

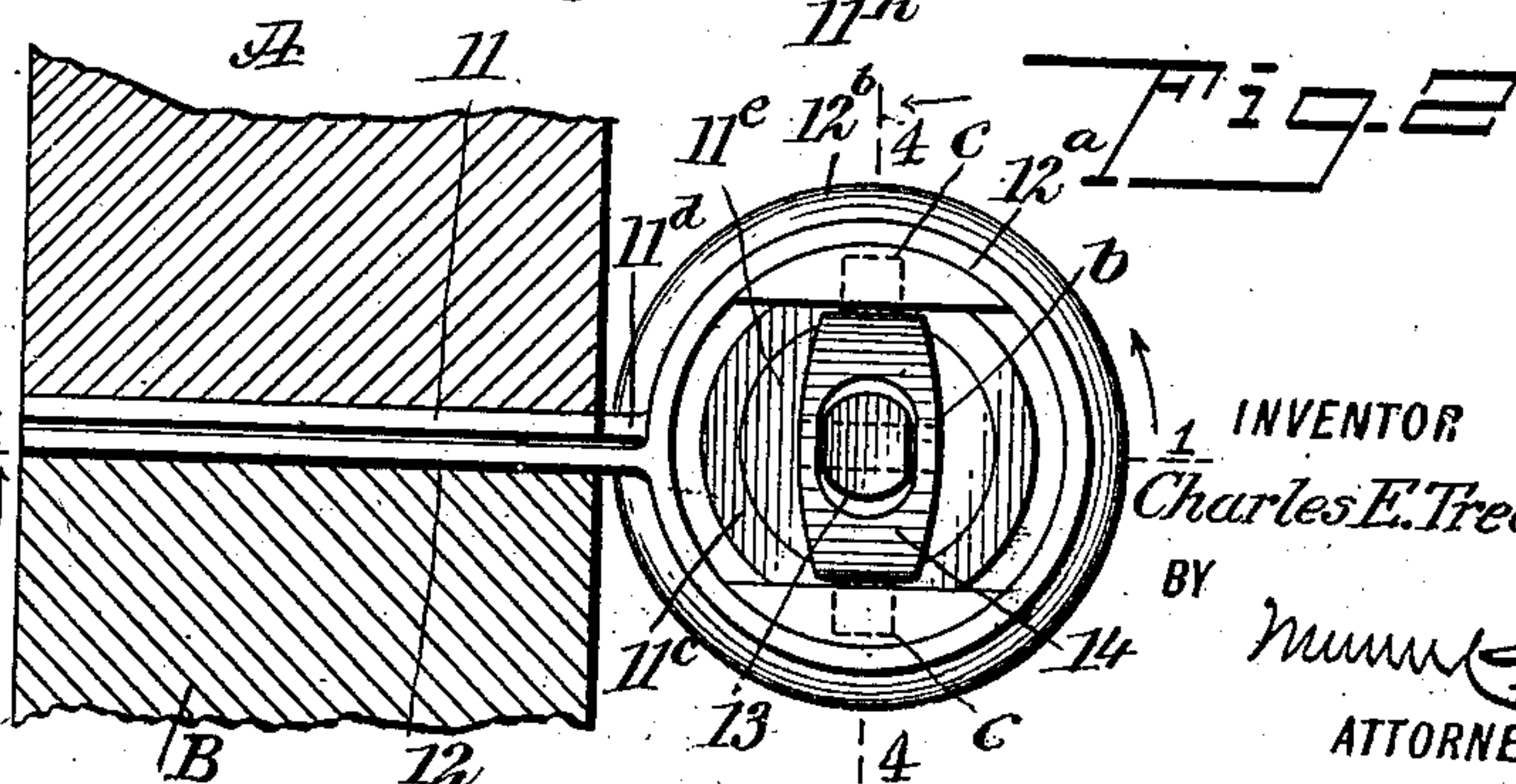
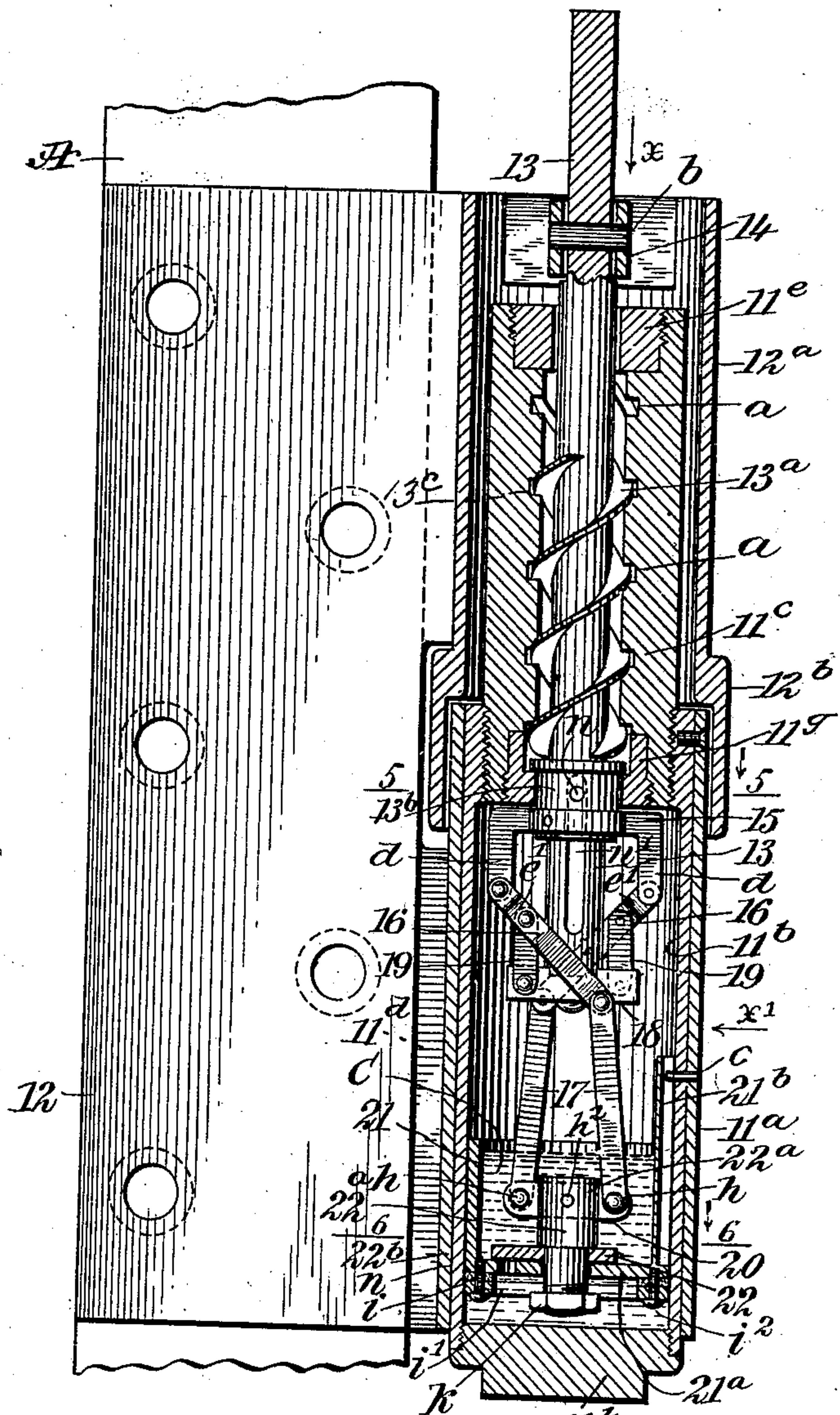
No. 828,351.

