

No. 654,303.

Patented July 24, 1900.

E. CLIFF.

COMBINED DOOR CHECK AND CLOSER

(Application filed Dec. 20, 1899.)

(No Model.)

2 Sheets—Sheet 1.

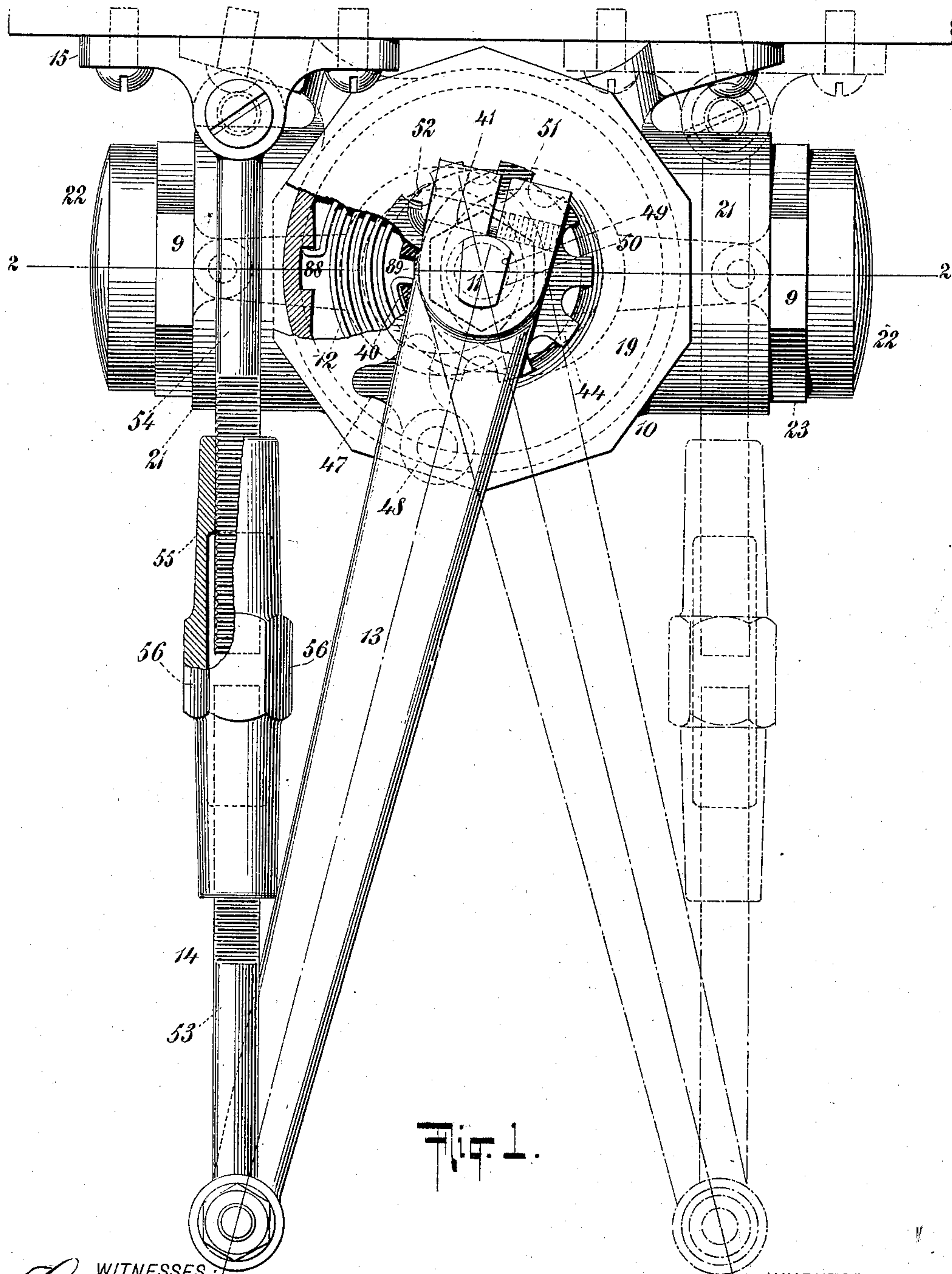


Fig. 1.

