

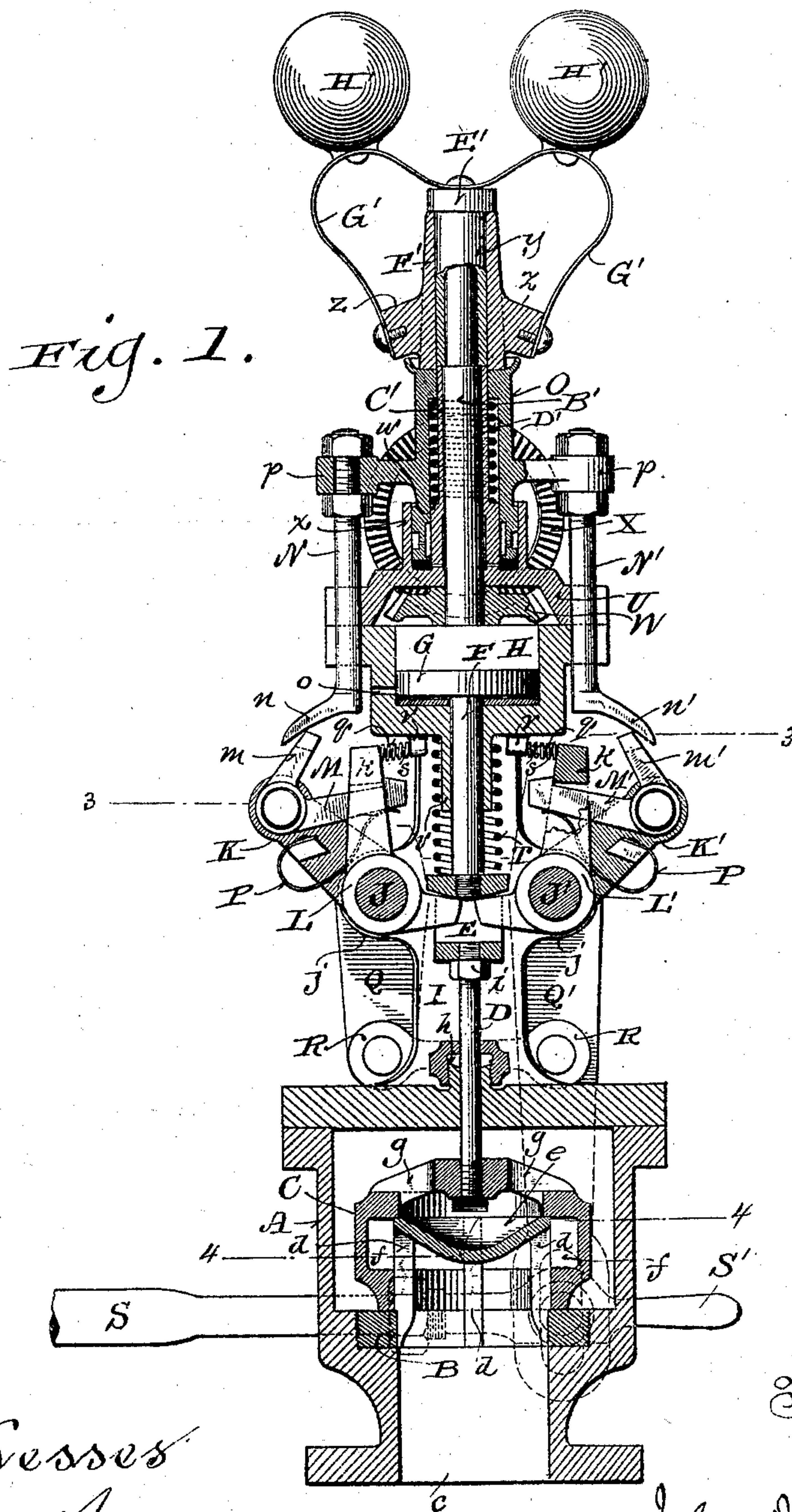
(No Model.)

2 Sheets—Sheet 1.

J. D. SILBERZAHN.
GOVERNOR.

No. 505,279.

Patented Sept. 19, 1893.



