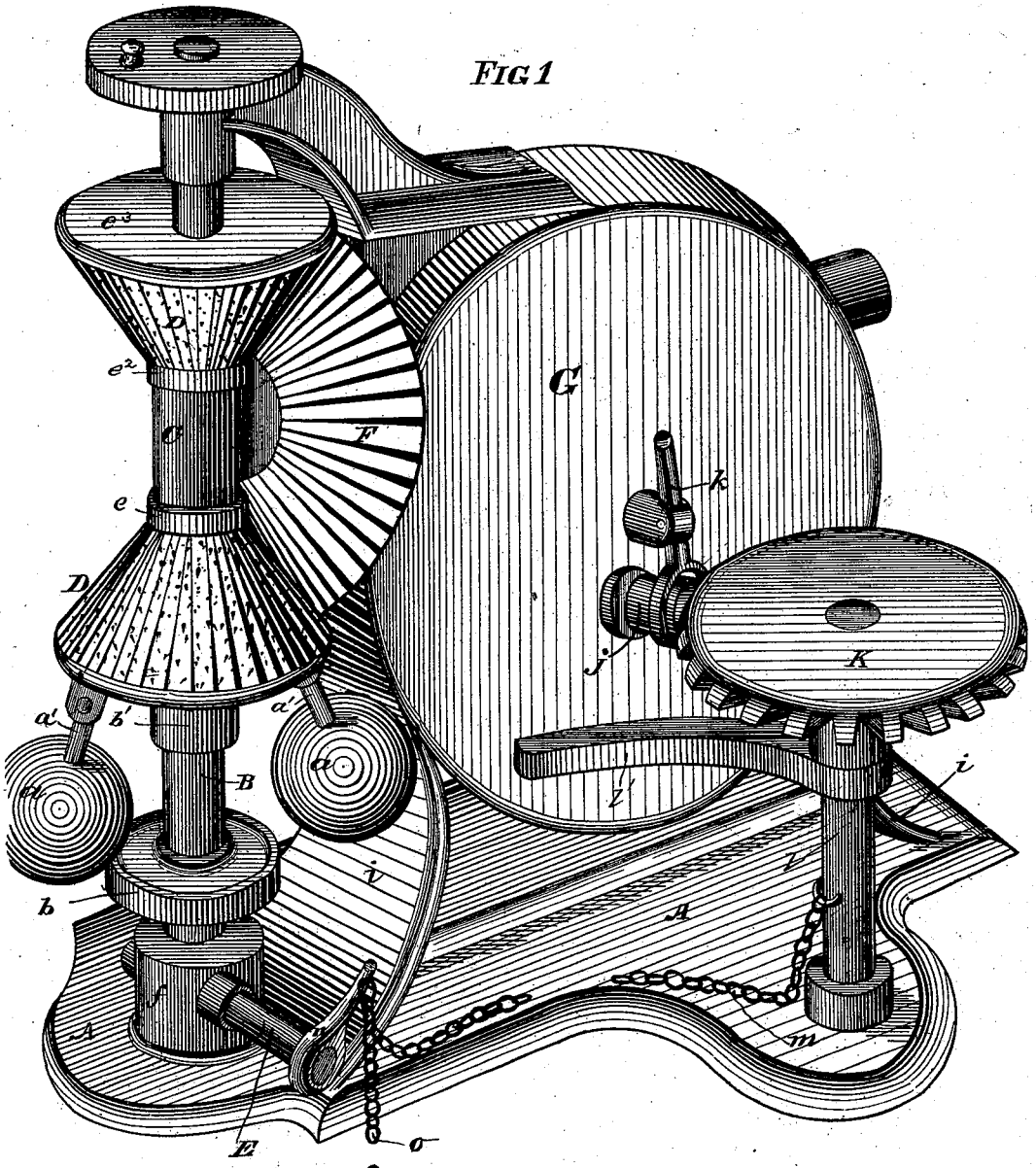
2 Sheets—Sheet 1.

