

(No Model.)

F. J. WATERS.
ENGINE GOVERNOR.

No. 485,361.

Patented Nov. 1, 1892.

Fig. 1.

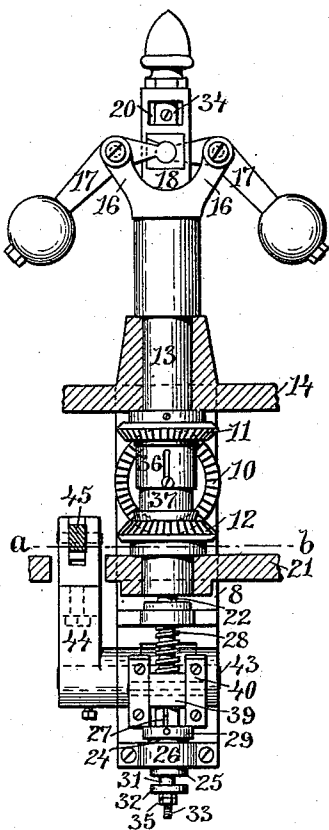


Fig. 3.

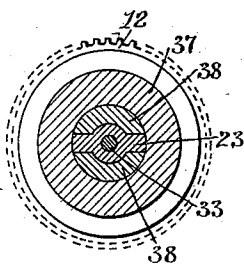


Fig. 2.

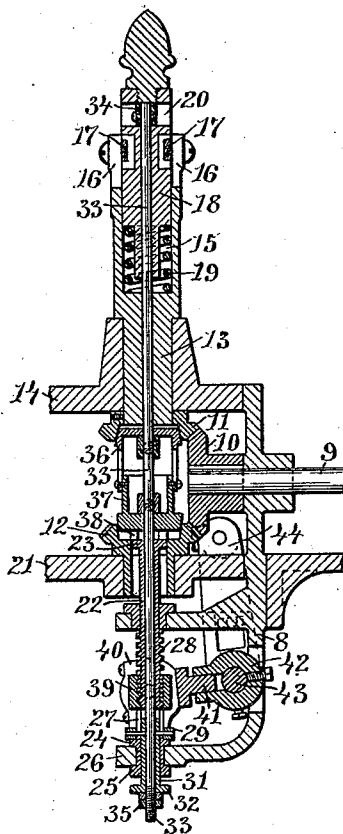
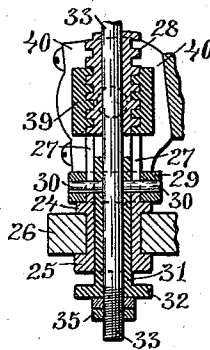


Fig. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANK J. WATERS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO GEORGE HOWE, OF SAME PLACE.

ENGINE-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 485,361, dated November 1, 1892.

Application filed April 25, 1892. Serial No. 430,506. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. WATERS, of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Engine-Governors; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in automatic governors for steam or other engines.

The object of this invention is to produce a governor which will automatically control the mechanism by which the cut-off valves of an engine are operated.

Another object of the invention is to produce a governing device by which the speed of an engine may be more perfectly balanced than by those as heretofore constructed.

The invention consists in the novel combination of peculiar parts, whereby two oppositely-rotatable gears are alternately engaged by a suitable clutching device located between said gears to shift the mechanism for controlling the cut-off valves.

The invention further consists in certain other peculiar features of construction and novel combination of parts, which will hereinafter be more fully described, and pointed out in the claims.

Figure 1 represents an elevation of the improved governing device and a pivoted arm by which any suitable valve-controlling gear may be operated. Fig. 2 represents a vertical sectional view of the same to more clearly indicate the construction and operation. Fig. 3 represents a cross-sectional view taken on a line *a b*, Fig. 1. Fig. 4 represents an enlarged cross-sectional view of the lower portion of the governor, more clearly showing the screw and the collar working thereon for operating the pivoted arm.

Similar numbers of reference designate corresponding parts throughout.

