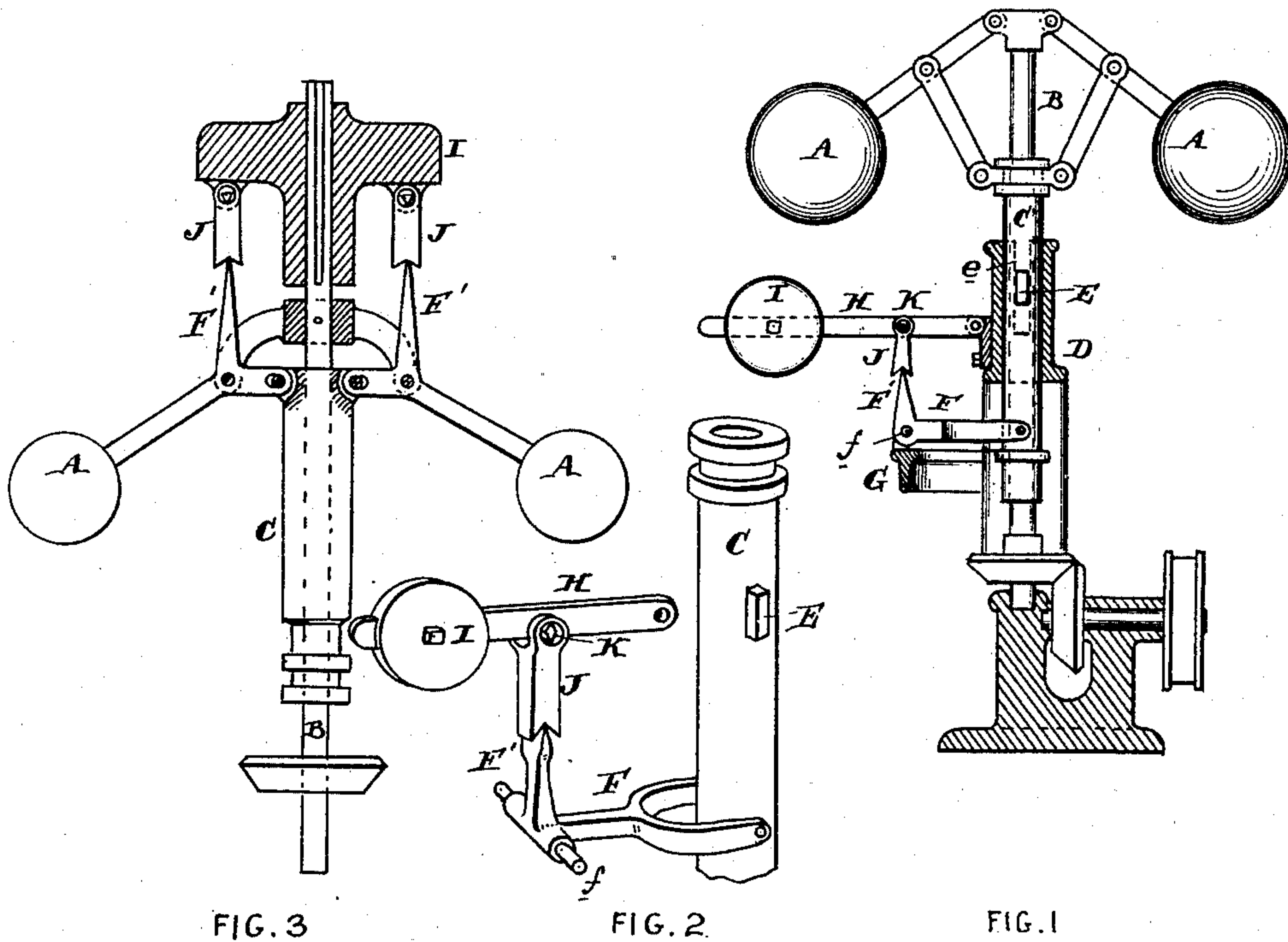


(No Model.)

J. CASHO.  
GOVERNOR.

No. 340,978.

Patented May 4, 1886.



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# UNITED STATES PATENT OFFICE.

JOSEPH CASHO, OF THURLOW, PENNSYLVANIA.

## GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 340,978, dated May 4, 1886.

Application filed October 21, 1885. Serial No. 180,490. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH CASHO, of Thurlow, county of Delaware, State of Pennsylvania, have invented an Improvement in Governors, of which the following is a specification.

My invention has reference to governors especially adapted for steam-engines; and it consists in suitable lever-and-weight mechanism acting directly or indirectly upon the balls or their mechanism for actuating the governor or throttle, by which they are practically increased or decreased in weight so far as their function or effect is concerned, and this, too, while the said balls are in motion, and in details of construction, all of which are fully set forth in the following specification and shown in the accompanying drawings which form part thereof.

Heretofore in operating ball-governors as commonly made the centrifugal force is relied upon wholly to control the time of the cut-off, and is more or less unreliable where there are great variations in the duty or load on the engine, not being sensitive to slight differences, requiring considerable time in which to adjust themselves, from which defects it follows that the engine will not remain at a uniform speed if its load is materially and quickly varied. This is the result with all ball-governors or those acting by centrifugal force, including the Judson, the Mackeye, the Armington and Sims, the Ide, &c., and the same defects will also be experienced more or less in the Huntoon.

