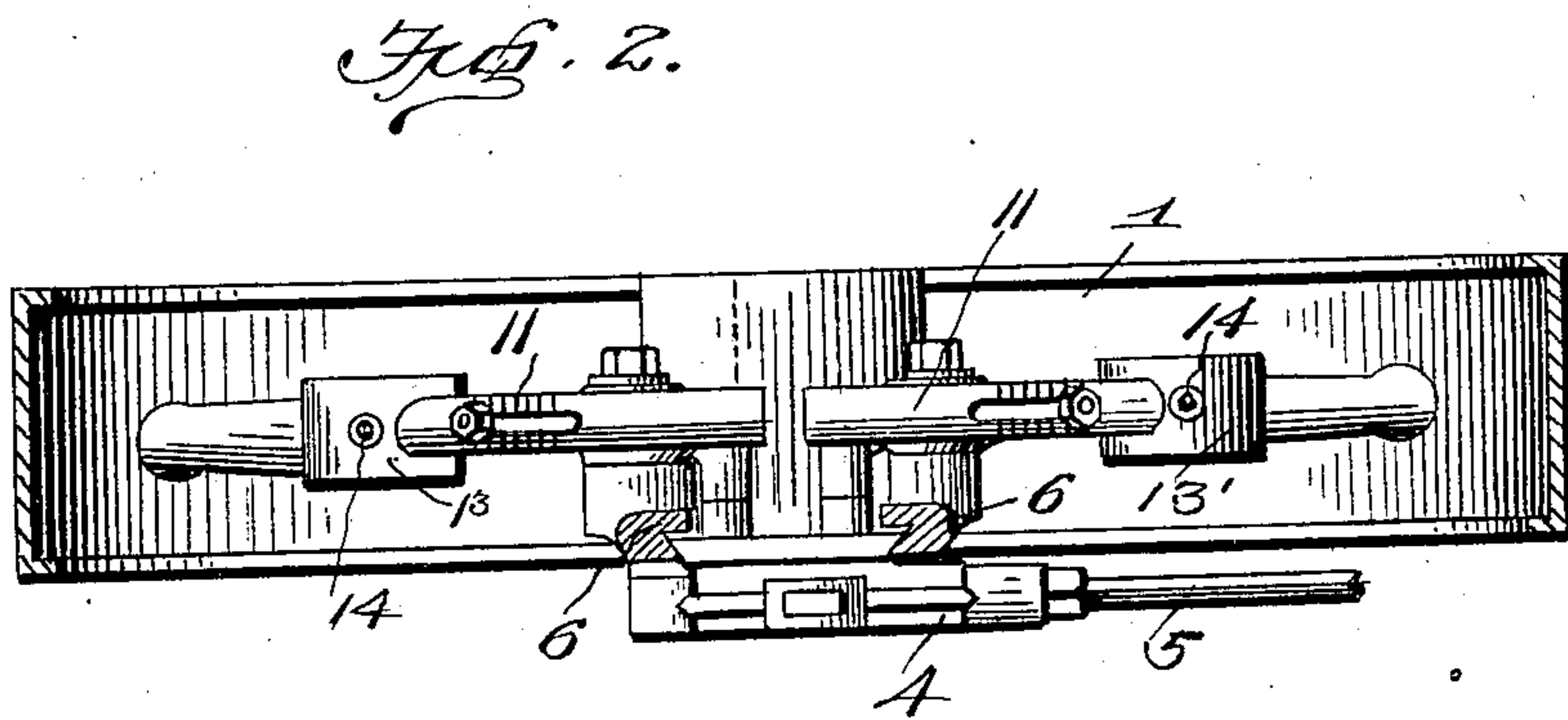
