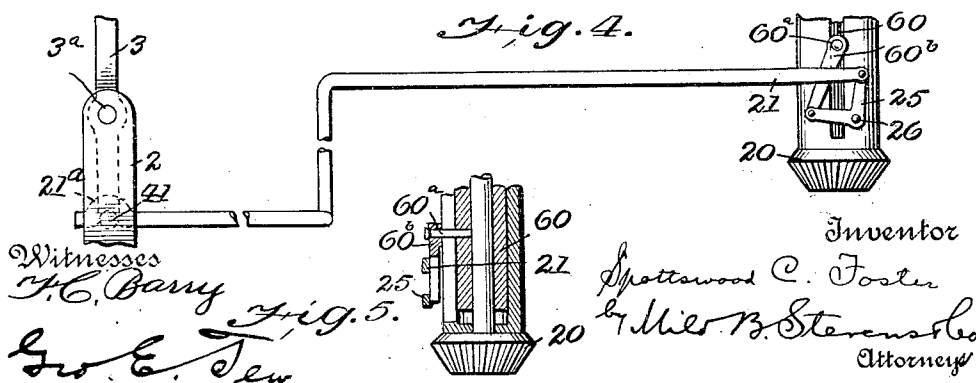
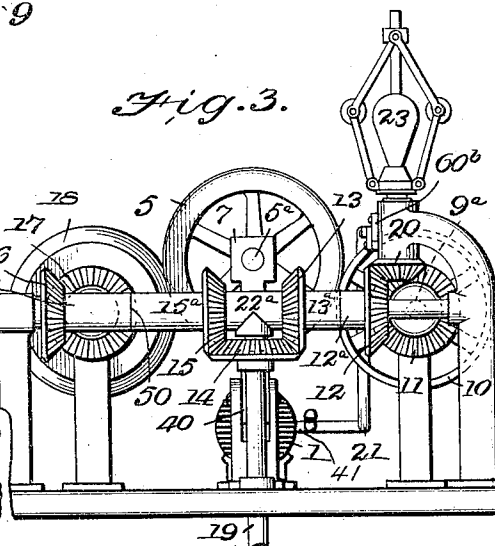
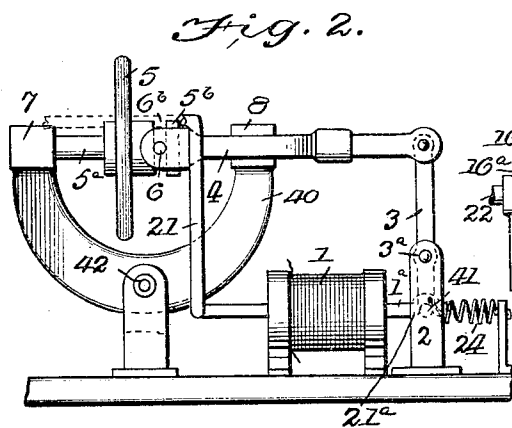
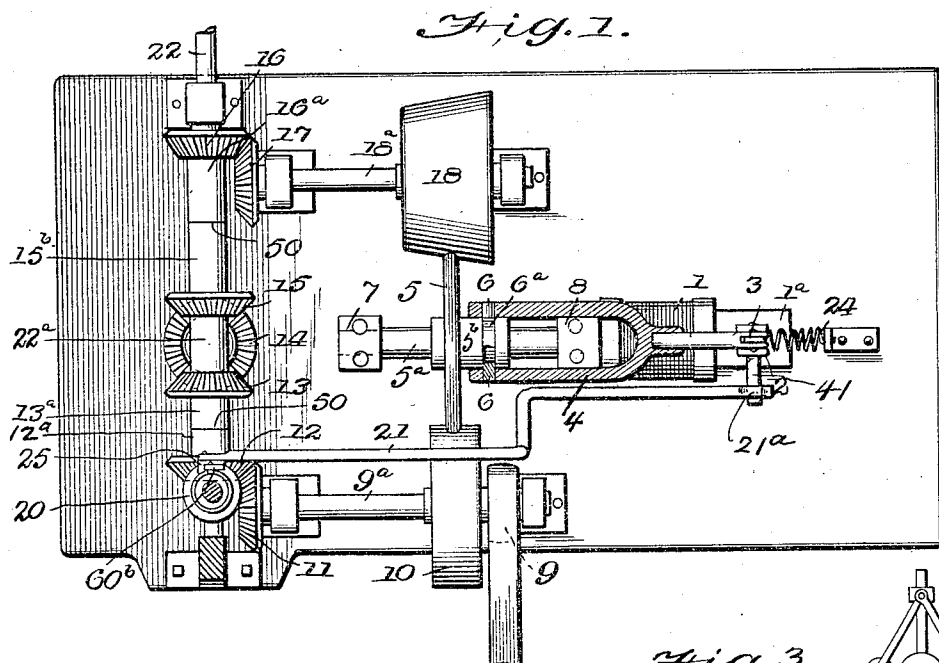


