(No Model.) 2 Sheets—Sheet 1.

F. M. GARLAND.

ELECTRIC STEAM ENGINE GOVERNOR.

No. 466,781. Patented Jan. 12, 1892.

Fig. 1

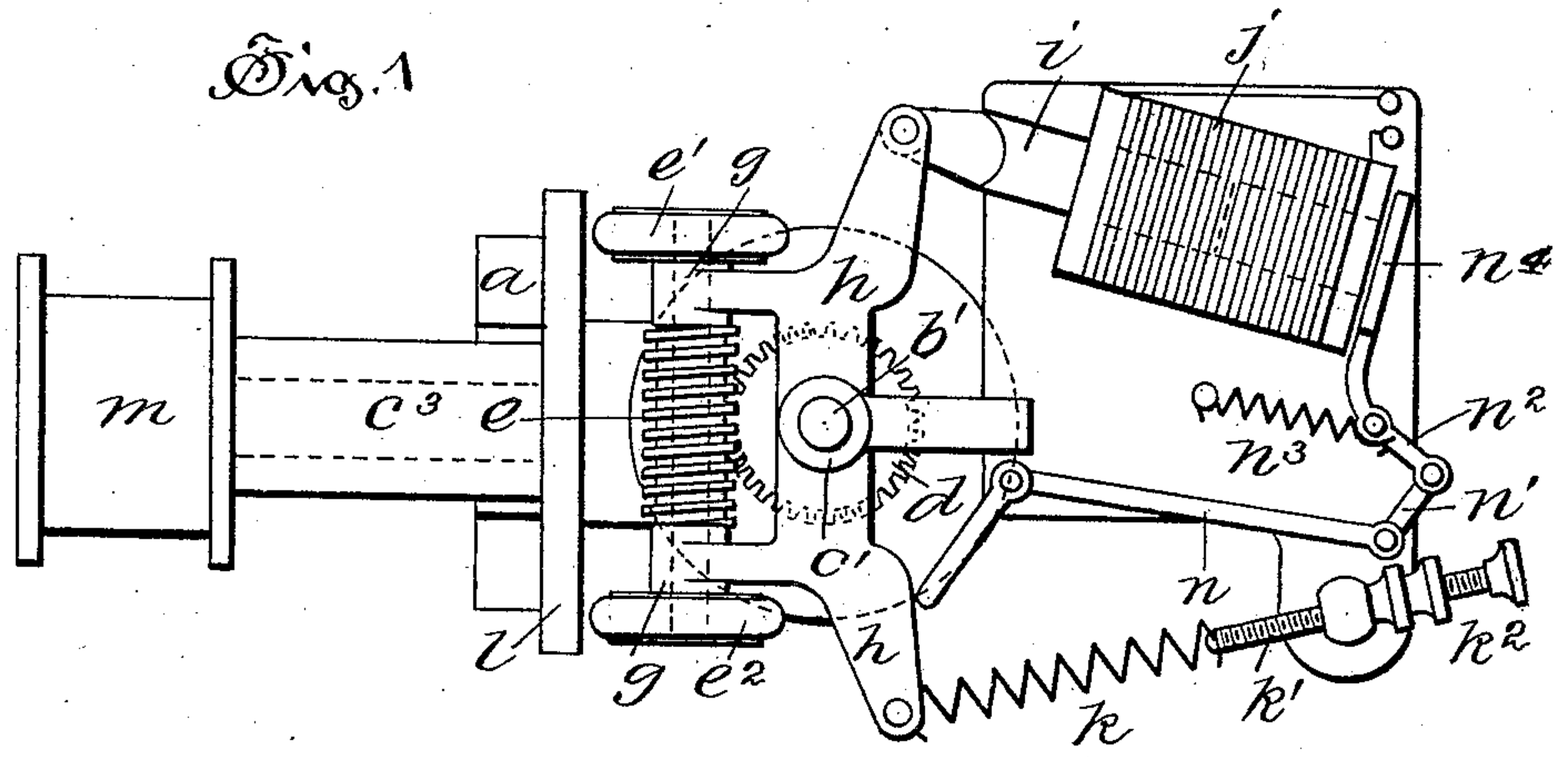

Fig. 2

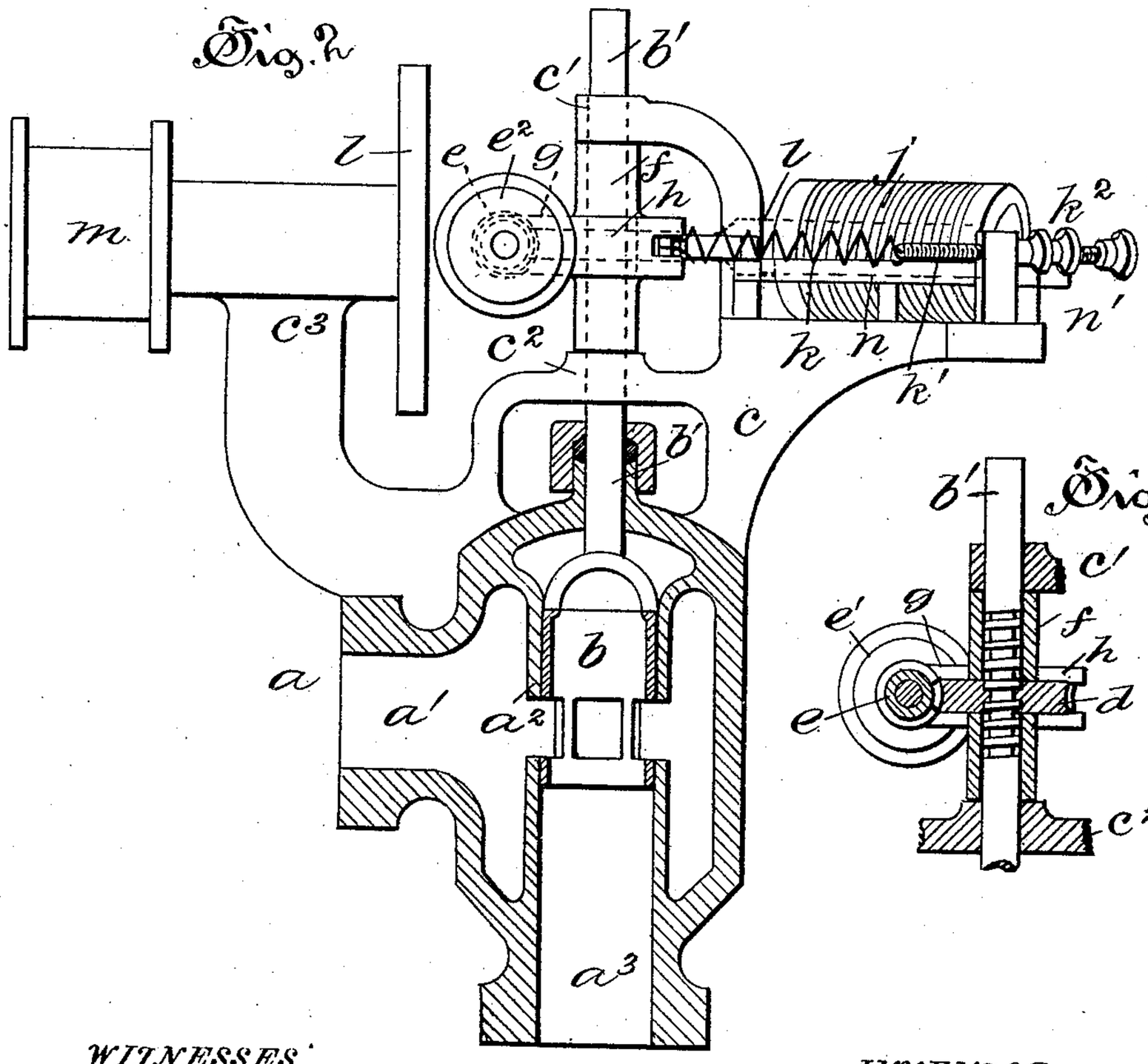

Fig. 3

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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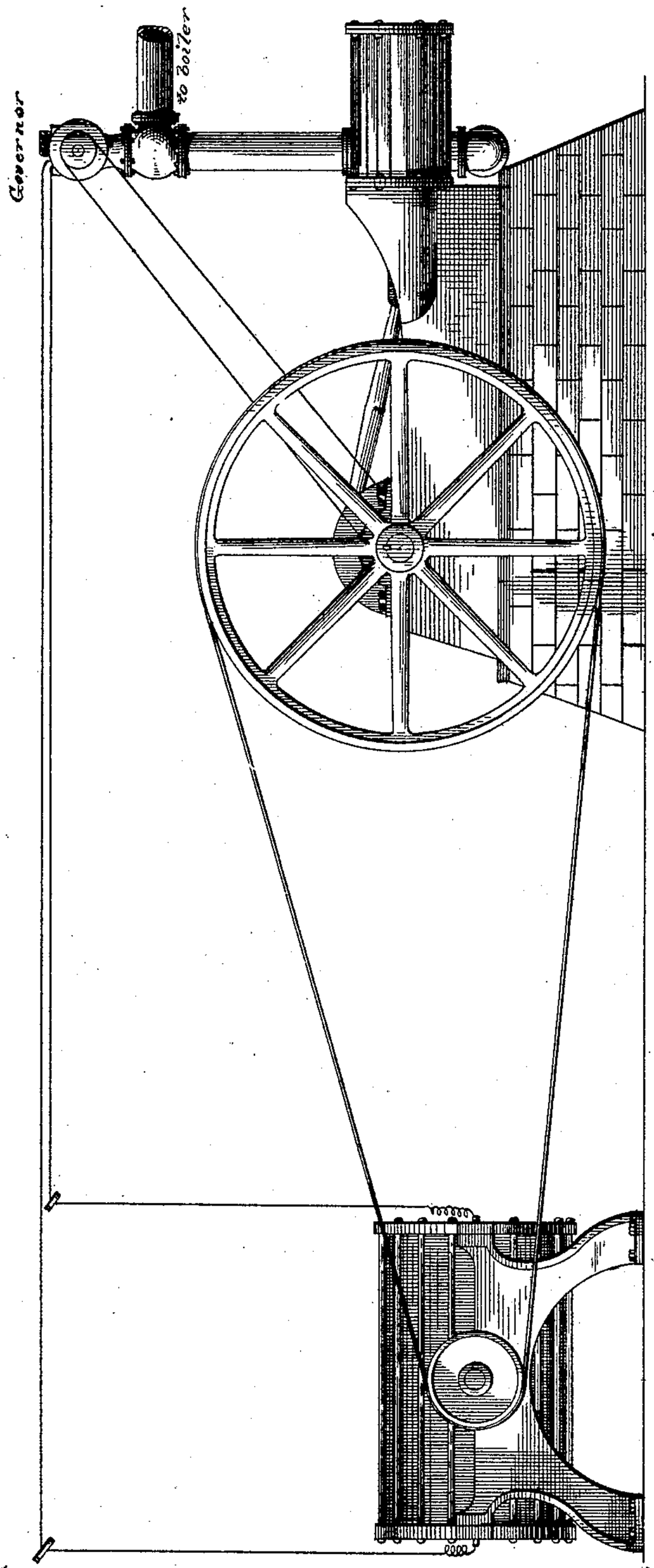

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK M. GARLAND, OF NEW HAVEN, CONNECTICUT.

ELECTRIC STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 466,781, dated January 12, 1892.

Application filed February 26, 1891. Serial No. 382,976. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. GARLAND, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Electrical Engine-Governors, of which the following is a full, clear, and exact specification.

The invention relates to the class of electro-magnetic steam-engine governors, and the object is to provide a simple and easily-regulated governor of this class