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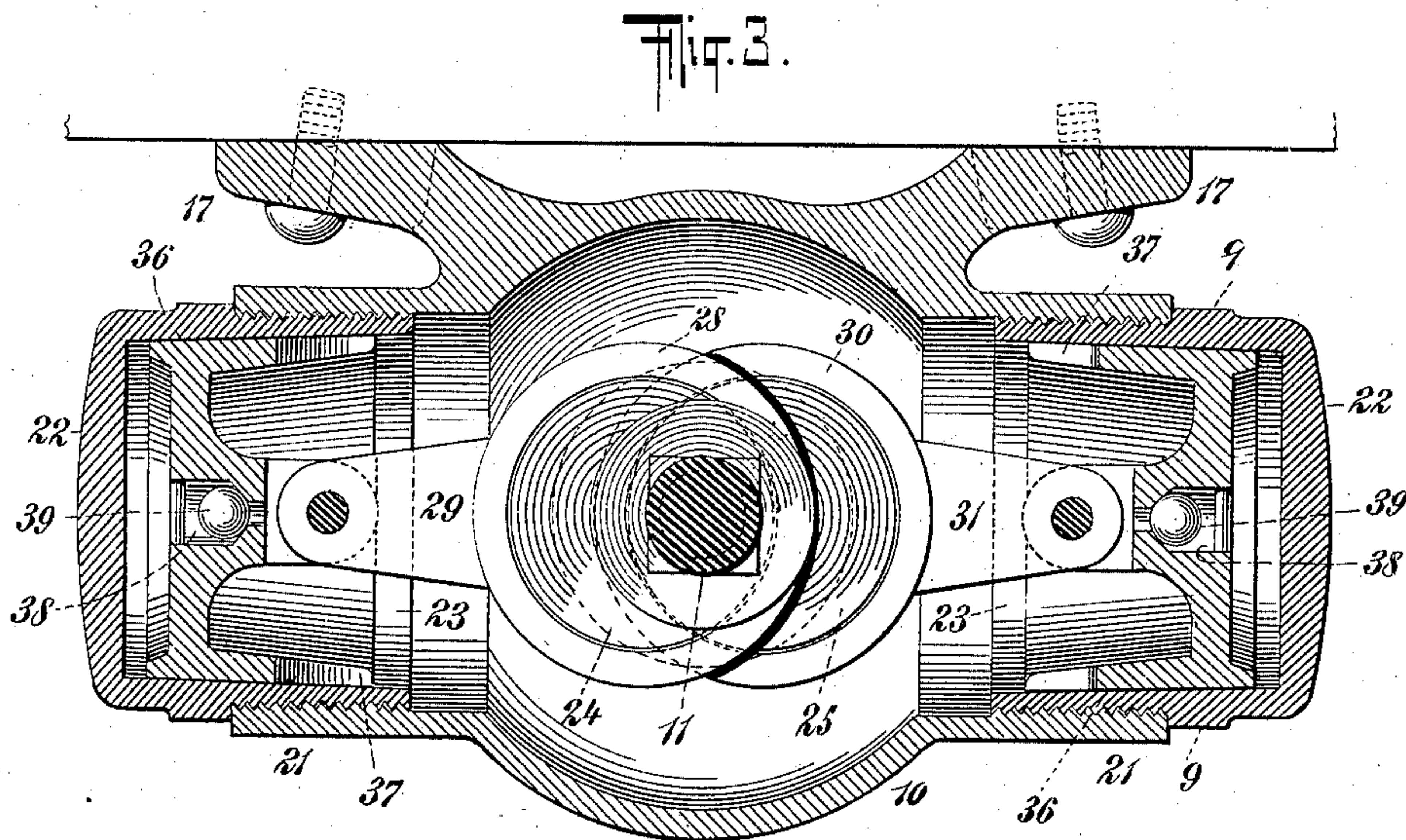
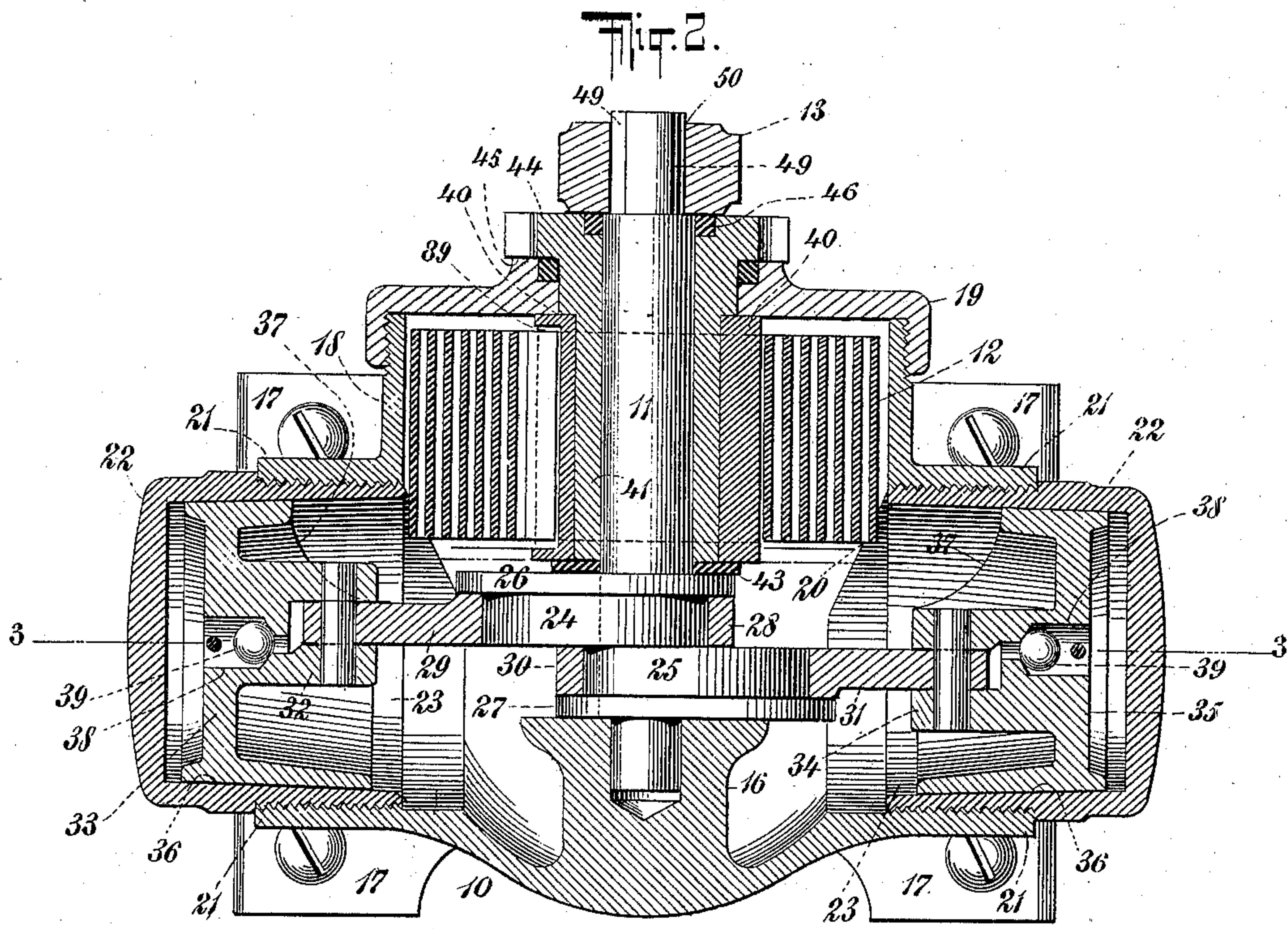
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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COMBINED DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 654,303, dated July 24, 1900.

