

(No Model.)

2 Sheets—Sheet 1.

P. GRÜDELBACH.

CUT-OFF VALVE GEAR.

No. 273,512.

Patented Mar. 6, 1883.

Fig. 1.

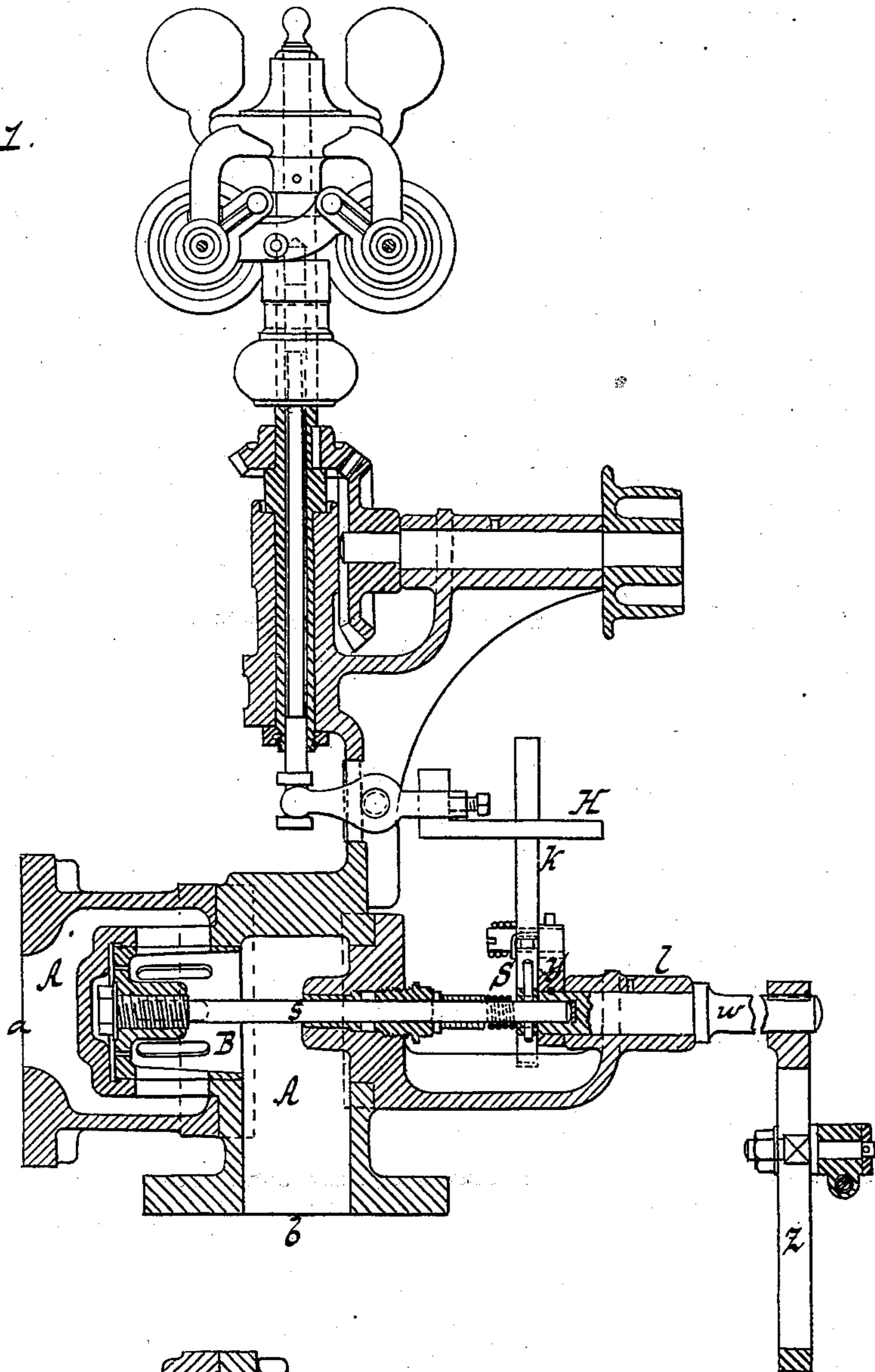
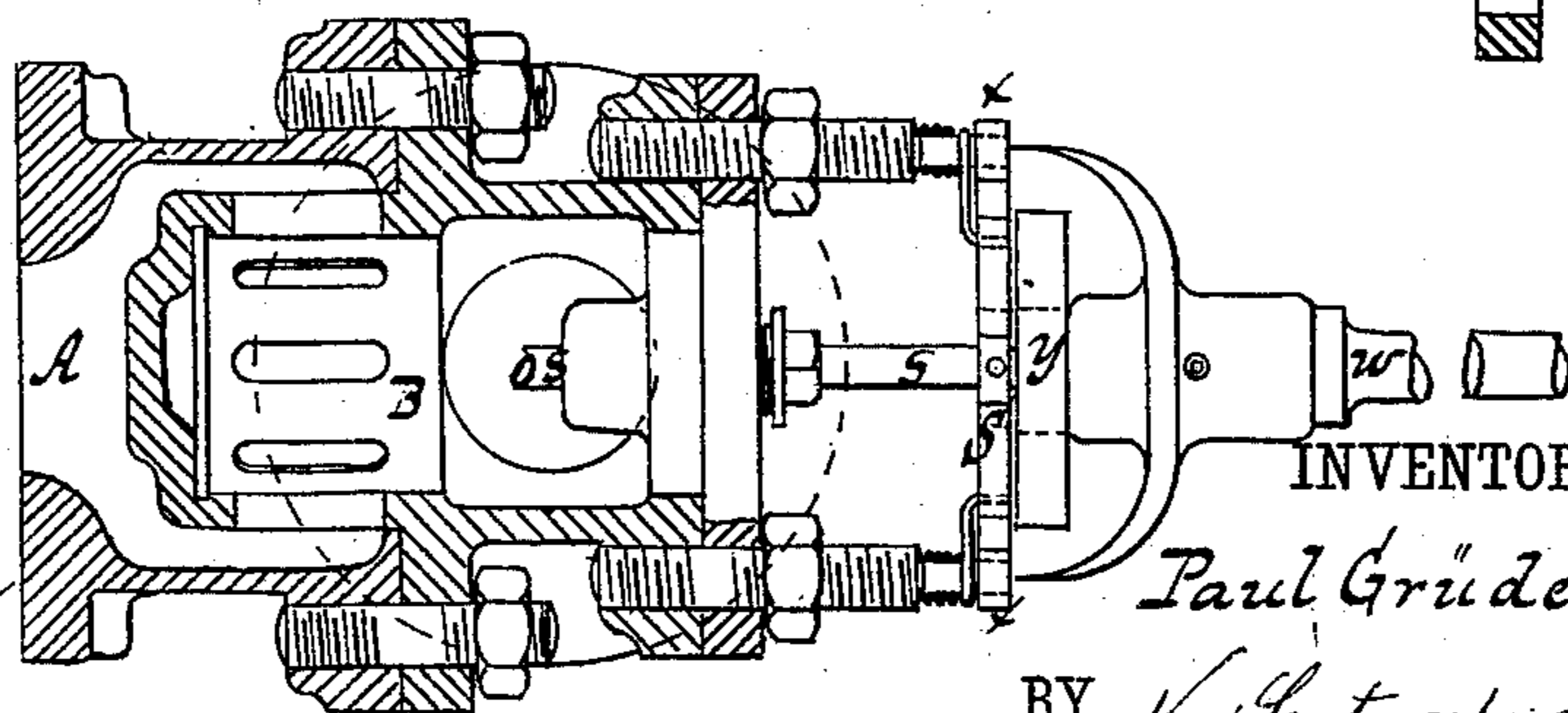


Fig. 2.



