

(No Model.)

J. W. THOMPSON.

GOVERNOR.

No. 385,152.

Patented June 26, 1888.

FIG. 1.

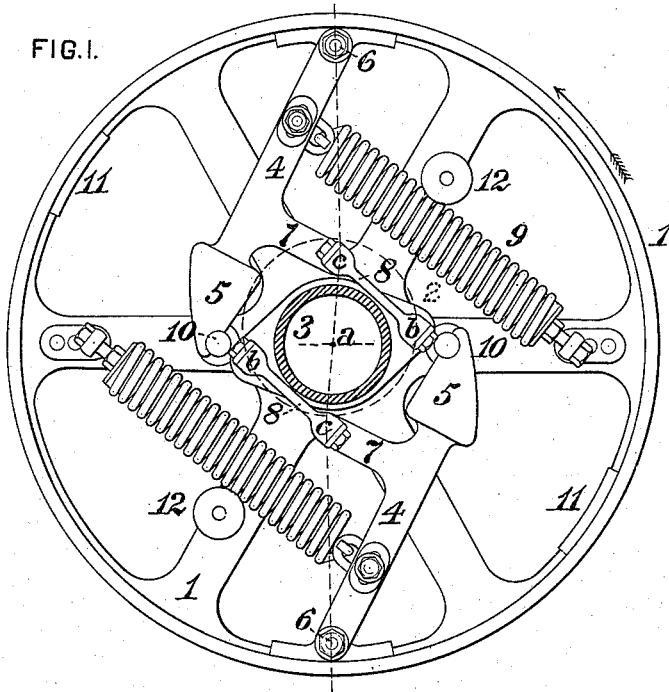


FIG. 3.

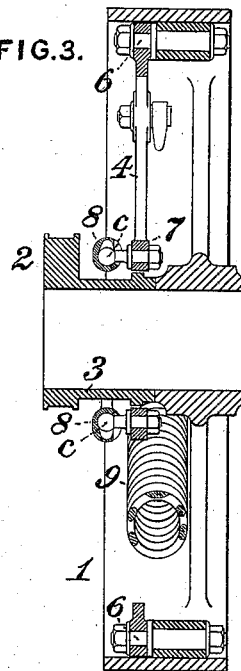


FIG. 2.

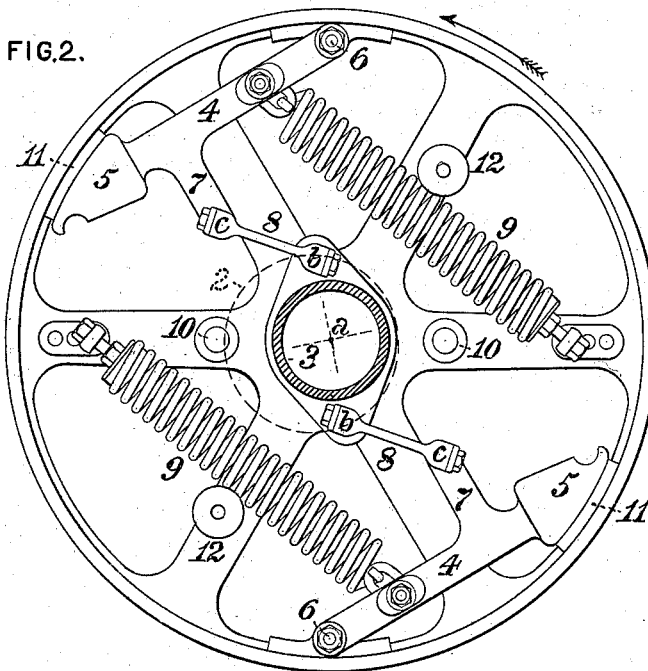
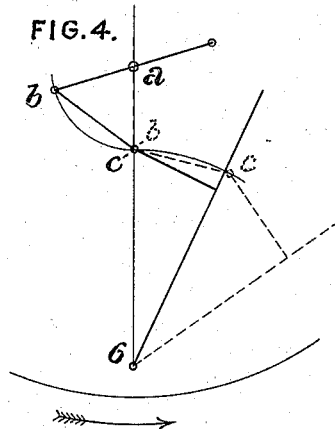


FIG. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH W. THOMPSON, OF SALEM, OHIO, ASSIGNOR OF ONE-HALF TO THE
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GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 385,152, dated June 26, 1888.

Application filed January 16, 1888. Serial No. 260,837. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. THOMPSON, of Salem, in the county of Columbiana and State of Ohio, have invented a certain new and useful Improvement in Governors, of which

improvement the following is a specification. My invention relates to centrifugal governors of the class which is adapted to be mounted upon the crank-shaft of an engine, and which effect regulation by variation of the position of a valve-operating eccentric.

The object of my invention is to enable a more constant ratio of angular movement to be maintained between the weight-arms and the adjustable eccentric than has been practicable with the link-connections heretofore employed, as well as to admit of a greater range of angular movement than under the latter constructions, and to prevent undue deflection of the springs from a right line.

To this end my invention, generally stated, consists in the combination of a movable eccentric, a weight-arm, and a link connecting the weight-arm and eccentric, the pivot-point of attachment of the link to the weight-arm being so located that it shall be in line with the center of the shaft and the pivot of the arm at a point adjoining and within the inner limit of the range of movement of the weight-arm, and that the point of pivotal attachment of the link to the eccentric shall in like manner be in line with the center of the shaft and the pivot of the weight-arm at a point adjoining and within the outer limit of the range of movement of the weight-arm.

