2 Sheets—Sheet 1.

F. W. DURHAM & H. HOWSE.

GOVERNOR.

No. 188,876. Patented March 27, 1877.

FIG: 1

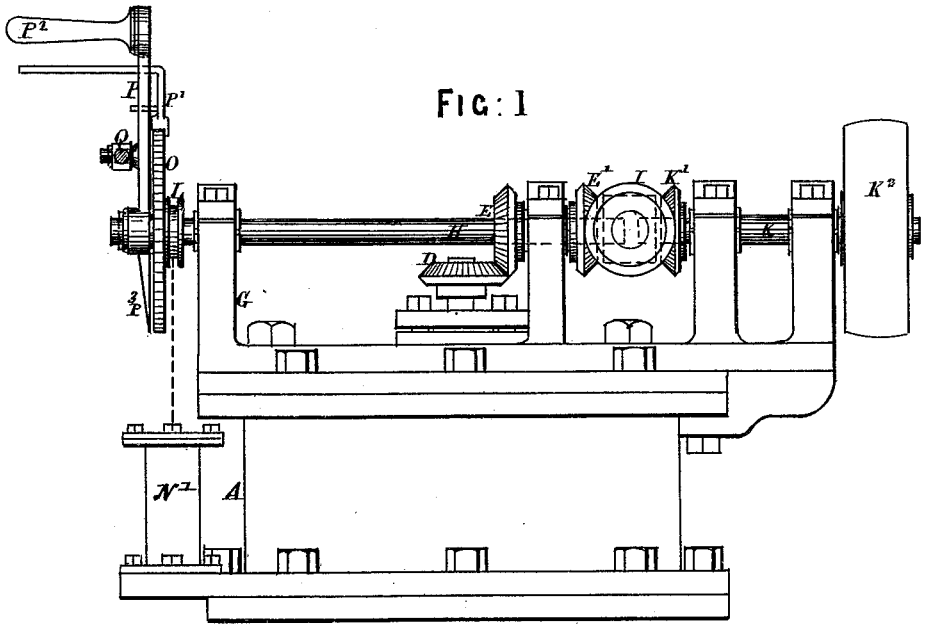
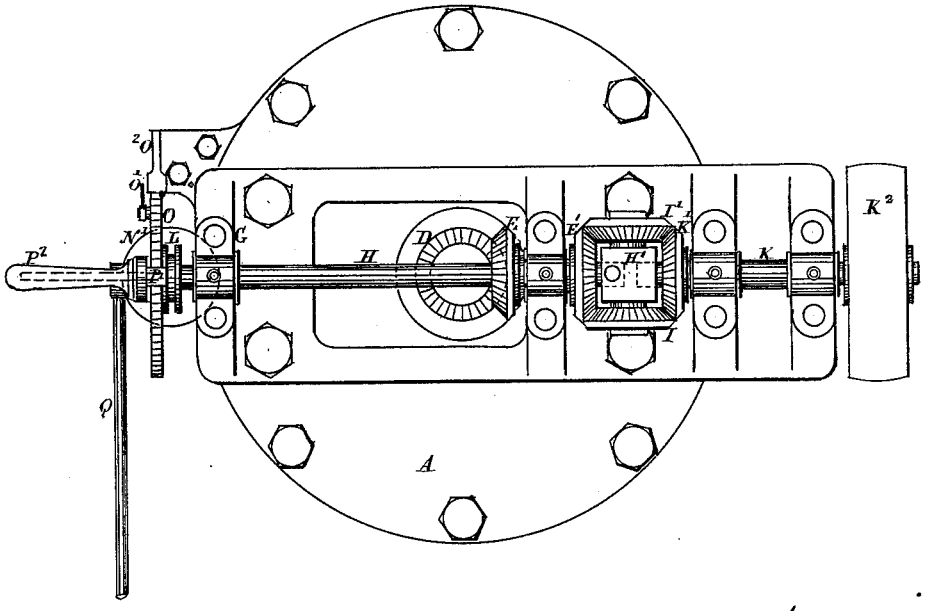


FIG: 2.



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2 Sheets—Sheet 2.

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FIG: 3.

