W. H. FRUEN.

Governor.

No. 210,847. Patented Dec. 17, 1878.

FIG. I

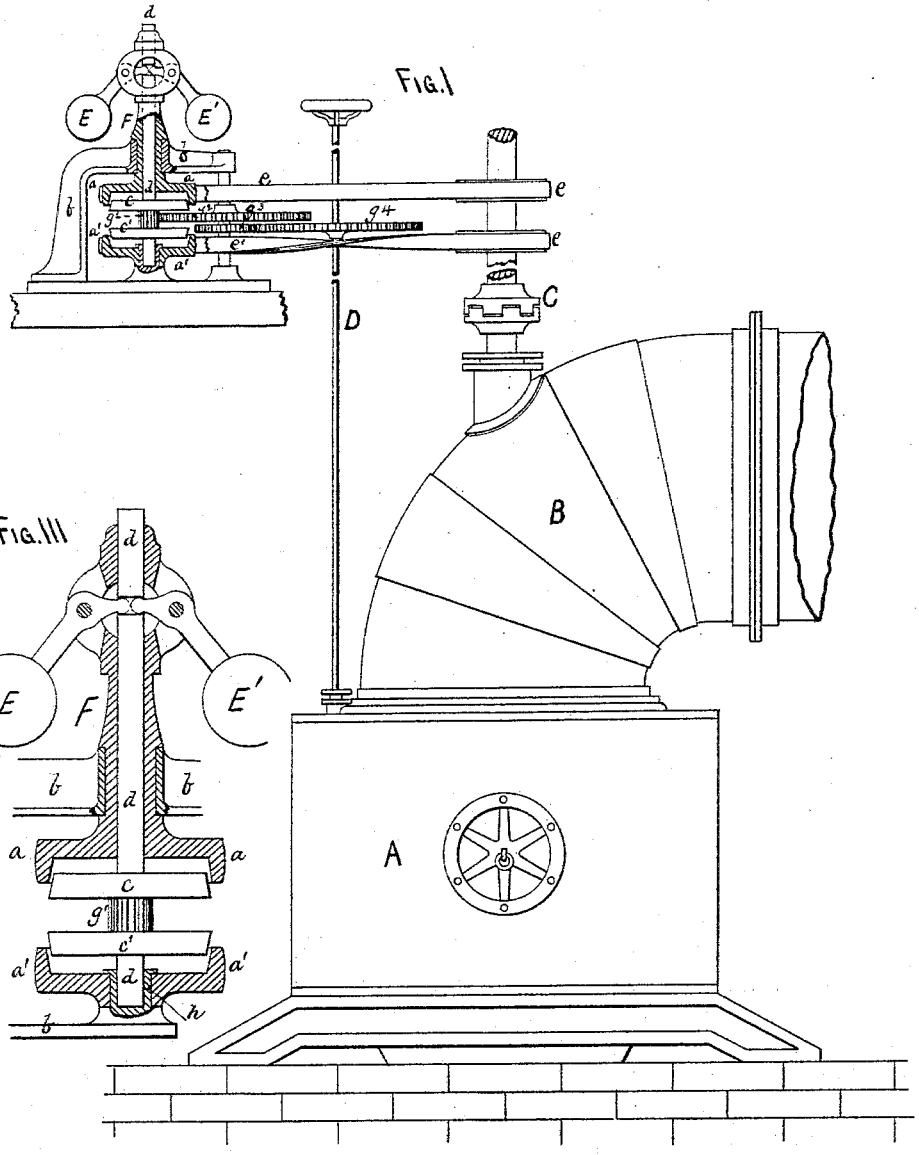
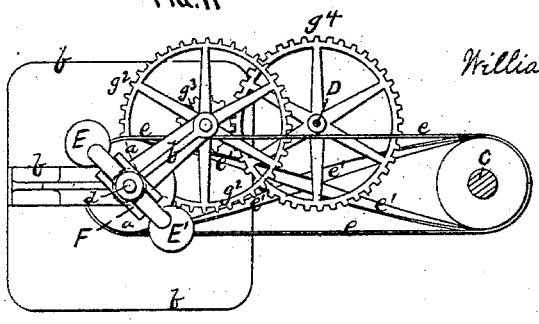


FIG. III

FIG. II



WITNESSES.

E. N. Woodward

Edward Rotert.

William Henry Fruen

INVENTOR, BY

Louis Fesser & Co.

Atty's.

UNITED STATES PATENT OFFICE.

WILLIAM H. FRUEN, OF MINNEAPOLIS TOWNSHIP, HENNEPIN COUNTY, MINNESOTA.