Application filed December 20, 1899. Serial No. 740,953. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CLIFF, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in a Combined Door Check and Closer, of which the following is a specification.

The invention relates to improvements in door checks and closers; and it consists in the novel features and combinations of parts hereinafter described, and particularly pointed out in the claims.

The object of the invention is to produce a more perfect and more durable and less complicated and less expensive combined door check and closer than those heretofore known to me.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a top view, partly broken away and partly in section, of a combined door check and closer constructed in accordance with and embodying the invention, the transmitting-arms being shown in full lines in about the position they will occupy when the device is applied to a right-hand door and by dotted lines in their position for a left-hand door. Fig. 2 is a central vertical longitudinal section of same on the dotted lines 2 2 of Fig. 1, and Fig. 3 is a longitudinal transverse section of same on the dotted lines 3 3 of Fig. 2.

In the drawings, 10 designates the main casing of the combined door check and closer; 11, the actuating-spindle; 12, the spring for closing the door, and 13 and 14, respectively, the jointed transmitting lever-arms intermediate the upper end of the actuating-spindle 11 and the lintel over the door, the casing 10 being secured to the door and the lever-arm 14 being pivotally connected with the bracket 15, which is secured to the said lintel in the usual manner.

The casing 10 contains an elevated seat 16 to receive the lower reduced end of the actuating-spindle 11, and said casing 10 is formed with the flanges 17 extending above and below the cylindrical portions of the casing to

receive the screws by which the casing may be fastened to the door in a very secure manner.

The casing 10 is formed with the upwardly-extending annular flange 18, within which is inclosed the spring 12 and which at its upper end is threaded to receive the closing-cap 19, and below the said flange 18 is formed the annular shoulder 20, Fig. 2, to form a seat for the lower outer edges of the spring 12, the said shoulder 20 being within the liquid-chamber, as indicated in Fig. 2, whereby the spring-chamber is caused to extend into the liquid-chamber and the spring mechanism brought as close as possible to the piston mechanism, thus as nearly as possible bringing the actuating parts into harmonious relation with one another and to as great an extent as possible reducing the height of the casing 10.

The ends of the casing 10 are formed with the horizontal internally-threaded annular flanges 21 21, which correspond with one another and each of which receives the cylinder 22, the latter being threaded on its exterior, so as to be screwed within its receiving-flange 21 and being formed on its exterior surface with polygonal section 9 to receive a wrench for facilitating the screwing of the cylinder within its said receiving-flange. The cylinders 22 are each in the form of a cup, being entirely open at their inner end and closed at their outer end and having tapered inner wall-surfaces 23, said inner wall-surfaces gradually converging toward the outer ends of the cylinders.

The lower portion of the actuating-spindle 11 is provided with the oppositely-extending eccentrics 24 25 and also with the disks 26 27, the disk 26 being immediately above the eccentric 24 and the disk 27 being immediately below the eccentric 25 and said disks 26 27 being greater in extent than said eccentrics. The eccentric 24 receives the closely-fitting band 28 connected with the piston-rod 29 and the eccentric 25 receives the closely-fitting band 30 connected with the piston-rod 31, as clearly indicated in Figs. 2 and 3, the said band 28 being directly below the disk 26 and the band 30 being directly above and seated upon the disk 27. The disk 27 is upon the broad surfaces of the upper end of the elevated seat 16, as shown in Fig. 2.

The piston-rod 29 is pivotally connected with the hub 32 of the piston 33, and the piston-rod 31 is pivotally connected with the hub 34 of the piston 35, said piston-rods 29 and 31 corresponding with one another and said pistons 33 and 35 also corresponding with one another.

The pistons 33 35 are within the cylinders 22, and each of said pistons is formed with the somewhat-elongated exterior tapered side walls 36, said side walls 36 corresponding in their taper with the tapered surfaces 23 of said cylinders 22. The side walls 36 of the pistons 33 and 35 are cut away at the upper side of said pistons, as at 37, so that during the instroke of said pistons they may not contact with the lower edges of the spring 12, which edges, as shown in Fig. 2, are disposed within the line of movement of both of said pistons.

