Charles Moore. Automatic Governor & Cut-off Device for Steam Engines.

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PATENTED JUN 27 1871

Fig. 2.

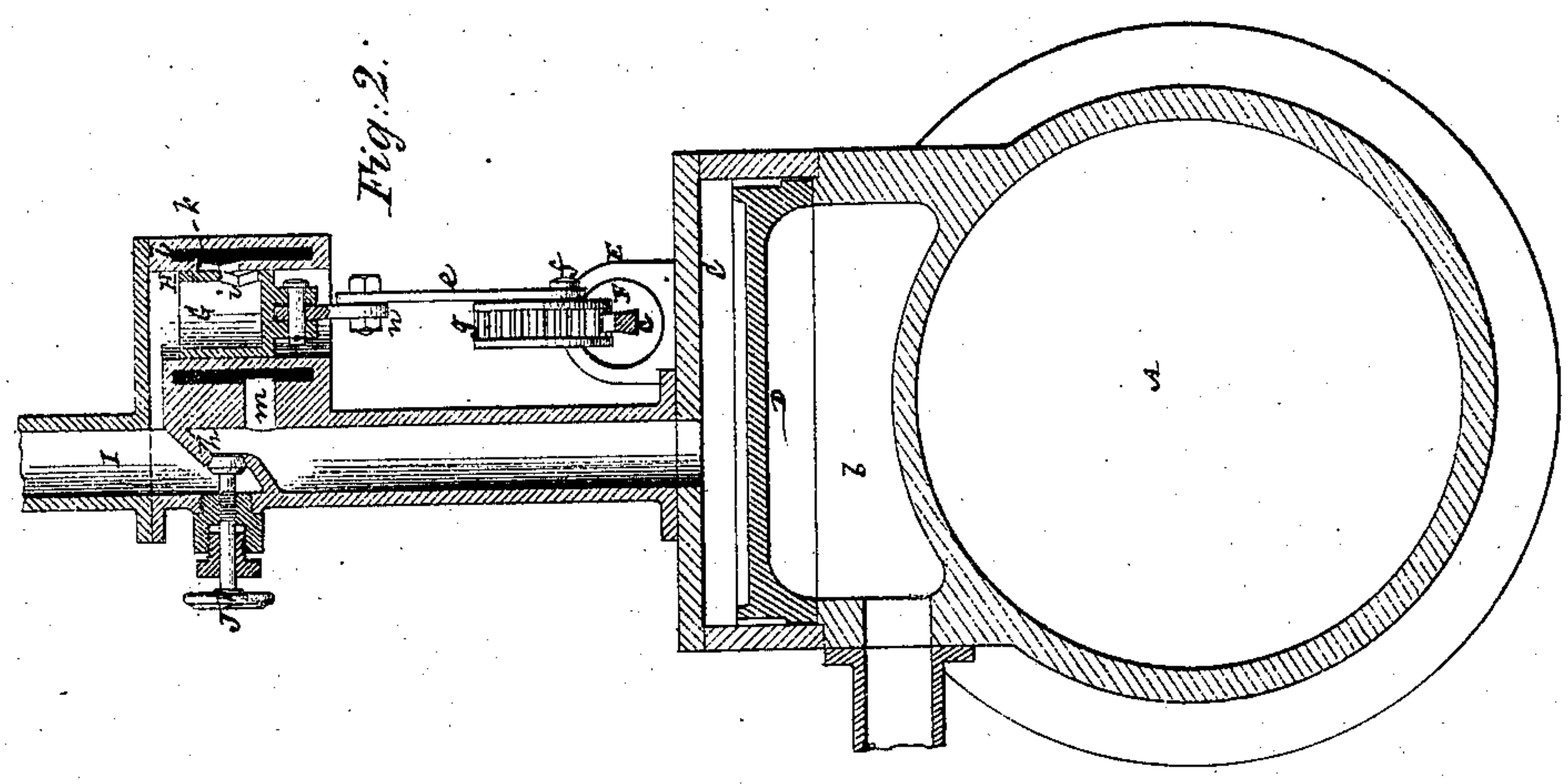
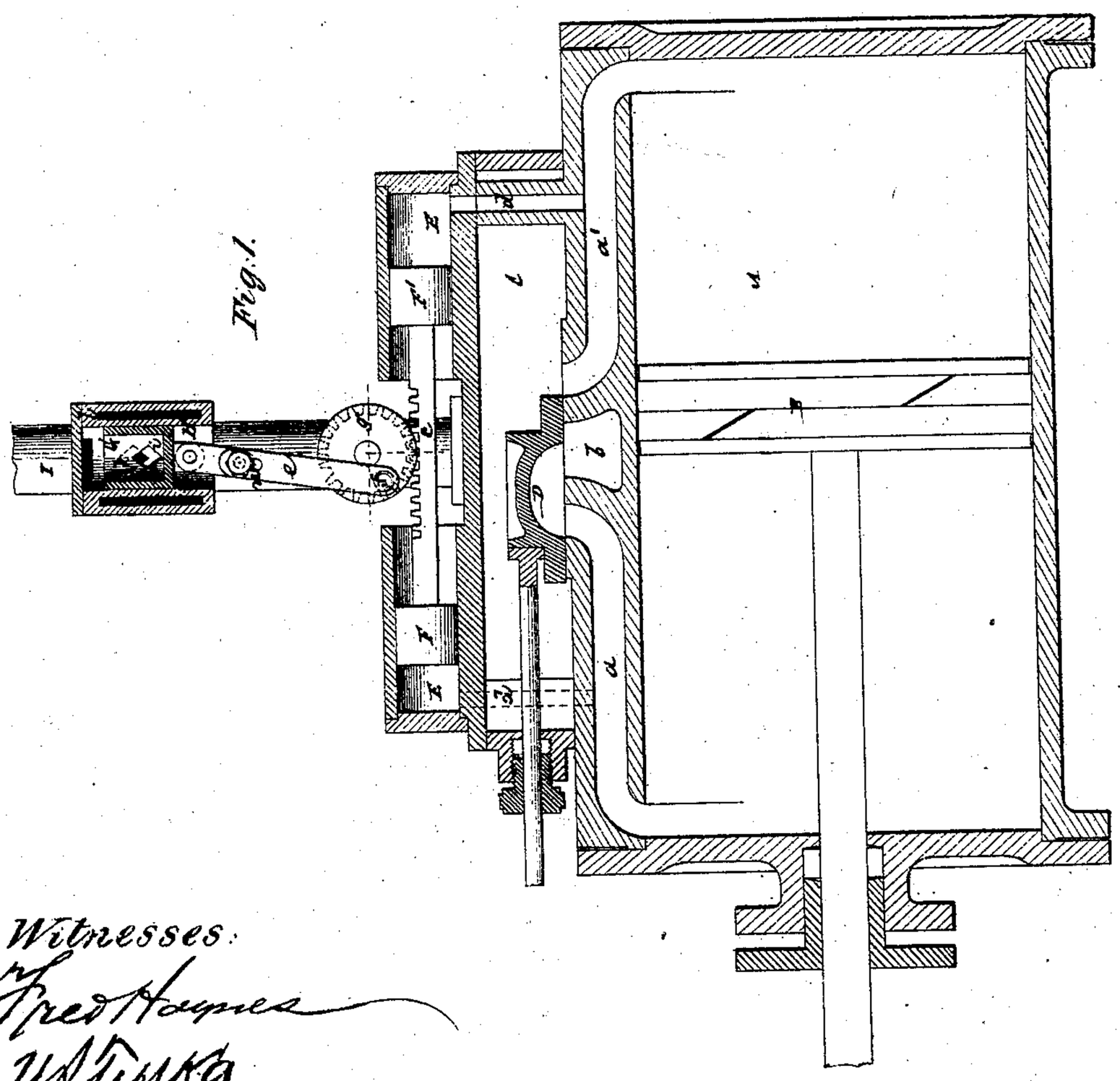