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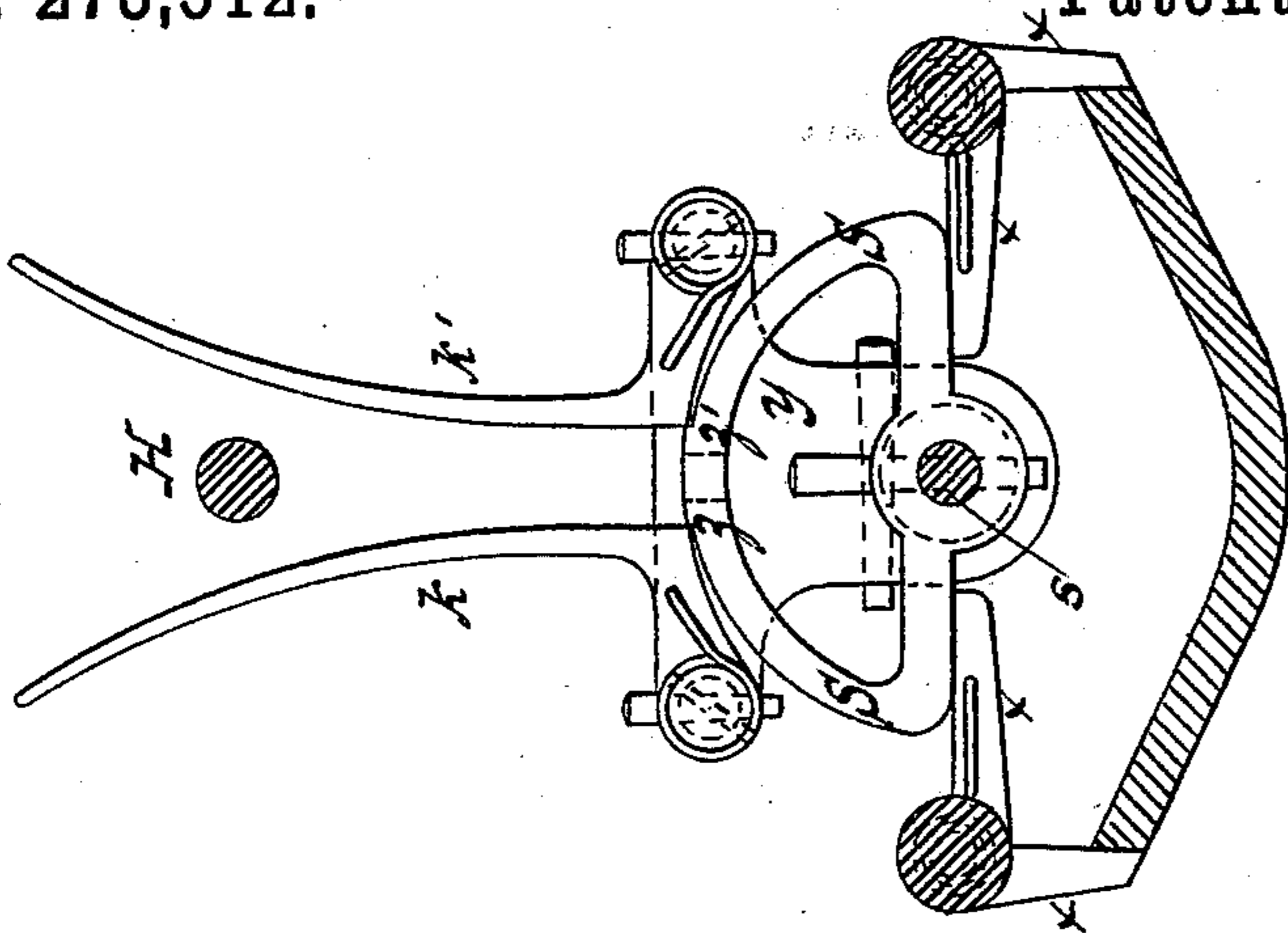


Fig. 5.

