(No Model.)

W. B. MASON.

GOVERNOR.

No. 312,138. Patented Feb. 10, 1885.

Fig: 1.

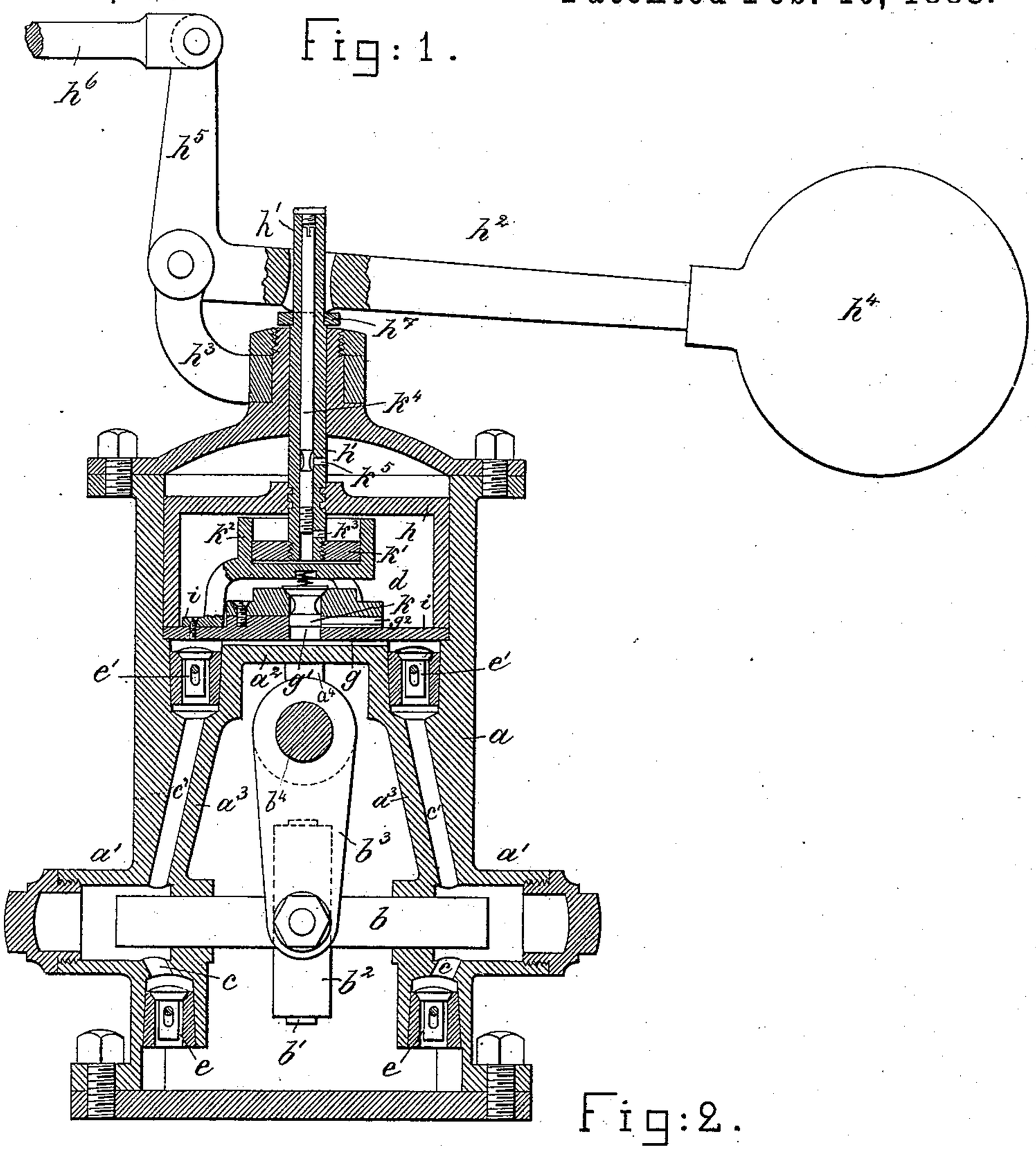
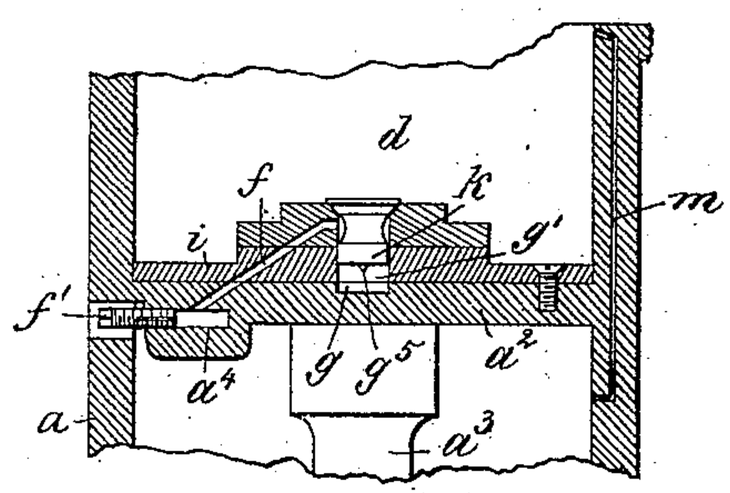


Fig: 2.



