

(No Model.)

2 Sheets—Sheet 1.

E. J. ARMSTRONG.
GOVERNOR FOR STEAM ENGINES.

No. 570,307.

Patented Oct. 27, 1896.

Fig. 1.

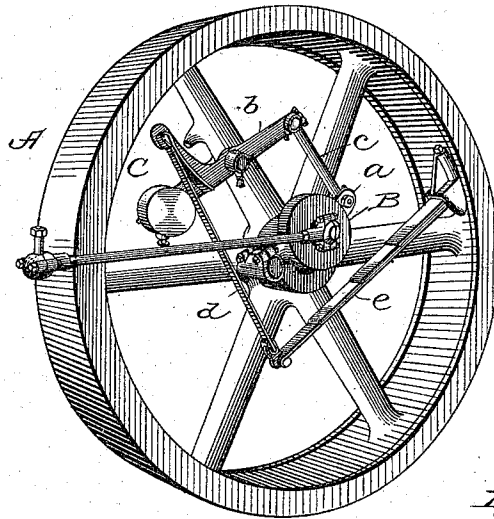


Fig. 2.

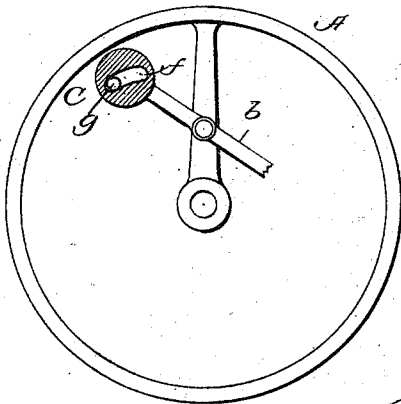


Fig. 3.

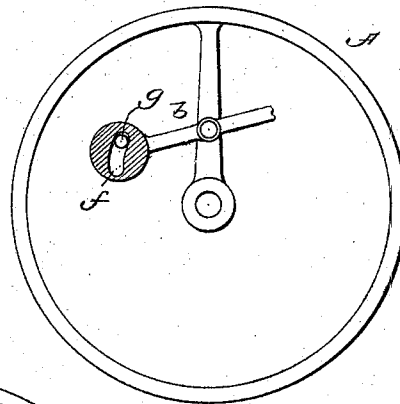
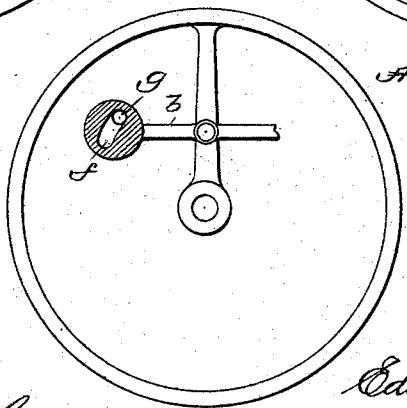


Fig. 4.



WITNESSES:

Harry D. Rohrer.
Wm. A. Redmond.

INVENTOR

Edwin J. Armstrong
BY
W. A. Redmond
ATTORNEY.

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Fig. 5.

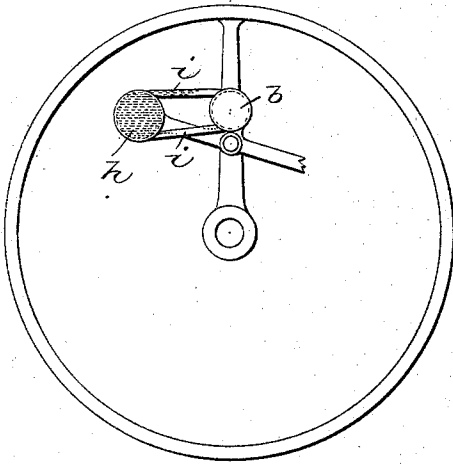


Fig. 6.

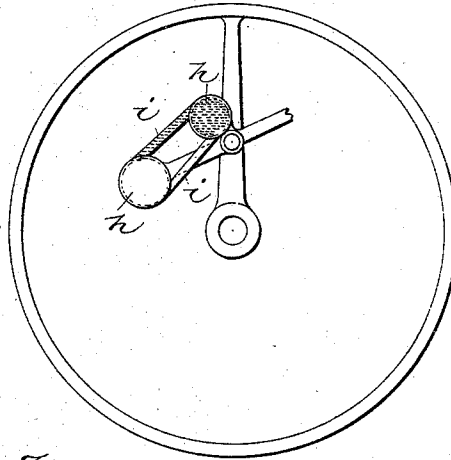
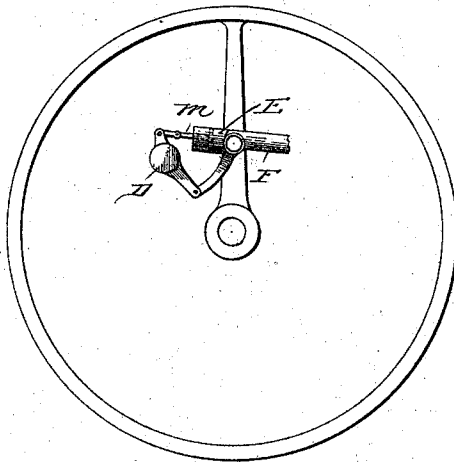


Fig. 7.



