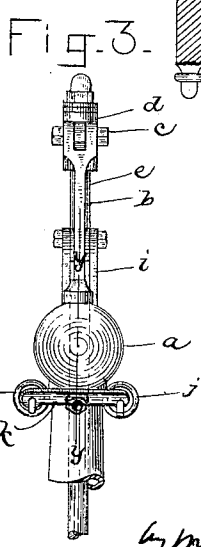
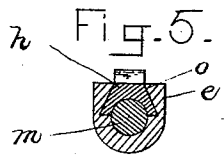
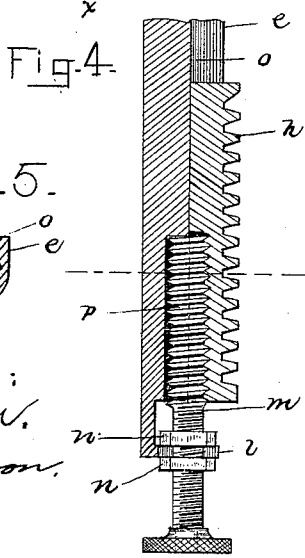
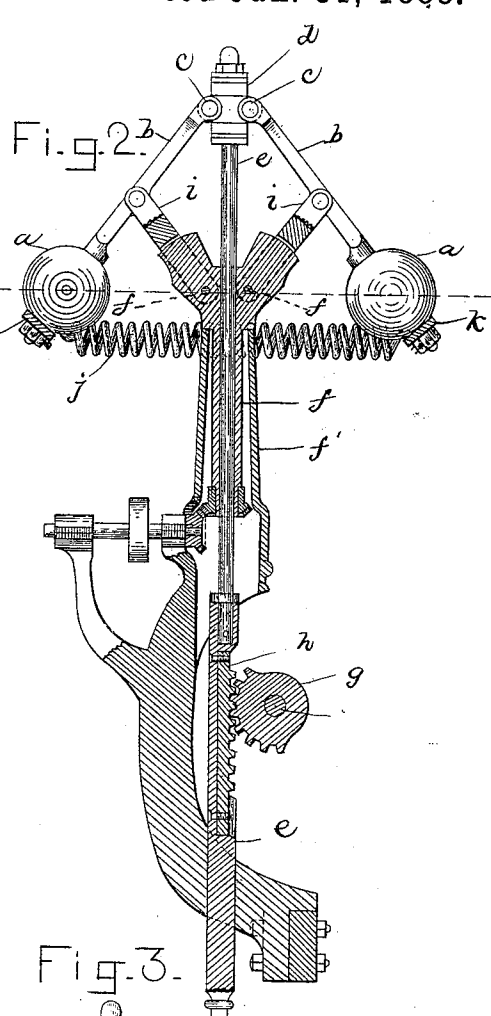
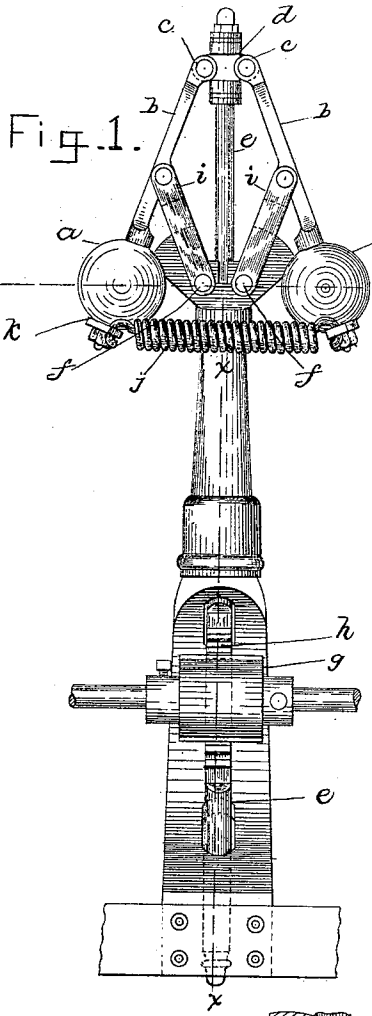


(No Model.)

J. A. HORTON.
STEAM ENGINE GOVERNOR.

No. 377,028.

Patented Jan. 31, 1888.



Witnesses:
H. Brown.
A. D. Harrison.

Inventor:
J. A. Horton.
by *Wright Brown & Cooley*
Atty.

UNITED STATES PATENT OFFICE.

JAMES A. HORTON, OF READING, MASSACHUSETTS.

STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 377,028, dated January 31, 1888.