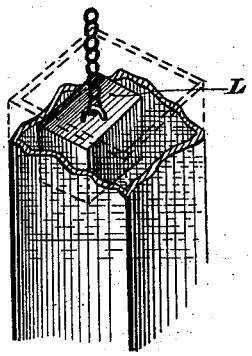
H. T. FARNSWORTH.

Engine-Governor.

No. 209,612. Patented Nov. 5, 1878.

FIG 1





WITNESSES
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2 Sheets—Sheet 2.

H. T. FARNSWORTH.

Engine-Governor.

No. 209,612. Patented Nov. 5, 1878.

FIG. 1

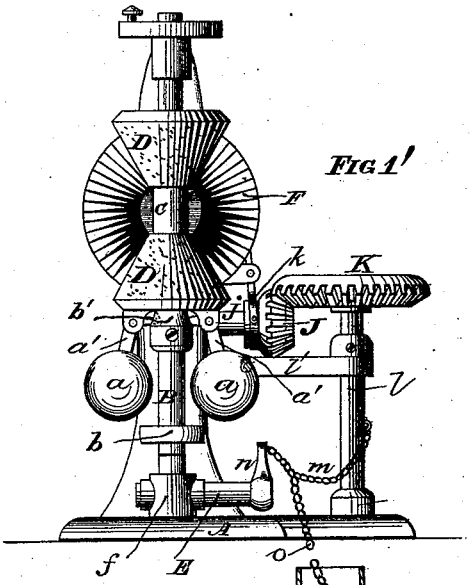


FIG. 3

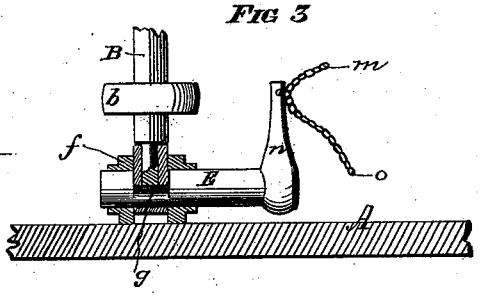


FIG. 2

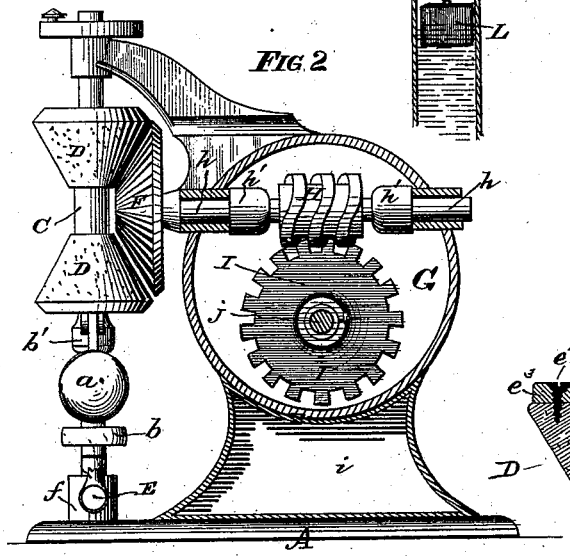


FIG. 4

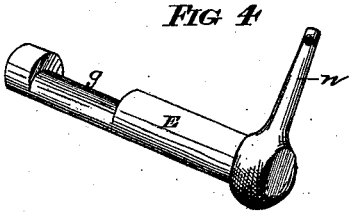
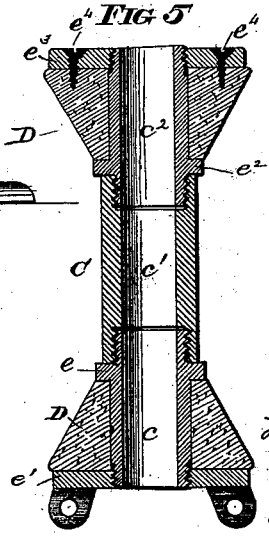


FIG. 5



WITNESSES

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UNITED STATES PATENT OFFICE.

