

No. 742,106.

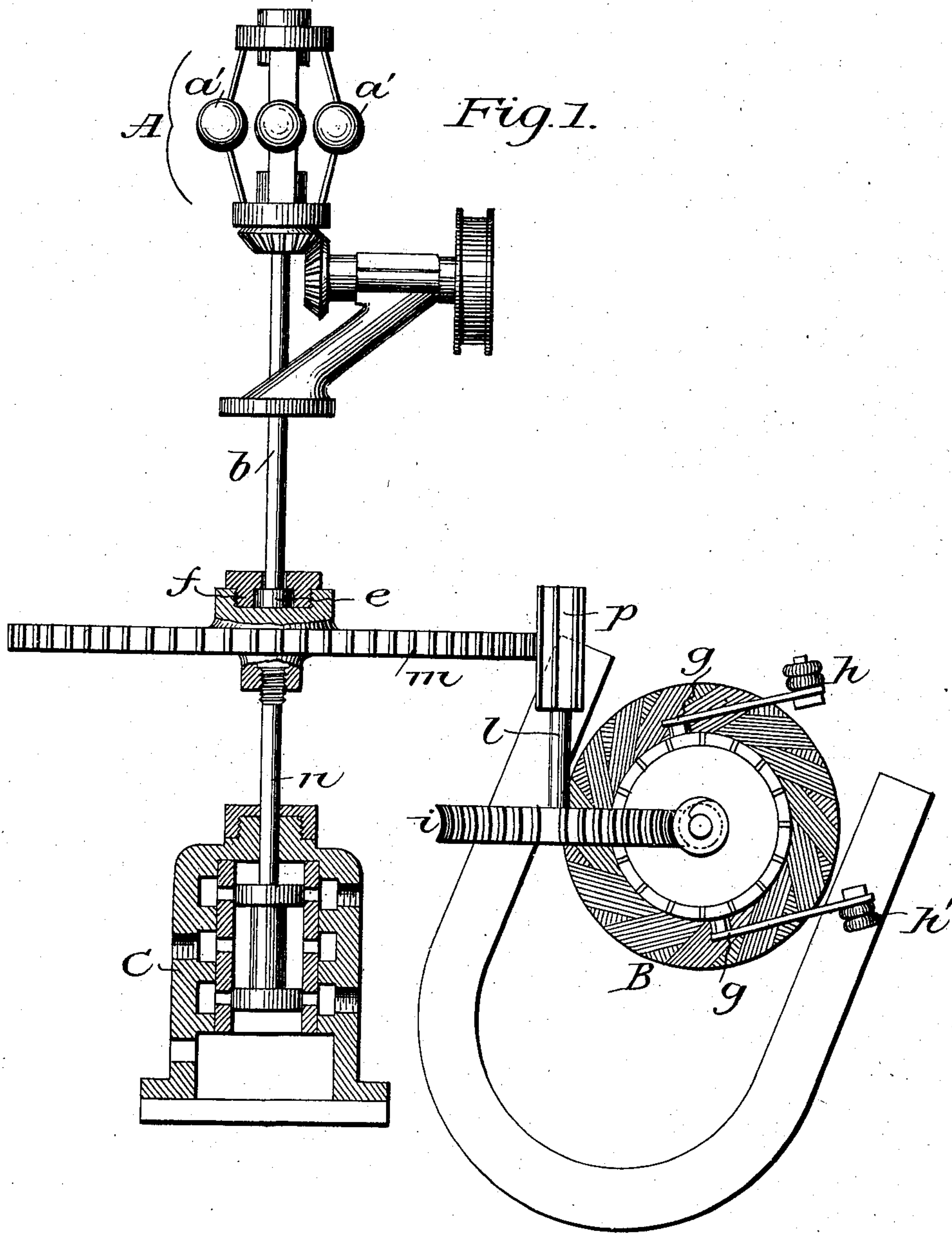
PATENTED OCT. 20, 1903.

H. E. WARREN.
SPEED REGULATOR.

APPLICATION FILED SEPT. 8, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

E. A. Finckel
Ada C. Briggs

Inventor:

Henry E. Warren
by W. A. Finckel
Esq. Atty.

