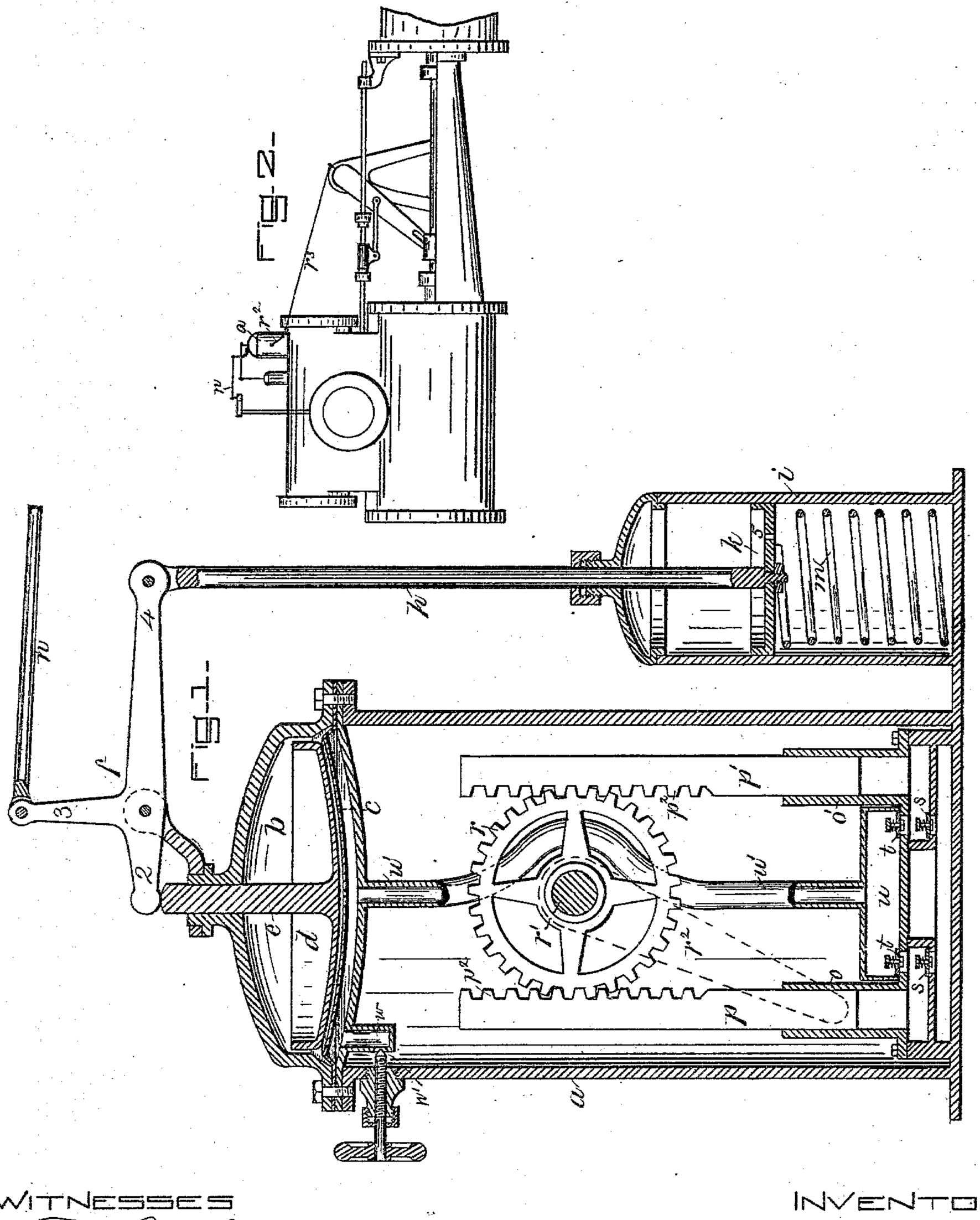
(No Model.)

W. B. MASON.

GOVERNOR.

No. 274,625. Patented Mar. 27, 1883.



WITNESSES

Fred A. Powell.

A. O. Orne

INVENTOR

William B. Mason

by Crosby & Gregory

Attys.

UNITED STATES PATENT OFFICE.

WILLIAM B. MASON, OF BOSTON, ASSIGNOR OF ONE-HALF TO WILLIAM A. PERRY, OF BROOKLINE, MASSACHUSETTS.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 274,625, dated March 27, 1883.

Application filed January 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MASON, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Governors, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to a governor for a reciprocating engine, it being especially adapted for use in connection with direct-acting steam-pumps, and having for its object to produce a regulator that will control the operation of a reciprocating engine throughout each entire stroke.

The regulator consists, mainly, of a small reciprocating regulating-pump connected with and actuated by some reciprocating part of the pump or engine to be regulated, so that each stroke of the said regulating-pump is in unison with the strokes of the main engine. The regulating-pump operates to force a liquid into a chamber provided with an outlet for the escape of the liquid, which acts upon a piston or diaphragm connected with the throttle-valve of the engine to be controlled. By this arrangement, when the liquid is forced into the chamber more rapidly than it is intended to be by the normal operation of the engine, the escape-passage being uniform, the liquid will enter the chamber faster than it escapes, and will consequently act on the diaphragm or piston, moving it in such manner as to close the throttle-valve of the main engine, and thus reduce its speed. The size of the outlet-passage from the regulating-chamber is controlled by an adjusting device, so as to regulate with great nicety the speed at which the engine can be driven. As herein shown, two single-acting pumps are employed in the regulator or governor, one operating to force the liquid at the forward stroke of the engine and the other at the return-stroke; but it is obvious that one double-acting pump might be employed instead.

