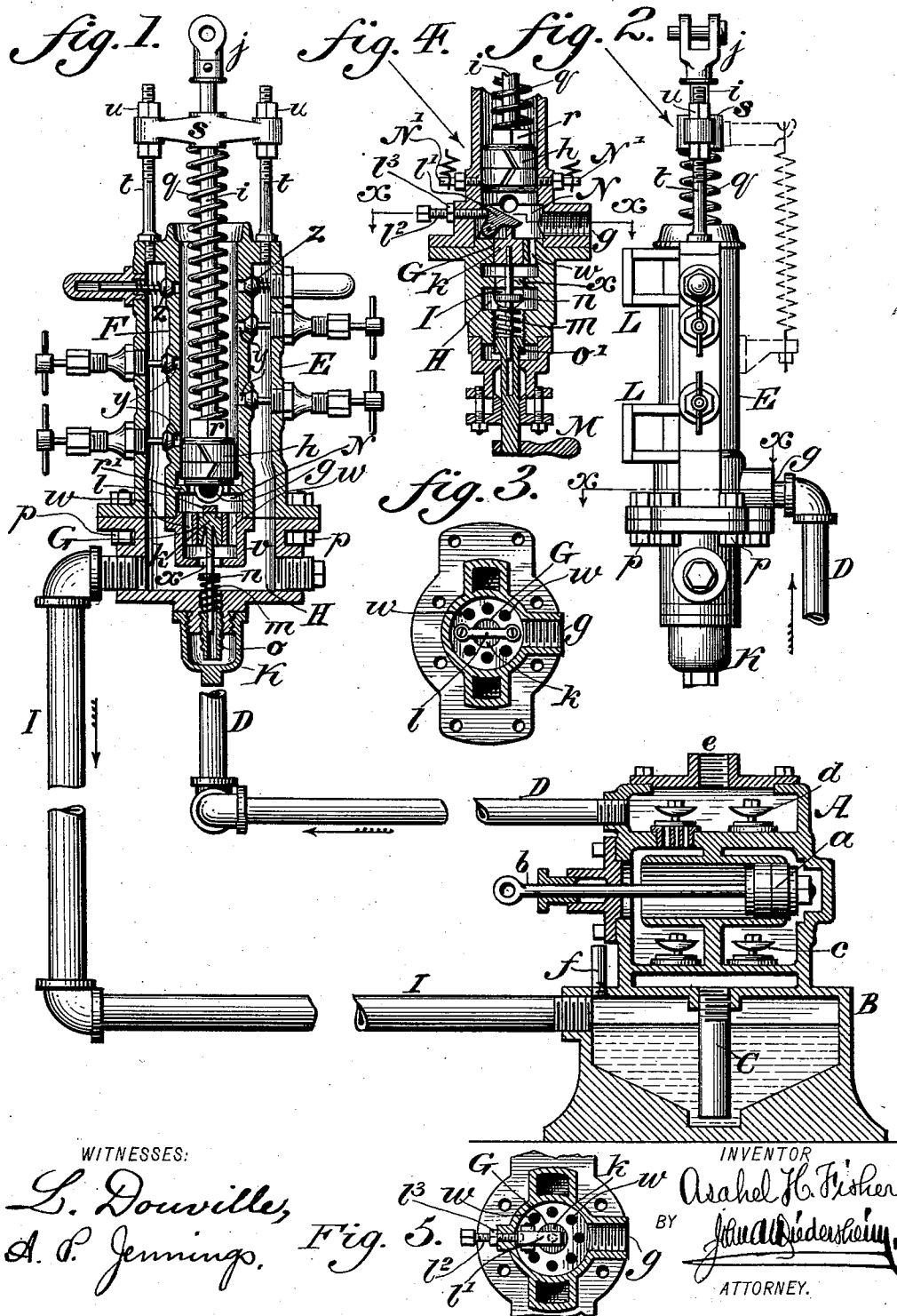


(No Model.)

A. H. FISHER.
GOVERNOR FOR ENGINES.

No. 531,107.

Patented Dec. 18, 1894.



UNITED STATES PATENT OFFICE.

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GOVERNOR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 531,107, dated December 18, 1894.

