, the lower peripheral edge of which rests upon the upper edge of the ring 35, as clearly shown in Fig. 1. This cover 37 is provided with a central aperture of a size to permit the passage therethrough of the stem or shank of the plunger and is further provided with a depending sleeve 38 of a size sufficient to pass over and engage the upstanding sleeve 32, formed on the lower plate or cover 31. This telescoping engagement of the sleeve 38 with the sleeve 32 serves to center the plate 37 and maintain the same in proper relation to the spring-casing 35, for which it serves as a cover. The outer surface of the sleeve 38 and the inner surface of the ring 35 are provided with vertical grooves or sockets 39 and 40, respectively, designed to receive the bent or hooked ends of the spring 36. The cover 37 is further provided with a centrally-disposed integral notched ring 41 for a purpose hereinafter disclosed.

The plunger-operating means consists of a disk or plate 42, seated below and concentric with the cover 31 and having its top face in engagement with the lower face of said cover, this plate 42 having a preferably integral central stem or spindle 43, extending upwardly through the sleeve 32 of the cover 31, and further provided with a pair of oppositely-disposed depending V-shaped cams 44 and 45, which are similar in all respects to the upstanding cams 27 and 28, with which they are designed to operatively engage. From an inspection of Fig. 1 it will be seen that when the plunger and its operating device are at their widest point of separation the peaks or

points of the cams 44 and 45 will rest directly upon the corresponding peaks or points of the cams 27 and 28, respectively, while when the said parts are in the closest juxtaposition which they are capable of assuming the peak of cam 44 will be in engagement with the bottom of raceway 30 and the peak of cam 45 will similarly engage the bottom of raceway 29, the plunger and its operating device having turned through a quarter-circle with relation to each other, the two parts being thereafter capable of turning through substantially a half-circle without any tendency to separate through engagement of their corresponding cams. This latter operation is permitted by the travel of the cams 44 and 45 in the corresponding semicircular raceways 30 and 29 of the plunger.

The spindle 43 near its upper end is squared, as shown at 46, for the reception of a correspondingly-shaped aperture in the inner end of an operating-arm 47, and above said squared portion of the spindle the latter is preferably reduced in diameter and screw-threaded, as shown at 48, for the reception of a retaining-nut 49. The operating-arm 47 is provided on its under surface, near its inner end, with a short pintle 50, on which is pivoted a pawl 51, the nose of which is adapted to engage the recesses or notches in the ring 41. The outer end of the operating-arm 47 is provided with an inverted-cup-shaped enlargement 52, this latter having a quadrant-shaped slot 53 in its outer face, extending from the bottom of the cup through the wall thereof and to its lower margin. The cup-shaped enlargement 52 is made of a size suitable to receive a ball 54, which depends from the outer end of a sectional connecting-rod 55, being connected therewith by a short neck or stem 56 of a diameter just sufficient to engage and pass through the quadrant-shaped slot 53. The connecting-rod 55, as clearly shown in Fig. 4, is made in two telescoping sections, whereby the rod is rendered easily adjustable as to length, and its inner end is provided with a ball 56, which latter seats in a substantially hemispherical pocket 57, formed on the outer face of a plate 58, adapted to be secured to the lintel. The outer surface of the pocket 57 has formed thereacross a horizontal slot 59, as shown in detail in Fig. 6, this slot being of a size sufficient to permit the passage of the inner section of the stem 55 therethrough from the rear, but retaining the ball 56 in engagement with its seat or socket 57. This construction, it will be seen, permits a horizontal play of the connecting-rod 55 through a swing of substantially a half-circle, and by reason of the fact that the rod 55 has a somewhat loose engagement with the slot 59 it also permits such slight vertical play of the rod 55 as may result from the hinging of the door or the location of the check itself slightly out of a true vertical line.

It being understood that the outer casing 10 is partially filled with a suitable liquid, pref-

erably oil, to serve as a checking agent, the operation of my invention is substantially as follows: The parts being assembled, as shown, and applied to a door and its lintel, as illustrated in Figs. 3 and 4, the plunger and its operating device occupy the separated positions illustrated in Fig. 1 when the door is closed. In this position of the parts it will be understood that substantially the entire body of the liquid agent is on the upper side of the plunger 19. When the door is swung outwardly through, say, an angle of substantially ninety degrees, the plunger-operating device is caused to rotate relatively to the oil-chamber and its contained plunger through substantially a half-circle. In such movement the points of the cams 44 and 45 ride down over the opposite sloping sides of the cams 27 and 28, respectively, until they engage the bottoms of the raceways 30 and 29, during which operation the plunger 19 is steadily pressed upward by the spring 26 and the body of oil flows freely through the ports 22 and past the open valve 23 into the bottom of the oil-chamber and below the plunger. The opening of the door through the engagement of the pawl 51 with the notched ring 41 and through the engagement of the sleeve 38 (which is integral or rigidly connected with the ring 41) with the inner end of the coiled closing-spring 36 winds the latter to an increased tension, the spring-containing ring 35 being rigidly held against rotary movement through the engagement of its lugs 34 with the lugs 33 of the cover 31. Upon the release of the door, therefore, the spring 35 tends to operate the parts of the check in a direction the reverse of their movement during the opening of the door. The door is thereby drawn to a closed position, in which movement the cams 44 and 45 again gradually mount the cams 27 and 28, in which operation they necessarily depress the plunger 19 against the action of spring 26, which latter relatively to the spring 36 exerts a light and comparatively negligible force during such movement. The body of oil being below the plunger it cannot return to the other side of the plunger through the ports 22, since the latter are instantly closed by the disk valve 23 the moment the plunger begins to descend. The only escape for the oil, therefore, is through the small port 15, governed by the needle-valve 16, the duct 14, and the slot 13 into the space above the plunger. This course for the oil being comparatively restricted to a degree capable of fine regulation by means of the valve 16, the downward movement of the plunger can be regulated with a fine degree of nicety to determine the speed and force with which the door is allowed to close under the action of its closing-spring. When the door is fully closed under the automatic action of the check, as thus described, the cams 44 and 45 will have again mounted to the top of cams 27 and 28 and the parts will be again in the relative positions illustrated