PATENTED AUG. 14, 1906.

C. E. TREADWELL.
DOOR HINGE AND CHECK.
APPLICATION FILED DEC. 24, 1904.

3 SHEETS—SHEET 1.

7191



WITNESSES:
J. A. Brophy -
Wm. Patton

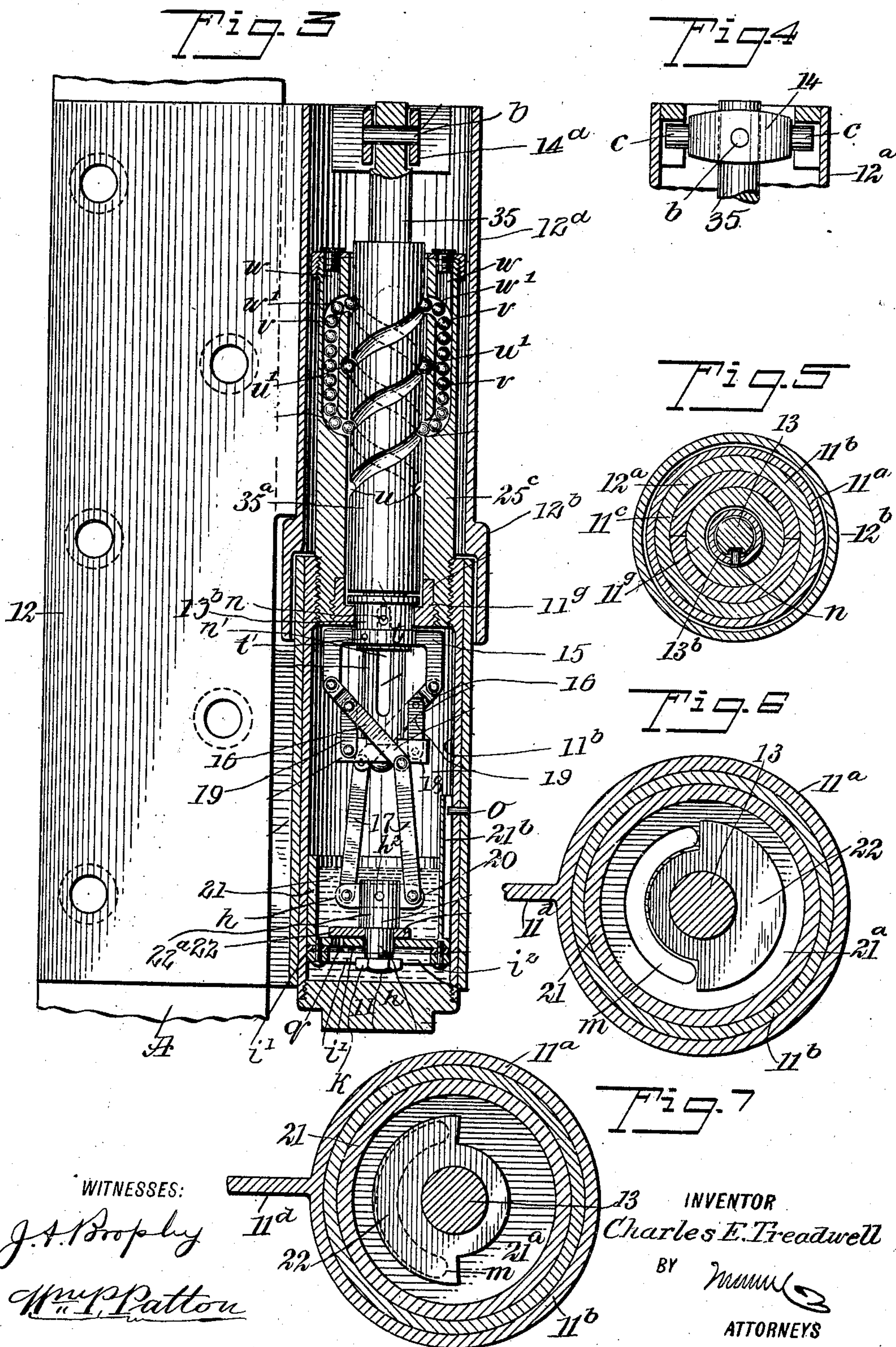