Witnesses
Geo W. Loring
W. E. Cliphant

Inventor
John D. Silberzahn
By H. G. Underwood
Attorney

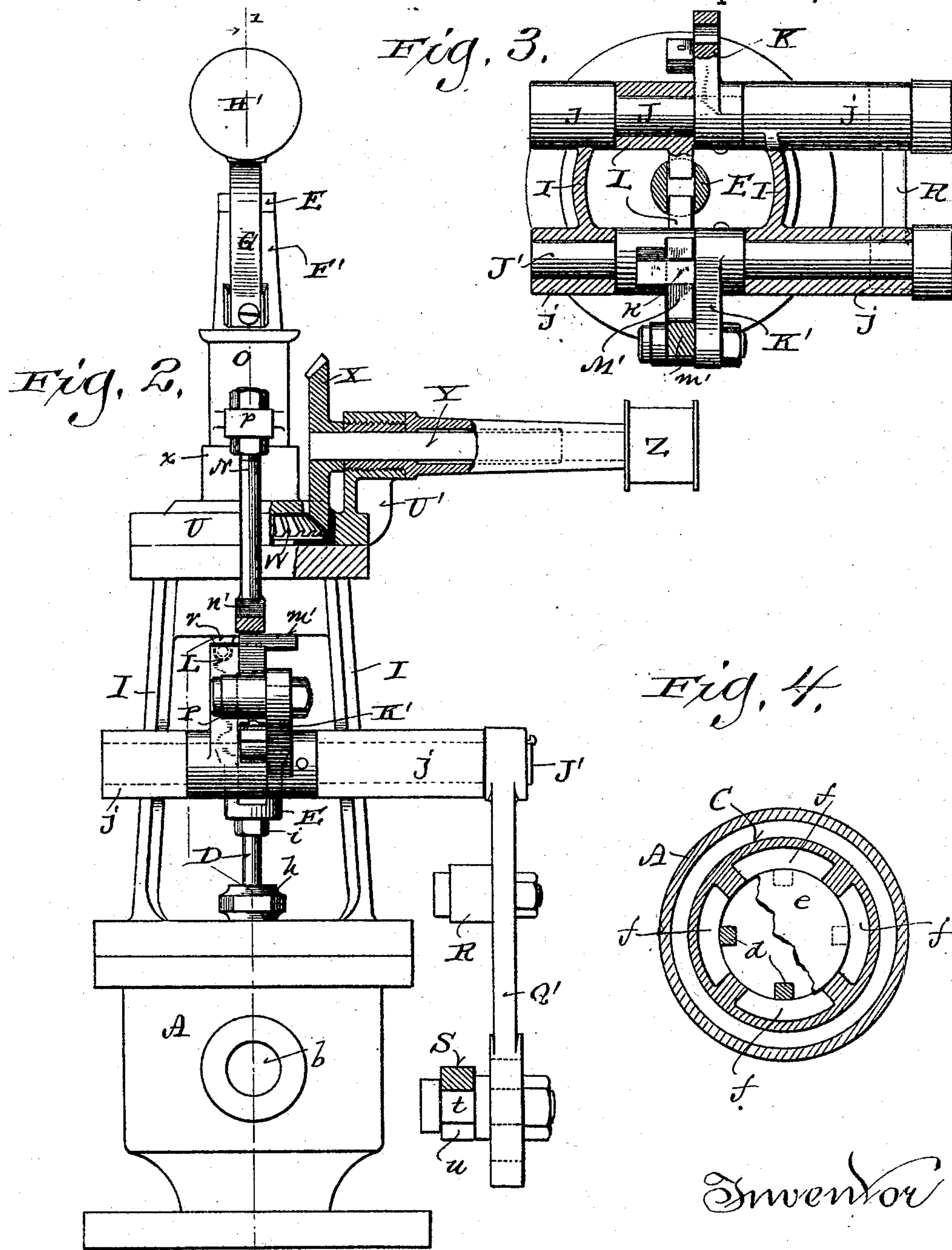
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UNITED STATES PATENT OFFICE.

JOHN D. SILBERZAHN, OF WEST BEND, WISCONSIN.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 505,279, dated September 19, 1893.