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To all whom it may concern:

Be it known that I, ASAHEL H. FISHER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Governors for Engines, which improvement is fully set forth in the following specification and accompanying drawings.

The object of my invention is to produce a governor which will positively prevent the racing of marine or other engines, thereby relieving the working machinery from spasmodic movements, which are liable to cause injurious strains, resulting in broken shafts, &c.

By my device any sudden increase in the number of revolutions of the engine is instantaneously and automatically communicated by proper intervening mechanism to the throttle or cut-off which controls the admission or exit of steam to or from the engine cylinders, in such a way that the flow of steam thereto will be momentarily checked, thereby causing the engine to immediately resume its normal speed, and furthermore this percentage of movement of the throttle or cut-off may be easily adjusted while the engine is in motion. The best results will be attained when the governor is connected to balanced throttles, but it can be connected with almost equal advantage to any of the ordinary or throttling or cut-off devices now in use. I attain these results by the mechanism illustrated in the following drawings, in which—

Figure 1 represents a vertical sectional view of the governor, showing the principal operative parts in section. Fig. 2 represents an elevation of the casing inclosing the governor proper. Fig. 3 represents a horizontal section on line *x, x*, Fig. 2. Fig. 4 represents a vertical section of a modified form of the governor, to be hereinafter referred to. Fig. 5 represents a horizontal section of the same, taken on line *x, x*, Fig. 4.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings: A designates a small pump provided with a piston *a*, piston rod *b*, suction and discharge valves *c* and *d* respectively, and the boss *e* for attachment

of an air chamber. The above parts are of ordinary construction, and require no further description. The piston rod *b* is to be attached to any of the reciprocating parts of the main engine, and should make the same, or an exact proportionate number of strokes as the main engine.

B designates a reservoir containing some suitable fluid, as oil or water, into which the suction pipe C of the pump is extended as shown.

f designates an air vent opening into the reservoir.

D designates a pipe leading from the discharge chamber of the pump and communicating with the governor casing E at the point *g* just below the water-tight piston *h*, which is of ordinary construction, and above the adjustable valve *k* which is held against the stop *l* by a spring *m*, which bears against the part *n* of the valve stem, and the sleeve *o* which serves as a guide for the valve stem. It will thus be seen that the office of the spring *m* is to tend to keep the valve up against the stop *l*. See Figs. 1 and 3. Attached to the piston *h* is the rod *i*, at the extremity of which is the knuckle *j*, from which point connection is made by means of links or similar devices, to the throttle or cut-off gear of the engine, not shown.

The piston *h* is held near the bottom of its stroke against the partition *r'*, which is the limit of the downward movement, by the spring *q* which abuts against the nut *r* and the cross piece *s* which is supported from the casing E on the rods *t, t*. The tension of the spring can of course be varied by moving the cross piece *s* up or down on rods *t, t*, said cross piece being held in place by the nuts *u, u*. In a stationary engine weights may be used instead of the spring *q*, and as is obvious, they would be a full equivalent of the same. The spring may be on the outside of the casing, as shown in dotted lines in Fig. 2, said spring being a tension spring.

v designates a cup-shaped projection attached to the downwardly projecting cylindrical barrel F of the casing E, and is provided with the central orifice G, which forms a seat or guide for the valve *k* in its movement, and it is also provided with the perfo-

rations w, w , which admit of the passage of the fluid from the pump A through the pipe D, inlet g , chamber N and opening x through pipe I back to reservoir B.

5 K designates a cap attached to the bottom of the casing E, which latter may be made in two pieces, and connected by the bolts p .

Above the piston in the cylindrical portion F, is a series of openings y , which form valve 10 seats for valves which can be operated from the exterior as shown, the function of which will be hereinafter described, and above these valve openings y are the relief valves z , which are uncovered when the piston is at the top 15 of its stroke.

L designates bosses or brackets used for supporting the governor casing in position.

Referring now to the modification shown in Figs. 4 and 5, in place of the rigid stop l shown 20 in Figs. 1 and 3, I may employ the movable stop l' pivoted as shown, one portion of which bears against the valve k , while the other portion has a bearing against the adjusting screw l^2 , whereby as is obvious, the valve k 25 may be moved vertically by turning the screw l^2 in or out.

g is the inlet and I the outlet, as in Fig. 1. The valve, valve stem and spring are the same and perform the same functions as in Fig. 1, 30 the spring however abutting against the movable part o' to which the handle M is attached, the part o' being capable of vertical adjustment, as is clear from Fig. 4.