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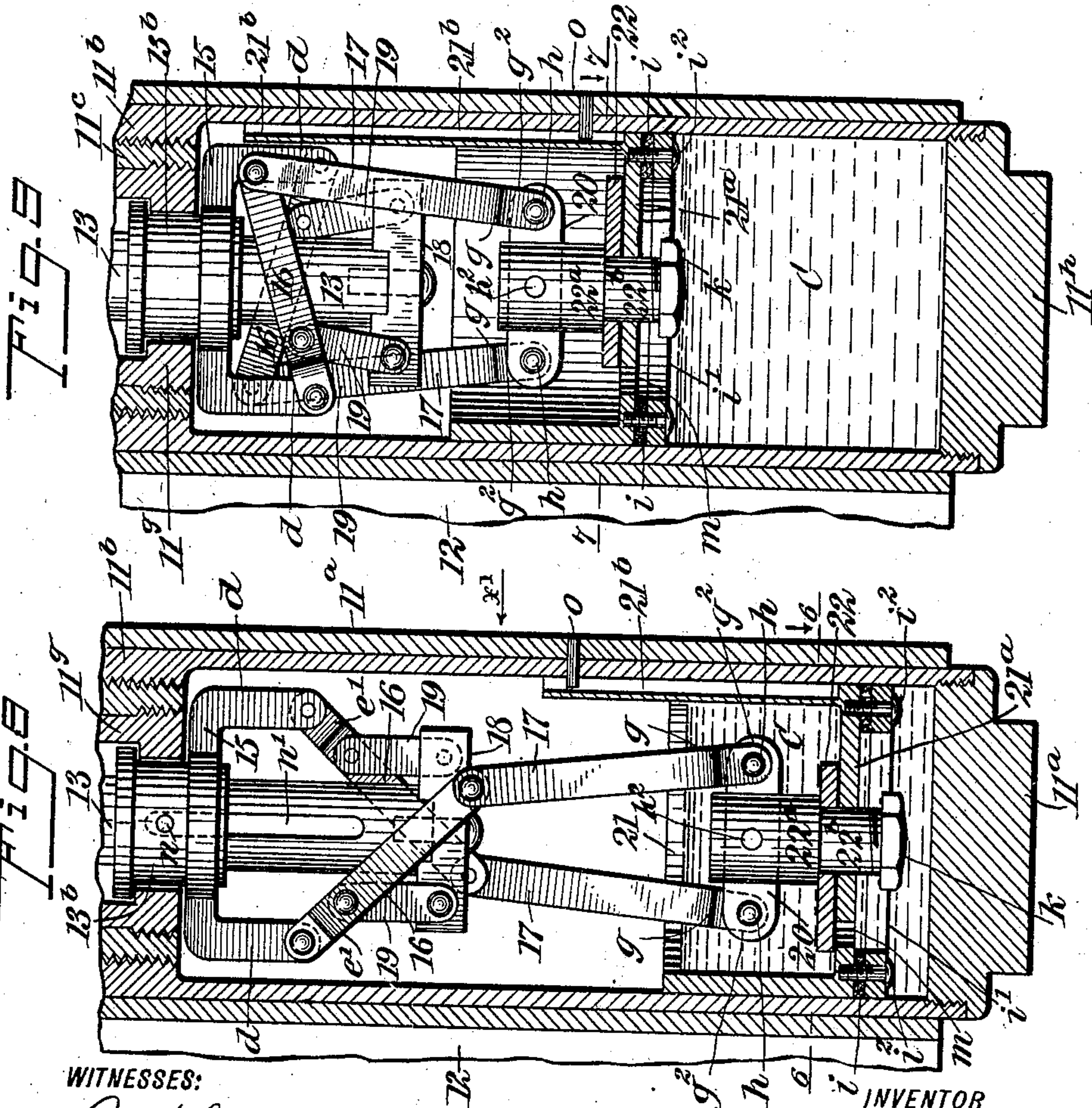
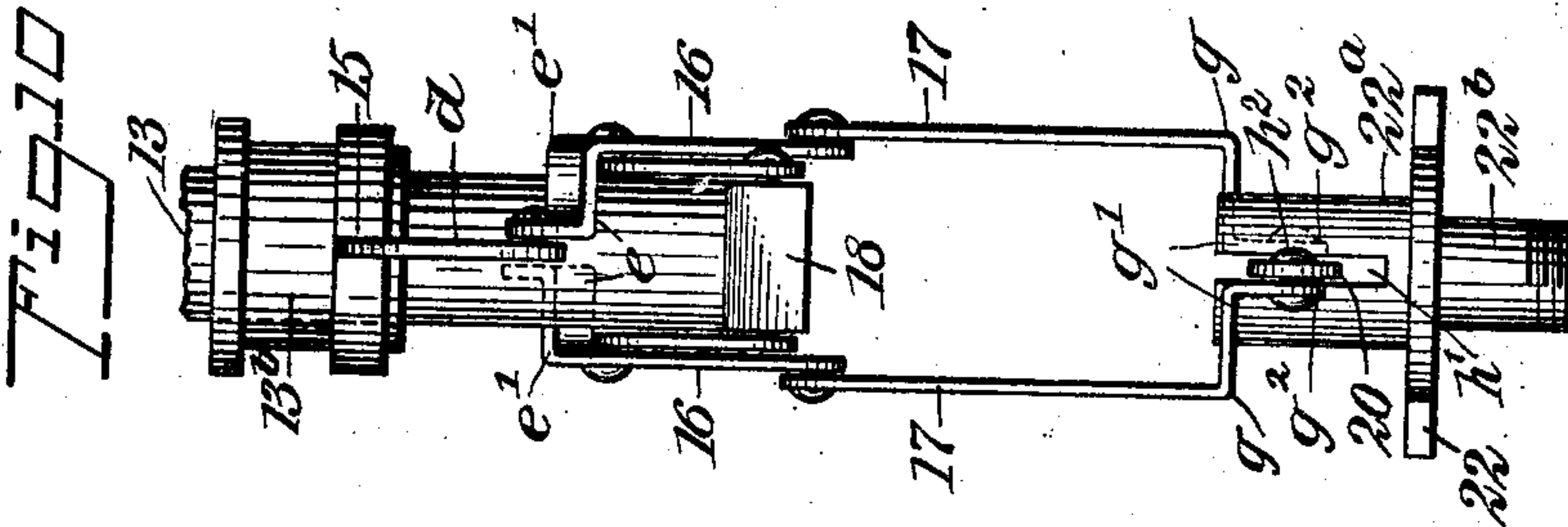
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES E. TREADWELL, OF DENVER, COLORADO.

