

No. 669,158.

Patented Mar. 5, 1901.

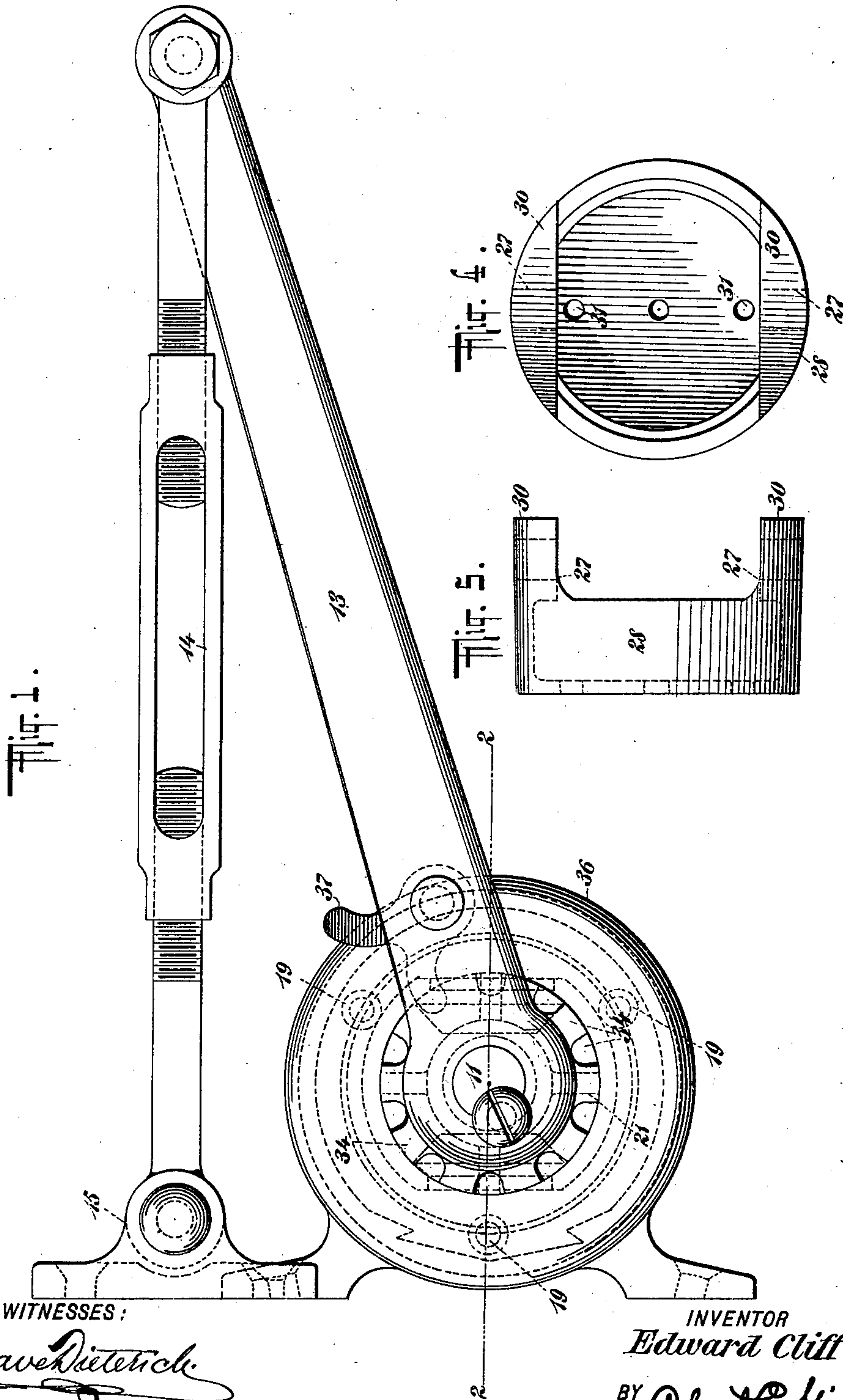
E. CLIFF.

