3 Sheets—Sheet 1.

G. F. ERNST.

GOVERNORS FOR STEAM ENGINES.

No. 181,927. Patented Sept. 5, 1876.

FIG. 1.

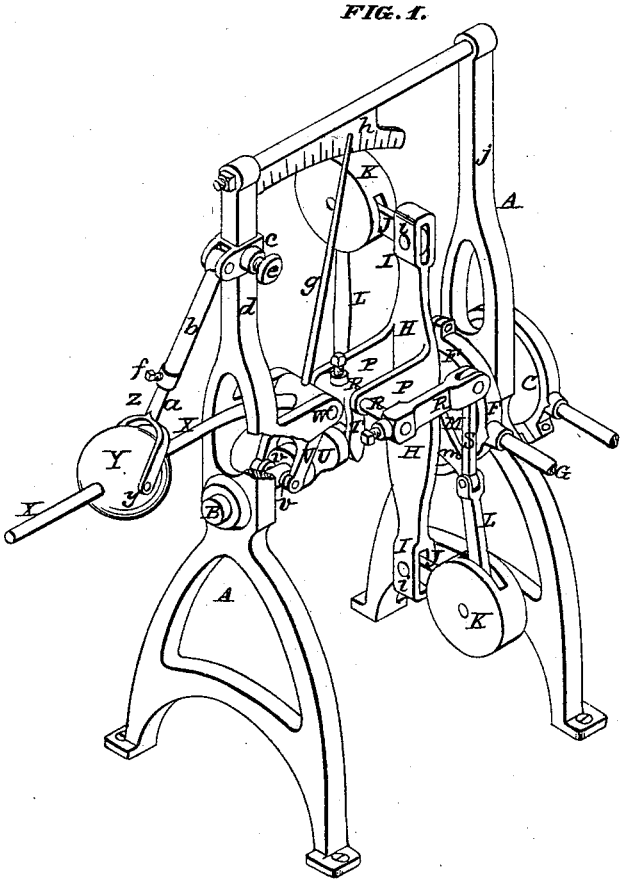

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FIG. 2.

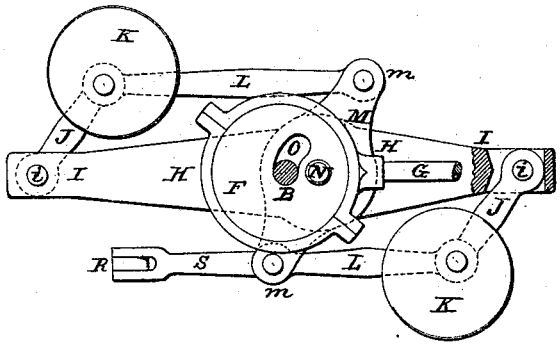

FIG. 3.

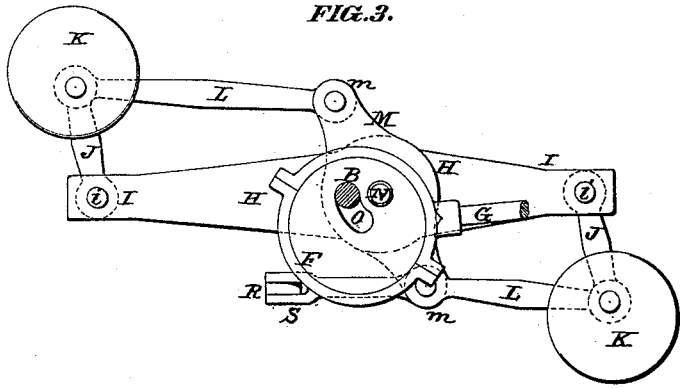

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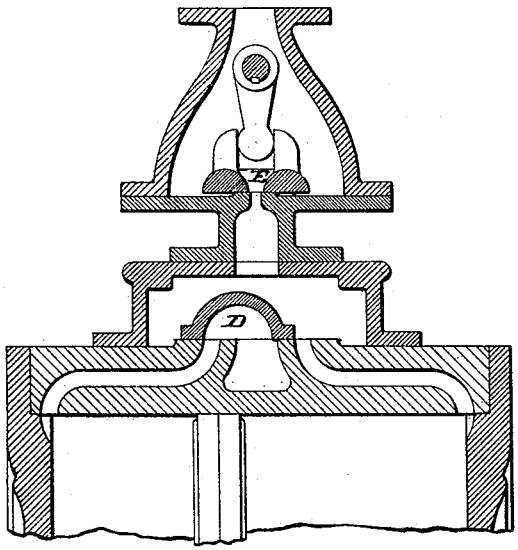
FIG. 4.