DOOR HINGE AND CHECK.

No. 828,351.

Specification of Letters Patent.

Patented Aug. 14, 1906.

Application filed December 24, 1904. Serial No. 238,190.

To all whom it may concern:

Be it known that I, CHARLES E. TREADWELL, a citizen of the United States, and a resident of Denver, in the county of Denver and State of Colorado, have invented a new and Improved Door Hinge and Check, of which the following is a full, clear, and exact description.

This invention relates to improvements in combined door-hinges of the self-closing type and checks that prevent shock of impact had by the door on the jamb of the casement.

The objects of my invention are to provide novel details of construction and arrangement of parts that render the device very effective and reliable in use, adapting the hinge and check for service on doors that swing right or left handed, and capable by duplication to support and close double-acting doors and serve as a check therefor.

The invention consists in the novel construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side view of one example of my invention as applied upon a casement-jamb for swinging a door toward the right, the section being substantially on the line 1 1 in Fig. 2. Fig. 2 shows a plan view of the door, the casement-jamb being shown in section, and a top view of the improved hinge and check thereon seen in the direction of the arrow *x* in Fig. 1. Fig. 3 is a similar view to Fig. 1, but showing a somewhat-different construction of the improvement. Fig. 4 is a transverse vertical sectional view of the upper portion of the hinge substantially on the line 4 4 in Fig. 2. Fig. 5 is a transverse horizontal sectional view substantially on the line 5 5 in Fig. 1. Fig. 6 is a transverse horizontal sectional view substantially on the line 6 6 in Figs. 1 and 8, showing the check-valve open. Fig. 7 is a like view taken substantially on the line 7 7 in Fig. 9, showing the check-valve closed. Fig. 8 is an enlarged axial sectional view of the lower portion of the hinge, showing the check-valve and novel actuating devices adjusted for opening the valve-gate, the plunger-valve being lowered. Fig. 9 is a view similar to Fig. 8, but showing

the check-valve gate opened and the plunger-valve raised; and Fig. 10 is a broken side view of the check-valve-actuating device seen in the direction of the arrow *x'* in Figs. 1 and 8.