in Fig. 1. The initial tension of the closing-spring 36 can be adjusted to any desired degree by the engagement of the pawl 51 with any one of the series of notches in the ring 41 which happens to be opposite the nose of the pawl when the spring has been thus wound to give it just the desired tension.

Having thus described both the construction and mode of operation of my improved check and closer, I desire to briefly point out some advantages of construction and operation which I believe the same to possess.

The cup-shaped plunger is readily removable from the outer casing of the oil-chamber by simply removing the cap or cover 31 and its superposed parts and inverting the casing, whereupon the plunger and its operating-spring will drop out of the casing. The interior mechanism of the device is thus readily accessible for purposes of cleaning or repair. By reason of the described arrangement of the upstanding cams and their raceways relative to the operating-cams 44 and 45 each of the latter is capable of a continuous travel through substantially three-fourths of a circle on the opening movement of the door without producing any downward movement of the plunger and consequent checking of the door's movement. This construction and relative operation of the parts permits a very wide opening of the door, where desirable, considerably in excess of ninety degrees, and, in fact, through substantially a half-circle, without encountering the checking action of the device. The cams of both the plunger and its operating device being disposed relatively to each other at different radial distances from the center of the plunger do not interfere with each other's operation, as they would did they occupy arcs of the same circle.

With reference to the closing device the annular casing or ring 35, containing the closing-spring 36, not being connected with or fastened to either of the parts lying therebelow or thereabove and having peripheral lugs which are capable of engaging the lugs 33 on either side of the latter is capable of being removed and inverted without removing the contained spring therefrom or in any way disturbing its coiled condition. Thus when it is desired to reverse the direction of the closing movement of the device this may be done by removing the operating-arm 47, then withdrawing the cap or cover 37 and its depending sleeve 38 from engagement with the inner end of the spring, then raising and inverting the annular casing 35 and its contained spring, replacing the same in inverted position, and again applying the cover 37, at the same time again securing the inner end of the spring in its recess in the sleeve 38. When thus inverted, the lugs 34 will engage and abut the opposite sides of the lugs 33. It is also to be noted that this ring 35 constitutes a part or section of the check-casing itself, from which the spring does not have to be removed in reversing, thus doing away with the time,

labor, and annoyance involved in removing the spring when under tension, recoiling it, and replacing it in its casing. The construction of the operating-arm and its connecting-rod, as described, facilitates the quick and easy assembling and separation of these parts, at the same time affording not only a wide separation of the arm and rod and a wide swing of the latter in a horizontal plane, but also permitting such vertical play of the parts as may take place owing to slight inaccuracies in the placing or adjustment of the check relatively to the door and its lintel. It will also be observed with reference to the cover 37 of the spring-chamber that the provision of its depending sleeve 38, revolubly engaging the upstanding sleeve 32 of the cover 31 and also engaging the upper portion of the spindle 43, has the effect of practically doubling the longitudinal extent of the bearings of the spindle 43, thereby contributing materially to the perfectly vertical alinement of the latter and the solidity and rigidity of its bearing.

It will be obvious that various modifications and changes might be made in the construction and relative disposition of the several parts of my invention as hereinabove enumerated and described without departing from the underlying principle and spirit thereof. I do not, therefore, limit myself to the precise details either of construction or relative arrangement hereinabove described, and shown in the drawings, except in so far as they may be made the subject of specific claims hereunto appended.

I claim as my invention—

1. In a door-check, the combination with the oil-chamber and a vertically-reciprocable non-rotatable valved plunger contained therein, said plunger having a pair of vertical and substantially semicircular V-shaped cams on its upper face disposed at different radial distances from the center of the plunger, of a plunger-operating device disposed thereabove, comprising a disk or plate connected with the rotatable spindle of the check and having on its lower face a pair of depending cams corresponding to and adapted to engage with the cams of the plunger, substantially as described.