HENRY T. FARNSWORTH, OF BELLEFONTE, PENNSYLVANIA.

IMPROVEMENT IN ENGINE-GOVERNORS.

Specification forming part of Letters Patent No. **209,612**, dated November 5, 1878; application filed August 19, 1878.

To all whom it may concern:

Be it known that I, HENRY T. FARNSWORTH, of Bellefonte, in the county of Centre and State of Pennsylvania, have invented certain new and useful Improvements in Engine-Governors; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification, and in which—

Figure 1, Sheet 1, is a perspective view of my improved water-wheel or engine governor. Fig. 1′, Sheet 2, is a front elevation thereof. Fig. 2 is a sectional and partly side elevation thereof. Fig. 3 is a detailed view, partly in elevation and partly in section, of the driving-shaft-elevating mechanism. Fig. 4 is a detailed perspective view of the cam-grooved shaft, and Fig. 5 is a vertical central section of the driving-shaft sleeve and its cones.

The same parts in the several figures are designated by the same letters of reference.

This invention relates to certain improvements in water-wheel or engine governors, by which the opening and closing of the gate of a water-wheel or a valve of an engine are controlled, either during a high or low or intermediate pressure of water or steam, and greater friction or adherence between the shaft-cones is obtained, and to a float for closing the gate of a water-wheel at low-water mark.

To these ends my invention consists, primarily, in connecting the stem of a water-wheel gate or valve-operating shaft of an engine to the governor by intermediate mechanism adapted to carry out these purposes, and in providing the shaft-sleeve with rubber cones and a float for automatically closing the gate, and in its detailed construction, substantially as and for the purpose set forth.

In the annexed drawing, A marks a foundation or base, which may represent the floor of the building in which the engine is located. B is the driving-shaft, having the band-pulley *b*, around which passes a band connecting with the water-wheel or engine shaft. Upon this shaft is also fitted or adjusted a sleeve, C, resting at its lower end upon a collar or other support, *b′*, on said shaft, and from which is hung the flying balls *a a* by means of knee-levers *a′ a′*, their inner free ends fitting or working in sockets in the collar *b′*.

The sleeve C is made in three sections, *c* c^1 c^2, fitted or screwed together, as clearly seen in Fig. 5.

To the lower and upper sections are adjusted rubber cones D D, these sections being provided, the lower one at its upper end with an annular flange, *e*, between which and a perforated plate, e^1, screwed on the lower end of the sleeve, the lower cone is secured upon the sleeve, while the upper one is provided at its lower end with a similar annular flange, e^2, between which and a-like perforated plate, e^3, screwed on the upper end of the sleeve, is held the upper cone.

To prevent the unscrewing of the plate e^3, it may be fastened to the cone by screws e^4 or otherwise. By this construction the sleeve can be more easily cast to adapt it for receiving and securing the rubber cones.

The object of making the cones of rubber is to create a greater adherence or friction between the impinging parts—the cones and the face-wheel hereinafter designated—to prevent the cones from revolving on the sleeve and their failure to engage with each other, and consequently insure their engagement.

The upright shaft B is let into the socket *f*, secured to the foundation or floor A, and rests in the cam groove or slot *g* of the shaft E, whose base or bottom is rounded or made convex, by which, as the said shaft is turned downwardly, (its normal position being with the groove uppermost,) the driving-shaft B will be elevated, the object of which will be explained hereinafter.

F is the beveled-face wheel, with which the cones D D engage, secured to a shaft, *h*, suitably journaled in boxes *h′ h′*, supported in the upright case or cylinder G, secured upon legs or supports *i*, fastened to the foundation A. Upon the shaft *h* is a worm-threaded screw, H, or its equivalent, with which engages a cogged or toothed wheel, I, upon a shaft, *j*, hung in the case G, and provided upon its external end with a beveled sliding pinion, J, which is susceptible of being shipped

by the shipper *k* into and out of gear with the horizontal beveled-gear wheel K, whose shaft *l* is held in position by the support *l'*, extending out from the case G, and which shaft extends down and connects with the gate, stem, or valve of an engine. To this shaft is connected, by a chain, *m*, or its equivalent, the shaft E, it having an arm or lever, *n*, to which the chain *m* is attached.