In the construction represented in Figs. 1, 2, 3, 4 to 10, inclusive, 11 12 represent two hinge-leaves that are respectively secured on the casement A of the doorway and a door B therefor. Upon one side edge of the hinge-leaf 11 is formed a cylindrical barrel 11^a, wherein is formed integrally or secured a tubular shell 11^b, forming the chamber for holding a liquid or other fluid used as a checking medium and which is hereinafter fully described in its operation. In an internal thread formed at the upper end of the chamber 11^b is screwed the lower threaded end of a cylindrical extension 11^c for the barrel 11^a. In this example of my invention as applied the extension 11^c is axially bored and threaded in said bore preferably with two quick-pitch threads that are right-handed in their turns, as shown at *a* in Fig. 1, and, as therein shown, the extension, that in this case is a nut, is somewhat reduced in its external diameter as compared with the barrel portion 11^a.

Upon one edge of the hinge-leaf 12 a cylindrical barrel 12^a is formed, that may be mainly equal in diameter to that of the barrel 11^a, but at and near its lower end 12^b is so increased diametrically as to fit loosely upon the upper portion of said barrel 11^a. To adapt these parts of the hinge for a rotatable as well as a sliding engagement with each other, the leaf 11 is connected with the barrel 11^a by a web 11^d, that extends from the lower end of said leaf a proper distance, clearing the lower end of the barrel 12^a when the latter is in its lowest position or when the hinge-leaves are folded together for a complete closure of the door, and as the barrel 12^a is extended from the upper end of the hinge-leaf 12 but half its length it will be seen in Fig. 1 that the two half-sections of the hinge may be operatively connected with each other.

Two male screw-threads 13^a and 13^c are formed on a shaft or pintle rod 13 of a pitch and diameter that adapts said threads for a screw engagement within the barrel-nut 11^c, and, as is shown in Fig. 1, the length of the threads on the rod is such that the latter may be reciprocated a proper distance in the nut-

thread *a* by a turning movement of said pintle-rod. In the upper end of the nut-barrel 11^c a centrally-bored filling-block 11^e is fitted and may be screwed into place, as shown in Fig. 1, the pintle-rod 13 having a neat sliding fit in the bore of said block. The lower end of the pintle-rod 13 passes down into the oil-chamber 11^b and is held central therein by a thimble 13^b, that is loosely secured on the pintle-rod, said thimble being held to turn by a thimble 11^g, that is screwed into a central counterbore formed in the lower end portion of the barrel-nut 11^c. The lower end of the chamber 11^b is normally closed with a removable screw-plug 11^h, that fits with a liquid-tight joint therein.

The pintle-rod 13, which extends upward a short distance above the filling-block 11^e, may be flattened upon opposite sides, and a transverse cross-head 14, that is mounted upon this flattened portion of the pintle-rod, is thereto pivoted, as at *b*, having like trunnion ends *c*, that are loosely engaged within opposite perforations in the wall of the hinge-barrel 12^a.

It will be seen from the foregoing description of details that if the cross-head 14 is properly positioned with relation to the hinge-leaf 12 to which it is connected said transverse connection will cause the pintle-rod 13 and thread 13^a thereon to turn with the hinge-barrel 12^a when the door is swung to open it, or in the direction of the curved arrow in Fig. 2, thus screwing said rod upwardly in the stationary nut 11^c and correspondingly raising the door B. It will be evident that the rocking connection of the cross-head 14 with the upper portion of the pintle-rod 13 and the similar engagement of the trunnion ends *c* with the wall of the barrel 12^a will adapt the threaded pintle-rod to work freely and avoid undue friction in its traverse of the barrel-nut 11^c and turning movement therein.

The upper end of the hinge-barrel 12^a is shown unclosed, but in the manufacture of the hinge it is closed around the pintle-rod that works in and through said closure.

The novel means for checking the abrupt closure of the door B, that is hung for swinging movement upon a casement A by means of the improved hinge, is directly connected with the hinge proper and is constructed essentially as follows: Upon the lower end of the thimble 13^b, which extends into the upper end of the chamber 11^b, a yoke 15 is secured, having like depending limbs *d*. As represented in Figs. 1, 8, 9, and 10, an essentially Z-shaped bar 16 is pivoted at its upper end upon the lower end of each yoke member *d*, the offsets *e e'* on each of said bars adapting the main portions thereof to lap across opposite sides of the pintle-rod 13, this being clearly shown in Fig. 10. Upon the remain-