COMBINED DOOR CHECK AND CLOSER.

(Application filed Nov. 24, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:
Gustave Dietrich
Edwin H. Dietrich.

INVENTOR
Edward Cliff
BY *Chas. C. Yell*
ATTORNEY

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2 Sheets—Sheet 2.

Fig. 3.

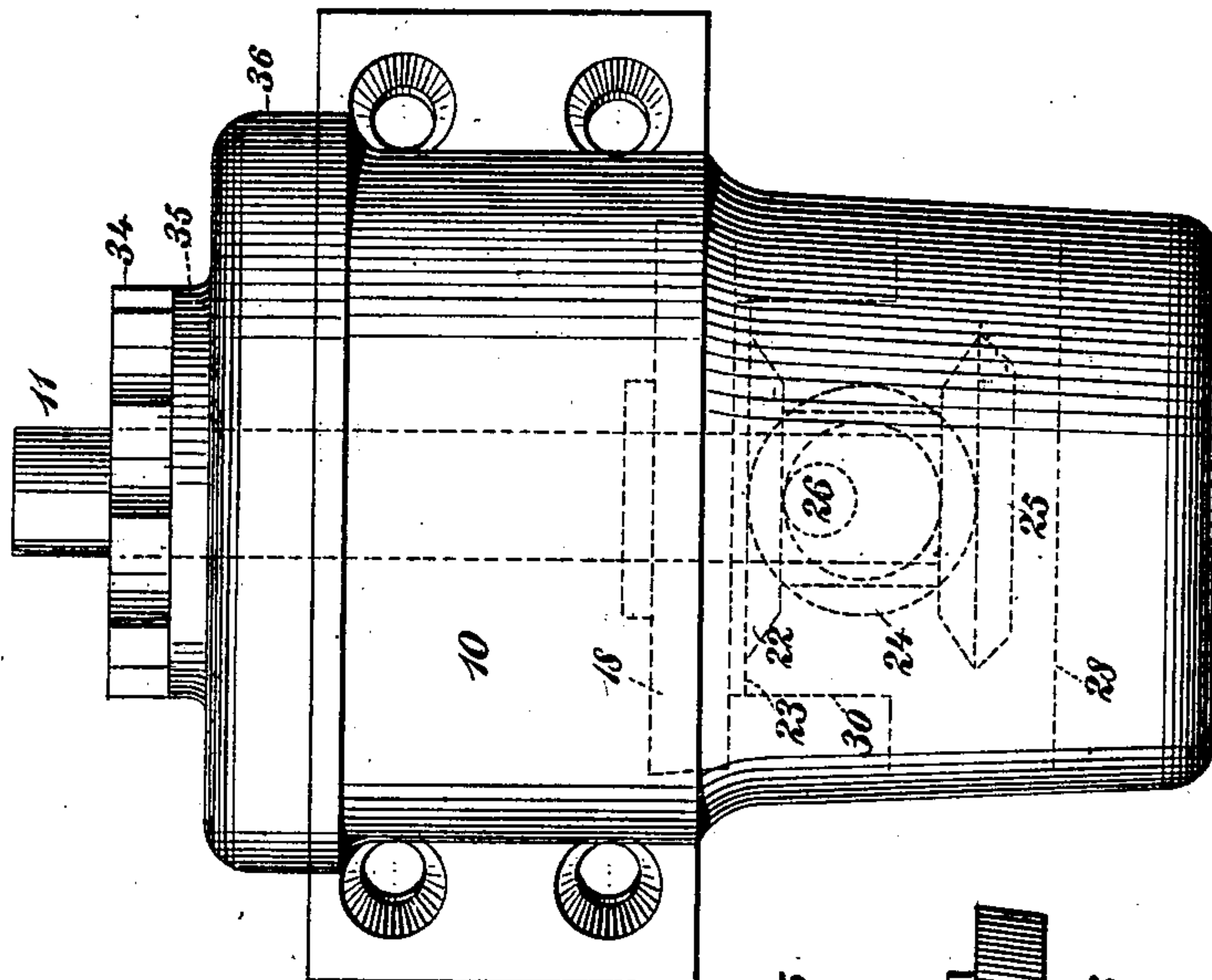


Fig. 6.