My invention further consists in the combination of a weight-arm, a spring coupled thereto, and an exterior stop abutting against the spring.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a view in elevation of a governor embodying my invention, the weight-arms being shown at the inner limit of their range of movement; Fig. 2, a similar view with the weight-arms at the outer limit of their range of movement; Fig. 3, a transverse section; and Fig. 4, a diagrammatic view indicating in full and dotted lines, respectively, the parts when in positions adjacent to those shown in Figs. 1 and 2.

The operative mechanism is, as in prior governors of this type, mounted upon a case or wheel, 1, adapted to be fixed upon and rotate with the main or crank shaft of the engine or upon a separate shaft rotating coincidentally therewith. The valve operating eccentric 2 is cast with or secured to a sleeve or tubular hub, 3, which fits freely upon the shaft and is coupled by links 8 to lateral projections 7 upon arms 4, which are journaled by pivots 6 to the case 1 adjacent to its rim, and carry upon their free ends weights 5, by the centrifugal force of which outward movements of the weight-arms are induced in the operation of the governor. The links may be connected to the hub and weight-arms either by ball-and-socket joints, as shown, or by other suitable pivotal connections. Centripetal force, tending to induce movement of the weight-arms in the opposite direction, is provided by springs 9, each of which is connected at one end to the case and at the other to one of the weight-arms. The latter abut at the inner and outer limits of their range of movement against stops 10 and 11, respectively, which stops are fixed in proper position upon the case 1.

The location of the centers *b* and *c* of the pivots by which the links 8 are coupled to the eccentric and weight-arms, respectively, must be such that when the weight-arms occupy positions adjoining and within the inner limit of their range of movement the pivot-centers *a*, *c*, and 6 shall be in line, as indicated by the full lines in the diagram Fig. 4, and when said arms occupy positions adjoining and within the outer limit of their range of movement the pivot-centers *a*, *b*, and 6 shall be in line, as indicated by the dotted lines in the same figure. Such location is preferably effected by connecting the links 8, as shown, to projection 7 upon the weight-arms, extending therefrom in the direction of the center of the shaft and governor-case; but the same end may be effected, although in a less advantageous manner, by the provision of supplemental arms fixed to the arms 4 and diverging inwardly therefrom by an amount corresponding to the length of the extensions 7—that is, sufficient to bring about the alignments above specified while allowing the weight to stand sufficiently far from the center when at the

inner limit of its traverse to be conveniently clear of the other members, and to afford in its outward traverse the requisite degree of centrifugal force. In order to prevent the outward deflection of the springs 9 under the influence of centrifugal force, a stop, 12, which is preferably, as shown, a friction-roller mounted upon a stud, is connected to the case in position to bear against the outer surface of each of the springs.

In the operation of the governor the arcs described by the pivotal points *b* and *c* around their respective centers of movement are substantially tangential one to the other, and hence when the parts are in such positions as to effect the alignments of pivotal centers above specified the angular movements of the eccentric and the weight-arms are equal and the same as though said members were connected by gears of which said arcs would be the pitch-lines. The same is true when the weight-arms occupy such a position between the outer and inner limits of the range of movement of the weight that lines joining the centers *a* and *b* will be parallel with lines joining the centers *c* and *d*. Thus there are three points within the movement range of the weight-arms and eccentric at which the ratio of their respective angular movements is the same, and adjacent to and between said points the deviation from such equal ratio is inconsiderable. By the maintenance of such substantial equality of ratio the centripetal tendency of the duty imposed on the eccentric is made so nearly uniform that it can be sufficiently compensated for by proper adjustment of the spring-tension, so as to effect no disturbance of normal regulation. It will further be seen that the construction is such as to admit, without detriment to the effective operation of the governor, of a greater range of angular movement of the eccentric than that indicated in the figures, provision being made in the proportions of the governor for such increased

range, as an increase of inward movement induces a decrease of centripetal effect, which is favorable to stability of regulation and prompt action at starting, and an increase in the available range of outward movement is accompanied by an increase of centripetal effect, which is likewise conducive to stability of regulation as tending to resist undue outward movement.

I claim as my invention and desire to secure by Letters Patent—

1. In a centrifugal governor, the combination of a supporting-case, a weight-arm pivoted thereto, a movable eccentric, and a link coupling the eccentric and weight-arm, the pivots connecting the link to the eccentric and to the weight-arm being so relatively located that the arcs described by said pivots shall be substantially tangential one to the other, and that each of said pivots may be brought into line with the centers of the case and of the weight-arm pivot in positions of the weight-arm within and adjacent to the outer and the inner limits of its range of movement, substantially as set forth.

2. In a centrifugal governor, the combination of a supporting-case, a weight-arm pivoted thereto, a spring coupled at its ends to the weight-arm and to the case, and a stop connected to the case in position to abut against the outer surface of the spring, substantially as set forth.

3. In a centrifugal governor, the combination of a supporting-case, a weight-arm pivoted thereto, a spring coupled at its ends to the weight-arm and to the case, a stud fixed in the case exterior to the spring, and a friction-roller mounted on the stud and abutting against the outer surface of the spring, substantially as set forth.

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Witnesses:

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