Witnesses.

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GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 312,138, dated February 10, 1885.

Application filed August 12, 1884. (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 relating to governors is intended as an improvement in a governor of the class shown in Letters Patent No. 274,625, granted to me March 27, 1883, in which the engine to be governed actuates a pump producing a circulation of oil or other liquid, which in turn controls the admission of steam to the engine in accordance with the speed at which the said liquid is forced by the pump.

In another application, No. 107,170, filed September 24, 1883, I have shown and described a governor operating upon the same principle as the one described in the patent referred to, but differing therefrom in the construction and arrangement of the parts; and my present invention consists in some further modifications in the construction of the parts, and in additional elements whereby the operation is somewhat modified.

In both my previous inventions the mechanism by which the throttle or engine valve is directly controlled has its movements regulated by a dash-pot outside of the main reservoir containing the circulating liquid and pump by which it is forced; and one feature of the present invention consists in a novel combination of the parts by which the said dash-pot is inclosed within the main reservoir, and by which its effect on the valve-actuating mechanism may be readily adjusted while the latter is in operation.

As described in my former patent, the pump of the governor is adapted to be connected directly with and actuated by the reciprocating parts of a direct-acting engine or steam pump, the said governor pump thus responding to variations in the velocity of movement of the engine-piston at all points in its stroke.

When the apparatus is to be used in connection with a duplex pumping-engine in which the strokes of one engine alternate with those of the other, if the governor-pump were actuated by only one of the said engines, the interruption in its operation at the end of each stroke would produce too large fluctuations in the valve-controlling mechanism unless some means were devised to prevent such fluctuations.

My present invention also consists in means for preventing such fluctuations, consisting, essentially, of a valve by which the outflow of the pumped fluid is stopped at the moment that its inflow ceases, so that while the governor-pump is making a stroke it produces a circulation of the oil, by which the engine-valve is controlled in accordance with the relation between the inflow and outflow of the fluid to and from a chamber, or, in other words, in proportion to the amount at each moment within the said chamber; but the moment that the inflow ceases the outflow also is stopped, so that the amount within the chamber, and consequently the condition of the engine-controlling valve remains unchanged until the next stroke of the governor-pump takes place.

Figure 1 is a vertical section of a governor embodying this invention; Fig. 2, a sectional detail on a plane at right angles to that of Fig. 1.

The main casting or reservoir *a*, provided with lateral chambers *a'*, in line with one another, bored to receive the plunger *b*, is provided with a transverse partition, a^2, separating it into upper and lower chambers, as in my former application. The interior of the lower portion of the main casting, below the partition, is provided with projections a^3, bored to form passages *c c'*, the former connecting the chambers *a'* with the lower portion of the main reservoir, and the latter leading from the said chambers *a'* to the chamber *d* above the partition a^2. The passages *c c'* are enlarged at their ends to receive the valve-seats and valves *e e'*, which operate the same as in my other application referred to, so that when the plunger *b* is so reciprocated it causes oil or other liquid contained in the reservoir to be forced up through the passages *c* and *c'* and valves *e* and *e'*, which latter prevent its re-

