(No Model.)

2 Sheets—Sheet 1.

# J. MEAD.

## GOVERNOR FOR STEAM ENGINES.

No. 306,167. Patented Oct. 7, 1884.

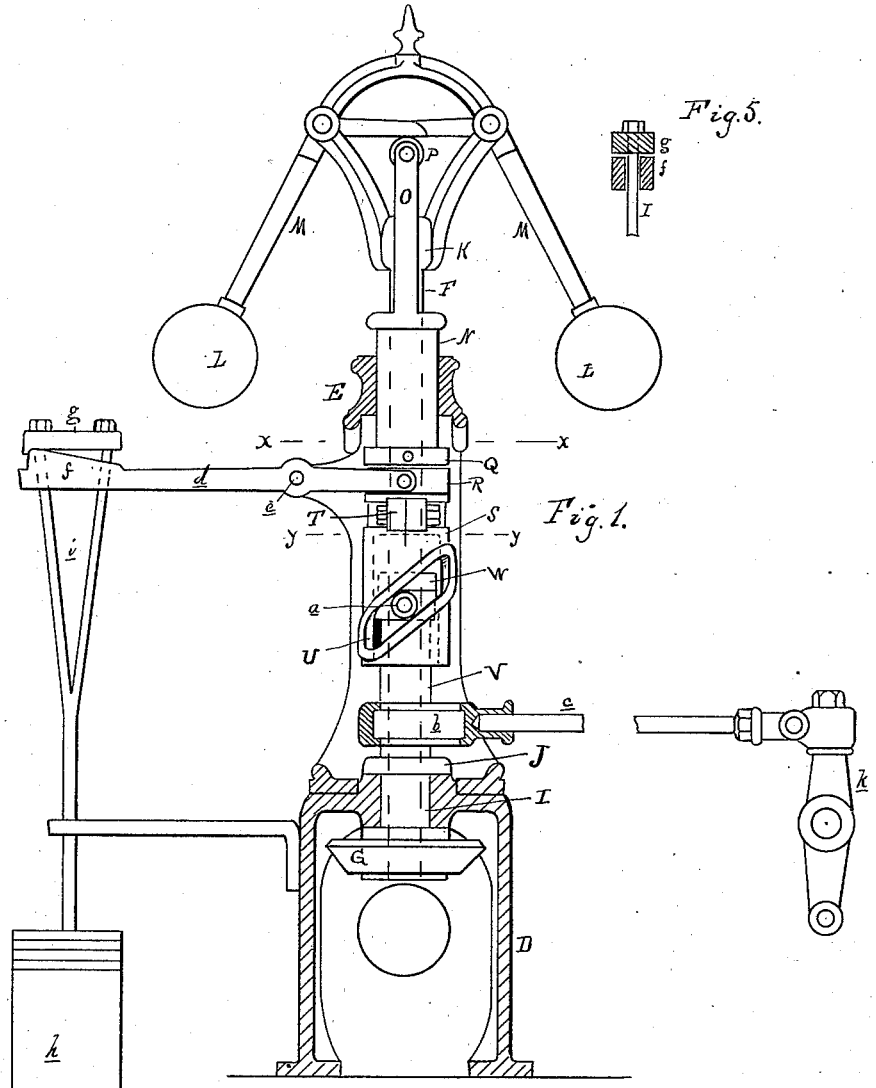


Fig. 1.




Fig. 5.




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## GOVERNOR FOR STEAM ENGINES.

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Fig. 2.