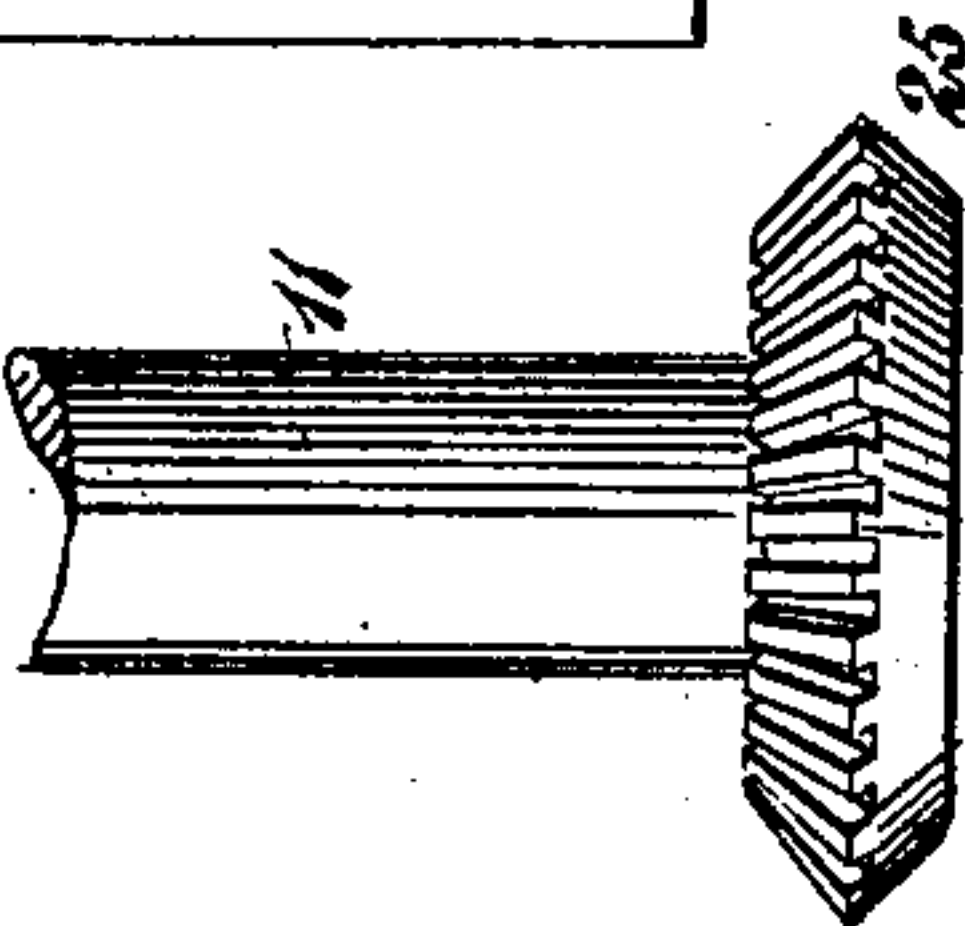