ing ends of the angularly-bent bars 16 are pivoted the upper ends of two link-bars 17. A foot-block 18 is secured transversely on the lower extremity of the pintle-rod 13, and upon opposite sides of the laterally-extended end portions of said foot-block are pivoted the lower ends of two reinforcing-links 19, the upper ends of said links being lapped upon and pivoted to the bars 16 near their pivot connections with the members *d* of the yoke 15. The lower portions of the link-bars 17 are each bent at *g* and *g'*, these right-angular bends providing similar short depending members *g*² on the lower ends of the link-bars that are disposed parallel with each other. The link members *g*² are connected together by a transverse rock-bar 20, that is lapped at its ends upon the ends of said members and thereon pivoted, as shown at *h*. A valved piston is employed comprising a cylindrical shell 21 and having an integral bottom wall 21^a, which is fitted to slide neatly in the chamber 11^b, and to insure at all times an air or liquid tight joint between the cup and chamber-wall a packing-joint *i* may be secured upon the bottom wall, said joint in ring form being clamped thereon by a cap-plate *i'* and screws *i*², that are screwed into said wall 21^a, the peripheral edge of the packing-ring being pressed against the true inner surface of the chamber-wall 11^b when the piston is reciprocated therein. A flat gate-valve 22 is secured upon the lower end of a short stem 22^a, preferably engaging the threaded and reduced lower end portion of said stem, which projects loosely down through a central perforation in the bottom wall 21^a of the piston 21, which is rendered true to form a seat for said gate-valve, and as shown, a nut *k* is screwed upon the threaded lower portion 22^b of the stem. The rock-bar 20 is held in a cross-slot *h'*, formed in the stem 22^a, and is centrally pivoted thereon, as shown at *h*². An arcuate slot or port *m* is formed in the bottom wall 21^a of a suitable length, and the gate-valve 22 is of such dimensions and form that it may be caused to uncover the port *m* or close it by a rotatable movement of said valve. As before mentioned, the thimble 13^b is loosely secured upon the pintle-rod 13, and, as shown, this connection is in the form of a cross pin or screw *n*, that passes transversely through the thimble and through a longitudinal slot *n'* in the pintle-rod, this connection permitting the pintle-rod to slide in the thimble and the latter be held to turn therewith. Obviously the slot in the rod may be in the form of a groove and a set-screw be employed to slidably engage the thimble with the groove, the same result being attained. A guide 21^b is formed on or in the outer side of the piston 21, having a vertical groove for the reception of a stud or pin *o*, that projects inward from

the chamber-wall 11^b, and it will be seen that this engagement of the cup 21 with the stationary barrel 11^a and chamber 11^b permits the cup and bottom wall 21^a thereon to slide 5 in the chamber 11^b, but not to turn therein.

It will be seen that by the construction and relative arrangement of parts as described the piston 21 will be raised in the chamber 11^b when the door B is fully opened, 10 as parts of the lazy-tongs device which connect the thimble 13^b with said piston will be contracted and assume the adjustment shown in Fig. 9. In effecting a cushioning of the descent of a door, such as B, as it closes, it is 15 preferred to employ oil or other suitable liquid as a restraining medium, a proper amount being placed in the chamber 11^b, and, as shown, the turning movement of the valve-stem 22^a, due to its connection with the pintle-rod 13, 20 will when the door is opened cause it to upwardly traverse the nut-block 11^c, thus raising the door B, as before explained. This elevation of the pintle-rod will cause the lazy-tongs device to close the members thereof 25 and lift the gate-valve 22 from its seat, fully opening the arcuate slot or port *m*, at the same time turning the gate-valve away from said port. The compression of air above oil that may be in said chamber above the gate-valve will enforce the downward passage of 30 the liquid through the port *m*, so that it will be deposited in the chamber 11^b below the gate-valve. Upon initiating the closure of the door B the lazy-tongs device will expand 35 lengthwise as the pintle-rod turns and slowly descends in the nut-block 11^c and immediately seat the gate-valve on the plate in which the port *m* is formed, this port being open. The closing movement of the door 13 40 as it progresses turns the gate-valve gradually toward and over the port *m*, thus restricting the passage of oil up through it and cushioning the descent of the door as it closes. The valve 22 may be so adjusted as to 45 close the port *m* at the instant the door impinges upon the door-casement, or, if desired, the port may be closed by the valve just before the door strikes the jamb of the casement, and hold a small quantity of oil in 50 the chamber below the gate-valve, which will cushion the impact of the closing door, this being advantageous in case the door is heavy or if it is pulled upon to close it.

It has been found in practice that it is essential for the proper operation of the gate-valve 22 that its opening movement be effected 55 when the door has been opened but a short distance, so that the port *m* is uncovered and permits the liquid C that has been above the valve 22 to pass freely down 60 through the port *m*, which will permit the door to be opened without resistance that might result from the restricted passage of the liquid C through the port *m*. To this

end the lazy-tongs device already described 65 has been devised, which gives sliding movement to the piston 21 and also turns the gate-valve 22 in harmony with the pitch of the screw-thread 13^a. Now as the gate-valve 22 is completely closed over the port *m* when the 70 door B is swung shut it is necessary to give a puppet action to the gate-valve to be effected instantly when the door is started to open. To effect this, the nut *k* on the threaded depending portion 22^b of the stem 22^a is screwed 75 tightly thereon, leaving a suitable space between it and the lower surface of the bottom wall 21^a, it being understood that the valve 22 is affixed upon the stem 22^a, as shown, so as to 80 seat on the true upper surface of this wall when the door is closed.

The initial movement for opening the door B gives the pintle-rod 13, lazy-tongs, and stem 22^a, along with the valve 22, a slight 85 elevation, that is defined in degree by contact of the nut *k* upon the lower surface of the bottom wall 21^a. This will open a crevice between said bottom wall and the gate-valve 22, thus completely uncovering the port *m* 90 and permitting the liquid C to pass down through said port, and obviously as the door is swung open the gate-valve will be correspondingly turned from the port *m*, furthering the freedom of transfer of the liquid 95 down through it.