IMPROVEMENT IN GOVERNORS.

Specification forming part of Letters Patent No. **210,847**, dated December 17, 1878; application filed April 3, 1878.

To all whom it may concern:

Be it known that I, WILLIAM HENRY FRUEN, of Minneapolis township, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Water-Wheel Governors, which improvement is fully set forth in the following specification and accompanying drawing, in which—

Figure 1 is a side elevation of a flume, wheel-casing, and shaft, and a sectional elevation of my governor, showing their relative positions. Fig. 2 is a plan view of the governor and main shaft, &c. Fig. 3 is an enlarged sectional elevation of the governor detached.

This invention relates to governors for water-wheels; and consists in two drums connected to the main shaft of the water-wheel in such a manner as to be revolved in opposite directions, and provided with the usual revolving balls, and two friction-clutches connected to the gate-shaft by gearing, &c., whereby one clutch may be actuated by the fast motion of the balls to close the gates, while the other will be actuated by the slow motion to open them, as hereinafter specified.

A is the water-wheel casing; B, the flume; C, the main shaft, and D the gate-rod, all arranged in the usual manner. *a* is a horizontal drum, mounted in a frame, *b*, and formed with the interior of the rim slightly tapered, to conform to the edge of a disk, *c*, upon a shaft, *d*, running up through the drum, as shown, the whole forming a friction-clutch.

E E′ are two governor-balls, connected to the stem F of the drum *a* in the usual manner, and having the inner ends of their shafts running in a groove in the shaft *d*, whereby the latter may be raised and lowered by the rising and falling of the balls when revolved, and so throw the clutch in and out of gear. The drum *a* will be connected by a belt, *e*, to the main shaft C, by which it and the balls are revolved in the same direction as the shaft.

a′ is another drum, centered in a hollow step, *h*, upon the bed-plate, and having the interior of its rim in the form of a clutch, similar to *a*, except that the positions are reversed.

c′ is another disk, similar to *c*, and attached to the same shaft, *d*, in such a position as to come in contact with the interior of the drum *a′* when the shaft is moved downward, the two disks being so arranged as to act alternately upon the two drums. This second drum *a′* will be connected to the main shaft C by a crossed belt, *e′*, so that it will be revolved in the opposite direction to the other drum, *a*.

g^1 is a pinion on the shaft *d*, between the two disks *c c′*, and connected by gears and pinions g^1 g^2 g^3 g^4 to the gate-rod D, as shown.

By this arrangement it will be seen that if the shaft C is revolved fast, the balls E E′ will rise and depress the shaft *d*, and throw the lower clutch, *a′ c′*, into gear, and the drum *a′*, running in the opposite direction to the shaft C, will, through the gears and pinions g^1 g^2 g^3 g^4, actuate the gate-rod D and close the gates partially, and thus shut off a portion of the water and decrease the speed, which will allow the balls E E′ to fall, and raise the shaft *d*, disengage the clutch *a′ c′*, and stop the rod D. Should, however, the speed be too slow, the balls will fall far enough to raise the shaft *d* and throw the clutch *a c* into gear and revolve the shaft D in the opposite direction, and open the gate slightly, and thus increase the speed, which will raise the balls, release the clutch, and stop the rod D, as before, thus perfectly governing and controlling the speed of the wheel, and causing it to run regularly.

Any number of the gears *g* may be used to obtain the required speed and motion and to gain more power.

By arranging the lower drum, *a′*, to run upon the outside of the hollow stud *h*, and the lower end of the shaft *d* inside, I prevent any unnecessary friction upon the shaft *d*, as the latter by this means is free to move up and down within the stud, which acts as a bearing and guide for it. The gearing g^1 g^2 g^3 g^4 will be so delicately adjusted as to render some such arrangement as the hollow stud necessary to prevent the friction of the drum *a′* from acting upon the shaft *d* and closing and opening the gates at the wrong time.

I am aware of Letters Patent No. 37,230, dated

December 23, 1862, and do not, therefore, wish to be understood as laying claim to what is therein shown; but,

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

1. In combination with the vertically-stationary drums *a a'*, shaft *d*, and governor-balls E E', with their connecting-arms, the tapered disks *c c'*, with intermediate pinion g^1 between said disks, all arranged substantially as and for the purpose set forth.

2. The combination and arrangement of the drum *a'*, hollow step *h*, and shaft *d*, whereby the drum and shaft are enabled to run independently of and without coming in contact with each other, substantially as hereinbefore specified.

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

WILLIAM HENRY FRUEN.

Witnesses:
C. N. WOODWARD,
LOUIS FEESER.