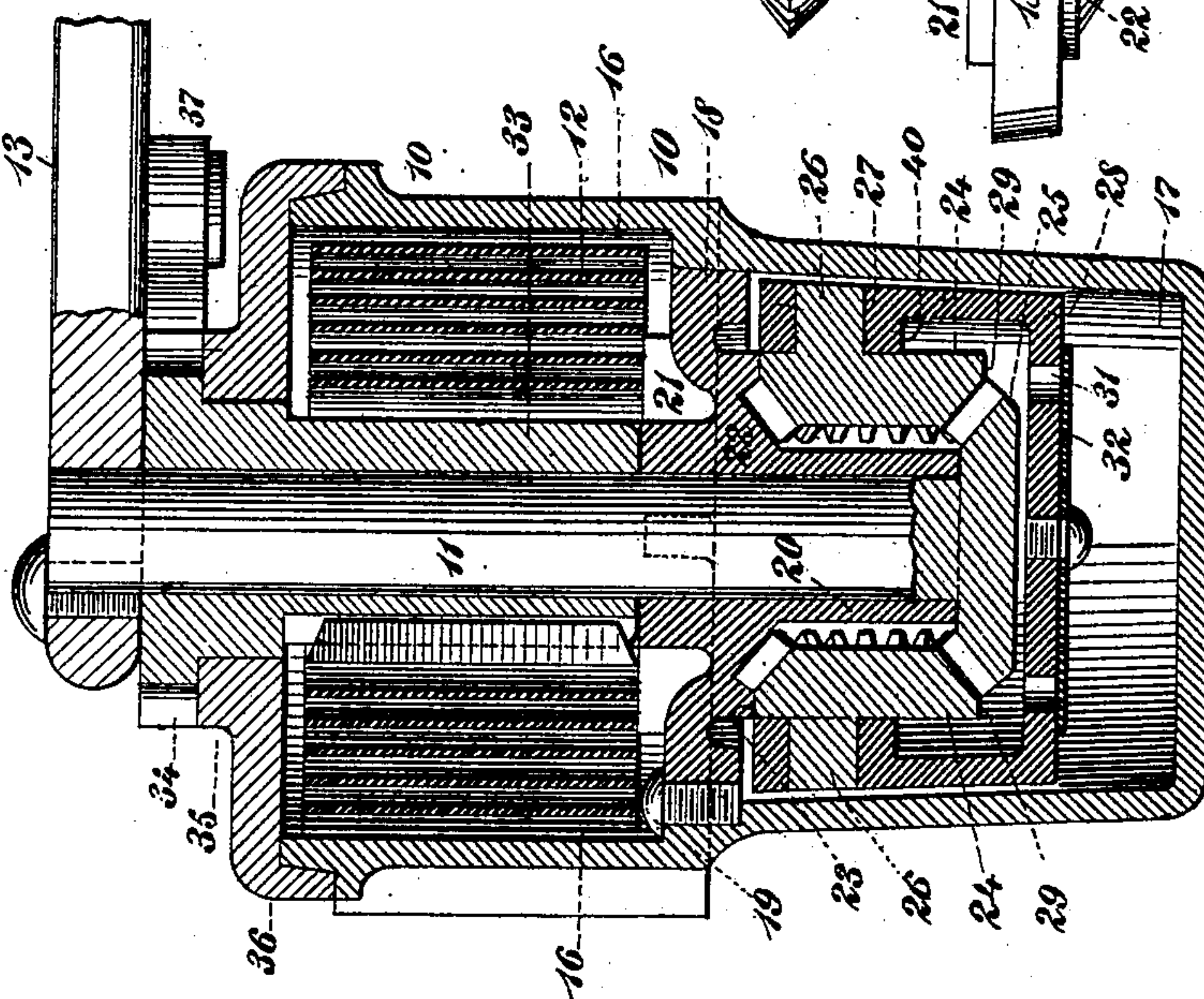