The object of my invention is to overcome these defects by producing a governor or an attachment therefor by which the governor is made sensitive to variations in the load.

In the drawings, Figure 1 is a sectional elevation of an ordinary ball-governor having my improvement applied thereto. Fig. 2 is a perspective view of the parts embodying the essential features of my invention, and Fig. 3 is a sectional elevation of part of a modified arrangement of governor.

A are the balls of the governor, and B is the vertical rotating spindle therefor which may be rotated by suitable gearing or in any of the ways in common use.

D is the frame or standard of the governor, and supports the spindle B and the vertically-moving sleeve C, which, while it is raised or depressed by the action of the balls, is pre-

vented from rotating by the lugs E, which work in the vertical slots *e* in the standard D. The movement of the sleeve controls the point of cut-off of the engine-valve or the governor-valve when throttling the steam-supply is desired.

There are a large number of types of governors; but all will be substantially included in the designs shown in the drawings, representing the principles involved in the Judson, Hast, Armington and Sims Buckeye, Ide, and Huntoon governors, and will illustrate the applicability of my invention to any type of governors. It will therefore be understood that the particular shape or construction of the governor proper is immaterial to my invention.

Referring specifically to Figs. 1 and 2, G is a bracket supporting the bell-crank F F', which is pivoted or hinged thereto at *f*, and in which the arm F is preferably bifurcated and connected to the sleeve C, or any part which directly or indirectly connects with the balls, while the arm F' is made knife-edged and projects vertically upward.

H is a pivoted lever, and is adjustably weighted at I. Connected with this lever H is the link J, the pivot-connection of which with the same lever being preferably formed on knife-edges to reduce friction, and the lever end of said link is made to receive the knife-edge F'. When the governor-balls are extended to the degree necessary to keep the cut-off at such a point of stroke for normal working, it is preferable that the arm F' should be vertical and in the same vertical line with the pivotal points *f* and K, as in this position the governor is the most sensitive.

Now, considering the governor in working position for a given speed with a given load, it will be observed that should the load be decreased the tendency of the speed would be to increase and the balls A move farther apart. This action would raise the sleeve C and rock the bell-crank F F', throwing the knife-edge to the right of a vertical line through the pivotal point *f* and K, in which case the action of the weight L and its lever is to quickly increase this spreading of the balls, owing to the weight I, counterbalanced to a certain extent, the weight of the balls A making the centrifugal force due to the speed at which the gov-



ernor is running relatively greater. If, on the other hand, additional load be put upon the engine, the increased duty would make the engine slow down and close the cut-off later, and this action would be facilitated by the weight I, as in this case the descent of the sleeve C would throw the knife-edge to the left of the pivotal points *f* and K, thus tending to oppose the action of centrifugal force on the balls A. This weight I therefore will assist or oppose the action of centrifugal force the moment the load is decreased or increased; but when the governor is working with a normal load the weight I preferably exerts no power, as the pivotal points *f* and K and the knife-edge should be in the same line; but this state of things is not absolutely necessary in carrying out the function of my invention. The weight I in effect adds to or takes from the weight of the ball A while in motion, this practically controlling their weight according to the demand and making the governor extremely sensitive, preventing any material variations in speed of the engine, no matter how much the duty may be varied. It is evident that in place of the weight I a spring, I', might be used, they being equivalents.

In the design shown in Fig. 3 the intermediate connections are dispensed with and the ball-levers have the arms F' formed thereon, and the weight I is carried upon the rotating spindle, and has the links J connected directly to it. In the case first mentioned the weight I and knife-edge connections were stationary, while in this case they rotate with the balls.

It is immaterial to my invention what the make of governor may be. The principle remains the same, although the details of construction may be greatly modified.

In this application I do not claim the specific construction of governor as applied to shifting eccentrics, as that forms subject-matter of an application filed May 9, 1885, and Serial No. 164,888.

I am aware of English Patent No. 2,050 of 1854, and claim nothing therein set forth or claimed.

Having now described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. A governor combined with a lever or arm, F', adapted to be oscillated by the rise or fall of the governor-balls to throw its free end to the right or left of the fulcrum, and an adjustable weight device, arranged and supported, substantially as shown, to act upon said free ends of the lever or arm to assist in raising or depressing the governor-balls, according as a free end of the lever or arm is moved to one side or the other of its fulcrum, substantially as and for the purpose specified.

2. A governor combined with lever F F', link J, lever H, and weight I, combined and arranged substantially in the manner and for the purpose set forth.

3. A governor, in combination with the lever F F', one arm of which is substantially vertical and provided with a knife-edge, a connection between said lever and the governor proper, and a weight device supported upon said knife-edge, substantially as and for the purpose specified.

4. A governor, in combination with the lever F F', one arm of which is substantially vertical when the governor is working at its normal speed, a connection between said lever and the governor proper, a horizontal arm or lever, H, pivoted at one end and weighted at the other, and a connection between said lever H and vertical arm of the lever F F', substantially as and for the purpose specified.

5. A governor, in combination with the lever F F', one arm of which is substantially vertical when the governor is working at its normal speed, a connection between said lever and the governor proper, a horizontal arm or lever, H, pivoted at one end and adjustably weighted at the other, and a connection between said lever H and vertical arm of the lever F F', substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

JOSEPH CASHO.

Witnesses:

R. M. HUNTER,

WILLIAM C. MAYNE.