The governor is supported in a bracket-frame 8, which is secured to the engine in a suitable position and is driven by means of the shaft 9, journaled in a vertical portion of said bracket and rotated by any ordinary

means, but usually by means of a belt passing over the main drive-shaft of the engine and over a pulley with which the shaft 9 is provided, the rotation of this shaft 9 being conveyed to the governing device by the beveled gear 10, which intermeshes with the independently-rotatable gears 11 and 12. The gear 11 is provided with a slightly-tapering depression in its lower surface and is secured to the lower end of the spindle 13, which is vertically journaled in a bearing provided in the bracket-arm 14. This spindle is centrally vertically perforated and at the upper portion has a circular bore or socket 15, the extreme upper end of the spindle being branched outward to provide four arms 16 16, arranged in pairs, and between each pair of these arms a weighted lever 17 is pivoted.

Vertically movable in the socket 15 is a plunger 18, which is also centrally vertically perforated, the lower end being contracted to form a neck, around which is a shoulder which bears against the upper end of the coiled spring 19, contained within the socket 15 and having a tendency to raise the plunger, the upper end of which has a transverse slot 20, below which are bearing-blocks let into the opposite sides of the plunger, and in these blocks are pivoted the short ends of the weighted levers 17. The beveled gear 12 has a slightly-tapering depression in its upper surface and has a collar which is vertically journaled in the bracket-arm 21, being located directly beneath the gear 11.

The sleeve or tube 22 is provided at its upper end with the cross-arm 23, located within the central open portion of the gear 12. This sleeve extends downward, being suitably journaled in vertical bearings, and at the lower end has the collars 24 and 25, bearing, respectively, on the upper and lower surfaces of the bracket-arm 26. Above the collar 24 two vertical slots 27 are cut through the material of the sleeve, and above these slots a screw-thread 28 is formed around its circumference. Encircling the slotted portion of the sleeve 22 is a ring 29, in which the pins 30 are secured, these pins extending through the slots in said sleeve and their inner ends being fastened in the interior sleeve 31, which has a flange 32 and is slightly vertically movable.

Extending through the sleeves 22 and 31 and also through the perforations in the spindle 13 and plunger 18 is the rod 33, which is secured at the upper end in a nut 34, held in the transverse slot 20, and at the lower end is furnished with an adjustable nut 35, which is adapted to bear against the under surface of the flange 32 and to draw the rod slightly downward when the interior sleeve 31 is depressed. To this rod 33 are secured the friction-clutches 36 and 37, which are located between the gears 11 and 12 and are adjustable one over the other, the clutch 36 being adapted to engage with the depression in the gear 11, while the clutch 37 is adapted to engage in the depression of the gear 12. This clutch 37 has, also, depending fingers 38, which extend partially into the collar of the gear 12 and engage with the cross-arm 23 on the upper end of the sleeve 22.

Surrounding the threaded portion of the sleeve 22 is a nut 39, which is swiveled in the frame 40, having an extension 41, pivoted between the ends of the clamp 42, which is secured to the rock-shaft 43, journaled in suitable bearings, and to one end of the rock-shaft is clamped the shifting-arm 44, by which reciprocating motion is imparted to the rod 45 to move any valve-governing mechanism.

When the engine is running, the bevel-gears 11 and 12 will be driven by the gear 10 in opposite directions. If the speed of the engine rises above the normal, the weighted ends of the levers 17 will rise, owing to their more rapid revolution. As the weighted ends of these levers rise, their short ends, pivoted in bearings in the plunger 18, will depress this plunger against the pressure of the coiled spring and will move the rod 33, secured to the nut in the upper end of the plunger, downward, thus carrying the friction-clutch 37 into the cavity of the gear 12, with the surface of which it will engage and will be rotated thereby. The rotation of the clutch 37 will be transferred to the sleeve 22 by the fingers 38 of the clutch engaging with the cross-arm 23 at the upper end of the sleeve and the screw-thread 28 will be turned in the direction in which the gear 12 rotates. The nut 39 will work up over the thread 28 and by means of the clamp 42 will rock the shaft, the arm 44 will be thrown, and movement will be imparted to the valve-controlling mechanism to reduce the amount of steam supplied to the cylinder. If the speed of the engine falls below the normal, the weighted ends of the levers 17 will descend, thus raising the plunger 18 and the rod 33 and carrying the clutch 36 into engagement with the depression of the gear 11, by which it will be revolved in a direction opposite to the direction in which the gear 12 travels. The sleeve 22 will also be turned in this direction by the fingers 38 of the clutch 37 engaging with the cross-arm 23, and the screw-thread 28, engaging the threads of the nut 39, will drive this nut down-

ward and by means of the rock-shaft 43 and the mechanism operated thereby will shift the valve-controlling device to supply a greater amount of steam to the main cylinder.

