

(No Model.)

J. W. THOMPSON.

GOVERNOR.

No. 381,597.

Patented Apr. 24, 1888.

FIG. 1.

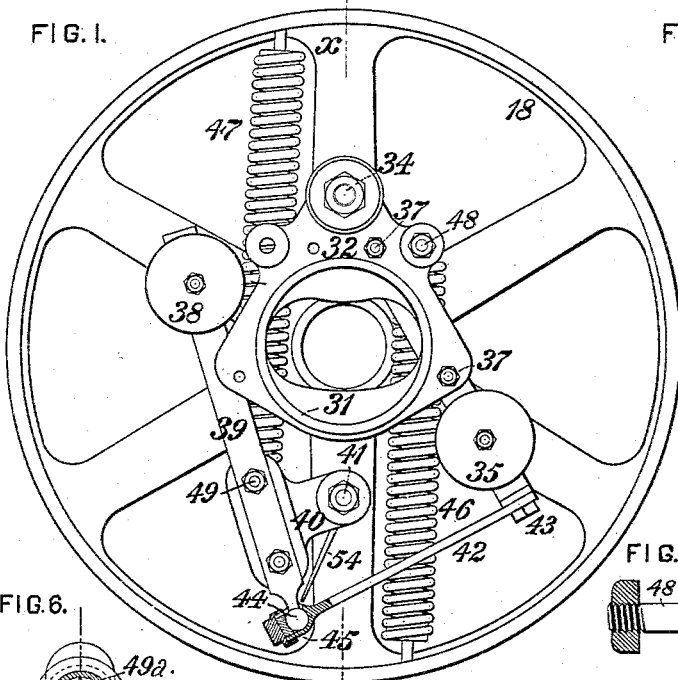


FIG. 3.

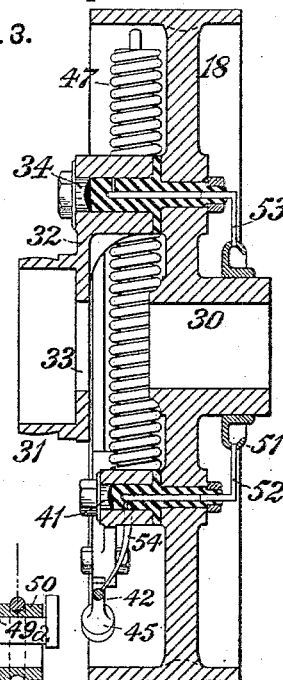


FIG. 6.

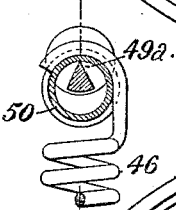


FIG. 2.

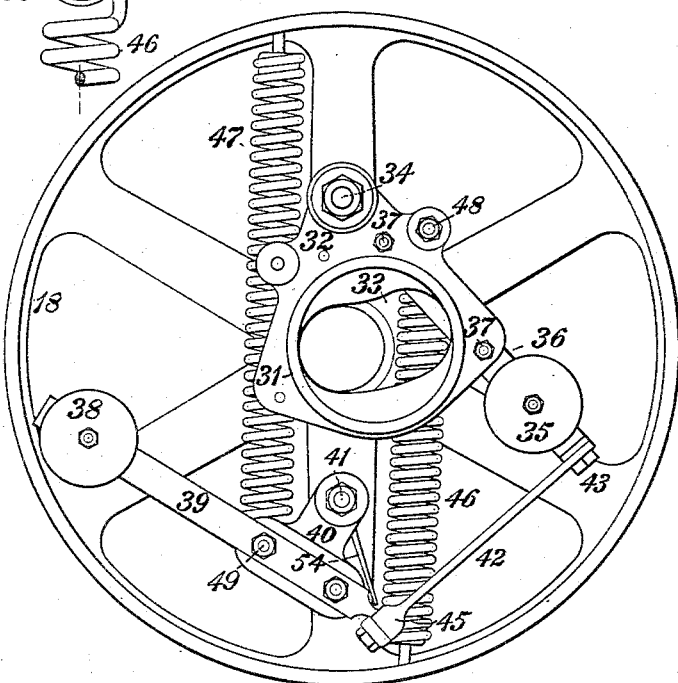


FIG. 5.

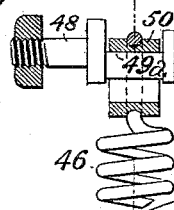
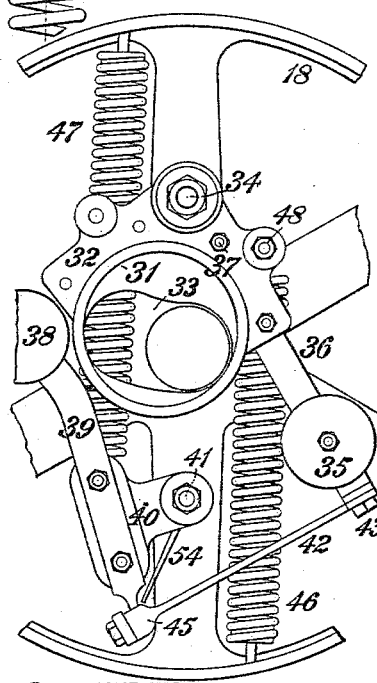


FIG. 4.