Fig. 7.



Fig. 2.



WITNESSES:

Gustave H. Dietrich
Edwin H. Dietrich

INVENTOR

Edward Cliff

BY

Chas. C. Gile
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD CLIFF, OF NEWARK, NEW JERSEY.

COMBINED DOOR CHECK AND CLOSER.

SPECIFICATION forming part of Letters Patent No. 669,158, dated March 5, 1901.

Application filed November 24, 1900. Serial No. 37,572. (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 combined door springs and checks; and it consists in the novel features, arrangement, and combinations hereinafter described, and more particularly pointed out in the claims.

My invention relates more particularly to the class of door closers and checks containing within a casing a coiled spring, a checking medium, a piston, and a central spindle operatively connected with said piston and the upper end of which is connected by lever-arms with the lintel over the door and the said spring being reversible, so as to adapt the device for right and left hand doors.

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 of a combined door check and closer constructed in accordance with and embodying the invention. Fig. 2 is a central vertical longitudinal section of same on the dotted line 2 2 of Fig. 1. Fig. 3 is a front elevation of same. Fig. 4 is a detached top view of the piston. Fig. 5 is a side elevation of same. Fig. 6 is a detached side elevation of the lower end of the actuating-spindle with the gear-wheel thereon, and Fig. 7 is a detached side elevation of the partition supporting the spring and liquid chambers.

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 adapted to be secured to the door and the lever-arm 14 being pivotally connected

with the bracket 15, which is intended to be secured to the said lintel in the usual manner.

The casing 10 is formed with the spring-chamber 16 and liquid-chamber 17, the chamber 17 being centrally below the chamber 16 and preferably having downwardly tapered or converging walls and forming a cylinder, which will be supplied with oil or other suitable checking medium. The spring-chamber 16 and liquid-chamber 17 are separated from each other by means of a partition 18, which is secured in place by means of the screws 19, which engage threaded apertures formed partly in the edge of the said partition and partly in the adjoining walls of the casing 10. At its central portion the partition 18 is formed with the vertical sleeve 20, which extends downward into the liquid chamber or cylinder 17 and also extends slightly upward above the general level of the upper surfaces of the partition 18, as shown in Fig. 2. The upper surface of the partition 18, more especially about its central portion, is formed with the series of ribs 21, which form a base for the spring 12 and keep said spring at a proper elevation to prevent the lower edges of the same from being interfered with by the heads of the screws 19. The partition 18 has at its lower surfaces and exterior to the sleeve 20 the annular rack 22 and annular shoulder 23, the rack 22 being continuous and formed of gear-teeth and the shoulder 23 being continuous and extending entirely along one edge of the rack 22 and forming a tramway for the edges of the gear-wheels 24, hereinafter described.

The spindle 11 has upon its lower end the bevel gear-wheel 25, which is engaged at its upper surfaces by the lower edges of the sleeve 20 and engages the bevel gear-wheels 24 24, disposed intermediate the teeth of the said gear-wheel 25 and the teeth of the rack 22, formed on the partition 18, as shown in Fig. 2, said bevel gear-wheels 24 being engaged by both the bevel gear-wheel 25 and said rack 22. The bevel gear-wheels 24 24 are provided with the eccentric pins 26 26, which enter bearings 27 in the upper edges of the cup-shaped piston 28 and during the rotation of said bevel gear-wheels 24 24 operate to elevate and depress said piston. The bevel gear-wheels 24 24 in addition to being pro-

vided with the usual teeth are formed beyond said teeth with the annular edges 29, which engage the annular shoulder 23 on the partition 18 and during the operation of the check roll over the surfaces of the said shoulder, and thereby prevent the wheels 24 from being crowded upward against the rack 22 to any such extent as would result in the teeth of the said rack being ground away or undue friction or grinding action being created. The annular shoulder 23 and the annular edges 29 of the wheels 24 are so disposed with relation to one another and to the depth of the teeth of the rack 22 and of said wheels 24 that said teeth are held in such accurate relation to each other that all undue grinding of the teeth of the wheels against the teeth of the rack is prevented, it being my purpose to secure ease of motion in said wheels 24 and avoid all unnecessary friction of the contacting parts. The edges 29 of the wheels 24 press against the annular shoulder 23, and thus relieve the teeth of the gear-wheels 24 from pressing unduly inward between the teeth of the rack 22, and since the surfaces of the shoulder 23 and edges 29 of the wheels 24 are smooth there will be an absence of friction between the said wheels and the said shoulder 23, the result being that the wheels 24 are assured ease of motion. The gear-wheel 25, carried on the lower end of the spindle 11, fits closely up against the lower edges of the sleeve 20 and supports the gear-wheels 24 in position, and the said gear-wheels 24 through the pins 26 support the piston 28. The close contact of the upper surfaces of the gear-wheel 25 with the lower edges of the sleeve 20 will prevent oil from unduly getting between the inner walls of the said sleeve 20 and the exterior surfaces of the said spindle 11. The partition 18 thus separates the liquid chamber or cylinder 17 from the spring-chamber 16 and affords at its upper surfaces a support for the spring 12 and at its lower surfaces is equipped with the sleeve 20, rack 22, and annular shoulder 23, and, as may be observed, the sleeve 20 forms an extended bearing for the lower portion of the spindle 11.

