J. FELBER.

Governor.

No. 167,885. Patented Sept. 21, 1875.

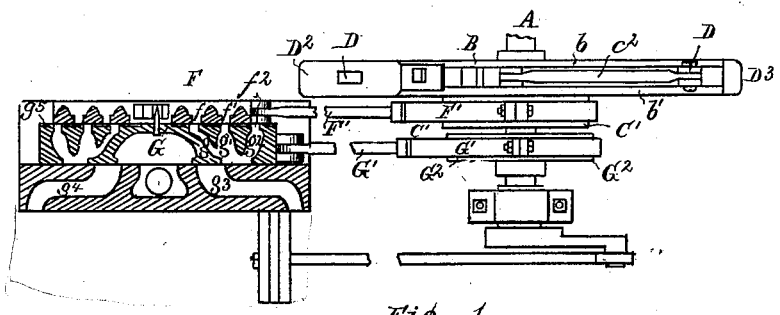

Fig. 1

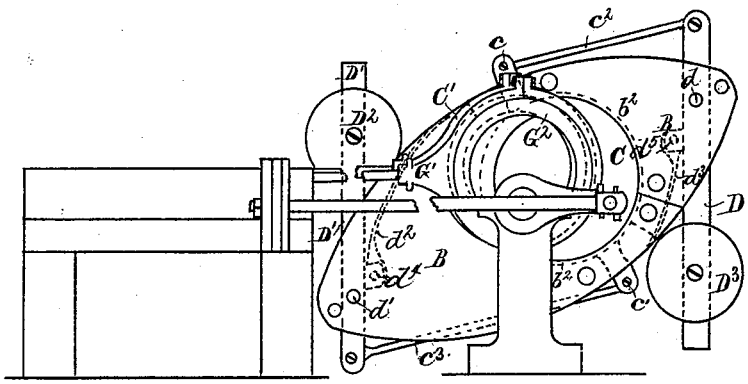

Fig. 2.

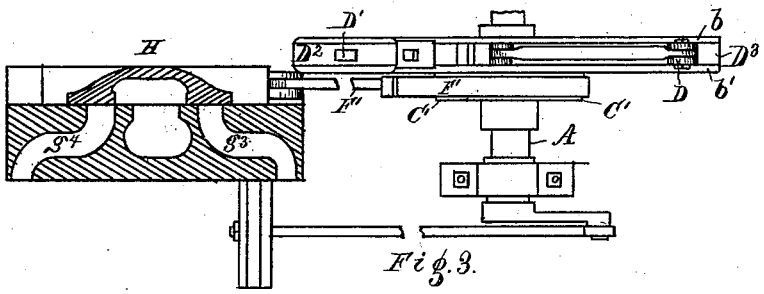

Fig. 3.

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UNITED STATES PATENT OFFICE.

JACOB FELBER, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN GOVERNORS.

Specification forming part of Letters Patent No. **167,885**, dated September 21, 1875; application filed June 2, 1875.

To all whom it may concern:

Be it known that I, JACOB FELBER, of St. Louis, in the county of St. Louis and State of Missouri, have invented an Improved Governor Cut-Off for Steam-Engines, of which the following is a specification:

The object of my invention is to form an improved governor cut-off by which the point of cutting off the steam is made automatically variable to suit the requirements of the machinery driven by the engine.

My invention consists in the improved construction and combination of the cut-off valves, and their novel eccentric attachment to the governor, to achieve the above object, with advantages of imparting a uniform velocity to the engine, a saving of steam, and consequent utilization of fuel and cost, all of which will now more fully appear.

Of the drawing, Figure 1 is a top plan, showing my improved cut-off valves and manner of connection with the governor. Fig. 2 is a side elevation, showing principally eccentrics and governor, and hidden parts thereof in dotted lines. Fig. 3 is a top plan, showing my single cut-off valve and connection with the same governor of Figs. 1 and 2.