WITNESSES:

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INVENTOR,

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Att'y.

UNITED STATES PATENT OFFICE.

JOSEPH W. THOMPSON, OF SALEM, OHIO, ASSIGNOR TO THE BUCKEYE
ENGINE COMPANY, OF SAME PLACE.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 381,597, dated April 24, 1888.

Application filed November 28, 1887. Serial No. 256,311. (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 certain new and useful Improvements in Governors, of which improvements the following is a specification.

My invention relates to centrifugal governors or regulators for steam or other fluid-pressure engines of the class which are fixed upon the crank-shaft of the engine or a shaft rotated therefrom, and which effect regulation by variation of a loose or adjustable eccentric.

The object of my invention is to provide a governor which, while especially adapted for use in connection with the improved valve-gear of my application, Serial No. 256,310, filed November 28, 1887, (in which it is partially illustrated without being described or claimed,) shall be desirably applicable in any other construction involving the movement of a loose eccentric transversely to the crank-line, and in which, further, the number of wearing-joints shall be reduced as far as practicable and facilities afforded for ready and sufficient lubrication while in operation, and for obviating the escape of lubricating material by the action of gravity or centrifugal force.

To this end my invention consists in certain novel devices and combinations, hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a view in elevation of a governor embodying my invention, the relative positions of the parts being those occupied when at rest or when running at speed insufficient to cause outward movement of the weights; Fig. 2, a similar view illustrating the weight-arms expanded to the outer limit of their range of movement; Fig. 3, a transverse section at the line *x x* of Fig. 1; Fig. 4, a view in elevation showing a modification; and Figs. 5 and 6, longitudinal and transverse sections on an enlarged scale, through the thimble and pivot connection of the springs and weight arms or levers.

The operative mechanism of the governor is, as in prior constructions, of the general type in which my invention is comprehended, mounted either upon a fly wheel or pulley or upon a special supporting disk or case, 18, having a central hub, 30, by which it is secured

upon the main or crank shaft of the engine or a counter shaft driven therefrom. An eccentric, 31, which is open internally, so as to be entirely clear of the shaft and of the disk, and to be free to move transversely thereto, is formed with or fixed to a supporting-plate, 32, which is provided with a transverse slot or opening, 33, of sufficient width to admit of the free passage of the shaft of the disk, and is journaled upon and moves freely about the axis of a stud or pivot, 34, fixed to the case 18. A weight or pendulum, 35, is fixed upon a weight arm or lever, 36, which is secured by bolts 37 to the supporting-plate 32, and a corresponding weight, 38, is secured to an arm, 39, having a lateral extension, 40, by which it is journaled upon a pivot, 41, on the governor-case. The weight-arms 35 and 38 are coupled, so that the weights shall move in unison through arcs of the different lengths resultant upon those of the weight arms, by a link, 42, which is preferably fixed to the arm 36 by a bolt, 43, and pivoted to the arm 39 by a ball-and-socket joint, formed by a ball or spherical end, 44, turned on the arm 39, and a socket, 45, on the link 42, inclosing the ball. The opening for the neck of the ball being on the side of the socket nearest the center of the disk, no tendency for the lubricating material to be thrown out of the socket by centrifugal force is induced, and on the other hand the action of centrifugal force tends to retain the lubricant therein. A rigid connection of the link 42 to the weight arm 36, which I deem preferable to a flexible joint in point of economy of structure and maintenance, and reduction of lost motion, is rendered admissible by reason of the fact that when the weight-arms 36 and 39 are at the middle of their range of movement the pivots 34 and 41 and the center of the ball-and-socket joint 44 45 will all be in line, so that the arc described by the ball 44 around the pivot 41 as a center and that which would be described by the socket 45 if detached from the ball and left free to move about the pivot 34 as a center may be made to coincide at their extremities, and these arcs will be separated when the weight-arms are at their middle positions only by a distance equal to the difference of the versed sines of the two arcs, such amount being inconsiderable and readily admissible by

the elasticity of the link 42. The imposition of such slight flexure upon the link I deem preferable to the employment of a joint between the same and the arm 36, more particularly because the connection of the lever 42 and arm 36 may be made in such manner as to spring the link inwardly sufficiently to cause a mean inward pressure at the ball-and-socket joint 44 45 slightly in excess of the outward centrifugal force, so that the point of contact in the joint will be at the location to which the oil tends to flow under the influence of centrifugal force.