The piston 28 is of cup construction and has upwardly-extending side arms 30 30, Fig. 5, containing apertures to receive the pins 26, carried by the gear-wheels 24, and said piston 28 will, when the walls of the cylinder 17 are tapered, have downwardly-converging walls corresponding with the taper of the inner walls of the cylinder 17. The lower end of the piston 28 is provided with the ports 31 and plate-valve 32, said valve 32 normally closing said ports 31 and at all times closing said ports 31 during the downstroke of the piston 28. During the upstroke of the piston 28 the liquid passing into the ports 31 will open the valve 32 and pass toward the lower end of the cylinder 17 in a well-known manner, said ports 31 and plate-valve 32 being familiar elements in this art. During the up-

ward movement of the piston 28 the liquid within the cylinder 17 may pass downward through the ports 31 and also through the space between the exterior side walls of the piston 28 and the interior adjacent walls of the cylinder 17, the purpose being to permit during the ascent of the piston 28 and the opening of the door a free flow of the liquid to the lower side of the said piston; but during the closing of the door and the descent of the piston 28 the liquid should be more or less confined at the lower end of the cylinder 17, so that said liquid may operate as a check to resist the slamming of the door during the closing of the latter by the spring 12, and hence during the descent of the piston 28 the valve 32 will close the ports 31 and the only escape for the liquid from the lower end of the cylinder 17 will be upward between the side walls of said piston and the adjacent walls of said cylinder. The taper of the piston 28 and cylinder 17 is such that as the piston 28 is moving toward its lower position its side walls will gradually pass into the lower more contracted portion of the cylinder 17 and in an increasing degree restrict the space between its side walls and the walls of the said cylinder, whereby during the first portion of the closing movement of the door the liquid may more freely pass upward around the outer sides of the piston 28; but during the latter portion of the closing movement of the door the escape of the said liquid will become more greatly restricted and the door at the latter part of its closing movement will be checked by the confinement of the liquid at the lower end of the cylinder 17, said liquid not being absolutely sealed at the lower end of the cylinder 17, but so nearly so that its escape during the latter part of the closing movement of the door will be so gradual that the liquid will be enabled to resist in a measure the action of the spring 12, whereby the door will close positively, but gently.

The spring 12 is reversible, as usual, and at its outer end is hooked upon the wall of the casing 10 and at its inner end is hooked upon the usual shoulder provided upon the sleeve 33, which encompasses the spindle 11 and extends downward to the upper end of the sleeve 20, forming a part of the partition 18, as shown in Fig. 2. The upper end of the sleeve 33 is formed with the gear-wheel 34, which is directly upon the central raised portion 35 of the cap 36, which closes the upper end of the spring-chamber 16. The gear-wheel 34 is directly intermediate the cap 36 and lower surface of the lever-arm 13, and said lever-arm 13 is provided with the pawl 37, which is adapted to engage said gear-wheel 34 and which is formed with the two ends, as shown, so that the one pawl 37 may, in a well-known manner in this art, be utilized in connection with the check whether the latter is arranged for a right-hand door or a left-hand door. The pawl 37, lever-arms 13 14, and gear-wheel 34 are well-known ele-

ments in this art and are not sought to be separately claimed herein. The spring 12 is also the customary form of spring used in this art and it is reversible in the usual manner and adapted to be secured at its hook-shaped ends to the casing 10 and sleeve 33, respectively, in a manner well understood.