Figure 1 shows in vertical section a regulating device embodying this invention, and Fig. 2 shows in side elevation a portion of a steam-pump with a regulating device applied thereto, on a smaller scale.

The working parts of the regulating device are mainly contained within or mounted upon a reservoir, *a*, containing the liquid to be forced by the regulating-pump, and provided at its upper end with a chamber, *b*, containing a diaphragm, *c*, and a follower, *d*, resting on the said diaphragm and actuated thereby. The follower *d* is provided with a rod or stem, *e*, passing out through the chamber *b*, and acting upon one arm, 2, of a three-armed lever, *f*, the arm 4 of which is connected with a rod, *h*, passing into a cylinder, *i*, and connected with a piston, *k*, acted upon by a spring, *m*, tending to force it upward, and thus through the lever *f* to keep the follower *d* pressed down upon the diaphragm *c* toward the bottom of the chamber *b*. The piston *k* is provided with a small opening, 5, or has a loose fit in the cylinder *i*, which is filled with a liquid, to prevent sudden or irregular movement of the said piston and connected parts. The arm 3 of the lever *f* is connected by a link, *n*, with the throttle-valve of the engine in such a manner that the movement of the lever *f* caused by the upward movement of the follower *d* will close the throttle-valve, while the movement of the lever caused by the upward movement of the link *h*, actuated by the spring *m*, will open the throttle-valve. The reservoir *a* is partially filled with some liquid, preferably oil or glycerine, and it also incloses in this instance two single-acting pump-cylinders, *o o'*, the plungers *p p'* of which are provided with racks p^2, engaging opposite sides of a gear, *r*, mounted on a shaft, *r'*, extending out through the side of the reservoir *a*, and provided with a crank, r^2, connected by a link, r^3, with some reciprocating part of the engine, as shown in Fig. 2, so that one of the plungers *p p'* will make its upward stroke and one will make its downward stroke in unison with the stroke of the engine. The cylinders *o o'* are provided with inlet-valves *s*, opening inward from the reservoir *a*, and outlet-valves *t*, opening outward into a chamber, *u*, connected by a pipe, *w'*, with the interior of the chamber *b* below the diaphragm *c*. The said chamber *b* is provided with an outlet-passage, *w*, controlled by a valve, *w'*, permitting the liquid to escape from the chamber *b* with a regulated speed and

return into the reservoir *a*, from which it is pumped.

It will be seen that an increase in speed of the reciprocating parts of the engine, such as might be produced by a sudden removal of its load, will cause the pumps *p p'* to receive a corresponding acceleration, thus forcing the liquid with greater than usual speed into the chamber *b* and faster than it can escape through the passage *w*, so that the follower *d* is raised, closing the throttle-valve of the engine and reducing its speed.

It will be seen that by wholly closing the passage *w* the liquid will have no escape from the chamber, and the follower *d* will be raised upward to its fullest extent, entirely closing the throttle-valve of the engine and stopping its movement, and by increasing or reducing the size of the passage *w* the speed of the engine can be regulated as desired.

I am aware that a governor has previously been made in which a liquid forced by a rotary pump, or series of reciprocatory pumps actuated by the engine to be regulated, controls the admission of steam to the said engine; but in such apparatus the operation of the regulating-pumps is substantially continuous, and the governor is only adapted to regulate the speed of a continuously-moving engine, while the herein-described governor is adapted to control a direct-acting reciprocating engine throughout each entire stroke.

I claim—

1. The reservoir and reciprocating pump, and means to actuate the piston or plunger of the said pump throughout each stroke in exact unison with the stroke of the piston of the engine to be regulated, combined with the chamber to receive the liquid pumped from the reservoir, and means whereby the throttle-valve of the engine is controlled by the liquid forced into the said chamber, thus regulating the engine during every portion of every stroke, substantially as described.

2. The reservoir, reciprocating pump therein, and chamber to receive the liquid pumped thereby, provided with an outlet-passage and regulating-valve therefor, combined with means for actuating the piston or plunger of the said pump in exact unison with the piston of the engine to be regulated throughout each stroke, and mechanism actuated by the liquid entering the chamber for controlling the admission of steam to the said engine, substantially as described.

3. The reservoir and reciprocating pump therein, and the chamber and diaphragm and follower therein, combined with the lever actuated by the said follower, and the regulating-chamber and spring therein, to operate substantially as described.

4. The reservoir and pair of single-acting pumps therein, combined with the actuating-gear for the said pumps, connected with a reciprocating part of the engine to be regulated, and the chamber to receive the liquid pumped therefrom and return it to the reservoir, each of the said pumps making its forward or forcing stroke in unison with the stroke of the piston to be regulated, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. B. MASON.

Witnesses:
JOS. P. LIVERMORE,
FRED. H. POWELL.