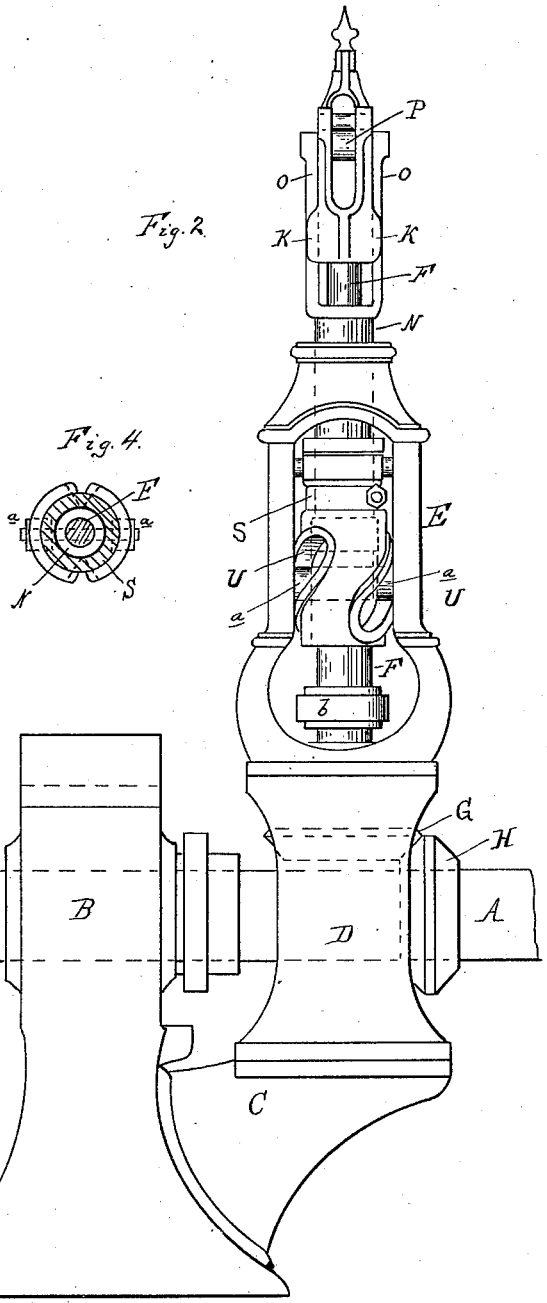
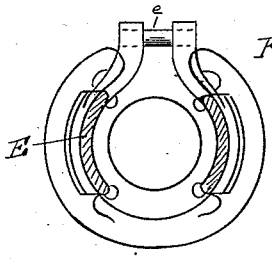



Fig. 4.




Fig. 3.

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Inventor.
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# UNITED STATES PATENT OFFICE.

JOHN MEAD, OF DETROIT, MICHIGAN.

## GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 306,167, dated October 7, 1884.

Application filed February 23, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN MEAD, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Governors for Steam-Engines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to an improvement in governors for steam-engines of the class usually called "variable cut-off" governors; and the invention consists in the construction, arrangement, and combination of the various parts, all as fully hereinafter set forth.

In the accompanying drawings, which form a part of this specification, Figure 1 is an elevation of the device complete, with some of the parts in vertical central section. Fig. 2 is another elevation, with some of the parts removed and showing the device at right angles to Fig. 1. Fig. 3 is a cross-section on the line X X in Fig. 1. Fig. 4 is a cross-section on ling *y y*, Fig. 1. Fig. 5 is a vertical cross-section through the suspension bearings of the counterpoise.

A is a shaft, preferably the crank-shaft of the engine.

B is one of the journal-bearings in which the shaft revolves.

C is a bracket projecting from the journal-bearing.

D is the base of the governor-frame.

E is the upper part of the governor-frame, which is bolted onto the base.

F is the ball-spindle, by means of which the balls L L′ receive their rotation through the medium of the bevel-pinions G H. The bevel-pinion G is vertically journaled through the base D of the governor-frame by means of the sleeve I, which rests, with its collar J, upon the top of the base D, and thereby supports the ball-spindle. The upper end of the ball-spindle forms the two guides or cheeks K, after which it bifurcates, each bifurcation forming a pivotal support for the ball-arms M M.

N is a hollow spindle loosely sleeved upon the upper end of the ball-spindle and vertically journaled in the upper end of the governor-frame. The upper part of this hollow spindle is bifurcated, (O O,) each bifurcation engaging with one of the cheeks K K, which form vertical guides for them.

P is an anti-friction roller, journaled between the upper ends of the bifurcations O O, and the inner ends of the ball-arms are adapted to bear against this roller. The lower end of the hollow spindle N is provided with the fixed collar Q, the loose ring R, and the clamped sleeve S. This latter sleeve is split upon its upper end and provided with the clamp-screw T, by means of which it is firmly clamped to the lower end of the hollow spindle N.

U U are two corresponding spiral slots upon opposite sides of the clamped sleeve S.