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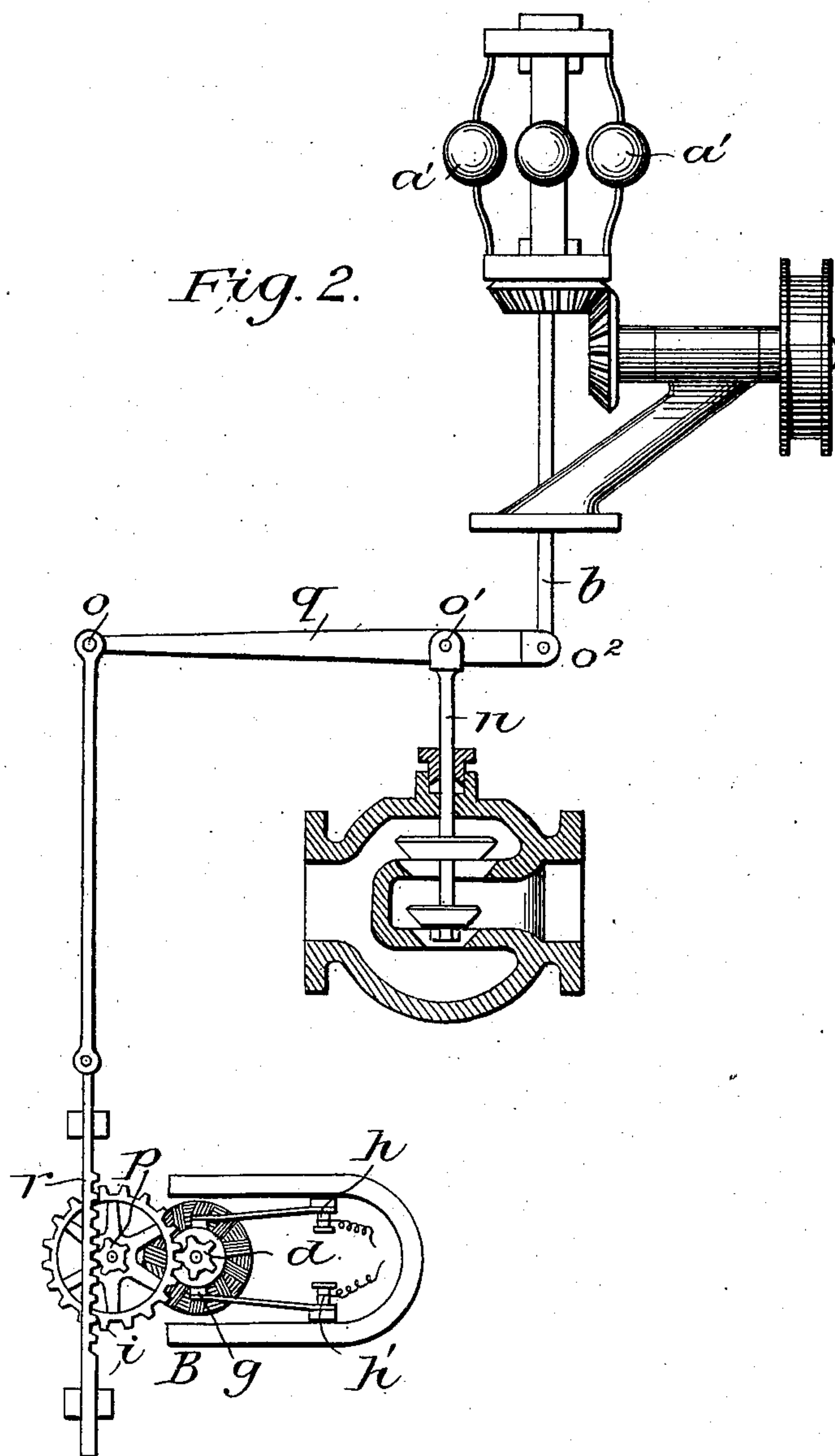
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Assoc. Atty.

UNITED STATES PATENT OFFICE.

HENRY E. WARREN, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO THE LOMBARD GOVERNOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 742,106, dated October 20, 1903.

Application filed September 8, 1902. Serial No. 122,479. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. WARREN, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Speed-Regulators, of which the following is a specification.