In Fig. 3 a modification of the door-hinge is shown that is particularly well adapted for the swinging support of heavy doors and 100 mainly consists in the substitution of balls working in special raceways, the balls reducing friction between male and female members of the hinge. In this application of the invention a pintle-rod 35 is employed having 105 a cylindrical hub-like enlargement 35^a, formed or secured thereon and held to slide in a thimble 13^b and turn said thimble by means of a slot or groove *n'*, and a pin or screw *n*, secured in the thimble, that works in the slot. As shown in Fig. 3, as well as in 110 previously-described figures, the slotted lower portion of the pintle-rod 35 extends below the thimble 13^b, and the latter below the 115 bushing 11^g sufficiently to receive a ring-like formation *t* on the yoke 15, that is mounted upon the lower end of said thimble and secured thereon by a pin *t'*, this construction being similar to that shown in Figs. 1, 8, and 9. In the exterior surface of the cylindrical hub-like enlargement 35^a two half-circular spiral 120 channels *u* are formed, that are of quick pitch, thus affording coarse female threads therein, which extend a suitable length between the ends of the hub, and, as shown, these screw-like spiral channels, that consist of continuous 125 and preferably concave-bottomed grooves, the turns of which are disposed at an equal distance apart, are right-hand in pitch or similar in trend to the spiral grooves *a* in the bar-

rel-nut 11°. (Shown in Fig. 1.) In the barrel 25°, that is truly bored, the hub enlargement 35^a of the pintle-rod 35 is loosely fitted, and in the interior wall of said cylindrical barrel two spiral grooves *u'* are formed, that are of a like pitch and form to that of the grooves or channels *u*, and when held opposite thereto afford, with said semicircular channels, two spiral channels, that are essentially circular in cross-section. A plurality of balls *v* of equal size are employed, which occupy the mated grooves or channels *u u'*, and thus afford an antifriction moving connection between the hubs 35^a and the barrel 25°. To enable the free introduction of the balls *v* into the mated grooves *u u'*, a plurality of passages *w* are formed in the wall of the barrel 25°, and branch passages *w'* extend from the vertical passages into the spiral tubular grooves *u u'*. As shown, there are two vertical passages *w*, which extend from the upper end of the barrel 25° down far enough to intersect the lower turns of the spiral channel that receives the balls *v*, and the upper ends of said upright passages may be closed with caps, as shown in Fig. 3. The upper end of the pintle-rod 35 is loosely connected with the hinge-barrel 26 by a cross-head 14^a, that is slotted at its center and receives the pintle-rod 35, whereon it is pivoted, as shown at *b* in Fig. 3, said cross-head having trunnions on its ends for a rocking engagement within opposite openings in the wall of the hinge-barrel similar to the connection represented in Fig. 4. It will be understood that as the construction of parts, except that of the antifriction-ball connection for the upper and lower barrels of the hinge, is similar to that already described in relation to the first example of the improvement, as shown in Figs. 1, 8, and 9, the operation of the hinge in both illustrations is the same; but the provision of the antifriction balls and channels greatly reduces the friction of the door-closer sections of the hinge one upon the other, and therefore adapts the hinge thus constructed for advantageous service.

As shown and described, two quick-pitch threads are specified and represented as a door-closer for the improved hinge, and two spiral tubular passages are illustrated for the employment of bearing-balls in place of screw-threads. It is to be understood, however, that it is not intended to restrict the construction to the exact form and arrangement of parts as shown, as a single thread may be employed in place of two threads, and a single spiral channel and balls therein may be substituted for the construction represented in Fig. 3, it being thought unnecessary to multiply views in the drawings for illustration of such modifications that are embraced within the scope of the claims.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. A hinge, embodying a stationary leaf having a barrel, and a spiral channel therein, another leaf having a barrel diametrically enlarged in its lower portion which is loosely mounted upon the exterior upper surface of the other barrel, a pintle-rod hung loosely from the upper portion of the mounted barrel and pendent therein, and means intervening between the spiral channel and the pendent pintle-rod, adapted for communicating a combined rising and turning movement to the mounted barrel when the leaf thereon is swung from the stationary leaf.

2. A hinge comprising two leaves, each having a barrel, one barrel having a spiral groove extending longitudinally therein, the other barrel being loosely mounted upon and incasing the first-named barrel, a pintle-rod pendent from the upper end of the mounted barrel and depending in both barrels, and a male spiral connection between the pintle-rod and spiral groove.

3. A door hinge and check, comprising two leaves, each having a barrel, a spiral connection between the barrels adapting one barrel to rise when turned on the other barrel, a hollow piston reciprocal in one barrel below said spiral connection, and having a slot or port in its bottom wall, a gate-valve seated over the port when the door is closed, and means actuated by opening the door and thus turning one barrel on the other one, adapted to lift the gate-valve from its seat and simultaneously turn it away from the port, the closure of the door seating the gate-valve, and gradually closing the port.

4. A hinge and check, embodying a pair of hinge-leaves, a spiral connection between said leaves adapting one leaf to turn and rise on the other leaf, a chamber below the spiral connection and carried by one leaf, a piston slidable in said chamber and having a port in its bottom wall, a gate-valve movably seated on said wall and mounted to turn thereon, and a lazy-tongs device actuated by the turning movement of one leaf on the other one, and adapted for lifting and turning the gate-valve.