The pistons 33 35 are each formed with a port 38, containing a ball-valve 39, which during the instroke or movement of the pistons will allow the oil or other liquid to freely pass to the ends of the cylinders 22 and which during the outward stroke or movement of the said pistons will close said ports 38 and compel the oil or other liquid to find its escape from the ends of the cylinders by passing between the tapered walls of the latter and the exterior tapered sides of the said pistons. The invention is not limited to any special valve mechanism in the pistons 33 and 35, since various forms of valves for the pistons of liquid checks are well known in this art, and in this application I present what I believe to be the best form of such valve mechanism known to me. When the pistons 33 35 are in their extreme outward position, they will exactly or very nearly fit the inner walls of the cylinders 22, and as said pistons move inward their tapered side surfaces 36 gradually separate from the tapered inner surfaces 23 of the cylinders 22, the space between the pistons and their cylinders gradually widening as the pistons approach their inner position during the opening of the door. During the closing of the door the pistons 33 35 gradually close the space between their side surfaces 36 and the inner tapered surfaces 23 of the cylinders 22, and thus as the door is reaching its closed position the liquid at the ends of the cylinders 22 gradually becomes more and more confined, with the result that the closing of the door is checked and the door while being forced to close under the action of the spring 12 is prevented from moving with undue violence. It is important to note that the inner surfaces of the cylinders 22 and the outer surfaces of the pistons 33 and 35 are both correspondingly tapered, since by reason of this construction the proper checking of the door may be successfully accomplished and the door kept under perfect control. When the side walls of the piston and the interior walls of the cylinders are both tapered, the pistons may maintain a controlling action upon the

liquid as it passes between the pistons and the walls of the cylinders, the pistons during their outward movement acting along their side walls to crowd the liquid against the walls of the cylinders, and thereby being enabled to perform a gradual checking action, both the ends and the side walls of the pistons coöperating with one another to produce this effect. I give to the sides of the pistons an elongated form, as shown, so as to enable said sides to the maximum degree to act upon the liquid and to coöperate to as great an extent as possible with the tapered inner surfaces of the cylinders 22. It is to be understood, however, that the invention claimed herein is not confined to the tapering form of the cylinders 22 and pistons 33 and 35.

The spring 12 is of well-known form and construction and it is reversible within the flange 18, so as to adapt the device for right and left hand doors. The spring 12 at its outer end will engage a notch or shoulder 88, formed in the flange 18, and at its inner end said spring 12 will engage a recess 89, formed in a sleeve 40, upon which the said spring is wound. The sleeve 40 contains a polygonal bore to receive the sleeve 41, whose outer surface conforms in outline with the polygonal bore of the sleeve 40, so as to be incapable of rotation within said sleeve 40. The sleeve 41 has a smooth central bore to receive the actuating-spindle 11, and upon the upper end or portion of the said sleeve 41 is formed the annular shoulder 42 to engage the upper edges of the sleeve 40. The sleeve 41 extends downward to the lower end of the sleeve 40, as shown in Fig. 2, and intermediate the lower ends of the sleeves 40 and 41 and the upper surface of the disk 26 is provided a metal washer 43. Upon the upper end of the sleeve 41 is formed the toothed wheel or flange 44, engaging an annular shoulder 45 upon the cap 19, which contains a gasket 46 to prevent leakage. The toothed wheel or flange 44 forms, substantially, a cog-wheel which is integral with the sleeve 41 and becomes engaged with the sleeve 40, connected with the spring 12, by reason of the interlocking construction of said sleeves 40 and 41. The sleeve 41 is capable of being turned upon the actuating-spindle 11 without affecting said spindle; but the rotation of said sleeve 41 will result in the sleeve 40 being rotated and in the winding or unwinding of the spring 12, the purpose of rotating the sleeves 40 and 41 independently of the spindle 11 being to regulate the tension of the spring 12, whereby said spring may be adapted for the various characters of doors to which the door check and closer may be applied. During the opening and closing of the door, however, the actuating-spindle 11, sleeve 41, and sleeve 40 will all turn in unison, and during such operation the sleeve 40 will wind up the spring 12 during the opening of the door and relieve said spring, so that it may unwind or regain its normal tension during the closing of the door. Thus the spring

12 after having been adjusted to the door will during the opening of the door have its tension increased, so that it may when the door is released fully close the latter while said spring is regaining its normal tension.

The notched flange or wheel 44 is engaged by one detent of the pawl 47, which is pivotally secured by means of a screw 48 to the lower side of the transmitting-arm 13.