No. 841,318.

PATENTED JAN. 15, 1907.

S. C. FOSTER.
GOVERNOR.

APPLICATION FILED SEPT. 4, 1906.



UNITED STATES PATENT OFFICE.

SPOTTSWOOD C. FOSTER, OF FREDERICKSBURG, VIRGINIA.

GOVERNOR.

No. 841,318.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed September 4, 1906. Serial No. 333,151.

To all whom it may concern:

Be it known that I, SPOTTSWOOD C. FOSTER, a citizen of the United States, residing at Fredericksburg, in the county of Spottsylvania and State of Virginia, have invented new and useful Improvements in Governors, of which the following is a specification.

This invention is a governor for water-wheels, or other motors, and is particularly adapted for those used for generating electricity and operates to vary the water-gate or other controlling-valve of the motor.

The invention is adapted for operation by an electrical device controlled according to the load on the generator and also by a mechanical device according to the speed.

An embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the mechanism, partly in section. Fig. 2 is a side elevation of part of the apparatus. Fig. 3 is an end elevation. Figs. 4 and 5 are details in elevation and section of the connections between the governor and the speed-regulating mechanism.

Referring specifically to the drawings, 9 indicates a pulley driven from the turbine or motor shaft, and this pulley is fast upon a shaft 9^a, which also carries a wide-faced friction-wheel 10 and a bevel-gear 11. At 5 is indicated a friction-wheel which is in contact with the wheel 10 and also in driving-contact with a friction cone-wheel 18, the diameter of which at the middle is the same as that of the wheel 10. The wheel 18 is fast upon a shaft 18^a, which also carries a bevel-gear 17.

The bevel-gear 11 meshes with a bevel-gear 12, which has a hub 12^a, and the bevel-gear 17 meshes with a bevel-gear 16, which has a hub 16^a. These wheels 12 and 16 are loose upon a shaft or axle 22. Also loosely mounted upon the shaft 22 between the hubs 12^a and 16^a are bevel-gears 13 and 15, which have hubs 13^a and 15^a in frictional contact at 50 with the respective hubs 12^a and 16^a. The diameter of these hubs or friction-surfaces is exactly the same at both places. The gears 13 and 15 both mesh with a bevel-gear 14 upon a perpendicular shaft 19, which may be connected in any suitable manner to the water-gate of the turbine or to the controlling-valve of any other kind of motor. A spacing angle-sleeve 22^a on the shaft 22, between the gears 13 and 15, serves to hold the gears in proper position and sup-

port the upper end of the shaft 19. The bevel-gear 12 also meshes with the driving-gear 20 of the mechanical governor 23, which is thus driven.

