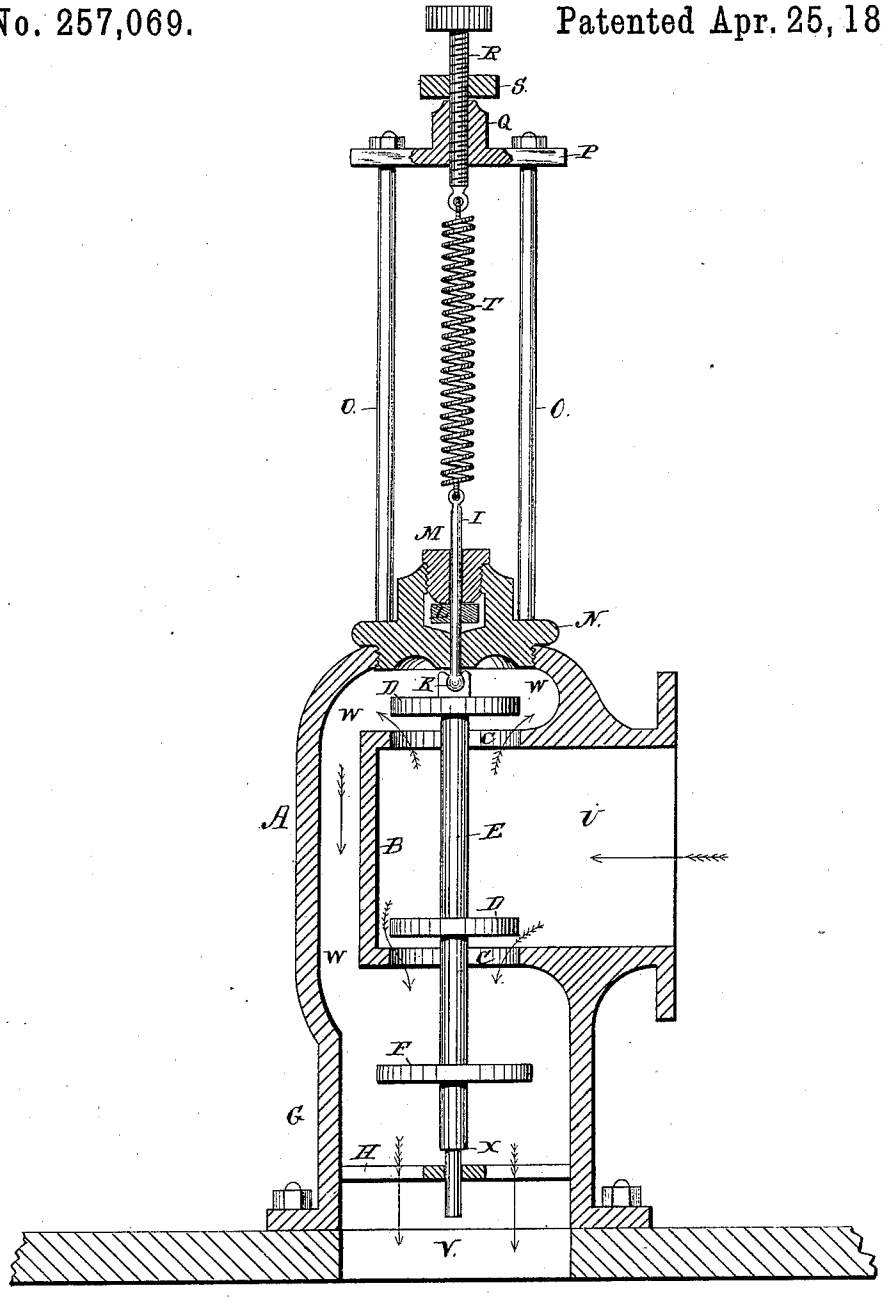
(No Model.)

G. REZNOR.

GOVERNOR FOR STEAM ENGINES.

No. 257,069. Patented Apr. 25, 1882.



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UNITED STATES PATENT OFFICE.

GEORGE REZNOR, OF MERCER, PENNSYLVANIA.

GOVERNOR FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 257,069, dated April 25, 1882.