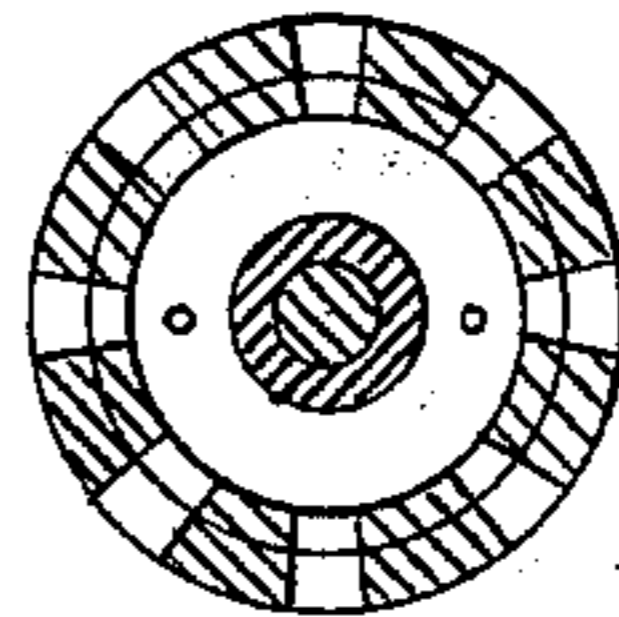


Fig. 3.