for controlling an engine by the electro-motive force of a dynamo to which the engine is connected, whereby the work of the engine is automatically reduced or increased, according to the desired output of the dynamo.

Referring to the accompanying drawings, Figure 1 is a plan view of the governor. Fig. 2 is a side elevation with parts broken away to show construction. Fig. 3 is a detail section of a portion of the governor; and Fig. 4 is a side elevation of the complete system.

In the views, the letter *a* indicates a valve-casing, which is cast to shape of any desirable metal, with an inlet-port a', valve-seat a^2, and outlet-port a^3, and is adapted to be connected to a steam-pipe between a boiler and engine. A balanced valve *b*, held in the valve-seat, is provided with a spindle b', that projects through the casing and suitable stuffing-box, and is supported by arms c' c^2 of the web *c*, that is preferably cast integral with the upper part of the valve-casing. A portion of this valve-spindle b' between the arms c' c^2 is threaded and bears upon the threaded portion a worm-gear *d*, the perforation through which is threaded to fit the spindle, while the teeth on the periphery are cut to mesh with a worm *e*. The worm-gear *d* is preferably held from vertical movement about midway between the arms c' c^2 in an opening in a sleeve *f*, that turns loosely upon the spindle b', and the worm *e* is rotarily supported by journals that turn in bearings *g*, projecting from an oscillating lever *h*, that is connected with the sleeve *f*. One end of the lever *h* is pivoted to the plunger-armature *i* of a solenoid *j*, supported by the web *c*, while the opposite end of the lever is connected by a spring *k* with a tension-adjusting screw k', provided with suitable clamping-nuts k^2, also supported by the same web. The terminal wires of the solenoid are connected in circuit in any proper manner with the dynamo, the output of which is to control the work of the engine.