WITNESSES:

Harry D. Robins.
Wallace Green,

INVENTOR

Edwin J. Armstrong

BY

W. A. Redmond
ATTORNEY.

UNITED STATES PATENT OFFICE.

EDWIN J. ARMSTRONG, OF OSWEGO, NEW YORK.

GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 570,307, dated October 27, 1896.

Application filed December 26, 1895. Serial No. 573,350. (No model.)

To all whom it may concern:

Be it known that I, EDWIN J. ARMSTRONG, a citizen of the United States, residing at Oswego, in the county of Oswego and State of New York, have invented certain new and useful Improvements in Governors for Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to governors for steam-engines; and it has for its object to provide means whereby the engine may be made to govern absolutely steady and to run at exactly the same speed when loaded as when running light, or to increase the speed of the engine when more work is given it; and it consists in the parts and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a perspective view of a fly-wheel governor provided with my invention; Fig. 2, a vertical longitudinal section through the fly-weight; Figs. 3 and 4, similar sectional views showing different positions assumed by the secondary shifting weight in the weight proper, according to the distance the latter is from the center of the engine; Figs. 5 and 6, longitudinal vertical sections through the weight of a modified form of my invention, and Fig. 7 a longitudinal vertical section of another modification.

Similar letters refer to similar parts throughout all the views.

A represents the fly-wheel, which is suitably secured to the main shaft of a steam-engine and to one of the spokes of which an eccentric B is pivotally secured by an arm, as is usual, so that the eccentric may have a free lateral movement across the shaft of the engine. The eccentric is also provided with an arm *a* opposite its pivotal point, to which is connected one end of the weight-lever *b* by means of a link *c*, said lever being pivoted to one of the spokes of the fly-wheel and carrying on its other end a fly-weight C. The weighted end of the lever *b* is connected by means of a flexible strap *d* to the free end of

a centripetally-acting spring *e*, the other end of which is secured to the inner surface of the rim of the fly-wheel, as clearly shown.

Referring to the diagrammatic views, the fly-weight will assume the position shown in Fig. 2 when the engine is running light, and when the full load is thrown on the engine the fly-weight will move toward the center of the engine, as shown in Fig. 3, and thereby shift the eccentric over, so as to let in more steam to carry the increased load. While the engine ran light its speed was, say, three hundred revolutions per minute, but the increase of load caused it to run slower, say two hundred and ninety-five revolutions per minute. It is evident that if the fly-weight could be made lighter with the increased load the engine would run up to speed again, notwithstanding the increase of load under which it is working.

Now it is the purpose of this invention to practically and automatically decrease or increase the effective weight when needed during the running of the engine by the simple device of changing or shifting the center of gravity of the fly-weight nearer to or farther from the pivotal point of the weight-lever to meet the conditions under which the engine is working. This may be accomplished by forming a chamber *f* in the shape of a quadrant, in which is arranged a secondary weight consisting, in this instance, of a short cylinder *g*, of solid metal, so that the same may move back and forth from end to end of said chamber. The movement of the cylinder, however, should be slightly retarded by filling the chamber with oil in order to prevent the engine racing.

The quadrantal chamber *f* is so formed that for any position which the fly-weight proper may assume in its movement toward and from the center of the fly-wheel there will be a point of equilibrium which the cylinder *g* will seek. Thus with the engine running light the cylinder will be at or near the outer end of the chamber *f*, where the additional weight is more effective, as shown in Fig. 2. With a full load on the engine the weight will seek the opposite end of the chamber, as shown in Fig. 3, thus lightening, practically, the fly-weight and bringing the

engine up to speed again, or, as shown in Fig. 4, the weight may come to rest at the center or midway the length of the chamber or at other points therein between center and ends, according to the conditions to be met.

Another form of this invention consists in the use of a fluid as the secondary or shifting weight. In this form, as illustrated in Figs. 5 and 6, two chambers *h* are formed in the weight proper, which communicate through the passages *i*, so that the fluid may either flow entirely into one or the other of said chambers or be equally divided between them, depending upon the position of the governor-weight relative to the center of the wheel, as will be readily understood, the area of the communicating-passages *i* between the chambers being small in order to prevent too rapid flow of the fluid, which would produce racing of the engine. Still another method of accomplishing the same object is shown in Fig. 7, in which the secondary weight *D* is pivotally connected to the plunger-rod *m* of a dash-pot *E*, secured on the weight lever or arm *F*. In this instance the secondary weight is secured pivotally to the lever *F* by a link pivotally connected to a horn or arm projecting from the weight-lever, as shown, and it is obvious that the movement of the secondary weight will be retarded by the dash-pot,

which acts in conjunction with the weight-lever as a fly-weight and its effective weight increased or decreased in a manner similar to the operation of the device hereinbefore described.

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

1. In a centrifugal governor, the combination, with a pivoted fly-weight, of a secondary weight adapted to move toward and from the pivotal point of the fly-weight, said movement being in such an arc that for each position of the fly-weight there will be a corresponding point of equilibrium which the secondary weight will seek, substantially as described.

2. In a centrifugal governor, the combination, with a pivoted fly-weight, of a secondary weight adapted to move in an arc toward and from the pivotal point of the fly-weight, and means for retarding the movement of said secondary weight, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN J. ARMSTRONG.

Witnesses:

J. F. BEALE,

H. M. STERLING.