Application filed May 5, 1893. Serial No. 473,071. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. SILBERZAHN, a citizen of the United States, and a resident of West Bend, in the county of Washington, and in the State of Wisconsin, have invented certain new and useful Improvements in Governors; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has for its object to provide a simple, economical and durable governor of that class designed for attachment to the steam-inlet nozzle of a slide-valve, rocking valve or similar throttling engine whereby the latter is converted into an automatic cut-off engine; and it consists in certain peculiarities of construction and combination of parts hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings: Figure 1 represents a vertical transverse section of my improved governor; Fig. 2, an elevation of the same with parts broken away, and Figs. 3 and 4, horizontal sections respectively taken on lines 3—3 and 4—4 of Fig. 1.

Referring by letter to the drawings A represents a chest that constitutes the base of my governor and is provided with a steam-inlet *b* as well as a steam-outlet *c*, the latter being for communication with an engine cylinder.

Screw-threaded or otherwise detachably arranged within the steam-chest is a horizontal ring B provided with a series of upwardly extended arms *d* that serve as guides for a reciprocative valve C, and these guides are connected at their upper ends by a plate *e*, the latter being preferably dish-shaped, as illustrated in Fig. 1. The valve C is in the form of a ring provided with a series of recesses *f* open to its inner circumference, and a spider *g* joined to the upper portion of the ring has a screw thread or other suitable connection with the lower end of a vertical stem D that enters the steam-chest through a stuffing box *h* in the top of the same. The upper end of the valve-stem has a screw-threaded or other suitable connection with a shackle E that depends from the rod F of a piston G, this piston being arranged in a flanged dash-pot H mounted on standards I that rise from the

steam-chest. By having the valve-stem screw-threaded to the shackle and provided with a set-nut *i*, as shown in Fig. 1, I provide for an adjustment of the valve to its seats, it being observed that this valve not only seats on the ring B, but owing to an inward extension above the recesses therein it also seats on the plate *e* connecting the guides that rise from said ring, whereby steam is permitted to escape from the chest at the bottom and top of said valve when the latter is lifted. It is also to be observed that the steam pressure on the valve is so distributed that said valve is perfectly balanced.

The standards I are provided with horizontal bearings *j* for parallel shafts J, J', that have rigid lever arms K K' and loose on these shafts adjacent to the lever-arms are bell-cranks L L' each of which latter has one arm thereof engaging the shackle above specified. The other arms of the bell-cranks are provided with suitable lugs *k* for engagement with hooks M M' pivotally connected to the levers K K' and provided with extended fingers *m m'* that come against outward and downwardly extended trip-feet *n n'* at the lower ends of vertical rods N N' adjustably connected to horizontal lugs *p* on a loose sleeve O hereinafter more particularly specified, the adjustment being controlled by means of set-nuts above and below the lugs engaging the screw-threaded upper ends of said rods.

Flat springs P, fast to projections on the levers K K' bear against the hooks M M' and spiral buffer springs *q* are arranged intermediate of the bell-crank arms and lugs *r* depending from the dash-pot above specified, these lugs being provided with stems *s* that engage and support the latter springs.

Rigid on the shafts J J' are depending cranks Q Q', united by a link R, and the latter one of these cranks is provided with a vertically adjustable wrist-pin *t* for the engagement with a slot *u* in one end of a rod S that connects with an eccentric or other suitable movable part of an engine to which my governor may be applied, the free end of this connecting rod being in the form of a handle S' to facilitate disengagement with the wrist-pin.

Surrounding the piston-rod guide *v* that depends from the dash-pot H is a spiral-spring

T that bears against the shackle E above specified, and supported on the flanged portion of said dash-pot is a circular plate U recessed upon its under side to give clearance
 5 for a miter-wheel W in mesh with a like wheel X fast on a shaft Y that has its bearing in a bracket U' on said plate and is provided with a pulley Z or some other suitable device for the transmission of power derived from the
 10 aforesaid engine. Registering slots in the plate U and the dash-pot flange serve as guides for the trip-rods N N' hereinbefore specified. The miter-wheel W is fast on a vertical shaft B' having its bearing in a hollow stem C' that
 15 rises from the plate U and is shouldered at *w* to form a seat for a spiral-spring D' inclosed by and supporting the loose sleeve O above specified, the lower end of this sleeve being free in a socket *x* that also rises from said
 20 plate.