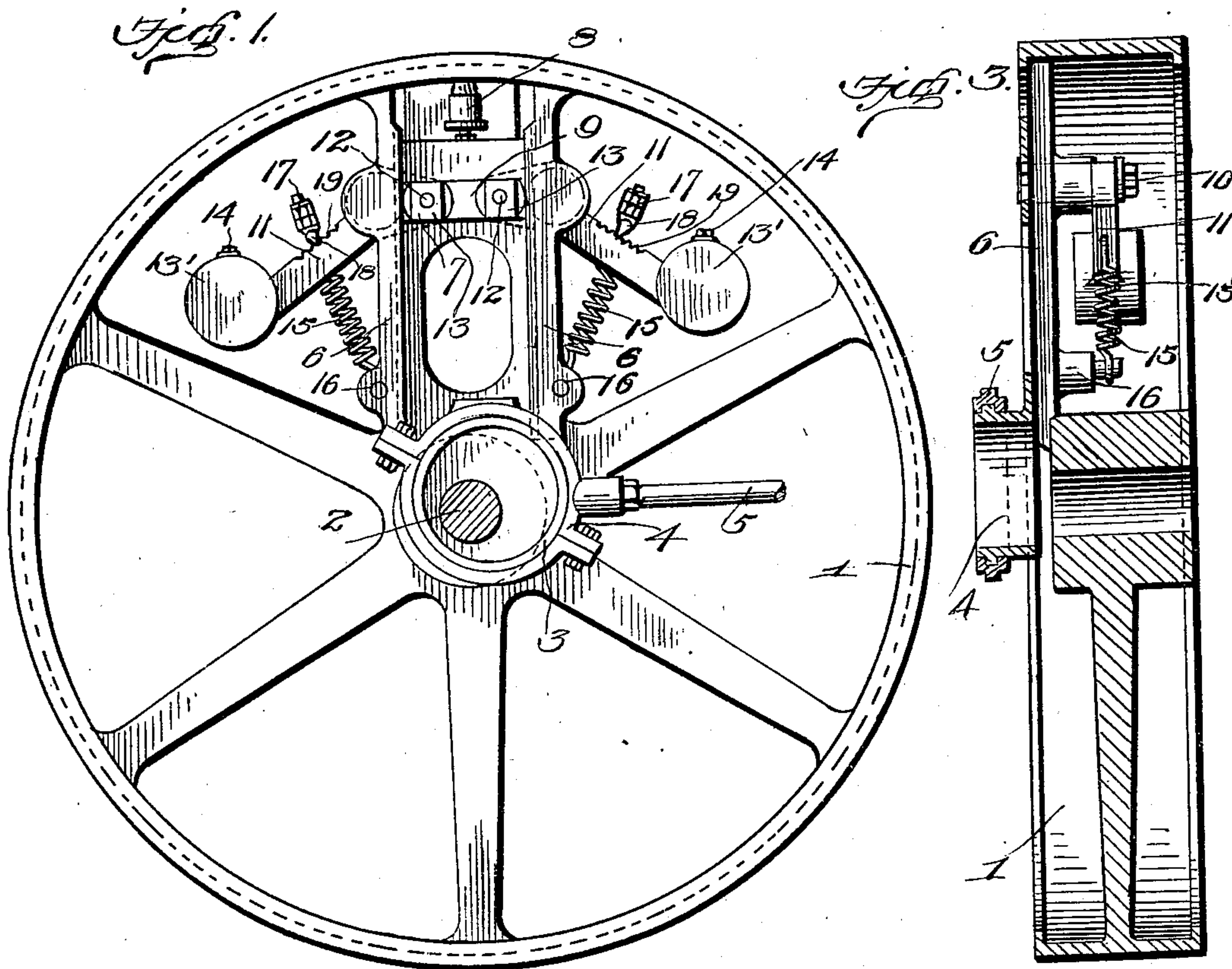