Fig. 1.



Witnesses:
Fred Haynes
U. Tibbits.

Charles Moore

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

CHARLES MOORE, OF NEW YORK, N. Y.

IMPROVEMENT IN AUTOMATIC GOVERNORS AND CUT-OFF DEVICES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 116,340, dated June 27, 1871.

To all whom it may concern:

Be it known that I, CHARLES MOORE, of the city, county, and State of New York, have invented a new and useful Automatic Governor and Cut-off Device for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a longitudinal section, and Fig. 2 a transverse section of a steam-engine, in part, with my invention applied thereto.

Similar letters of reference indicate corresponding parts.

My invention consists in a combination of pistons exposed on their one side to the atmosphere, and arranged to work in concert within cylinders, which are connected, respectively, the one with the steam-supply from the boiler, and the others with opposite ends of the engine-cylinder to control the supply of steam to the latter, and so regulate the engine by variation of pressure in the cylinder as produced by change in the resistance, and to cut off supply when the engine is running by momentum, as in the case of locomotives running down grade. The invention also consists in a peculiar construction of one of said pistons, whereby it is made to operate also as a valve; likewise, in the combination of a hand-valve with such mechanism for admitting or shutting off a direct supply of steam to the engine free from passage through the governor.

Referring to the accompanying drawing, A represents an engine-cylinder, and B its piston; C, the valve-box; and D, an ordinary slide or other main valve for controlling the admission and exhaust of the steam to and from opposite sides of the piston alternately by passages *a'*, *a*, and *b*, in the usual manner. Mounted on the valve-box, or otherwise suitably arranged, is a supplementary small cylinder, or two independent cylinders, E E', containing pistons F F', which are connected as by a toothed bar or rack, *c*, and which are exposed to the atmosphere on their approximate ends, but on their backs or other ends to the steam in the engine-cylinder A, on opposite sides of its piston B, respectively, by means of passages *d d'*, arranged to connect the rear portions of the cylinders E E' with the ports or passages *a a'* of the engine. G is a third supplementary piston, made hollow to perform the functions both of valve and piston, and which, when its connections are as hereinafter described, is of the same area as either of the pistons F F', and is arranged to work at right angles to said pistons, with which it is connected, as by a pitman, *e*, crank or eccentric pin *f*, and pinion *g*, in gear with the rack *c*. The travel of the pinion *g* during a complete stroke of the pistons F, F', and G is restricted to a quarter of a circle or thereabout, so as to carry the eccentric pin *f* from a vertical into a horizontal position, or vice versa, as indicated by dotted lines in Fig. 1 The hollow piston G works within a cylinder, H, open below to the atmosphere, but in communication above with the main steam-supply pipe I, above a diaphragm, *h*, which may be fitted with a hand-valve, J, to admit steam direct, when required, to the valve-box C either for the purpose of starting the engine or otherwise. This is independent of a main or general starting-valve used, if desired, on the boiler side of the communication, between the cylinder H and steam-pipe I.

The general course of the steam to the engine is made through the hollow piston G by one or more openings, *i k*, made in its sides and in the cylinder H, an annular space, *l*, surrounding said cylinder, and a passage, *m*, communicating with the pipe I on the under side of the diaphragm *h*.

When the eccentric pin *f* is at its lowest point, then the openings *i k* are closed, or nearly so, provision for adjusting which, under a nominally closed condition of the valve-piston G, so as to establish a slight current through said openings for starting purposes or overcoming friction, may be established by a slotted connection, as at *n*, of the pitman *e*.

Supposing the engine to be at rest, then the live steam from the boiler will act upon the piston G to depress it and adjust the pin *f* to its lowest position; but upon steam being turned on to work the engine, then either piston F or F', according to the side of the piston B to which steam is admitted, will act by the steam on its back and the leverage as acquired by the position of the pin *f* to lift or partially lift the piston G from it dead-point till, on the pressure being equal or nearly so on the pistons F or F' and G, the pin *f* approximates a horizontal position, when said pistons are in a state of balance. Upon taking off load from the engine, then the piston B, traveling, by reason of such diminished resist-

ance, with an accelerated velocity, will cause a diminution of pressure in the steam in the engine-cylinder and in rear of the piston F or F′, as compared with the boiler pressure of the steam on the piston G, which will induce the piston G to descend and partly shut off the supply of steam through the ports *i k*, and so check the speed of the engine. A reverse action will take place on putting extra load onto the engine by the diminution in its velocity, causing the pressure to accumulate or increase in rear of the engine-piston and on the back of the piston F or F′, so as to approximate the pressure on the piston G, which will accordingly rise and give more steam to the engine to accelerate its velocity again. In this way the device acts automatically as a governor to control the speed of the engine, and, when the engine is running by momentum, as a cut-off to shut off supply or to keep the supply closed, as in the case of locomotives going down grade. Instead of the piston G being constructed to operate as a valve it may be restricted to its function as a piston and be caused to operate a valve for the same purpose and in like manner as when combining the function of a valve. The relative disposition of the ports, too, may be changed, and various means employed for gearing the pistons F, F′, and G to work in unison, as described; but it is an essential feature that the piston G, with its cylinder, should be so arranged in relation with the steam-supply pipe or valve-chest of the engine that said piston is exposed to the steam as it passes from the boiler to the engine, and that the pistons F F′ are controlled by the steam from opposite ends of the engine-cylinder.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination of the pistons F, F′, and G, geared for operation together, as described, and arranged, as regards their respective cylinders, in relation with the steam-supply pipe or valve-chest and ends of the engine-cylinder, substantially as specified.

2. The hollow piston G, with its cylinder H, constructed to operate as a valve, in combination with the connected pistons F F′ arranged to work in cylinders E E′ and geared for operation in concert with the piston G, subject to control of a crank or eccentric pin, *f*, and pitman *e*, essentially as described.

3. The combination of the hand-valve J with the elements recited in the next preceding claim.

CHARLES MOORE.

Witnesses:

FRED HAYNES,

FERD TUSCH.