Application filed September 3, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE REZNOR, of Mercer, in the county of Mercer and State of Pennsylvania, have invented a new and useful Improvement in Governors for Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which the figure represents a central vertical section of the steam-chest of a reciprocating engine with my improved governor secured thereto.

My invention relates to improvements in governors for steam-engines; and it consists in an ordinary double-seated valve, the stem of which is extended somewhat below said valves, and is provided with a piston near its lower end, the lower part of the shell or outer body being shaped in a cylindrical form around said piston, the space between them being ample for a free passage of steam, the lower opening in said body being immediately attached to the valve-chamber of any reciprocating engine, as shown in the accompanying drawing, whereby useful and novel results never heretofore fully accomplished are obtained, as will be hereinafter more fully explained.

In the accompanying drawing, A represents the outer shell or body.

B is a hollow inward projection of the body, in which are two circular openings, C C, of equal diameter.

D D represent two circular valves having nearly the same diameter as C C.

E is a stem connecting valves D D, and extending somewhat below, to which extension is attached a piston, F, of circular form, and on the lower end of stem E a shoulder, X, is formed, that part of the stem passing through the guide-bar H being smaller than that above, forming a stop to prevent the valves D D from passing below the openings C C.

G is a continuation of the outer shell, A, of cylindrical form.

H is a guide-bar for valve-stem E.

I is a continuation of the valve-stem E, secured by ball or other loose joint at K, having an eye in its upper end, and extending upward through a central orifice in the plug N.

M is a nut threaded centrally into the upper end of plug N, having a central orifice, through which stem I passes loosely.

L is a cylindrical washer, with a central orifice ground steam-tight around the stem I, also having its upper face ground, forming a steam-joint with the lower face of nut M.

N is a plug threaded into the upper part of the shell A.

O O are standards secured to the plug N.

P is a cross-bar connecting standards O O, having a central hub, Q, extending upward, through which set-screw R, with an eye in its lower end, is threaded.

S is a lock-nut, through which set-screw R is threaded.

T is a coiled spring, attached at its lower end to stem I and at its upper end to set-screw R.

U is the opening for steam service.

V is the steam-outlet, being attached directly to an opening in the valve-chamber of an engine.

W W W is a space sufficient for the free passage of steam between the shell A and the inward hollow projection, B, surrounding the projection B on all sides, except toward the opening U, and opening directly into the cylinder G.

The operation of my improved governor is as follows: Steam is admitted at U by means of the ordinary service-pipe, having connected with it a common stop cock at any convenient point between the governor and the steam supply or boiler; and the valves D D, piston F, stem E, and its continuation I being free to reciprocate between the shoulder X and plug N, the coiled spring T, having sufficient tension, holds the valves D D open. The above-mentioned stop-cock is now thrown wide open, and steam passes the openings C C, filling the space W W W, the cylinder around the piston F, and the valve-chamber of the engine. One of the ports leading from the valve-chamber into the cylinder of the engine being now open, steam enters the cylinder behind the piston and drives it forward, which movement causes a rapid current of steam through the cylinder G, carrying the piston F downward by its momentum, and closing the valves D D. The closing of the valves D D, and also the closing of the cylinder-port of the engine, stops the rush of steam through the cylinder G, and consequently

relieves the piston F. The spring T, assisted by the pressure of the steam on the lower end of the valve-stem, again opens the valves D D instantly, the length of time or the extent of the opening (since the engine is now in motion) being controlled by the movement of the engine-piston. As soon as enough steam has passed the valves D D to move the piston at a given speed it will again have closed the valves, as before, which operation is repeated at every stroke. The functions of nut M and cylindrical washer L are to form a stuffing-box or steam-joint around stem I. The nut M being secured into the plug N steam-tight, a chamber is formed below said nut somewhat larger than the washer L, so that the washer will not be confined laterally, but will conform to the direction of the stem I, thus forming a steam-tight stuffing-box around the stem having but little friction, and hence the governor is not affected, as is usual with the ordinary stuffing-box.