The pawl 47 is provided with two detents or engaging ends, as illustrated, in order that the pawl may be adapted for right and left hand doors, one detent engaging the cog-wheel 44 when the parts of the check are arranged for right-hand doors, as illustrated in Fig. 1, and the other detent of said pawl being intended to engage said cog-wheel when the parts of the check are arranged for left-hand doors. The engagement of the pawl 47 with the cog-wheel 44 serves to lock said wheel to the transmitting-arm 13, and thus during the opening of the door the motion thereby communicated to said arm 13 is transmitted by the latter through the pawl 47 and cog-wheel 44 to the sleeves 41 and 40, with the result that during the opening of the door the spring will be wound up by the sleeve 40. During the closing of the door the spring 12 while regaining its normal tension will reverse the motion of the sleeves 40 and 41, and thereby through the cog-wheel 44 and pawl 47 return the arm 13 to its normal position.

The outer end of the actuating-spindle 11 possesses the flattened sides 49, which are tapered so as to converge toward one another at one side of said spindle 11, and upon the upper end of the said spindle 11 is placed the inner end of the transmitting-arm 13, said end having an aperture 50 conforming to the flattened sides of the said spindle 11 and also being split or bifurcated, as at 51, so as to readily pass upon the upper end of the spindle 11 and to be firmly secured or bound thereto by means of the screw 52, which passes transversely through the bifurcated portion of the arm 13, as shown. By reason of the bifurcation 51 and the screw 52 of the arm 13 the latter may be firmly secured upon the upper end of the spindle 11 without regard to any small irregularities which may be present on the end of said spindle or in the aperture 50 of said arm, thereby avoiding all looseness or rattling of the parts, and in addition should any wear take place upon the upper end of said spindle 11 or within the aperture 50 of said arm 13 the same may be compensated for by simply tightening the screw 52. Thus the presence of the bifurcation 51 and screw 52 in the arm 13 results in said arm being adapted to the various conditions of the said spindle, and it is rendered possible thereby to always keep said arm 13 in firm contact with the sides of the spindle 11. The sides 49 at the upper end of the spindle 11 are tapered, as shown, in order to prevent the arm 13 from being misplaced upon said spindle, the presence of the said tapered sides 49 on

the spindle and of the conforming aperture 50 in said arm 13 rendering it substantially impossible to place said arm upon said spindle in any other than the correct manner, and this manner being indicated by the corresponding outlines of said sides and said aperture. When the flattened sides 49 on the spindle are turned transversely to the door and the arm 13 is placed upon said sides, it will be found that said arm will have been correctly applied.

The transmitting-arm 13 at its outer end is pivotally secured to the transmitting-arm 14, and said arm 14 is formed of the two threaded sections 53 and 54, which substantially correspond with one another and are connected at their facing ends by means of the internally-threaded sleeve or turnbuckle 55, the latter having at its exterior the polygonal surface 56 and at the ends of its interior the right and left screw-threads corresponding with the screw-threads on the ends of the rod-sections 53 and 54. The screw-threads will not extend throughout the entire length of the turnbuckle 55, and the interior central portions of the turnbuckle will be cored out, as indicated in Fig. 1, so that the threads will terminate at convenient points adjacent to the ends of the turnbuckle, it only being necessary that a sufficient length of the screw-threads be provided within the turnbuckle for the proper and firm engagement of the rod-sections 53 and 54. The purpose of the turnbuckle 55 is to lengthen or shorten the transmitting-arm 14 for the adjustment of the check to the door and the position of the pistons 33 and 35 within their cylinders 22.

The lower portion of the actuating-spindle 11 from the upper edge of the disk 26 to the lower edge of the disk 27 will be polygonal in cross-section, so as to receive the disks 26 and 27 and eccentrics 24 and 25 and compel said disks and said eccentrics to rotate with said spindle.

The operation of the combined door check and closer will be largely understood from the description hereinbefore presented. The spring 12 operates in the usual manner in this art and the lower portion of the casing 10 will be supplied with oil or other suitable liquid. The casing 10 will be secured to the door, and the bracket 15, connected with the transmitting-arm 14, will be secured to the lintel over the door. The pistons 33 and 35 will be in their outward position within the cylinders 22 when the door is in its closed position, and as the door is opened said pistons will, by means of the eccentrics 24 and 25 and piston-rods 29 and 31, be drawn toward their inward position, the oil during such movement of the pistons passing around the latter and through the ports 38 into the end portions of the said cylinders 22. When the door is released, the spring 12 will, through the transmitting-arms 13 and 14, close the same, and the eccentrics 24 and 25 will force the pistons 33 and 35 outward toward the ends