In what is termed the "fore-bay," which holds a column for feeding the water-wheel through its gate, and whose height varies according to the amount of water in the stream, is placed a float, L, chained as at *o*, or otherwise connected to the chain *m*, closely to the arm or lever *n* of the shaft E, as seen in Fig. 1, or directly to the lever. This float is anchored or confined at one point to prevent its untimely drawing on the shaft *l*.

The gate of the water-wheel having been slightly lifted or opened, the water will flow into the wheel and put it in motion, which will drive the driving-shaft belt or band and set the whole machinery in motion. As the flow of water to the wheel increases its gate will accordingly open until it has reached its maximum height. Simultaneously with this movement of parts, the chains *m* will be wound around the shaft *l*, and draw the lever of the shaft E downwardly and cause the latter to elevate the shaft B and its upper cone from contact with the face-wheel F, stopping the motion of the shaft *l*, and thus prevent any of the parts from being pulled or broken.

The upward movement thus imparted to the shaft B is just sufficient to free its upper cone from the face-wheel F, and not to permit of the contact of the lower cone therewith, thus holding them for the time being out of contact with said wheel F.

In the event of too great a flow of water upon the wheel, which will, of course, cause the balls *a a* to fly faster, and cause their extension, whereby the lower cone will be elevated into contact with the wheel F, by which the motion of the gate-shaft-operating machinery will be reversed, and the gate thus be more or less closed, restoring a uniformity of flow of water upon the wheel.

In case the pressure of water is not sufficient to lift the lower cone of the shaft B in contact with the wheel F, to reverse the motion of the gate-operating shaft *l*, to prevent the disaster above mentioned—the pulling at or breaking of the gate—the flow of water through and lifting or opening the gate will cause the rotation of the shaft *l*, and wind thereon the chain *m*, depress the lever *n*, and turn the shaft E, so as to elevate the shaft B and free its upper cone, as well as its lower cone, from the wheel F, thus stopping the motion of said shaft *l*, and obviating the breaking of the gate. Should the pressure of water in the fore-bay become so low as to be unable to cause the closing of the gate through the mechanism heretofore described, the float L, descending with the receding or falling water, will draw upon the chain *m* or lever *n*, which will rotate the shaft E, and bring the lower cone into contact with the face-wheel F and close the gate, and thus prevent sticks, paper, and the like, which naturally settle down with the falling or receding water, from entering the wheel.

I do not wish to be understood as confining myself to the particular construction shown, as I am aware they can be changed in form without departing from my invention—as, for example, in lieu of the slotted shaft, a shaft with an eccentric or lever can be used, &c.

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

1. In a water-wheel or engine governor, the combination, with the governor proper and the gate opening and closing shaft, of a cam grooved or slotted shaft, and a chain or its equivalent, arranged and operating substantially as herein shown and described, for the purposes specified.

2. In a water-wheel or engine governor, the combination, with the governor proper, the gate-operating shaft, and the intermediate grooved or slotted shaft, and the connecting-chain or its equivalent, of a float connected therewith, substantially as herein shown and described, for the purpose set forth.

3. An engine or water-wheel governor sleeve, C, provided with the rubber cones D D, held thereon by the flanges $e\ e^2$ and threaded plates $e^1\ e^3$, and means for securing the cones to said plates, substantially as herein shown and described, for the purpose set forth.

4. The sleeve C, formed with two detachable sections, *c c'*, having flanges $e\ e^2$ and plates $e^1\ e^3$, in combination with the rubber or frictional cones D D, substantially as herein shown and described, for the purpose set forth.

In testimony that I claim the foregoing as my own I hereunto affix my signature in presence of two witnesses.

H. T. FARNSWORTH.

Witnesses:
J. P. BERTHRONG,
JOSEPH FORREST.