The operation of the governor under varying supply or boiler-pressure, and with varying force or power required of the engine, is as follows: First, the varying of pressure at U, or the rising and falling of boiler-pressure, as commonly expressed, has no effect upon the governor or the motion of the engine, for the following reasons: Valves D D, being of exactly the same size, present an equal amount of surface to both upward and downward pressure, and consequently it is perfectly balanced, so far as affected by the steam, before passing the valves D D. Consequently it has no effect, as above stated, unless the pressure of steam or boiler-pressure should fall below that required to drive the engine at the usual speed; but it may rise to the limit of the strength of the generator without affecting the motion of the engine. Second, the varying of the load upon the engine affects the governor as follows: For instance, the engine is running light, or without load, and a belt is suddenly shifted onto some machinery requiring more or less additional power to run it and the engine at the same rate of speed. Instantly that check or additional resistance is felt upon the piston of the engine, having a tendency to check its motion, and thus increasing the pressure of steam behind it, which is instantly communicated back through the ports of the cylinder to the governor, increasing the upward pressure upon the area of the stem I and lifting the valves higher than before, immediately and exactly supplying the necessary volume of steam to keep the engine at the usual speed. Again, suppose the belt to be suddenly or otherwise thrown off. The result is an instantaneous relief or falling of the pressure driving the engine-piston, caused by the attempt of the piston to spring away from the heavy force behind it; but this falling of pressure is also instantly communicated through the ports and valve-chamber to the governor, causing an instant decrease of pressure on the area of the stem I, which, in conjunction with the attempted rush of steam upon the piston F, caused by the steam attempting to follow the engine-piston as it attempts to spring away, instantly lowers the valves D D, and the engine is held at its usual speed.

High and low or varying boiler-pressure, so called, has no effect upon the governor, so far as the volume of steam passing through the valves is concerned; but, as a result of high pressure, the upward stroke of the valves D D is short, and the reverse with low pressure, for the following reasons, which have been hereinbefore partially set forth: The lifting-power of the steam, after passing the valves D D, being limited and controlled by the spring T and the motion of the engine-piston, it therefore follows that when valves D D have opened and passed sufficient steam to produce the hereinbefore-stated limited result they will immediately be closed by the effect of the steam on the piston F in passing.

The advantages of this construction are—

First. The motion of the engine is fully controlled and regulated, regardless of the rise and fall of so-called "boiler-pressure."

Second. The varying of the load upon the engine does not change the speed, being controlled by the steam, and not by the motion of the engine.

Third. It can be quickly and easily adjusted to any desired speed while the engine is in motion, controlling the engine equally well at any point between high and low speed.

Fourth. It is extremely simple, durable, and cheap.

I claim as my invention—

1. The combination, with a reciprocating steam-engine and a valve-chamber, A, provided with the interior chamber, B, having valve-seats C, and connected with the steam-chest and boiler of said engine, of a valve-stem, E, provided with double valves D, and a piston, F, with a wide intervening space between said piston and the inner wall of the valve-chamber, whereby when the steam is admitted into the cylinder of the engine the double valves will be closed by the momentum of the steam upon the piston, substantially as described.

2. The combination, with a reciprocating steam-engine and a valve-chamber, A, provided with valve-seats C, and connected with the steam-chest and boiler of said engine, of the valve-stem E, having the stem I projecting into the atmosphere, and provided with the double valves D, and a piston, F, with an intervening space between said piston and the inner wall of the valve-chamber, and spring T, whereby when the steam is admitted into the cylinder of the engine the double valves will be closed by the momentum of the steam upon the piston, and when the steam is cut off from the cylinder the valves will be opened by the spring, substantially as described.

3. The combination, with a reciprocating steam-engine and a valve-chamber, A, con-

nected with the steam-chest and boiler of said engine, of the valve-seats C C, valve-stem E, provided with the valves D D, and piston F, stem I, set-screw R, and spring T, secured at its lower end to the upper end of the stem I, and attached at its upper end to the lower end of the set-screw, substantially as described, and for the purpose set forth.

4. The combination of the stem I, plug N, nut M, and reciprocating washer L, chambered into plug N, and having its upper face ground to form a steam-tight joint with the lower face of the nut M, substantially as described, and for the purpose set forth.

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Witnesses:
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