of the cylinders 22, the oil during such outward motion of the pistons causing the ball-valves 39 to close the ports 38 and being compelled to pass from the ends of the cylinders through the space between the tapered sides of the said pistons and the tapered inner surfaces of said cylinders. As the pistons 33 35 gradually approach the ends of the cylinders 22, the oil or other liquid will become more and more confined and check the movement of said pistons, with the result of retarding the rotation of the spindle 11 and checking the closing action of the door. The object in providing the pistons with tapered sides and the inner walls of the cylinders 22 with tapered surfaces has been hereinbefore described, and it is only necessary at this point to say that the construction embodying said tapered surfaces is highly advantageous.

When the pistons 33 35 are in their extreme outward position, their tapered sides preferably seat against the tapered inner surfaces of the cylinders 22; but if for any reason it should be desired that the sides of the pistons should not actually seat against the inner surfaces of the cylinders 22 such result may be very easily accomplished during the adjustment of the apparatus by screwing said cylinders 22 very slightly outward from the casing 10. The cylinders 22 engage by screw-threads the flanges 21 of the casing 10, and hence said cylinders may be given any adjustment desired with respect to the pistons 33 and 35. The position of the pistons 33 and 35 within the cylinders 22 may also be very accurately regulated by means of the turnbuckle 55, which may be used to lengthen or shorten the rod 14, and thereby more or less turn the spindle 11 to determine the position the pistons 33 and 35 shall initially have. In addition, however, to the adjustment that may be given by means of the turnbuckle 55 the relation of the pistons 33 and 35 to their cylinders 22 may also be controlled by adjusting the cylinders 22 themselves. The cylinders 22 are each in one integral piece and there is an entire absence of ports and valves in their walls, and hence all danger of leakage through the cylinders is prevented.

The pressure of the pistons against the liquid during the closing of the door is directed against the ends and sides of the cylinders 22. The durable character of the mechanical features of the combined door check and closer is also an important feature, and in carrying my invention into effect I have endeavored to produce a combined door check and closer which would be lacking in complication and capable of withstanding severe usage. The spring 12 in the construction presented is brought downward into what may be termed the "liquid-chamber," and thereby the actuating-spindle 11 is of reduced length and the working parts of the check have been brought as nearly as possible into such relation with one another as to avoid

any straining of the parts. The sleeve 41 extends downward to the washer 43, and likewise the sleeve 40 encompasses the sleeve 41 downward to the washer 43, and hence there are broad bearing-surfaces between the sleeves 40 and 41 and the spring 12 is enabled effectually to transmit its force to the said sleeve 41 and through said sleeve 41 to the transmitting-arms 13 and 14. The sleeve 40 carries the spring 12, and during the reversal of said spring to transform the check for, say, a right-hand door from a left-hand door the said sleeve 40 and spring 12 are reversed together, the said sleeve 40 having corresponding ends.

The eccentrics 24 and 25 are within the eccentric bands 28 and 30 and describe true circles, and said eccentrics 24 and 25, while possessing great strength and durability, may be turned with the spindle 11 in continuous revolutions without danger of breaking any of the parts of the check. This feature of the construction becomes important when the checks fall into the hands of unskilful persons, since by reason of the construction presented any unnecessary revolving of the spindle 11 will have no influence in straining or breaking the parts. The chamber within the casing 10 is of globular outline, as shown in Fig. 3, so as to permit of the full and proper movements of the eccentrics 24 and 25. The fact that the eccentrics 24 and 25 may be turned in continuous revolution also aids in preventing the check and closer from being wrongly applied to the door. When the flattened and tapered sides of the upper end of the spindle 11 are employed, it will be practically impossible to apply the check wrongly to the door, since, as may be observed upon reference to Fig. 1, the transmitting-arm 13 cannot be applied upon the spindle 11 except when its opening or recess 50 is in alinement with the sides 49 of said spindle 11. When the sides 49 of the spindle 11 are extended transversely of the casing 10, as shown in Fig. 1, the pistons 33 and 35 will be in their outward position and the arm 13 will extend outward at an angle to the door, and this is the correct position for the parts upon their application to a door. If for any reason the flattened sides of the upper end of the spindle 11 shall be turned to extend lengthwise of the casing 10, no harm will result, for the workman will still be compelled to properly place the transmitting-arm 13 upon the spindle and turn it around to meet the transmitting-arm 14. Thus without relying upon marks upon the arm 13 or actuating-spindle 11 the workman can hardly fail to properly apply the door-check to the door. The bands 28 and 30 are kept upon the eccentrics 24 and 25 by reason of the disks 26 and 27, and all of the parts of the check will be properly lubricated by the oil which will be employed as a checking medium. The spring-chamber and the oil-chamber merge into one another,