The friction-wheel 5 is loosely mounted upon a shaft 5^a, which is fixed in boxes 7 and 8 at the opposite ends of a curved or semicircular yoke 40, which is pivoted at 42 to a suitable supporting-bracket to swing in a transverse vertical plane, so that the wheel 5 may run up and down the conical wheel 18. A fork 4 is pivotally connected at the ends of its branches by a pivot-pin 6 to a collar 6^a, loose in a circular groove 6^b around the hub 5^b of the wheel 5. This fork is connected at its other end to a vertical lever 3, which is fulcrumed at 3^a on a standard 2 and has at its lower end a laterally-extending arm or pin 41. The lower end of the lever is also connected to the core 1^a of a solenoid 1, which is in circuit with the translating devices or load. The lower end of the lever 3 is also connected to a spring 24, which opposes the pull of the solenoid.

The sleeve 60 of the mechanical governor is connected by a stud 60^a and link 60^b to one arm of a bent lever 25, which is fulcrumed at 26 to the governor-casing and is connected at its other arm to one end of a horizontally-extending rod 21, the other end of which has a hook 21^a, adapted to be engaged over the laterally-extending pin 41 at the lower end of the lever 3.

Operation: The parts are so constructed that when the water-wheel is running at proper speed the friction-wheel 5 is at the middle of the cone-wheel 18, where said cone-wheel is the same size as the friction-wheel 10, and consequently the gears 12 and 16 turn with equal speed, and by the uniform friction at the faces 50 the gears 13 and 15 have the same force applied thereto, and consequently do not move, being in mesh with the gear 19, which accordingly does not move. If the turbine or water wheel runs too slow, the governor 23 (which is driven by the gear 12) forces down the sleeve 60 and link 60^b, which turns the bent lever 25, and by means of the connecting-rod 21 the lever 3 is swung, so that the fork 4 shifts the wheel 5 toward the small end of the cone, said wheel being kept in contact by the swing of the yoke 40. This action increases the speed of the gear 16, and hence causes increased friction on that side, which thus drives the gear 15 with greater force than the gear 13 and

causes said gear 15 to turn to a certain extent, thus turning the gear 14 in the corresponding direction and turning the shaft 19, which, as said before, may be connected by mechanical devices to the governing gate or valve. If the turbine or water wheel runs too fast, the reverse operation takes place. In its application to an electrical plant the rod 21 is disconnected, and the solenoid 1 is connected to the bus-bars of the plant. Should the load rise, the strength of the solenoid-coil is weakened, allowing the core 1^a to be pulled out by the spring 24 to an extent in proportion to the rise of the load, thereby swinging the lever 3 and causing the friction-wheel 5 to be pulled to the small end of the cone.

I claim—

1. In a governor, the combination of a plain wheel and a cone-wheel, a shiftable friction-wheel therebetween, gears driven oppositely by said plain and cone wheels and having equal friction-surfaces, a motor-controlling shaft having opposite operative connections to said friction-surfaces and adapted to be turned one way or the other according to variations in speed of the said surfaces, and means to shift the friction-wheel to vary the relative speeds of the plain and cone wheels.

2. In a governor, the combination with a motor-controlling shaft, of frictionally-driven

wheels geared to said shaft and tending to turn the same oppositely, the friction-surfaces of the wheels being equal, and automatic means to vary the speed of the respective wheels.

3. In an electric governor, the combination with a motor-controlling shaft, of frictionally-driven wheels geared to said shaft and tending to turn the same oppositely, the friction-surfaces of the wheels being equal, and electric means actuated by the rise and fall of the load to vary the speed of the respective wheels.

4. In an electric governor, in combination, a plain wheel, a cone-wheel, a connecting shiftable friction-wheel therebetween, means actuated by the plain and cone wheels to control the motor according to the respective speeds thereof, a solenoid in circuit with the load-line, and connections between the core of the solenoid and the shiftable wheel adapted to shift the latter according to movement of the core incident to variation in the load.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SPOTTSWOOD C. FOSTER

Witnesses:

J. HARVEY VISER,
CHAS. D. FOSTER.