2. In a door-check, the combination with an oil-chamber and an upwardly spring-pressed non-rotatable valved plunger contained therein, said plunger having two diametrically opposite upstanding V-shaped cams, substantially semicircular in extent on the upper face thereof and disposed at different radial distances from the center of the plunger, and a plunger-operating device, the same comprising a horizontal rotatable plate connected to the stem or spindle of the door-check, said plate having depending therefrom two cams shaped and disposed in a manner similar to the cams of the plunger and adapted to engage the latter to depress the plunger during

the closing movement of the door, substantially as described.

3. In a door-check, the combination with an oil-chamber having vertical grooves formed in its inner wall, of a cup-shaped plunger vertically reciprocable in said chamber, said plunger having vertical ears or flanges engaging the grooves of the chamber to prevent rotation of the plunger, said plunger having also a valve-controlled aperture formed through its base and being further provided with a pair of diametrically opposite vertically-disposed V-shaped cams located at different radial distances from the center of the plunger, the inner cam having a substantial semicircular raceway in rear thereof, and the farther cam having a substantial semicircular raceway in front thereof, a spring located between the base of the plunger and the base of the oil-chamber, and normally tending to raise the plunger, and a plunger-operating mechanism comprising a horizontal rotatable plate secured to the central vertical stem of the door-check, said plate being provided with a pair of depending cams corresponding in shape and location relatively to the plate with the cams of the plunger, and being adapted to slidingly engage the latter to effect the depression of the plunger and control its elevation, and also adapted to ride idly in said raceways when the plunger is elevated, substantially as described.

4. In a door-check, the combination with the oil-chamber having a pair of vertical grooves formed in its inner wall and being further provided with a vertical duct cored in its wall, said duct communicating at its upper end with one of said grooves, and at its lower end communicating through a valve-controlled port with the interior of the oil-chamber at the bottom of the latter, of a cup-shaped plunger having vertical ears or flanges engaging said grooves whereby it is capable of a vertical reciprocation within the oil-chamber but is held non-rotatable relatively thereto, said plunger having a valve-controlled aperture formed through its base centrally thereof, and having also a pair of oppositely-disposed and substantially semicircular V-shaped cams located at different radial distances from the center thereof, and being further provided with substantially semicircular raceways on opposite sides of said cams respectively, a spring located between the base of the plunger and the base of the oil-chamber and normally tending to elevate the plunger, and a plunger-operating mechanism comprising a horizontal rotatable plate secured to the central vertical stem of the door-check, said plate being provided with a pair of depending cams corresponding in shape and disposition relatively to the plate with the cams of the plunger and adapted to engage the latter to effect the depression of the plunger and control its elevation, and also adapted to ride idly in said raceways

when the plunger is elevated, substantially as described.

5. In a door-check, the combination with a cup-shaped casing containing the checking mechanism and a covering-plate secured thereon, of a coiled closing-spring horizontally disposed above said covering-plate, an annular casing in which said spring is contained, said casing constituting a removable section of the check-casing, and suitable laterally-abutting projections on the peripheries of said plate and annular casing respectively to lock the latter against rotation, said spring-casing being capable of being inverted to reverse the spring without removing the latter therefrom, substantially as described.

6. In a door-check, the combination with a cup-shaped casing containing the checking mechanism, and a covering-plate secured thereon, said covering-plate having a plurality of upstanding lugs disposed about its periphery, of a separable annular casting resting on said covering-plate and having a coiled closing-spring therein, said casing having a series of radial lugs on its periphery adapted to engage the lugs of the covering-plate on one side of said lugs when the casing is in one position and on the opposite side of said lugs when the casing is inverted, the spring-casing thus constituting a removable section of the check-casing and enabling the spring to be reversed to suit a door opening either to the right or left, substantially as described.

7. An operating-arm for a door-check or similar device, said arm being adapted to be keyed on the stem of the check and having

a hemispherical socket member formed on its outer end, such socket member having a vertical slot formed through one side thereof, in combination with a rod adapted to be pivoted at one end at a fixed point on the door or its frame and having at its other end a ball which seats in the socket of the arm, said ball being connected with said rod by means of an integral neck or shank extending at right angles to the rod, such neck being of a size to enter the vertical slot of the socket member and thus permit the assembling of the ball and socket in cooperative relation, substantially as described.

8. The combination with an operating-arm adapted to be keyed to the stem of a door-check or the like and a connecting-rod, said arm and rod having their meeting ends united by a ball-and-socket joint and said rod terminating at its other end in a ball of greater diameter than the thickness of the rod, of a bracket-plate adapted to be secured on the door or its casing, said bracket-plate having cast on and protuberant from its outer face a hemispherical socket to receive said ball, said socket having formed across the face thereof a horizontal slot of a width less than the diameter of the ball but greater than the thickness of the rod, thereby permitting a limited vertical play of the latter therein and a horizontal play through an angle determined by the length of the slot, substantially as described.

FREDERICK H. ROLFE.

Witnesses:

SAMUEL N. POND,

FREDERICK C. GOODWIN.