When steam is shut off from the engine, the rotation of the main shaft will gradually come to a stop. As the speed decreases, the regulating device will act as last above described and the nut 39 will be driven downward. The lower end of the frame 40 will be pressed against the ring 29 with sufficient force to drive that ring downward. As the ring is pinned through the slots 27 into the interior sleeve 31, the lower end of which presses against a nut 35 on the lower end of the rod 33, this rod will also be carried downward sufficiently to draw the clutch 36 out of engagement with the gear 11, thus avoiding the drag of this clutch on said gear when the engine is again started.

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

1. In an engine-regulator, the combination, with two oppositely-driven gears having friction-cavities formed therein and a double adjustable clutching device located between said gears and adapted to engage the cavity in either, of a sleeve adapted to be driven by the clutching device in the direction of its travel and provided with a screw-thread, a threaded nut working on said threaded portion of the sleeve and pivotally secured to a frame pivoted to a rock-shaft, and a shifting-arm carried by said rock-shaft, as described.

2. The combination, with a governor having two oppositely-rotatable gears and means for driving the same, a clutching device located between said gears and adapted to engage either of them, and a rod secured to said clutching device, of a sleeve adapted to be turned in the direction of travel of the clutching device and having a screw-threaded surface and longitudinal slots, a ring surrounding the end of said sleeve, an interior sleeve contained within said first-mentioned sleeve and having a flanged end, being secured to the ring by pins passing through the slots in the outer sleeve, a nut secured to the end of the clutch-rod and bearing against the plunger end of the interior sleeve, and a nut working on the threaded portion of the sleeve and adapted to be driven against the ring secured to the interior sleeve to draw the clutch-rod in this direction, as described.

3. A governing device consisting of a vertical shaft supported in a suitable bearing and having bracket-arms, weighted levers pivoted to said arms and to a vertical spring-lifted plunger partially contained within a socket at the upper end of said shaft, a beveled gear having a friction-cavity in its lower surface, secured to the lower end of said shaft, and meshing with the beveled gear of a drive-shaft, a beveled gear centrally perforated, having a collar journaled in a bearing parallel to the gear on the vertical shaft, and having

a friction-cavity in its upper surface, a rod extending through central vertical perforations in said shaft and plunger, a double adjustable clutching device secured to said rod, 5 located between said parallel gears, and adapted to engage either of them and to be rotated thereby, a rock-shaft suitably journaled, and means intermediate said clutching device whereby the said shaft may be 10 rocked in opposite directions, as described.

4. The combination, with the centrally-perforated spindle 13, vertically journaled in a bearing, provided with the socket 15, and having the arms 16, the spring-lifted plunger 18, 15 partially contained within said socket, the weighted levers 17, pivoted to the arms 16 and having their short ends pivotally secured to the plunger 18, a beveled gear 11, secured to the lower end of the spindle 13 and having 20 a cavity in its lower surface, a beveled gear 12, having a tubular collar journaled in a suitable bearing, a drive-gear 10, intermeshing with the gears 11 and 12, and means for

driving the same, of the independently-rotatable rod 33, extending through the central 25 perforations in the spindle and plunger and supported at the upper end, the clutches 36 and 37, supported by said rod between the gears 11 and 12 and adjustable to each other, downwardly-extending fingers 38 on said 30 clutch 37, a sleeve 22, surrounding the lower end of said rod 33 and having an upper cross-arm 23, adapted to be engaged by the fingers 38, a screw-thread 28 on said sleeve, a threaded 35 nut 39, swiveled in the frame 40, working on said screw-thread, and a rock-shaft 43, suitably journaled and pivotally secured to said frame and adapted to be rocked by the raising and lowering of the same, as described.

In witness whereof I have hereunto set my 40 hand.

FRANK J. WATERS.

Witnesses:

HENRY J. MILLER,
JOSEPH A. MILLER, Jr.