The centripetal force by which the weights are retracted is exerted by springs 46 47, each of which is secured at one end to the rim of the governor case or disk 18, and is coupled at its opposite end to a pin on one of the weight-arms, the spring 46 being connected to a pin, 48, on the supporting-plate 32, to which the weight-arm 36 is fixed, and the spring 47 to a pin, 49, on the weight-arm 39. To admit of the free action of the springs upon the arms in the various positions assumed by the latter, the connection of the springs and pivots is preferably effected by means of rings or thimbles 50, which fit on knife-edge bearings 49^a, formed on the pivots 48 and 49, the ends of the springs being bent or hooked around and fitting in peripheral grooves formed in the thimbles 54, so as to enable the tension of the springs to be exerted upon the pins 48 and 49 uniformly in the axial lines of the springs, irrespective of the position of the arms.

In order to enable the wearing parts to be readily and effectively lubricated during the operation of the governor, a ring having an annular channel, 51, in its periphery is secured upon the hub 30 of the governor-disk, and oil-passages 52 53 are led from the channel 51 to the pivots 41 and 34, respectively, said passages terminating on the outer surfaces of the pivots, so that oil supplied to the channel 51 will, by the action of centrifugal force, be carried to and distributed over the wearing surfaces of the pivots and the sockets of the supporting-plate 32 and arm 39, which fit thereon. Oil is supplied to the ball-and-socket joint 44 45 by a pipe, 54, inserted in the hub of the lateral projection 40 of the arm 39, which fits around the pivot 41, said pipe having its outer end adjacent to the opening of the socket 45, and serving to carry thereinto any surplus oil that might otherwise tend to be thrown from the pivot 41.

Fig. 4 illustrates a modification of the relative location of the eccentric and the center line of its supporting-plate suited to adapt the governor to control an induction valve or valves without the intervention of a compound rocker system—that is to say, when it is desired that the maximum travel of the eccentric shall be when the weight-arms occupy their innermost positions and the minimum travel when the weight-arms are expanded to the extremity of their outward traverse.

It will be seen that under my invention but three wearing joints or pivots are required, and that these may be oiled as required without stopping the engine or involving liability to discharge of oil by centrifugal force, the latter feature being of substantial advantage where, as is frequently the case, long runs must be made without an opportunity of obtaining direct access for oiling in the ordinary manner.

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

1. In a centrifugal governor, the combination, substantially as set forth, of a supporting case or disk, a valve-operating eccentric pivoted thereto, a weight secured to an arm which is connected to the eccentric and movable therewith about its pivot, a weight secured to an arm pivoted to the case, and a link which is fixed at one end to one of the weight-arms and connected by a pivotal joint to the other weight-arm.

2. In a centrifugal governor, the combination, substantially as set forth, of a supporting case or disk, an eccentric connected to a supporting-plate which is pivoted to the disk, a weight fixed upon an arm secured to the supporting-plate, a weight fixed upon an arm pivoted between its ends to the disk, and a link jointed to said arm exterior to its pivot and fixed at its opposite end to the other weight-arm.

3. In a centrifugal governor, the combination, substantially as set forth, of a supporting case or disk, a weighted arm pivoted thereto, and a spring which is fixed at one end to the disk and connected at its opposite end to a ring or thimble fitting a knife edge bearing on the weighted arm.

4. In a centrifugal governor, the combination, substantially as set forth, of a supporting case or disk, an eccentric, and a weighted arm pivoted independently thereto, a ring or plate fixed upon or adapted to rotate with the case and having an annular channel adjacent to its periphery, and pipes or passages leading from said channel to the pivots of the eccentric and weighted arm.

5. In a centrifugal governor, the combination, substantially as set forth, of a supporting case or disk, an eccentric and connected weighted arm pivoted thereto, a weighted arm pivoted independently to the disk, a link jointed to said arm and fixed at its opposite end to the other weight-arm, a ring or plate fixed upon or adapted to rotate with the case and having an annular channel adjacent to its periphery, pipes or passages leading from said channel to the pivots of the eccentric and of the weight-arm, and a pipe leading from the pivot of the weight-arm to the joint between said arm and the link.

JOSEPH W. THOMPSON.

Witnesses:

JOHN E. ROGERS,
L. C. HOLS.

Correction in Letters Patent No. 381,597.

It is hereby certified that Letters Patent No. 381,597, granted April 24, 1888, upon the application of Joseph W. Thompson, of Salem, Ohio, for an improvement in "Governors," was erroneously issued to the "Buckeye Engine Company" as assignee of the entire interest; that the said Letters Patent should have been issued to said *Joseph W. Thompson and the Buckeye Engine Company jointly*, said Buckeye Engine Company being the assignee of one-half interest only in said invention, as shown by the assignments recorded in this Office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 1st day of May, A. D. 1888.

[SEAL.]

D. L. HAWKINS,

Assistant Secretary of the Interior

Countersigned:

BENTON J. HALL,

Commissioner of Patents.