E. BUSS.

STEAM ENGINE GOVERNOR.

No. 183,636. Patented Oct. 24, 1876.

Fig. 1.

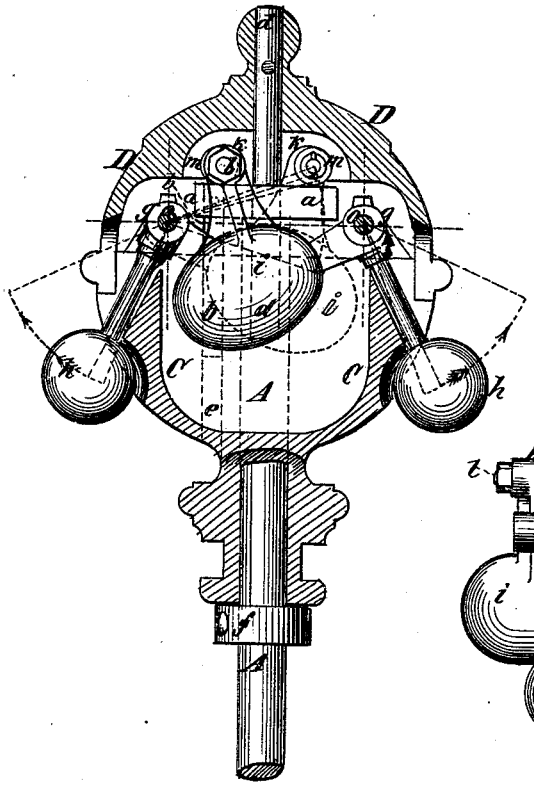


Fig. 2.

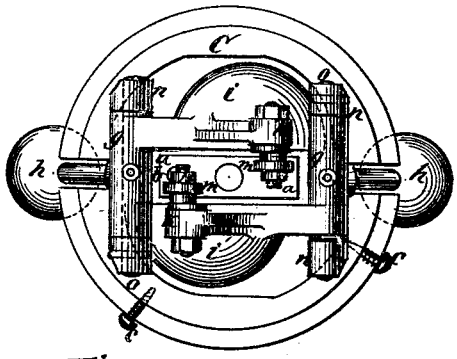
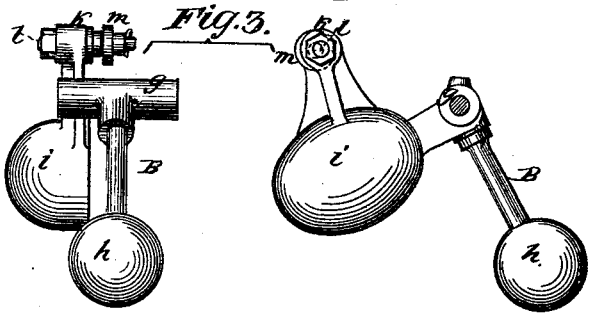


Fig. 3.



Witnesses.
John Becker
Fred Haynes

Edward Buss
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

EDWARD BUSS, OF MAGDEBURG, GERMANY.

IMPROVEMENT IN STEAM-ENGINE GOVERNORS.

Specification forming part of Letters Patent No. **183,636**, dated October 24, 1876; application filed June 23, 1876.

To all whom it may concern:

Be it known that I, EDWARD BUSS, of Magdeburg, Germany, engineer, have invented an Improvement in Steam-Engine Governors, of which the following is a specification:

This invention relates to certain improvements in governors for steam-engines, and other machinery, in which the rotating pendulums are so constructed and arranged in relation to the other parts that the momentum of the centrifugal power will be proportioned to the cosine of the angle of separation, and the sensitiveness or movability of the apparatus made nearly constant. The pendulum and its weights are of such shape and construction in relation to the point of suspension and center of gravity that, when the angle of separation equals forty-five degrees, the mass of metal will be equally distributed on each side of a line drawn through the center of gravity from the point of suspension, and as the angle of separation is either increased or decreased the mass of metal will be thrown to one side or the other in exact proportion as the angular speed is increased or decreased, so as to keep the momentum of the centrifugal force constant, no matter how the angle of separation varies, and, consequently, as the cosine of said angle is increased or decreased, the body of the metal composing the pendulum and weights will be thrown forward or within the line drawn from the point of suspension and the center of gravity when the angle of separation is forty-five degrees, and the governor be thus made perfectly astatic; and it consists in a governor composed of a hollow sphere loosely mounted upon a vertical spindle, with which it rotates, and provided with two or more weighted levers or pendulums pivoted thereto at suitable points, and provided with friction-rollers on their inner ends, which bear upon a horizontal plate secured to the upper end of the vertical spindle in such a manner that when the outer arms of the levers are thrown apart by centrifugal force they will elevate the sphere which operates the steam-valve or other regulating device, through the medium of suitable machinery, the said inner ends of the levers or pendulums traveling in a horizontal plane across the face of the plate secured to the upper end of the vertical spindle, as more fully hereinafter set forth. My invention further consists in certain combinations of devices in connection with the sliding sphere, pendulums, and spindle, as more fully hereinafter specified.