No. 728,707.

PATENTED MAY 19, 1903.

J. HARDILL.
ENGINE GOVERNOR.
APPLICATION FILED JULY 14, 1902.

NO MODEL.



Inventor

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Witnesses

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UNITED STATES PATENT OFFICE.

JOSEPH HARDILL, OF MITCHELL, CANADA, ASSIGNOR OF ONE-HALF TO
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ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 728,707, dated May 19, 1903.

Application filed July 14, 1902. Serial No. 115,514. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH HARDILL, a subject of the King of Great Britain, residing in the town of Mitchell, in the county of Perth and Dominion of Canada, have invented certain new and useful Improvements in Engine-Governors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to engine-governors; and its object is to provide a simple and efficient governor adapted to operate in connection with a pin or eccentric motion in such manner that no matter at what point of cut-off the engine is working the lead of the valve will always be the same either at friction or full lead.

With the above and other objects in view, which will readily appear as the nature of the invention is better understood, said invention consists in certain novel features of construction and combination and arrangement of parts, which will hereinafter be fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a governor-wheel, eccentric-motion, and governor embodying my invention. Fig. 2 is a horizontal section of the same on the line of the pivots of the governor-arms. Fig. 3 is a central vertical section.

Referring now more particularly to the drawings, 1 represents a governor or fly-wheel; 2, the shaft on which it is mounted; 3, an eccentric; 4, the eccentric-strap, and 5 the controlling valve-rod connected to said strap. Extending radially between the hubs and the rim of the wheel are guides 6, in which radially reciprocates a slide 7, connected at its inner end to the eccentric 3. This slide is connected at its outer end to the stem of a piston working in a dash-pot 8, secured to the rim of the wheel, and is provided with a transverse slot 9.

Fulcrumed upon pins 10, projecting from the guides 6, are bell-crank governor-arms 11, the shorter arms of which are provided with pins 12, carrying securing-nuts 13 and arranged to slide in the slot. The long arms

of the governors project in opposite directions and are provided at their free ends with hollow governor-weights 13', each having an opening closed by a plug 14, whereby access may be had thereto for inserting and removing shot or other weights for increasing or decreasing the weights, as desired. The outward swing of the governors is controlled by springs 15, secured at their inner ends to lugs 16, projecting from the guides 6 and connected at their outer ends to the long arms of the governors, so as to be adjustable to regulate their resistance to the outward movement of the arms and vary the sensitiveness of the governors as desired. This is preferably effected by threading the outer ends of the springs to receive adjusting-nuts 17, bearing upon tapered pins or pivot-bearings 18, adapted to engage notches 19 in the lever-arms, each arm being provided with a series of such notches, so that the connection of the springs between the pivot-pins 10 and the weights 13' may be regulated to increase or decrease the resistance of the springs to the outward movement of the arms, and thereby make the action of the governor more sensitive.

In operation as the wheel revolves and the valve-rod 5 is reciprocated by the action of the eccentric 3 the throw of the said eccentric is regulated according to the speed of the wheel by the action of the governors, which when the speed passes beyond the normal swing outwardly under the action of centrifugal force and cause the pins 10 to slide inward in the slot 9 and at the same time to force the slide 7 radially inward, so as to change the throw of the eccentric 3, thereby regulating the movement of the rod 5, so as to cause the valve to have shorter travel or entirely cut off the supply of steam to the engine, according to the load and steam-pressure. When the speed of the engine is too slow, the governor-arms are drawn inward by the action of the springs, thus forcing out the slide 7 and causing the eccentric to have greater travel and open the valve wider to admit a fuller supply of steam to the engine, and this action to a greater or less degree is also effected as the governor-weights are turning to their normal positions upon the slackening of speed of the engine, owing to

the reduction of steam-supply when the engine has been running at abnormal speed, the movement of the slide being sensitively regulated to vary the throw of the eccentric to a greater or less degree to cause the valve to be operated to supply a greater or less amount of steam to the engine, as circumstances require. The outward movement of the slide 7 is of course restrained by the dash-pot 8, which cushions the slide on its outward or inner movement, thereby causing the engine to run more smoothly under varying loads.

From the foregoing description, taken in connection with the accompanying drawings, the construction, mode of operation, and advantages of my improved engine-governor will, it is thought, be readily apparent.

It will be seen that the invention provides an automatic governor adapted to operate in connection with pin or eccentric gearing in such manner that no matter what point of cut-off the engine is working the lead of the valve will always be the same either at friction or full load, besides maintaining an equal point of cut-off on both ends of cylinder and avoiding an unequal amount of work being done by either end of cylinder at full load when valve is set true at friction load, this result being obtained by keying the governor-wheel in proper relation when the pistons are at dead-center and placing the pin or eccentric to one side of the slide in proper

proportion to the valve travel, so that the change only takes place between dead-centers, also that a governor mechanism as provided is as far remote from the center of the shaft as possible, thus enabling quick action of the governor to be secured.

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

In an automatic governor for engines, the combination with a rotatable governor-wheel provided with radial guides, of an eccentric and connections for operating a controlling-valve, a slide radially movable in said guides and connected to the eccentric and provided with a transverse slot, bell-crank levers fulcrumed upon the guides and each having a long arm carrying a weight and formed with notches and a short arm provided with a projection slidable in said transverse slot, and springs for resisting the movement of said levers, said springs being secured at one end to the guides and provided at their free ends with adjustable pivot-bearings to engage the notches in the long arms of said levers, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOSEPH HARDILL.

Witnesses:

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ROBT. BENSON.