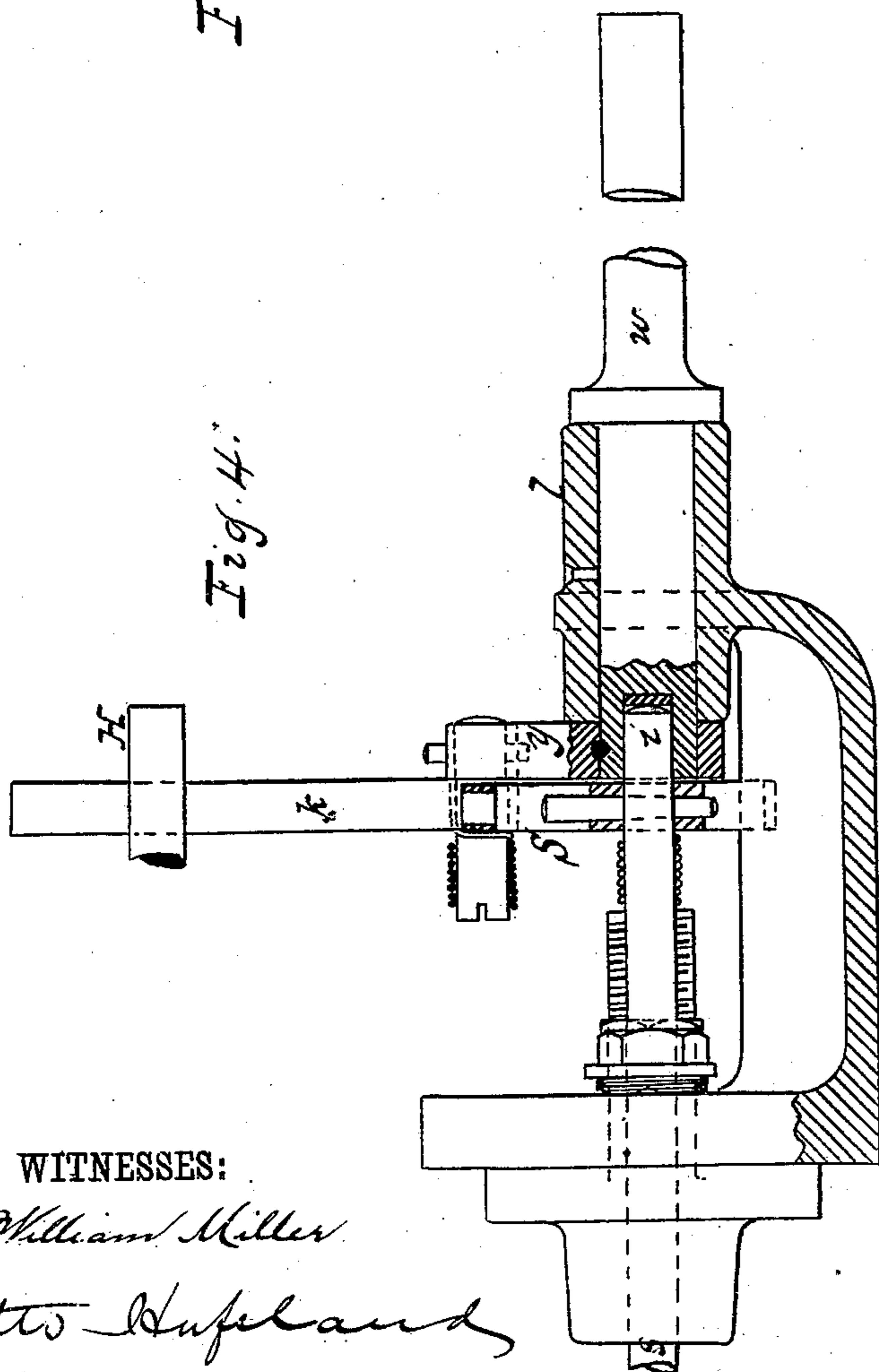


Fig. 4.

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UNITED STATES PATENT OFFICE.

PAUL GRÜDELBACH, OF BERLIN, ASSIGNOR TO SCHAEFFER & BUDENBERG,
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CUT-OFF-VALVE GEAR.

SPECIFICATION forming part of Letters Patent No. 273,512, dated March 6, 1883.

Application filed December 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, PAUL GRÜDELBACH, a subject of the Kingdom of Prussia, German Empire, residing at Berlin, Prussia, have invented a new and useful Improvement in Cut-Off-Valve Gear, of which the following is a specification.

This invention relates to a governor, the regulation or governing being accomplished by a cut-off automatically set by the governor, and the apparatus operates in such a manner that at the beginning of the stroke the steam is allowed to flow into the valve-chest with full pressure, and it is cut off sooner or later, according to the lower or higher position of the regulator. The operation of the governor is thus similar to that in steam-engines with automatically-changing cut-off, excepting in regard to the fact that the steam in the valve-chest has partially to expand twice for each revolution of the machine.

The construction in which this apparatus chiefly differs from other apparatuses for the same purpose is shown in the accompanying drawings, in which—

Figure 1 is a vertical central section. Fig. 2 is a plan view, partly in section. Fig. 3 is an end view, in section, of the valve. Fig. 4 is an enlarged view of part of Fig. 1. Fig. 5 is an end view, enlarged, of part of the apparatus.

Similar letters indicate corresponding parts.

The steam flows from the boiler through the casing A into the valve-chest either in the direction from *a* to *b* or from *b* to *a*.

B is an oscillatory rotary valve, which is mounted on a spindle, *s*. Upon this spindle *s* is firmly keyed or mounted a segment, S, against which strike spring arms or levers *x x*. These levers *x x* each consist of two branches, one of which strikes against a fixed part of the machine, thus limiting the motion in one direction. The other branch is caused to strike against the segment S by means of a spring or weight, thus holding the segment S, and consequently the valve B, in a certain position, and the valve is closed. In the view shown in the drawings, coiled springs are shown mounted on the brackets on which the pivots about which the levers *x x* oscillate are formed, and one end of each spring catches into a slot in

one branch of the levers *x x*, thus throwing one branch of each lever against the segment S.