The operation of the lever-arms 13 14, pawl 37, gear-wheel 34, sleeve 33, and spring 12 will be understood without detailed explanation. During the opening of the door the spindle 11 will be rotated, as usual, and will communicate its motion to the gear-wheel 25, carried at its lower end, and this gear-wheel 25 will, in conjunction with the annular rack 22, rotate the bevel gear-wheels 24 and cause said wheels 24 while rotating to roll upon the rack 22 and annular shoulder 23, the result being that during the opening of the door the spindle 11 and gear-wheel 25 will rotate the gear-wheels 24 and, through the latter and their eccentric pins 26, effect the ascent of the piston 28 and that during the closing of the door the spindle 11, then rotating in the reverse direction, will, by means of its gear-wheel 25 and bevel gear-wheels 24, effect the descent of the piston 28 against the liquid within the lower end of the cylinder 17, said liquid acting to check the downward motion of said piston 28 and consequently to retard the rotation of the spindle 11 and, through the levers 13 14, the closing of the door. The rotation of the spindle 11 and gear-wheel 25 effects, in conjunction with the rack 22, the positive rotation of the bevel gear-wheels 24 and the rolling of the said wheels 24 along the rack 22 and shoulder 23, and during the rolling action of the pinion-wheels 24 along the rack 22 and shoulder 23 said wheels 24 will, through the pins 26, carry the piston 28. Thus the piston 28 while performing its vertical motion travels on a substantially spiral line, being gradually lowered against the liquid at the lower end of the cylinder 17 and gradually elevated therefrom, said piston 28 having a descending motion on a spiral line during its partial rotation and having its ascending motion on the same spiral line during its partial rotation back to its upper position. It has been sufficiently explained above that the outer edges 29 of the bevel gear-wheels 24 ride against the annular shoulder 23 during the use of the check, and I regard the employment of the annular shoulder 23 for the purpose specified as of considerable advantage.

In the preferred construction the gear-wheel 25 will correspond in size with the rack 22 and the gear-wheels 24 24 will be smaller than the gear-wheel 25 in order that said gear-wheels 24 may be enabled to impart a full stroke to the piston 28 with the minimum travel of said wheels along the rack 22. The employment of the smaller wheels 24 also enables me not only to make use of a shorter cylinder 17, but it secures the advantages of employing a piston 28 of considerable area and having a short stroke. I deem it of ad-

vantage to impart to the piston 28 a rotary spiral or screw-like motion during its descent, especially when said piston is of the extended surface area indicated in the drawings, since thereby the descent of the piston against the liquid at the lower end of the cylinder 17 while performed positively is rendered uniform—that is to say, when the piston while descending is given a rotary or screw-like motion there is an entire absence of any irregularity in the mechanism or jarring effect on the door, which might be caused by the sudden thrust of the flat piston in a direct line against the body of the liquid or by the presence of air below the piston or other causes. When the piston while descending is given the rotary or screw-like motion, the parts of the check, and consequently the door to which they are applied, have a steadiness of motion and action and an efficiency which are highly desirable.

It may be observed on reference to Fig. 2 that the gear-wheels 24 are firmly held at their upper and lower edges between the annular shoulder 23 and gear-wheel 25 and that at their outer faces the said gear-wheels 24 are against the hubs 40, which surround the bearing-apertures 27 in the piston 28 and project inward, so as to contact with the outer faces of said wheels 24, whereby said wheels 24 are kept from moving laterally away from the teeth of the wheel 25 and rack 22.

I desire it to be fully understood that the invention is not limited to a partition 18 adapted to seal the liquid-cylinder from the spring-chamber, nor to a partition of any special construction other than may be indicated in the following claims.