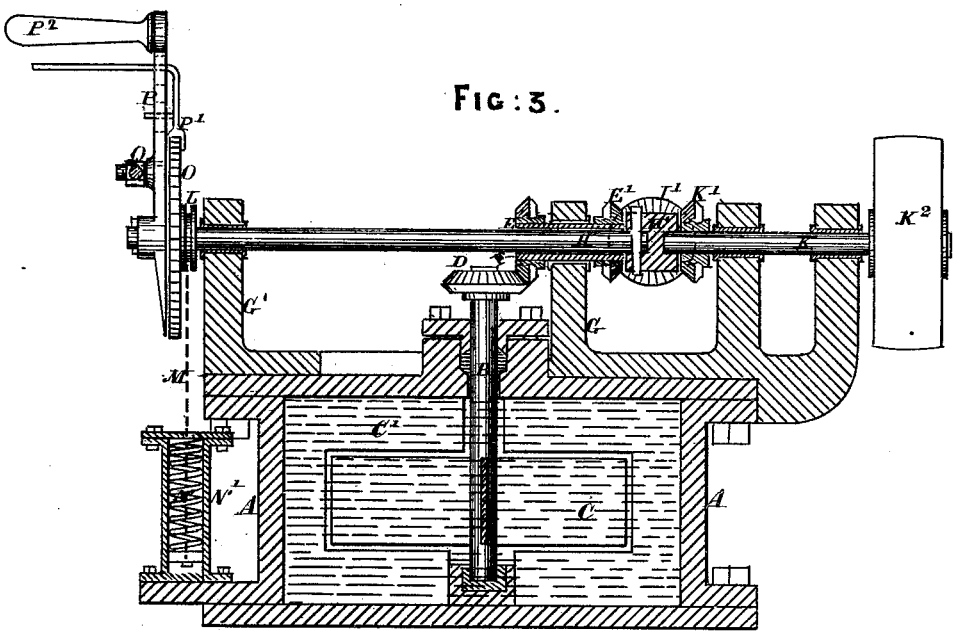
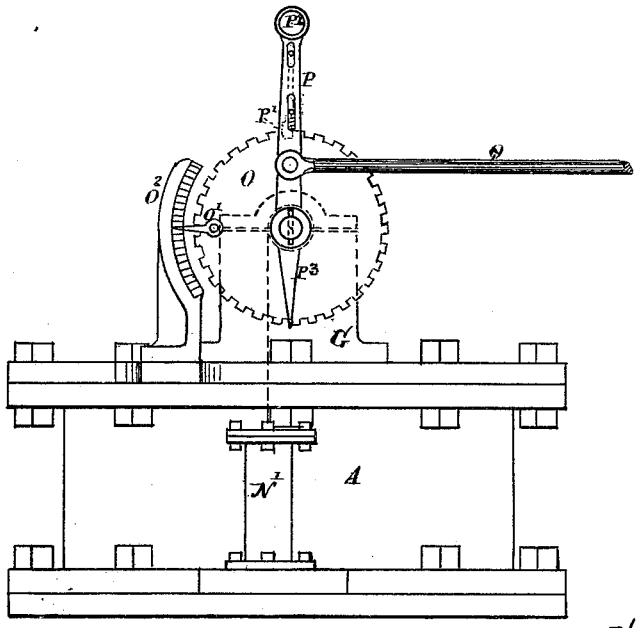


FIG: 4.



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UNITED STATES PATENT OFFICE.

FREDERICK W. DURHAM AND HENRY HOWSE, OF HOMERTON, ENGLAND.

IMPROVEMENT IN GOVERNORS.

Specification forming part of Letters Patent No. **188,876**, dated March 27, 1877; application filed February 6, 1877.

To all whom it may concern:

Be it known that we, FREDERICK WILLIAM DURHAM and HENRY HOWSE, both of Homerton, county of Middlesex, England, have invented an Improved Apparatus for Governing and Indicating the Speed of Motor-Engines; and do hereby declare that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein we have set forth the nature and principles of our said improvement, by which our invention may be distinguished from others of a similar class, together with such parts as we claim and desire to secure by Letters Patent—that is to say:

Our invention relates to improved apparatus for governing the speed of motor-engines, wherein the controlling effect is obtained by the varying resistance due to the varying speed of rotation of vanes revolving in a liquid, causing motion, in one direction or the other, to be imparted to a spindle acted on by a spring, and connected by a lever to the supply-valve, or friction-brake, or other mechanism that controls the speed of the motor.

The construction of such apparatus will be readily understood on reference to the accompanying drawings, in which—

Figure 1 shows a side elevation of our before-described improved governor. Fig. 2 shows a plan; Fig. 3, a longitudinal section, and Fig. 4 an end view.