The operation of the governor will now be 35 apparent to those skilled in the art, and will be described first in relation to Fig. 1. Suppose now the engine to make one hundred revolutions under the normal load, the plungers of the small pump A by reason of its attachment 40 to the proper reciprocating part of the engine makes the same number, or a proportionate number of strokes as the main engine, and there is a steady flow of the fluid from the reservoir B through the pipe D to the inlet g , 45 chamber N, small holes w, w , and passages x , chamber H and pipe I back to the reservoir, and the pressure under the piston h and above valve k being steady and constant, and the valve properly adjusted by the spring m 50 and piston h being held in its proper place by spring q , piston h will remain stationary. Should now from any cause the number of the revolutions of the main engine be increased, 55 say to one hundred and one, a greater volume of the fluid would be forced into the chamber N than could readily escape through the reduced passages w, w , and x , without an increase of pressure in the chamber N, and this accumulation of pressure therein should instantly 60 cause the piston h to rise, which upward motion is instantly communicated to the throttle by the proper connections, at once partially closing the same, thereby shutting off a portion of the supply steam to the engine, the 65 speed of which will at once be reduced until it runs under its normal conditions as before. Should there be an undue pressure upon the

piston, so that it does not respond instantly to the accumulation of pressure in the chamber N, this sudden increase of pressure will 70 instantly force the valve k downwardly, tending to close the passage x , and to further restrict the flow of the fluid through the same, and this increase of pressure in chamber N will, as is obvious, cause the piston h to positively move upwardly, and to partially close 75 the throttle as before.

The adjustment and operation of the modification shown in Fig. 4 are as follows: The spring m is adjusted by means of the handle 80 M, so that the valve k temporarily bears against the pivoted stop l' . The area of the passage beneath the valve being sufficient to permit the free exit of the fluid pumped in at g no movement is made by the piston, until 85 by means of the set screw l^2 acting on the stop l' the valve is forced down, contracting the escape orifices until a pressure is accumulated in the chamber M equal to the stiffness of the spring q , at a given number of revolutions. 90 The piston is now in equilibrium and the adjustment by means of the set screw l^2 is permanent, and the same is locked in place by the nut l^3 . By means of the handle M, a 95 small spring m can now be slacked up, until it is in equilibrium, and the adjustment of the whole device is permanent, and the operation of the governor will be as has already been described. As it is not desirable that 100 the piston h be forced suddenly to the top of its cylinder in ordinary work, its upward movement is regulated by the valve openings y, y . By means of the screw valve over one of the lower openings y , I can make its area 105 equal to the discharge of the fluid without an increase of pressure, at say one hundred turns of the engine. When this opening is uncovered, the pressure is relieved and the ascent of the piston is checked. Should the partial 110 closing of the throttle due to this rise of the piston reduce the speed of the engine, the piston h will fall, but should the revolutions continue above one hundred, the piston will continue to rise to the next opening y , above 115 which can be gaged in combination with the opening below, to discharge the fluid pumped in by say one hundred and one turns, but not one hundred and two. The throttle is now 120 half shut, and under ordinary circumstances the speed of the engine and the number of revolutions will be at once reduced. When the speed falls to a trifle below the normal, the pressure in the chamber N falls, valve k 125 opens and the piston h rapidly drops, opening wide the throttle. After the adjustments are made they are practically permanent, and all the movements described are instantaneous. The fluid employed, whether water or oil, being to all intents non-compressible, the 130 first impact of the pump plunger or piston is immediately communicated to the piston of the governor, and thence to the throttle or cut-off gear.

It is obvious that the above described gov-

ernor not being dependent on momentum, gravity belting or gearing is peculiarly adapted to marine engines, although of course it can be used with equal advantage with other engines or motors. In a marine engine its action will be positive, whether the vessel be on her beam ends or with bow or stem out of water.

In compound or triple expansion engines, one pump may operate governors attached to more than one cylinder, if very close regulation is required.

It is obvious that a diaphragm may be employed in place of the piston and spring.