V is a hollow spindle, loosely sleeved upon the lower end of the ball-spindle and partially extending within the hollow sleeve S. The hollow spindle V rests upon the collar J, and is held on top against vertical displacement by a collar, W, secured to the ball-spindle. Secured upon opposite sides of the hollow spindle V are two anti-friction rollers, *a a*, adapted to fit and engage into the spiral slots U U of the sleeve S.

*b* is the cut-off eccentric, secured upon the spindle V, and *c* is the actuating-rod of the cut-off.

Secured to the loose ring R is the forked inner end of the lever *d*, which is fulcrumed at *e* to the governor-frame, and terminates upon its free outer end in a bearing-plate, *f*, the face of which is slightly curved and inclined, as shown, so as to form a variable support for the straight-faced bearing-plate *g*, from which the weight *h* is freely suspended by means of the forked rod *i*.

In practice the centrifugal force of the governor is furnished by the balls L L, which are rotated by the ball-spindle F. The weight *h* furnishes the centripetal force, which is made the desired variable quantity by the changing positions of the lever *d*, which shift the point of suspension of the weight in or out. The rotation of the ball-spindle communicates motion to the hollow spindle N and clamp-sleeve S by reason of the engagement of the cheeks or guides K with the bifurcations O O, and

also to the hollow spindle V by reason of the engagement of the anti-friction rollers *a* into the spiral grooves U. Upon a change of speed the eccentric will be either turned ahead or back—that is, if the sleeve S is raised by the dropping of the balls, the hollow spindle V, upon which the eccentric is secured, will be turned back, and when the sleeve S is depressed by the flying out of the balls through an increase of speed, the hollow spindle V and eccentric will be turned ahead of their motion.

To effect an easy action of the spiral grooves U upon the rollers *a*, I give to the former a pitch of about forty-five degrees, and a little less than one-half of a turn is sufficient to give the governor complete control over the eccentric. At the desired normal speed the rollers *a* should be in the center of the spiral slots U. This arrangement is easily effected by adjusting the weight *h*, and, if necessary, the position of the loose ring R, which is held in position by the collar Q and clamped sleeve S, which are both adjustable upon the hollow sleeve N.

The arrangement of the different parts gives a very compact and simple device which is easily mounted and connected with the valve-gear, as indicated in the drawings, where *k* is an oscillating lever pivoted in its center, and having the valve-rod attached to its lower end, which is thereby easily brought in alignment without complicated valve-gear.

As far as the operation of the governor is concerned, the sleeve S may form an integral part of the hollow spindle N; but for practical reasons I prefer to construct it as shown.

What I claim as my invention is—

1. In a centrifugal governor, the combination of the drive-spindle actuated by the engine, of a hollow spindle sleeved thereon, of devices for rotating the two spindles together, but allowing the latter to move endwise under the varying action of the centrifugal and centripetal weights acting upon it, of a sleeve forming the lower end of said hollow spindle and provided with corresponding spiral slots upon opposite sides, and of another hollow spindle sleeved upon the lower end of the driving-spindle and provided with the valve-eccentric and two wrist-pins engaging into the spiral slots, substantially as set forth.

2. In a centrifugal governor, the combination of the counterpoise *h* and lever *d* with the ring R, collar Q, spindle N, and clamp S, constructed and arranged substantially as and for the purposes described.

3. The combination, in a centrifugal governor having a vertical drive-spindle, of a valve-eccentric having its axis of motion coincident with the axis of the drive-spindle of the governor-balls, and deriving its motion therefrom, and of devices for turning the eccentric around the drive-spindle under the action of said governor, substantially as set forth.

4. The combination, in a centrifugal governor, substantially as described, with the crank-shaft A, of the engine journal-bearing B, bracket C, secured to the bearing B, loose eccentric *b*, eccentric-rod *d*, oscillating lever *k*, and valve-rod *l*, all combined substantially as and for the purpose described.

5. In a centrifugal governor, the combination of the lever *d*, curved and inclined bearing-plate *f*, bearing-plate *g*, rod *i*, and weight *h*, all combined and operating substantially as described.

JOHN MEAD.

Witnesses:
H. S. SPRAGUE,
J. PAUL MAYER.