Application filed October 8, 1886. Serial No. 215,671. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. HORTON, of Reading, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Engine Governors, of which the following is a specification.

This invention relates to governors of the class used in connection with stationary steam-engines, cut-off valves, &c.; and it consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of my improved governor as it appears when standing at rest. Fig. 2 represents a section on line *x x*, Fig. 1, and also a sectional view of the head or rotating portion of the same on the line *yy* of Fig. 3. Fig. 3 is an edge view of the upper portion of the governor. Figs. 4 and 5 represent sectional views hereinafter referred to.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention I construct a governor preferably of the form used by me to operate my improved cut-off valve for which I have made application for Letters Patent, filed concurrently with this, Serial No. 215,655.

An important feature of my improved governor is that the balls *a a* always move in a horizontal plane, as shown in Fig. 2, the ball-rods *b b* being jointed at *c c* to a head, *d*, which rotates on a rod, *e*. Said rod or spindle slides vertically within a hollow driving-spindle, *f*, Fig. 2, and is adapted to operate a gear, *g*, meshing with a rack, *n*, for the purpose of manipulating a cut-off valve, or for operating a valve for the admission of steam to a cylinder, or for any purpose for which governors are used. The hollow driving-spindle *f* is supported by a fixed sleeve or bearing, *f'*.

The ball-rods *b b* are jointed at the middle to links *i*, which are secured at their lower ends to the main driving-spindle *f*. Said driving-spindle takes its motion through bevel-gearing and intermediate shafting from the engine-shaft in the usual manner. Two coiled springs, *j j*, (see Fig. 3,) are attached to a cross-bar *k*, bolted to the lower end of the ball-rods

b. Said springs are adjusted so as to prevent sudden fluctuations of speed from throwing the governor-balls beyond the proper position for adjusting speed, and prevent the oscillations of speed which attend the use of governors of the ordinary fly-ball pattern, where the balls swing in the arc of a circle and are not thus controlled.

When the engine is at speed, the action of centrifugal force is entirely overcome by the agency of the opposing springs *j*, and the speed of the governor may be much higher than the speed of the engine, which being the case causes the governor to act with more accuracy—*i. e.*, the variation of one revolution in the speed of the piston will, under these circumstances, make a variation of a higher number of revolutions in the governor in proportion as the relative speed of the governor and piston is adjusted, the adjustment of speed of the governor being attained by the adjustment of the tension of the springs *j j*, which can be arranged so that the degree of adjustment can be regulated to a fine point by any ordinary devices usually used for the purpose, such as screws, or by using springs of different degree of stiffness to suit the requirements of circumstances.

I have shown in Figs. 4 and 5 means for adjusting the rack *h*, by which means, when the governor is used in connection with a cut-off valve, the rack may be adjusted on the stem to regulate the cut-off valves, and thus regulate the speed of the engine. To these ends I have shown the lower portion of the spindle *e* provided with a foot, *l*, slotted to receive a bolt, *m*, provided with jam-nuts *n n*, and extending up into the stem or spindle *e* and engaging with the rack *h*, which is also screw-threaded and adapted to move up in the dovetail slot *o* in the spindle *e*, as shown in Fig. 5. The cavity *p* in the stem *e* is not screw-threaded, and by rotating the screw-bolt *l* the rack *h* can be moved up and down as required. (The position of the rack shown in Fig. 4 is at its lowest point.)

It will be seen by reference to Figs. 1 and 2 that the balls *a* are in different positions, those in Fig. 1 being drawn in, as would be the case when the governor is at rest, and those in Fig. 2 are extended, as when the governor

is in motion. It will be observed that the horizontal dotted line passes through the centers of the balls in both figures, showing that the balls are always on the same horizontal plane at all points. I therefore avoid the variations of resistance which attend the swinging movement of governor-arms, the pivotal connections of which are not vertically movable. The balls of such arms necessarily swing in the arc of a circle, and in rising experience the resistance due to gravitation, while the balls of my governor-arms do not rise, but remain in the same horizontal plane at all times.

I do not limit myself to the use of my improved governor in connection with a cut-off, as it can be used in any position that governors of any construction are used.

I claim—

The combination, with the fixed sleeve or

bearing, of a hollow driving-spindle mounted to rotate therein and immovable against vertical movement, a vertically-moving valve-operating rod playing in said sleeve and having a removable rack-section, governor-arms having balls and connected to said rod, links pivoted to said sleeve and governor-arms, and coiled springs arranged at each side and connecting the governor-arms to control their normal position, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of September, 1886.

JAMES A. HORTON.

Witnesses:

C. F. BROWN,
ARTHUR W. CROSSLEY.