5. In a door hinge and check, the combination with two rotatably-connected hinge-leaves, each having a barrel on one side edge thereof, a pintle-rod, and means for giving a turning and rising movement to said pintle-rod when the barrels are turned one upon the other by divergence of the leaves, of a chamber in the lower portion of one barrel, a piston having a bottom wall with an arcuate slotted port therein, said piston being slidable in the chamber, a gate-valve seated upon the bottom wall, and a lazy-tongs device connecting the lower portion of the pintle-rod with the piston, said device giving

lifting movement to the piston and simultaneously turning the gate-valve when the pintle-rod is elevated and turned.

6. In a hinge, the combination with a hinge-leaf having a barrel on one side edge and an internal spirally-grooved nut-block mounted upon and extended upward from said barrel, of a mating hinge-leaf, a barrel thereon having the lower end thereof swivelly connected with the upper end of the other barrel, a pintle-rod hung from the upper barrel and extended centrally down into the nut-block, and a spiral formation on the pintle-rod having a loose engagement within the grooved nut-block, the loose engagement of the upper end of the pintle-rod with the barrel that supports it preventing improper friction between the spiral formation and walls of the spiral channel.

7. In a hinge and check, the combination with a hinge-leaf having a barrel on one side edge thereof, a chamber in said barrel, and an internally spirally grooved nut-block extended upward from the barrel, of a mating hinge-leaf, a barrel thereon which is swivelly connected with the upper end of the lower barrel and loosely incases the nut-block, a pintle-rod engaged loosely at its upper end within the upper end of the upper barrel, and extended down through the spirally-grooved bore of the nut-block into the chamber, a piston working in said chamber, means for connecting said piston with the pintle-rod at its lower end, and means carried by the pintle-rod for engaging said rod with the spiral groove in the nut-block, said means causing the rod to traverse and turn in the chamber for actuating the piston.

8. A hinge and check embodying two leaves, a spiral connection between the leaves adapting one leaf to turn on the other leaf, a chamber below said spiral connection, a piston slidable in said chamber and having a port in its bottom wall, a gate-valve held to turn laterally over and from the port, and means actuated by turning one leaf on the other one adapted for lifting the gate-valve from its seat and simultaneously turning it from the port.

9. In a hinge, the combination with a stationary hinge-leaf having a barrel on one side edge of the leaf forming a chamber, a closure at the lower end of said chamber, and an internally spirally grooved nut-block mounted on the upper end of the fixed chambered barrel, of a cylindrical barrel on a like edge of a mating hinge-leaf, said barrel having a diametrically enlarged lower end that is mounted to turn upon the upper end of the lower barrel, a pintle-rod loosely connected with the upper barrel by a transverse cross-head, said rod passing down through the nut-block and having means engaging grooves in the nut-block which means causes the pintle-rod

to longitudinally and spirally traverse the nut-block when the upper barrel is turned on the lower one.

10. In a door hinge and check, the combination with a leaf having a barrel, and a spiral channel longitudinally therein, another leaf having a barrel mounted upon the first-mentioned barrel, a pintle-rod hung from the upper portion of the mounted barrel and pendent in both barrels, and means intervening between the spiral channel and said rod adapted for traversing said channel and giving the upper barrel an upward trend when turned by divergence of the hinge-leaves, of a piston having a slotted bottom wall, a gate-valve, and a lazy-tongs device connecting the piston and said gate-valve with the lower portion of the pintle-rod, comprising a yoke, two links pivoted at their upper ends on depending members of the yoke, a foot-block on the lower end of the pintle-rod, two short links loosely connecting the foot-block with the upper portions of the other links, and two long depending links, said links being pivoted at their upper ends on the lower ends of the last-mentioned links, and at their lower ends loosely connected with a stem which engages the piston and gate-valve.

11. In a door hinge and check of the character described, the combination with two hinge-leaves supported to turn one in the other, and a chamber on the lower portion of one leaf, of a piston having an arcuate port in its bottom wall, a flat gate-valve engaging said bottom wall, and means for turning and simultaneously lifting the gate.

12. In a door hinge and check of the character described, the combination with two hinge-leaves and spiral connections therefor, of a chamber formed in a barrel on one of said leaves, a piston slidable in said chamber and having a port in its bottom wall, a gate-valve seated in said piston and adapted to be turned upon and lifted from said bottom wall, and means for turning and lifting said gate-valve.

13. In a door hinge and check of the character described, the combination with two hinge-leaves each having a barrel, one barrel having a chamber in its lower portion, and the other barrel turning on the first-mentioned barrel, of a piston fitted liquid-tight in said chamber, a pin-and-grooved connection between the side wall of the chamber and corresponding wall of the piston, said piston having a bottom wall and a port therein, a gate-valve, and means for turning and lifting said gate-valve.

14. In a door hinge and check of the character described, the combination with two hinge-leaves, each having a barrel on one edge, one barrel being mounted upon the other one, and a cylindrical nut-block on the lower barrel having a central bore, and a spi-

ral channel in the wall of said bore, of a pin-
tle-rod having a male thread formed thereon
that engages the spiral channel, a cross-head
loosely mounted on the upper end of the pin-
5 tle-rod and having trunnions on its ends
which loosely engage opposite perforations in
the side wall of the mounted barrel, thus
adapting the rotatable movement of said bar-
rel to correspondingly turn the pintle-rod

and cause it to traverse the nut-block up- 10
wardly.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

CHARLES E. TREADWELL.

Witnesses:

T. H. THOMAS,
A. V. TAYLOR.