By means of suitable channels and ports clearly illustrated in Fig. 1, lubricant deposited in the socket *x* is distributed to the friction surfaces of the spring-supported sleeve
 25 as well as to the vertical shaft above specified, and said socket also serves to steady the reciprocative movement of said sleeve and the rods N N' connected thereto.

The upper portion of the vertical shaft B' is shown reduced to form a shoulder between
 30 which latter and a head E' I arrange a cylindrical guide *y* for a loose sleeve F' that abuts against the sleeve O hereinbefore set forth, said head being fast to said shaft. The sleeve
 35 F' loose on the guide *y* is provided with lateral lugs *z* to which the ends of a flat-spring G' are detachably secured by screws or other suitable means, this spring being centrally
 40 secured to the head E' and forming a pair of bows to each of which latter a ball H' is made fast.

It is to be observed that there is a lateral opening *o* in the dash-pot H adjacent to the
 45 bottom of the latter, and that when the piston G descends this opening is cut-off, and thus I provide for a rapid descent of said piston and at the same time cushion its downstroke whereby there is a gentle seating of the valve.

In the operation of my invention the shafts
 50 J J' are rocked in their bearings by the oscillation of the connected cranks Q Q', due to the movement of the rod S, and thus motion is imparted to the lever arms K K' fast on
 55 said shafts. When the shafts and lever-arms rock in one direction the spring-controlled hook M will pull on the bell-crank L, and thereby cause a lift of the shackle E and valve C that has its stem connected thereto,
 60 while at the same time there is a lift of said shackle against the resistance of the spring T and an upward movement of the piston G in the dash-pot. This operation continues and the valve is open until the finger *m* of
 65 the hook M comes into contact with the foot *n* on the rod N and because of the resistance of this foot said hook is depressed against

the power of the spring P and thereby tripped out of engagement with the bell-crank L at
 70 which time the recoil of the spring T returns said bell-crank, piston and valve to their normal position thereby cutting off the escape of steam from the chest. The rock of the shafts
 75 J J' and lever arms K K' in the reverse direction returns the hook M to its normal position in engagement with the bell-crank L, and at the same time the hook M' actuates the other bell-crank L' to cause another lift of the shackle
 80 E connecting the valve-stem and piston-rod, said hook being eventually tripped by contact of its finger *m'* with the foot *n'* on the rod N' to thus permit of another cut-off by
 85 said valve. From the operation as thus far described it will be seen that the valve is opened and closed each time the rod S moves
 90 forward or back, and when occasion requires this rod may be readily disconnected from the governor to prevent the engine from taking steam.

The trip of the hooks M M' is at greater
 95 or less intervals in proportion as the feet *n* *n'* of the rods N N' are more or less in the paths of the fingers *m* *m'* on said hooks, a result dependent on the speed of the engine. If the engine be running at high speed, move-
 100 ment of the balls H', due to centrifugal force engendered by their rotation, will, through the spring G, exert power on the abutting sleeve F', O, to automatically lower the same and the rods N N', whereby the intervals of
 105 contact between the trip-hook fingers *m* *m'* and the feet *n* *n'* on said rods will be shortened thus providing for a quicker cut-off of the valve. The downward movement of
 110 the sleeve O contracts the spring D' and if the engine slows up the expansion of this spring will lift the said sleeve and the tripping-rods to thereby lengthen the interval of
 115 contact of the trip-hook fingers with the opposing feet, thus permitting the valve to remain open long enough to supply the engine-cylinder with a sufficient amount of steam.

Having thus described my invention, what I claim as new, and desire to secure by Letters
 120 Patent, is—

1. The combination of a steam-chest, a valve controlling the outlet of the chest, an automatic lift-and-trip mechanism governing the movement of the valve, a dash-pot having
 125 a lateral opening therein adjacent to its bottom, and a piston in the dash-pot, this piston being operated in unison with the valve and having such thickness as to cut-off the lateral opening in said dash-pot when moving in the direction necessary to a seating of said valve,
 130 substantially as set forth.