When the spring is on the outside of the casing, it may be secured in position by means of the bolts N', as shown in Fig. 4, or the brackets shown dotted in Fig. 2.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an engine governor, a casing with an inner cylinder, a pipe leading into said inner cylinder, a pipe leading from said casing, a piston in said inner cylinder above its inlet pipe, and an adjustable valve below said piston controlling the communication between a chamber in said cylinder below said piston, and a chamber in the casing outside of said cylinder said valve having its seat in a cap suitably attached to the lower end of the inner cylinder, said parts being combined substantially as described.

2. In an engine governor, a casing with an inner cylinder forming a chamber in said casing outside of said cylinder, a piston in said cylinder, a pipe leading into said cylinder below said piston, a pipe leading from said chamber in the casing, a cap on the lower end of said cylinder, and a valve in said cylinder below said piston having a seat thereon for said valve, said seat having openings therein, said parts being combined substantially as described.

3. In an engine governor, a casing having an inner cylinder with an intervening chamber, a pipe leading into said cylinder, and a pipe leading from said casing, a piston in said casing above the said inlet pipe, a cap secured to said cylinder having a valve seat with openings therein, and a valve adapted to close an opening in said cap, said piston having its stem provided with means for connecting it with the throttle valve of an engine, said parts being combined substantially as described.

4. In an engine governor, a casing with an inner cylinder forming an intervening chamber, a pipe leading into said cylinder, a pipe leading from said chamber, a piston in said cylinder above said inlet pipe, a cap at the lower end of said cylinder with an opening therein communicating with said chamber, a valve in said cylinder closing said opening, a stop in said cylinder for said valve, and means connected with the stem of said pis-

ton for connecting it with the throttle of an engine, said parts being combined substantially as described.

5. The combination of a pump having a piston adapted to be connected with a reciprocating part of a main engine, a governor having a casing with an inner cylinder forming an intermediate chamber, a piston in said cylinder having its stem provided with means for connecting it to the throttle of the main engine, a pipe leading from said chamber in the casing to a reservoir in communication with said pump, and an adjustable valve in said cylinder controlling an opening in the lower end of the cylinder, communicating with said intermediate chamber said valve having its seat in a cap suitably attached to the lower end of the inner cylinder said parts being combined substantially as described.

6. In an engine governor, a cylinder with inlet and outlet openings, a piston in said cylinder above said inlet opening, a pivoted stop piece in said cylinder, an adjusting screw having a bearing and in contact with said stop piece, and a valve controlling the outlet opening of the cylinder and adapted to abut against said stop, said parts being combined substantially as described.

7. In an engine governor, a cylinder with inlet and outlet openings, a piston in said cylinder above said inlet opening, a cap on the lower end of said cylinder, a valve seated in said cap and controlling said outlet opening and an adjustable stop for said valve, said parts being combined substantially as described.

8. A governor for an engine consisting of a casing having an inner cylinder with an intervening chamber, a piston in said cylinder, an adjustable spring bearing against said piston, a cap on the lower end of said cylinder with an opening therein, a valve in said cylinder controlling said opening, and a stop in said cylinder for said valve, said cylinder having openings therein above said piston, forming seats for relief valves, said parts being combined substantially as described.

9. In an engine governor, a cylinder having inlet and outlet openings, a piston in said cylinder above said inlet opening, an adjustable spring or its equivalent bearing on said piston, a valve controlling said outlet opening and a pivoted stop for said valve and an adjusting screw for said stop, said parts being combined substantially as described.

10. An engine governor, consisting of a casing having an inner cylinder with an intervening chamber, a piston in said cylinder, an adjustable spring bearing against said piston, a perforated partition in the lower portion of the said cylinder, a valve suitably supported and guided in said partition and adapted to control a port in the end of the cylinder, relief valves in the inner cylinder above the piston and openings into the outer casing and inner cylinder, adapted to be con-

nected with the discharge and suction passage of a pump, said parts being combined substantially as described.

5 11. In an engine governor, an inner cylinder with a cap on its lower end, and a valve having a seat on said cap, said cylinder being provided with a piston adapted to have a

connection with the throttle of an engine, and having also connections below said piston to and from a pump, substantially as described. 10

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Witnesses:

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