In the closed casing A, filled with liquid, is contained a spindle, B, having vanes C, which, in revolving in the liquid, offer a resistance to the rotation of the spindle, such resistance varying with the speed of rotation. On the upper end of the spindle is fixed a bevel-wheel, D, in gear with another bevel-wheel, E, on the short tubular sleeve F, carried by the bracket G, and having a second bevel-wheel, E′, on its other end. Through the sleeve F passes a shaft, H, on the end of which is fixed a block, H′, carrying two bevel-wheels, I I′, in gear with the wheel E′, and with another wheel, K^1, on a shaft, K, to which rotary motion is imparted through the pulley K^2, from the motor-engine of which the speed is to be governed. The inner end of this shaft is made to run loose in the block H′. The other end of the shaft H is carried in a bracket, G′, and has fixed thereon a small pulley, L, on which is coiled one end of a cord or chain, M, the other end of which is drawn downward by the helical spring N inside the casing N′, fixed to A. The shaft H has also fixed upon it a notched disk, O, in the notches of which engages the spring-catch P^1 of a lever, P, loose on the spindle, and connected by a rod, Q, to the throttle-valve or other controlling mechanism of the motor-engine.

From the above-described arrangement it will be seen that if rotary motion be imparted to the spindle B and vanes C from the shaft K through the bevel-gearing, the resistance to such motion offered by the liquid in the casing A will cause the gears I I′, in revolving, to travel partially round the gear E′, thus making the shaft H turn to a certain extent. By such partial rotation of this shaft the cord M will be wound up, so as to compress the spring N until the resistance offered by the latter balances the resistance offered by the vanes C, whereupon the shaft H will become stationary. Assuming this to take place when the normal speed of the motor-engine is attained, it will be seen that on an increase of speed taking place the increased resistance of the vanes will again cause the shaft H, and with it the disk O and lever P, to turn somewhat against the action of the spring N, thus causing the rod Q to actuate the throttle-valve, so as to reduce the speed of the engine. If, on the other hand, the speed of the engine falls below that required, then the decreased resistance offered by the vanes will allow the spring N to turn the shaft H in the contrary direction, whereby the rod Q will be m de to open the throttle-valve to a greater extent.

It will be evident that in place of the arrangement of bevel-gears, E I I′ K^1, described for imparting the partial rotary motion to the shaft H through the increase or decrease of resistance of the vanes, any other well-known contrivance, such as sun and planet wheel motion, may be used, the sun-wheel being attached to the shaft K, the planet-wheel to an arm on the shaft H, and an internal wheel surrounding the two, and gearing with the planet-wheel, being connected to the tubular sleeve F.

In order to increase the resistance of the fluid to the rotation of the vanes, it is preferred to provide in the casing fixed vanes C′, which prevent the entire body of the liquid from partaking of the rotary motion. Should it be desired to alter the normal speed of the engine this is effected by withdrawing the spring-catch P^1 of the lever P from the notch of disk O, and turning it, by the handle P^2, into a different position relatively to the disk, whereby the rod Q will be made to hold the throttle-valve in a more open or more closed position in relation to the equilibrium position of the governor. To facilitate this adjustment the disk O may have divisions on its circumference, as shown, indicating the position into which the lever has to be moved for working at a certain normal speed, the lever being provided with an index, P^3, for this purpose.

The apparatus may also be made to indicate the actual speed of the engine at any moment by providing at any point of the circumference of the disk O an index, O^1, projecting over a graduated arc, O^2, fixed near the circumference of the disk, so that as the disk turns, as before described, when the speed increases or diminishes, it, (the index,) in moving over the scale, will indicate the number of revolutions corresponding to the position assumed; or the scale may be formed on the disk and the index be fixed at the side.

Having thus described the nature of our invention, and in what manner the same is to be performed, we claim—

1. In apparatus for governing the speed of prime movers, the vanes C, operating in combination with the shafts F H, toothed gearing E E′ I I′ K^1, spring N, and lever P, substantially as herein described.

2. In combination with the vanes C, operating with the shafts F H, toothed gearing E E′ I I′ K^1, spring N, and lever P, the toothed disk O, fixed on the shaft H, and operating in combination with the lever P and catch P^1, substantially as and for the purposes specified.

3. In combination with vanes C, operating with the shafts F H, toothed gearing E E′ I I′ K^1, spring N, and lever P, the index O^1 on the disk O, operating in combination with the scale O^2, for indicating the speed of the prime mover, substantially as herein described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses this 19th day of January, 1877.

FREDERICK WILLIAM DURHAM.
HENRY HOWSE.

Witnesses:
CHAS. D. ABEL,
JNO. P. M. MILLARD.