In the drawings, Figure 1 represents an elevation of my improved governor, the interior portions being represented by dotted lines. Fig. 2 represents a top view with the upper half of the sliding sleeve removed; and Fig. 3 represents detached views of weighted levers or pendulums of the governor.

The letters C D represent a hollow sphere or sleeve constructed in two parts, for conveniently securing the weighted levers or pendulums and other parts of the governor within the same, said sphere or sleeve being loosely mounted upon a vertical spindle, A, so that it may move vertically thereon, being prevented from rotating upon it by means of a pin or rod, *b*, secured to a horizontal plate, *a*, attached to the top of the vertical spindle, the said pin or rod fitting loosely in a vertical aperture, *e*, formed in the lower part of the sphere or sleeve. From the center of the upper part of the sphere or sleeve projects a vertical rod or pin, *d*, which extends downwardly through an opening in the center of the plate *a* into the upper end of the spindle A, which is made hollow for the purpose, said pin being capable of a vertical movement in said aperture and spindle, thus serving as a guide for the sphere or sleeve in its vertical movement. The downward movement of the sphere is limited by a collar, *f*, attached to the spindle, and the upward movement by the horizontal plate *a*. The letter B represents two angular levers or pendulums provided with a long sleeve or bearing at the angle through which pass the pins *k k*, which pass also through lugs *k' k'* at each side of the levers, serving to pivot said levers between said lugs. The outer arms of said levers are provided at the ends with spherical weights *h*, and the inner arms with hemispherical or nearly hemispherical weights *i*, from each of which extends an upwardly-projecting arm, *i'*, to the end of which is secured a disk, *m'*, by means of a pin, *m''*, extending from the center of said plate through a suitable aperture in the end of the arm *i*, said pin being provided at its other end with a screw-nut, by

means of which the disk can be clamped in any desired position. To the face of the disk, eccentric therewith, is secured a pin, upon which is mounted a friction-roller, *m*, which rests against the upper face of the plate *a*, and travels thereon when the governor is in operation, the roller and adjustable disk forming an eccentric stud, by means of which the position of the lever can be adjusted.

The operation of my improved governor is as follows: When the governor is at rest the weight of the sphere and its attachments causes the rollers *m* to press or bear upon the plate *a a*. When the governor is put in motion by rotating the spindle A the sphere C D is carried with it, the centrifugal force causing the spherical weights *h h* to be thrown outwardly. This causes the studs *m* to bear with additional force upon the plate *a* proportionately to the speed with which the governor rotates. This causes the sphere and its attachments to rise vertically upon the sleeve and operate the steam-valve or other device through the medium of suitable machinery, which it is not necessary to show, the friction-rollers or studs *m* traveling in a horizontal plane upon the upm face of the plate *a*, as the position of the levers or pendulums is changed.

The governor as thus constructed possesses an almost equal degree of sensitiveness, and exerts an almost equal amount of energy at any angle of separation, and the degree of sensitiveness may be changed from perfect isochronism to any degree of stability. The spindle A with the plate *a*, all parts of the governor, including pendulum-rods, pendulum-bearings, &c., co-operate, thus exerting a much greater amount of force or power than the governors heretofore constructed, and the apparatus is much more compact, simple, and easily constructed than the ordinary governor.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A governor, consisting of a weighted pendulum and a slide, the angles of the pendulum and arms being such that the momentum of the centrifugal force will be proportional to the cosine of the angle of separation, whereby the governor will be astatic in operation, in the manner and for the purpose set forth.

2. A governor, consisting of a spherical sleeve, provided with weighted pendulums, constructed to operate as described, whereby the sleeve is elevated vertically upon the spindle to regulate the speed of the engine or other apparatus, substantially as described and shown.

3. In combination with the angular weighted levers or pendulums B, one of the weights of which extends to the side of the axis opposite its point of suspension, the vertically-sliding sleeve or sphere C D, and the plate *a* secured on the spindle A, the whole constructed to operate substantially as described.

4. In combination with the angular levers, the eccentric stud and friction-rollers, by means of which the position of the levers or pendulums may be adjusted, substantially as set forth.

5. In combination with the sphere C D and plate *a*, the rod *b* extending through a vertical aperture in the lower part of the sphere for the purpose of rotating the sphere with the spindle, substantially as set forth.

6. In combination with the sliding sphere C D, plate *a*, and spindle A, the downwardly-projecting guide-rod *h* extending through the center of the plate *a* and into the spindle A, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of May, 1876.

EDWARD BUSS.

Witnesses:
BERTHOLD ROI,
EDWARD P. MACLEAN.