The governor is mounted upon the fly-wheel shaft A, so that the number of its revolutions corresponds to that of the engine. Concentric on the shaft A is the housing B. This housing consists of two side plates, b b^1. (See Figs. 1 and 3.) The plate b I form to have an eccentric shoulder or bearing, b^2. (See dotted lines, Fig. 2.) The plate b^1 has an opening corresponding to the eccentric shoulder b^2, and said plate is properly bolted to that of b, thus completing the housing B. In the housing are contained the parts that by centrifugal force control the cut-off valves, and said parts are as follows: C is an eccentric, fitting in the opening of the plate b^1, and turning in the eccentric shoulder b^2 of the housing. (See Fig. 2.) Forming part of C is the further eccentric C′, made to project out of the housing, (see Figs 1 and 3,) and which connects to the cut-off valve, as will hereinafter appear. The eccentric C has its arms c c^1 projecting through the open parts of the eccentric shoulder b^2, and also out at top and below of the housing B, and to said arms are secured the connecting arms c^2 c^3 in opposite directions, which further are pivoted to each end of the levers D D^1. (See Fig. 2.) The levers have their fulcrum at d d^1, and when inert are in inclined position, and carry at their lower ends the balls D^2 D^3. These balls are adjustable, so that they can be set and secured in varying positions on the levers. Further, said ball-levers are connected to springs d^2 d^3, which materially increase the sensitiveness of the governor. The spring d^2 has one end secured to the top of the shoulder b^2, while its opposite end is journaled by a connecting-arm, d^4, to near the lever-fulcrum. (See Fig. 2.) The other spring, d^3, is similarly secured by connecting-arm d^5, but in vice versa position. (See Fig. 2.) It is plain, therefore, that the centrifugal action taking place causes the balls to recede from the center and carry the levers and arm connections with the eccentric C with them, and, in so doing, vary the angle of the eccentric C′, this motion of the balls to and from the center depending upon the velocity with which the engine moves, varying their position on increase of speed, and, consequently, also the position of the eccentric C′ accordingly. The centrifugal action is thus made to act upon and control an inlet-valve, F, by its eccentric rod attachment F′ with the eccentric C′. (See figures.) The valve F is a slide-valve, which I form to have one or more steam-ports, f f^1 f^2, at one end, being duplicated with the same ports at its opposite end, as shown in Fig. 1. I form the ports f f^1 f^2, &c., to be small, their number being determined according to the size of the engine. These ports being small, and one or more, enables the governor to act in a most decisive and certain manner, the centrifugal action operating with less movement, and, consequently, more direct and at the required times. Alongside of the valve F I arrange a further slide-valve, G. This valve has similar ports g g^1 g^2, (corresponding to those of F,) also duplicated at its opposite end. (See Fig. 1.) Further, I form the valve G to control the main ports g^3 g^4 of the cylinder, (see Fig. 1,) so that if the port g^3 is open to inlet of steam to cylinder, that of g^4 is open to exhaust. The slide-valve G I connect to be operated by the eccentric rod G^1 on the eccentric G^2, which is firmly se-

cured to the shaft A. (See Figs. 1, 2.) Between the valves F and G, this latter I provide with steam-spaces g^5, (see Fig. 1,) in which the steam acts to balance the sliding action of said valves, and, consequently, ease and facilitate the centrifugal action that operates them. The piston connects by crank attachment to shaft as usual.

The slide-valves thus constructed and related to the governors, as shown and described, the operation of the parts is therefore as follows: Supposing the piston to be at one end of the cylinder, and the crank at its dead-stroke, (see Figs. 1 and 2,) it will be noticed that the ports f f^1 f^2 and g g^1 g^2 are open to full steam, while the duplicated ports at the opposite end are in closed position. Further, that the valve G has sufficiently opened the main port g^3 to admit steam in the cylinder, and I thus have in this position of the governor cut-off the great advantage of achieving a full boiler pressure to act on the piston. Now, as the piston travels in its stroke the feed of steam through port g^3 becomes greater, the valve G being operated to more fully open said port, while at same time the valve F follows along that of G as long as no centrifugal action operates the governor. In case, however, during the above travel of the piston centrifugal action takes place, be it great or small, said action changes the angle of the crank carrying the eccentric G^2, and consequently the position of its valve G; also it will be noted at same time the eccentric C in the housing changes the stroke of the cut-off valve F, thus cutting off excess of steam in any place or position that the piston may be positioned. The engine operates then by expansion, but when no such centrifugal action takes place, the full boiler pressure acts, and consequently the full stroke of the piston can be performed.

In Fig. 3 I show my improved eccentric attachment, with the governor simplified, by the use of the single slide-valve H, made to control the main ports g^3 g^4 of cylinder. I connect the valve H to the eccentric rod attachment F with the eccentric C, (see Fig. 3,) thus dispensing entirely with the outer eccentric attachments G^1 G^2. The operation of the governor and valve H is the same as before described, so far as obtaining a correct action of cutting off the steam, with same advantages of operating the piston by full boiler pressure, or by expansion.

What I claim is—

The governor cut-off, consisting of a housing, B, containing the eccentric C, connected by rods c^2 c^3 to lever-arms D D^1 which carry the balls, as shown and described, also the eccentric C′, made to control a cut-off valve formed to have the ports f f^1 f^2 and the further eccentric G^2 connected to slide-valve G, having ports g g^1 g^2, all said parts being constructed and combined to operate in the manner and for the purpose set forth.

In testimony of said invention, I have hereunto set my hand.

JACOB FELBER.

Witnesses:

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CHAS. F. MEISNER.