This invention relates to speed-regulating apparatus, particularly that form in which centrifugal weights are used to regulate the speed of motors more or less indirectly through the agency of valves, hydraulic pistons, friction and magnetic clutches, and the like, which hereinafter will be referred to generally as "controllers."

The invention consists in a motor so connected with the controller which is normally operated by the centrifugal governor that an operator at a distant station may regulate or control the operation of the governor even to the extent of starting or stopping the prime motor.

The details of the apparatus and their operation will be understood from the description following, taken in connection with the accompanying drawings, wherein—

Figure 1 is an elevation of the governor, its controlling-valve, which is in section, and one form of my improved regulating devices.

Fig. 2 is an elevation of the governor, its controlling-valve, which is in section, and another form of my improved regulating devices.

Referring to Fig. 1, A represents a centrifugal governor connected, by means of a stem *b*, with the valve C, shown in this case as a piston-valve, such as is used in connection with hydraulic governors for water-wheel purposes. B is an electric motor, as illustrated, having permanent magnetic fields, but which may be of other convenient type. *d* is a worm upon the motor-shaft, which engages a gear *i* upon a counter-shaft *l*, which also carries a long pinion *p*. The pinion *p* engages with a gear *m*, the hub of which is tapped to receive the threaded end of the lower part *n* of the valve-stem, and this hub is connected with the upper part of the stem by a head *e* and socket *f*, leaving it free to turn thereon, or this upper connection may be by a nut and

screw, the same as the lower. In such case, however, the threads on the ends of the portions *n* and *b* of the stem should be of different pitch or one a right-hand and the other a left-hand screw.

In the form of construction shown in the drawings, Fig. 1, the head or shoulder *e* upon the end of the stem *b* prevents linear motion with respect to the gear *m*, while that gear is allowed to revolve freely on the shoulder. Through the rotation of the gear *m* the total length of the combined stem *b n* is changed as the threaded portion or portions of such stem are drawn toward or forced away from each other through the action of the screw-threaded hub. The result of a change in length of the stem *b n* is indirectly to cause the fly-balls *a* and *a'* of the governor A to assume different positions for a central position of valve C, and since the change in position of these fly-balls *a* and *a'* depends upon the speed at which the governor is revolving, and consequently the speed of the prime motor the rotation of the armature of the motor, B in one or the other direction acts to produce an acceleration or retardation of the speed of the prime motor. The armature of the motor B is caused to revolve by an electric current supplied to it from a distant point through the action of suitable switches, making it rotate in one or the other direction, according to the direction of flow of the current through the binding-posts *h* and *h'* and the brushes *g* and *g'*. If the motor B has electromagnetic fields instead of permanent magnetic fields, change in the direction of rotation of the armature may be accomplished by any of the well-known reversing devices.

Fig. 2 shows a form of my device whereby substantially the same alteration in the length of the connection between the governor proper and its controlled valve C is produced by means of a floating lever *q*, of which one end *o* is connected, through a rack *r* and pinion *p*, to the motor B, while the other two fulcrum-points *o'* and *o''* are connected, respectively, to the stem of the valve C and stem *b* of the governor A. By this means every change in the position of the end *o* of the lever *q* caused by the action of the motor B changes the posi-

tion of the valve C in relation to any given position of the governor-balls *a a'* and establishes a new speed relation between the governor and its controlled engine or other motor.

5 My improved regulating devices are applicable to other forms of controllers than valves—for example, such as are operated by intermediate mechanical or electrical connections to apply friction devices, to open and
10 close gates, to change speed, or to cut off mechanisms—as used in steam-engines to control speed by regulating the time during which a moving valve is to remain open.

I claim—

15 1. In combination with a centrifugal speed-governor and its controlled valve, a two-part valve-stem, an interconnecting device for the two parts, which is adapted to move pivotally upon each to change the position of the

valve in relation to the governor, and automatically-operated extraneous means adapted to engage and move said device irrespective of changes in the position of the valve and its stem.

2. In combination with a centrifugal speed- 25 governor and its controlled valve, a two-part valve-stem, a gear rotatably connected with each part, means upon the gear to change the length of the valve-stem when the gear is rotated, and an extraneous motor adapted to be 30 operated from a distant point, and to engage the gear and rotate it, irrespective of variations in the position of the valve and its stem.

HENRY E. WARREN.

Witnesses:

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