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

1. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, combined with the gear-wheel 25 carried at the lower end of said spindle, the partition having the stationary rack 22 in line with the teeth of said gear-wheel 25, the gear-wheels 24 intermediate the said gear-wheel 25 and said rack, the piston within said cylinder, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24; substantially as set forth.

2. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, combined with the gear-wheel 25 carried at the lower end of said spindle, the partition having the stationary rack 22 in line with the teeth of said gear-wheel 25, and also having the annular shoulder 23 forming a tramway along the edge of said rack 22, the gear-wheels 24 intermediate the said gear-wheel 25 and

said rack and having the peripheral edges 29 to engage and roll on said tramway, the piston within said cylinder, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24; substantially as set forth.

3. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, combined with the partition between said spring-chamber and said cylinder and having the central bearing-sleeve 20 for said spindle and also having the rack 22, the gear-wheel 25 carried at the lower end of said spindle and having its teeth in line with the teeth of said rack, the gear-wheels 24 intermediate the said gear-wheel 25 and said rack, the piston within said cylinder, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24, said bearing-sleeve 20 extending downward to the upper surface of said gear-wheel 25; substantially as set forth.

4. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, combined with the partition 18 between said spring-chamber and said cylinder and having the central bearing-sleeve 20 for said spindle, and also having the annular rack 22 and annular shoulder 23, the gear-wheel 25 carried at the lower end of said spindle and having its teeth in line with the teeth of said rack 22, the gear-wheels 24 intermediate the said gear-wheel 25 and said rack, and having the peripheral edges 29 to engage and roll on said shoulder 23, the piston within said cylinder, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24; substantially as set forth.

5. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle extending through said spring-chamber into said liquid-cylinder, the sleeve 33 encompassing said spindle within said spring-chamber and having the gear-wheel 34 on its upper end, the spring 12 engaging the wall of said casing and said sleeve, and the lever-arm connected with said spindle and said gear-wheel, combined with the partition 18 between said spring-chamber and said liquid-cylinder and having the rack 22 and also the central bearing-sleeve 20 which extends upward to the lower end of said sleeve 33 and downward into the liquid-cylinder to form an elongated bearing for said spindle, the gear-wheel 25 carried at the lower end of said spindle and having its upper sur-

face close to the lower edges of said bearing-sleeve 20, the gear-wheels 24, intermediate the said gear-wheel 25 and said rack, the piston within said cylinder, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24; substantially as set forth.

6. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, said cylinder being centrally below said spring-chamber and disposed vertically, combined with the piston within said cylinder and means coöperating with said spindle for moving said piston vertically and compelling said piston, while performing its vertical movement, to also have a rotary motion, whereby said piston, when moving against the liquid during the closing of the door, is compelled to move both vertically and in a rotary direction; substantially as set forth.

7. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, combined with the gear-wheel 25 carried at the lower end of said spindle, the partition having the stationary rack 22 in line with the teeth of said gear-wheel 25, the gear-wheels 24 intermediate the said gear-wheel 25 and said rack, the cup-shaped piston 28 within said cylinder and having the bearing-hubs 40, and the pins disposed eccentrically to said gear-wheels 24 and engaging said piston to elevate and lower the same upon the rotation of said gear-wheels 24, the said hubs 40 extending inward to the outer faces of said gear-wheels 24 and keeping said gear-wheels 24 in mesh with said gear-wheel 25 and said rack 22; substantially as set forth.

8. In a door check and closer, the main casing forming the spring-chamber and liquid-cylinder, the spring within said spring-chamber, the actuating-spindle, and the lever-arms connected with said spindle and spring, said cylinder being centrally below said spring-chamber and disposed vertically, combined with the piston within said cylinder, the gear-wheels 24 and eccentric pins engaging said piston for raising and lowering the same, and means coöperating with said spindle for imparting a rotary and also a rolling motion to said gear-wheels, whereby said piston while on its descent is given a screw-like motion against the liquid; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 23d day of November, A. D. 1900.

EDWARD CLIFF.

Witnesses:

CHAS. C. GILL,
GUNDER GUNDERSON.