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UNITED STATES PATENT OFFICE.

GEORGE F. ERNST, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN GOVERNORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **181,927**, dated September 5, 1876; application filed November 29, 1875.

To all whom it may concern:

Be it known that I, GEORGE F. ERNST, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Governors for Steam-Engines, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My improvement relates to a ball-governor. The arms to which the balls are attached are pivoted to arms extending radially from a hub or plate attached to a shaft receiving rotation from the engine.

Pivoted to the hub, at a point eccentric to the shaft, is the eccentric by which the cut-off valve is operated. Secured to the eccentric is a plate or disk, having at the opposite sides ears connected to the balls by rods, so that the distance of the balls from the shaft governs the position of the eccentric upon the shaft.

The centrifugal movement of the balls is checked by a weight, which is adjustable upon a bar forming one arm of a bell-crank lever, whose other arms rest against a sleeve upon the main shaft, and the other end of the lever rests against the arms of a rock-shaft having an adjustable arm connected by a link to one of the ears of the plate, which is connected to the balls, as aforesaid. The weight is moved outward on the arm, as the latter rises, by an extensible arm connecting said weight to a bracket, that is adjustable on an upright of the frame.

Figure 1 is a perspective view of my improvement. Figs. 2 and 3 are detail views, in elevation, showing the eccentric governor balls and connections in different positions. Fig. 4 is a diagram, in elevation, of the slide-valve and cut-off.

A is a frame-work, supporting a shaft, B, which receives rotation from the engine, the shaft B having an equal rotary speed with the main or crank shaft of the engine. C is the eccentric, by which the ordinary slide-valve D is driven.

The eccentric C may be on the counter-shaft B, as shown, or may be on the main shaft of the engine, as usual.

In addition to valve D, there is a cut-off valve, E, driven by an adjustable eccentric, F, and eccentric-rod G. Attached firmly to the shaft B is a plate or hub, H, from which arms I I extend radially from the shaft. The ends of the arms I I furnish bearings, at *i*, to the oscillating bars J, to which the governor-balls K are secured. These balls are connected, by rods L, to ears *m m*, at the opposite edges of a disk, M, oscillating on an arbor, N, projecting from the side of the plate H. Attached to the disk M is the cut-off eccentric F, the disk M and eccentric F having an orifice, O, for the passage of the shaft B. P is a bracket, projecting from the plate H, and giving bearing to the rock-shaft R, connected, by link S, to one of the ears *m*. This rock-shaft carries a forked arm, T, whose ends span the shaft, and rest against one end of a sleeve, U, having endwise motion on the said shaft. The end of the sleeve, against which the forked arm rests, is flat at the sides, and this part is embraced by the fork, so as to cause the sleeve to turn with the shaft. Against the other end of the shaft rest anti-friction rollers *v*, at the ends of forked arm V, which loosely embraces the shaft. The arm V forms one part of a bell-crank lever, fulcrumed at W, and whose other arm, X, is of considerable length, and forms a yard, upon which is a sliding weight, Y. The weight Y has trunnions *y*, upon each side, engaging in the ends of the fork or bail Z, upon the end of the arm *a b*, whose other end is pivoted to a bracket, *c*, which is adjustable vertically on the upright *d*. The bracket *c* is held in position by a set-screw, *e*. The part *b* of the arm slides in the part *a*, and is held to any position therein by a set-screw, *f*.

It will be seen that the weight Y is forced outward by the arm *a b* as the yard X rises, so as to exert a greater centripetal influence on the balls. The mean position of the weight on the yard is governed by the extension or contraction of the arm *a b*, and the proportional distance of movement of the weight to that of the yard X is governed by the position of bracket *c*.

Extending upward from the weight-lever, at W, is a pointer, *g*, which moves in front of a scale-plate, *h*, supported on the uprights *d* and *j*. This pointer indicates the position of the cut-off eccentric, and consequently the point of the stroke at which the steam is cut off.

It will be seen that the length of arm *a b* and the position of the bracket *c* may be both adjusted while the apparatus is in motion, so that the speed of the engine may be changed, or the parts adjusted for any other purpose, while the engine is in motion.

I claim as my invention—

1. The combination of cut-off valve E, eccentric F, secured to disk M, governor-balls and arms K J, secured to arms I, and connected to sleeve-operating device L S R T, sleeve U, and lever X V with weight Y, constructed and combined substantially as set forth.

2. The combination of weighted arm X V, register *g h*, sleeve U, cut-off eccentric F, and connections T R S M, constructed and combined substantially as and for the purposes set forth.

GEORGE F. ERNST.

Witnesses:
SAML. KNIGHT,
ROBT. BURNS.