2. The combination of a steam-chest, a valve controlling the outlet of the chest, a spring-resisted shackle connected to the valve, a dash-pot supported on standards ris-
 135 ing from said chest, a piston in the dash-pot having a rod connection with the shackle, a pair of linked together rocking shafts having bearings on the standards and provided with

lever-arms, bell-cranks loose on the shafts and engaging said shackle, spring-controlled hooks that are pivoted to the lever-arms and exert power on the bell-cranks, fingers extended from the hooks, and automatically adjustable trips in the paths of the fingers, substantially as set forth.

3. The combination of a steam-chest, a valve controlling the outlet of the chest, a spring-resisted shackle connected to the valve, a dash-pot supported on standards rising from said chest, a piston in the dash-pot having a rod connection with the shackle, a pair of linked together rocking shafts having bearings on the standards and provided with lever-arms, bell-cranks loose on the shafts and engaging said shackle, buffer springs interposed between arms of the bell-cranks and lugs depending from the dash-pot, spring-controlled hooks that are pivoted to the lever-arms and exert power on the bell-cranks, fingers extended from the hooks, and automatically adjustable trips in the path of the fingers, substantially as set forth.

4. The combination of a steam-chest, a valve controlling its outlet, a lift-and-trip mechanism for the valve, rotative speed-governing balls, a reciprocative sleeve actuated by movement of the balls due to centrifugal force, a movable spring-controlled device in the path of the former sleeve, and feet carried by the spring-controlled sleeve to come in the paths of fingers extended from hooks that constitute parts of the aforesaid lift-and-trip mechanism, substantially as set forth.

5. The combination of a steam-chest, a valve controlling its outlet, a lift-and-trip mechanism for the valve, a rotative shaft, speed-governing balls connected to the shaft, a cylindrical guide maintained on the shaft, a sleeve loose on the guide and controlled as to movement by said balls, a stationary hollow stem engaging said shaft and provided with an exterior annular shoulder, a spiral spring supported on the shoulder, another sleeve that engages the stem against the resistance of the spring and abuts against the ball controlled sleeve; and feet carried by the spring-controlled sleeve to come in the paths of fingers extended from hooks that constitute parts of the aforesaid lift-and-trip mechanism, substantially as set forth.

6. The combination of a steam-chest, a valve controlling its outlet, a lift-and-trip mechanism for the valve, a stationary base

having a socket and an exteriorly shouldered hollow stem rising therefrom, a shaft rotative in the stem, speed-governing balls connected to the shaft, a cylindrical guide maintained on the shaft, a sleeve loose on the guide and controlled as to movement by said balls, a spiral-spring supported on the stem-shoulder, another sleeve that engages said stem against the resistance of the spring, enters the socket on said base and abuts against the ball-controlled sleeve; suitable channels and ports for conveying lubricant from said socket to the aforesaid stem and rotative shaft, and feet carried by the spring-controlled sleeve to come in the paths of fingers extended from hooks that constitute parts of the aforesaid lift-and-trip mechanism, substantially as set forth.

7. The combination of a steam-chest, a valve controlling its outlet, a spring-resisted shackle connected to the valve, a flanged dash-pot supported on standards rising from the chest, a piston in the dash-pot having a rod-connection with the shackle, a pair of linked together rocking shafts having bearings on the standards and provided with lever-arms, bell-cranks loose on the shafts and engaging said shackle, spring-controlled hooks that are pivoted to the lever-arms and exert power on the bell-cranks, fingers extended from the hooks, a plate supported on the dash-pot flange, an exteriorly shouldered hollow-stem rising from the plate, a shaft rotative in the stem, speed governing balls connected to the shaft, a cylindrical guide maintained on the shaft, a sleeve loose on the guide and controlled as to movement by said balls, a spiral spring supported on the stem-shoulder, another sleeve that engages said stem against the resistance of the spring and abuts against the ball-controlled sleeve, rods secured to the spring-controlled sleeve and engaging registering slots in the dash-pot flange and plate supported thereon; and feet on these rods that come in the paths of the fingers belonging to the aforesaid hooks, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at West Bend, in the county of Washington and State of Wisconsin, in the presence of two witnesses.

JOHN D. SILBERZAHN.

Witnesses:

CHAS. H. SILBERZAHN,
HERMAN BARTH.