Upon each end of the worm *e* is mounted a friction-wheel e' e^2, the peripheries of which are adapted to make contact with the face of the rotating disk *l*, according to the position of the lever *h*, as it is oscillated by the pull of the solenoid or the spring. This disk is connected to one end of a shaft journaled in a bearing at the end of the arm c^3, the opposite end of which shaft bears a pulley *m*, adapted to be belted to and driven by a pulley upon any engine, the work of which is to be controlled by the dynamo. Pivoted to the casing is a bent lever *n*, one end of which projects into the path of oscillation of one end of the lever *h*, while the opposite end of the lever *n* is connected by a link n' with one end of a lever n^2, the opposite end of which bears an armature which is held to the solenoid when a sufficient current is passing along the coils to overcome the tension of the spring n^3. When the governor-valve is open and steam passes through it to the cylinder and the engine starts, the pulley *m*, which is belted to the engine, revolves the disk *l* continuously in one direction. As the electro-motive force of the dynamo which the engine drives increases, more current is shunted and passes through the coils of the solenoid, attracting the plunger which pulls the lever *h* against the action of the spring *k*, so that the wheel e^2 makes contact with the revolving disk. The friction of the disk and wheel rotates the worm and drives the gear that is threaded upon the valve-spindle, causing the valve to close and cut off steam until the work of the engine is only sufficient to cause the dynamo to send a current through the solenoid to balance the pull of the spring *k* and hold the friction-wheels from the face of the disk. Should the current which passes around the solenoid be insufficient to attract the armature, the spring *k* will draw the lever *h*, so that the wheel e' comes in contact with the disk and the worm and gear are rotated in an opposite direction. This opens the valve and allows more steam to be passed through the engine, so that its work may be increased and the voltage of the dynamo raised. When

the current passes around the coils of the solenoid, the armature of the lever h^2 is attracted so as to throw the bent end of the lever n away from the end of the lever h, but should the current short-circuit or break this armature is released from the solenoid by the stopping of the current, and the spring n^3 throws the levers, so that the bent end of the lever n comes against the lever h and forces the wheel e^2 into contact with the disk, so as to shut off the steam and stop the engine and dynamo.

This device is simple, easily regulated, and controls the work of the engine, according to the desired voltage or output of the dynamo, and stops the engine in case of any accident to the circuit.

I claim as my invention—

1. A steam-engine governor consisting of a valve having a spindle bearing a worm-gear, an oscillating worm meshing with the gear, and a continuously-revolving disk adjacent to the worm, whereby the worm is rotated in opposite directions, according to its position of oscillation, substantially as specified.

2. A steam-engine governor consisting of a valve having a spindle bearing a worm-gear, an electro-magnet, a spring, a pivoted worm meshing with the gear oscillated in one direction by said electro-magnet and in the opposite direction by said spring, and a continuously-rotating disk adjacent to the worm, whereby the worm is rotated in opposite directions by the disk, according to the variations between the pull of the magnet and spring, substantially as specified.

3. A steam-engine governor consisting of a valve having a spindle bearing a worm-gear, an electro-magnet, a spring, a pivoted worm meshing with the gear oscillated in one direction by said electro-magnet and in the opposite direction by said spring, a continuously-revolving disk adjacent to the worm, whereby the worm is rotated in opposite directions by the disk, according to the variations between the pull of the magnet and spring, a spring-retracted armature for said magnet, and a lever pivotally connected with said spring-retracted armature, with its end in the path of oscillation of the worm, substantially as specified.

4. A steam-engine governor consisting of a valve having a threaded spindle bearing a worm-gear, a pivotally-supported worm meshing with the gear and bearing friction-wheels upon its opposite ends, with the armature of an electro-magnet connected with one end and a spring connected with the opposite end of the worm, and a continuously-rotated disk adjacent to the friction-wheel, whereby the worm is rotated in opposite directions by the disk, according to the variations between the pull of the magnet and spring, substantially as specified.

5. A steam-engine governor consisting of a valve having a threaded spindle bearing a worm-gear, a lever supporting a worm meshing with the gear, with the armature of a solenoid connected with one end and a spring connected with the opposite end of the lever, and a continuously-revolving disk adjacent to the ends of the worm, whereby the worm is rotated in opposite directions by the disk, according to the variations between the pull of the solenoid and spring, substantially as specified.

6. A steam-engine governor consisting of a valve having a threaded spindle supporting a sleeve bearing a worm-gear, a lever provided with bearing supporting a worm in mesh with the gear with the armature of a solenoid connected with one end and a spring connected to the opposite end of the lever, a disk adjacent to the ends of the worm, and a revolving pulley connected to the disk, whereby the worm is rotated in opposite directions by the continuous revolution of the pulley, according to the variations between the pull of the solenoid and spring, substantially as specified.

FRANK M. GARLAND.

Witnesses:
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