so that the oil may enter the spring-chamber and lubricate the spring. The washer 43 will rest upon the disk 26 and upon the polygonal portion of the spindle 11 and will prevent the spindle 11 from having any upward motion except with the sleeves 40 and 41, and during the use of the check the sleeve 40 is held in its downward position by means of the cap 19.

I have illustrated the combined door check and closer employing two pistons 33 35 and two cylinders 22; but I desire it to be understood that I do not limit the invention to the employment of the two pistons and two cylinders, since in many instances one cylinder and one piston will be sufficient to secure the proper checking action, and in all such instances one of the pistons and one of the cylinders will be omitted without changing the function or operation of the remaining parts of the combined door check and closer.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a door check and closer, the main casing containing the spring, actuating-spindle, liquid chamber and cylinder, the piston within said cylinder and operatively connected with said spindle, the sleeve 41 upon said spindle and having a smooth bore conforming to the surfaces of said spindle, the sleeve 40 upon the exterior surfaces of said sleeve 41 and having a polygonal bore to conform with said exterior surfaces, and the closing-cap 19 receiving the sleeve 41 through it and engaging the upper edges of said sleeve 40, the said sleeve 40 carrying the spring, and said sleeves 40 and 41 extending substantially the full height of the spring-chamber, combined with the transmitting lever-arms upon the upper end of said spindle, the pawl carried by one of said arms, and the cog-wheel on the upper end of said sleeve 41 and engaged by said pawl; substantially as set forth.

2. In a door check and closer, the main casing containing the spring and actuating-spindle and having the liquid-cylinders, said casing containing a seat to receive the lower end of said spindle, combined with pistons within said cylinders, the piston-rods pivotally connected with said pistons, the circular bands connected with said rods, the circular eccentrics on said spindle and within said bands for operating said pistons, and the disks above and below said eccentrics and extending lat-

erally beyond said eccentrics to engage said bands; substantially as set forth.

3. In a door check and closer, the main casing containing the spring and actuating-spindle and having the liquid-cylinder, the elevated seat within said casing to receive the lower end of said spindle and being in line with said cylinder, a piston within said cylinder, the piston-rod pivotally connected with said piston, the circular band connected with said piston-rod, the circular eccentric on said spindle directly above said elevated seat and being within said band; substantially as set forth.

4. In a door check and closer, the main casing containing the spring, actuating-spindle, liquid chamber and cylinder, the piston within said cylinder and operatively connected with said spindle, and the lever-arm connected with the upper end of said spindle, combined with the sleeve 41 having the cog-wheel upon its upper end and encompassing said spindle, means engaging said lever-arm with said cog-wheel, and the sleeve 40 having a polygonal bore engaging and inclosing the outer corresponding surfaces of said sleeve 41, the said sleeve 40 being reversible upon said sleeve 41 and carrying the said spring, and the latter engaging a recess in said sleeve 40 and being adapted at its outer end to engage a recess in the wall of said main casing; substantially as set forth.

5. In a door check and closer, the main casing comprising the liquid-chamber, cylinder, spring-chamber, upper closing-cap, said casing at the base edges of said spring-chamber having the shoulder to receive the outer edges of the spring, and said spring-chamber being extended downward into said liquid-chamber, combined with the elevated seat within said casing, the vertical spindle at its lower end entering said seat, the piston within said cylinder and operatively connected with said spindle, the spring, and the lever-arms connected with the upper end of said spindle; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 19th day of December, A. D. 1899.

EDWARD CLIFF.

Witnesses:

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GUNDER GUNDERSON.