The letter Z represents a bar or lever, which is in connection with the eccentric or other part of the machine, so that an oscillating motion is imparted to it, which is communicated to the shaft *w*. This shaft *w* is provided with a recess or shoulder, in which the end of spindle *s* rests, but so that said spindle *s* can turn independently of the shaft *w*. On the shaft *w* is firmly keyed or mounted a bracket, *y*, on which are pivots about which the arms *k k'* oscillate. These arms *k k'* are held in contact with the segment S by springs or weights. In the view shown in the drawings coiled springs are shown to keep the arms *k k'* in contact with the segment S, said springs being applied in the same manner as the coiled springs in connection with the levers *x x*. When the lever Z receives an oscillating motion from the eccentric this motion is communicated through the arms *k k'* and segment S to the valve B, the parts being so combined that the valve is opened each time when the crank is on the line of dead-center—that is, twice in one revolution. The connection between the lever Z and the valve B, as is seen, is not fixed; but the movement of the latter is indirectly, through the segment S and arms *k k'*, dependent upon the eccentric. The segment S and arms *k k'* serve to make the period of cutting off the steam dependent upon the position of the governor, as presently described. On the shaft *w*, turning freely in the support *l*, is firmly mounted the bracket *y*, with the arms *k k'*, as already described. On the spindle *s* the segment S is firmly mounted, said segment having shoulders *z z'*. As the arms *k k'* are pressed onto the segment S the lever Z comes into firm connection with the spindle *s*, imparting its oscillations, through shaft *w*, arms *k k'*, shoulders *z z'*, segment S, and spindle *s*, to the valve B; but this connection lasts for each oscillation of lever Z only so long as the respective arm *k* or *k'* is in gear with segment S. The putting out of gear of these arms *k k'* depends on the position of the lever H, lying between the arms *k k'*, and the position of which is higher or lower, according to the movement of the governor. The governor, be-

ing of any well-known construction, (weights which are caused to fly out by centrifugal force thus causing the arm of the lever H between the arms $k k'$ to descend,) receives motion in the ordinary way. According as the governor mounts higher or sinks lower, the arms $k k'$ come into contact sooner or later with the lever H, and the steam is accordingly cut off sooner or later. If the machine goes faster, the arms $k k'$ come into contact sooner with the lever H, and if the machine goes slower they come into contact later. Whenever one of the arms $k k'$ thus comes into contact with the lever H it is lifted out of gear with the corresponding shoulder, z or z' , on segment S, the segment S is forced back to the central or closing position by the levers $x x$, and the valve is closed. The number of revolutions in the machine thus governs the length of time the steam is allowed to flow in. As the arms $k k'$ strike perpendicularly against the lever H, the latter is not influenced in its rising or falling by the power requisite to overcome the tension of the springs or weights acting on said arms $k k'$, and the governor has not to exercise great force. As the spindle s has its end resting in an exactly-fitting shoulder or recess, i , thereby reducing the friction to a minimum, the varying pressure of steam for the cross-section of the stuffing-box, through which the spindle s passes, does not affect the apparatus. This, in connection with the fact that the operation of the valve B requires only a slight turning, whereby the stuffing-box friction of an axially-reciprocating bar is avoided, constitutes one of the advantages of this construction.

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

1. The combination, with a governor for steam-engines, having an automatically-varying cut-off, of an oscillating valve opening in two directions, and provided with a spindle turning in a stuffing-box, said spindle resting against a shoulder or support upon the end of a shaft having an oscillating lever mounted thereon, substantially as and for the purpose set forth.

2. In a governor apparatus, the combination, with the segment S, of arms $k k'$, moving in a plane perpendicular to the plane of movement of the governor-arm H, substantially as and for the purpose set forth.

3. In a governor, the combination, with an oscillating valve and spindle s , of a segment, S, levers $x x$, and arms $k k'$, substantially as and for the purpose set forth.

4. In a governor, the combination, with an oscillating valve and spindle s , of a segment, S, levers $x x$, and arms $k k'$, said arms $k k'$ being operated by a shaft, w , provided with a shoulder or recess, i , substantially as and for the purpose set forth.

In testimony that I claim this as my own I have hereunto set my hand and seal in the presence of two subscribing witnesses.

PAUL GRÜDELBACH. [L.S.]

Witnesses:

BRUNO KNIFFLE,
B. ROl.