turn through the said passages *c* and *c'*. The liquid thus forced, instead of passing directly into the chamber *d*, so as to act on the piston *h* therein, as in the former application, enters a passage, *g*, formed by grooving the partition a^2 beneath a plate, *i*, fitted within the chamber *d*. The liquid passes from the passage *g* into a passage, *g'*, in the plate *i*, and acts on the under side of a plug, *k*, which, when in its lowest position, closes a passage, g^2, leading from the one *g* into the chamber *d*. When the liquid is forced up through one or the other of the valves *e* by the plunger *b*, it enters the passage *g g'* and raises the plug *k*, thus opening the passage g^2, through which it enters the chamber *d*, tending to lift the piston *h*. The passage *g'* above the cylindrical portion of the plug *k* communicates with the interior of the chamber *d*, and the upper portion of the said plug *k* constitutes a valve which, when in its lowest position, closes the upper end of the said passage *g'*, preventing the escape of liquid from the chamber *d* into the said passage, this being the normal condition while no liquid is entering the lower end of the said passage, so as to raise the plug *k*. When, however, the liquid is being forced upward by the plunger *b*, raising the plug *k* and entering the chamber *d* through the passage g^2, the valve is raised and the upper end of the passage *g* communicates with the interior of the chamber *d*, and also with an outlet passage, *f*, (see Fig. 2,) leading through the partition a^2 into a boss or projection, a^4, at the under side thereof, provided with a valve or controlling device, *f'*, governing the outflow of liquid from the chamber *d* through the passage *f*, from which it falls back into the lower portion of the main reservoir, from which it is again pumped by the plunger *b*. The valve *f'* is shown as consisting of a screw entering a threaded passage in the boss a^4, forming a continuation of the passage *f*, the said screw being longitudinally slotted, as shown in Fig. 2, and regulating the escape of liquid in accordance with the distance that the slotted portion projects outside of the threaded passage, the liquid passing longitudinally through the slot and then laterally out through the sides thereof where the slotted portion projects from the threaded passage. The passage g^2 is grooved at its under side, as shown at g^5, Fig. 2, to afford a slight connection between the passages *g'* and g^2 when the plug *k* is in its lowest position, so that the said plug will not entrap the liquid in the passage *g'* below it, and thus prevent the valve from seating in the upper end of the said passage *g'*. The plunger *b* is provided with a pin, *b'*, forming a guide for a ring, b^2, connected with a forked arm, b^3, on a rock-shaft, b^4, actuated by a suitable arm or lever at the outside of the main reservoir, as described in my former application, where these parts are more fully shown. The piston *h*, made hollow at its lower side to constitute an air-chamber, cushioning the effect of the liquid beneath it, is connected with a rod, *h'*, acting on a lever, h^2, pivoted on an arm or bracket, h^3, and provided with a weight, h^4, the arm h^5 of the said lever being connected by a suitable rod or link, h^6, with the throttle-valve of the engine or other device controlling the application of power to the motor to be governed.

In order to prevent too sudden movements of the valve-actuating mechanism, a dash-pot is provided consisting of a cylinder, k^2, supported within the chamber *d*, as shown, the stem *h'* being continued below the piston *h*, and provided with a secondary or controlling piston, *k'*, fitting within the said cylinder k^2, which will be filled with a liquid. The stem *h'* is made tubular, and provided with a lateral opening, k^3, above the piston *k'*, so that the liquid may pass through the said stem and opening as the piston *k'* moves in conjunction with the one *h*, the controlling effect of the liquid in the dash-pot depending on the size of the said passage k^3, which is regulated by a threaded rod, k^4, which may be operated by a suitable key or wrench applied at the upper end of the rod *h'*, the adjustment being effected, if desired, while the apparatus is in operation. The rod *h'* is provided with another lateral opening, k^5, above the piston *h*, so that the liquid which may be forced up through the rod will escape into the space above the piston *h*, and, together with the liquid which may leak around the piston *h* from the chamber *d*, will be returned to the lower portion of the case or reservoir through a suitable passage, *m*, (see Fig. 2,) provided for this purpose. The upper portion of the stem k^4 passes through an opening in the lever h^2, which rests on a shoulder or collar, h^7, on the said rod. If desired, the pump-chambers *a'* may be connected by a duct or passage, as described in my other application, and the operation is substantially the same as in the said application, except that the outflow from the chamber *d* is arrested the moment that the inflow thereto ceases, so that there will be no material change in the position of the lever h^2 after the plunger *b* comes to rest.

I claim—

1. In a governor, a reservoir and chamber and pump actuated by the motor to be governed, producing a circulation of fluid from the said reservoir to the said chamber, combined with a valve whereby the outflow of fluid from the chamber is stopped when the inflow ceases, substantially as and for the purpose described.

2. In a governor, a reservoir and chamber provided with connecting-passages, combined with a pump actuated by the motor to be governed, for forcing fluid from the said reservoir into the said chamber, a return-passage from the chamber to the reservoir, and a valve controlling the flow of fluid through the said return-passage, operated by the fluid forced by the pump in its passage into the chamber, substantially as described.

3. In a governor, a reservoir and chamber and pump for forcing fluid from the former into the latter, combined with a piston in the said chamber actuated by the fluid therein, and a secondary piston and co-operating dash-pot cylinder inclosed within the said chamber, substantially as described.

4. The main case provided with a partition separating it into a lower reservoir and upper chamber, and a pump for forcing fluid from the said reservoir to the said chamber, combined with the plate *i* in the said chamber, having passages *g'* and *g²* for the inflowing fluid, and a passage for the outflowing fluid, and the plug and valve *k*, actuated by the inflowing fluid and controlling the outflowing fluid, substantially as described.

5. The reservoir, chamber, and pump, and the piston in the said chamber operated by the pumped fluid, combined with the piston-rod adapted to actuate the motor-controlling valve or device, the secondary piston connected with the said rod, and the dash-pot cylinder co-operating therewith, inclosed within the said chamber, substantially as described.

6. The reservoir, chamber, and pump, and the piston in the said chamber operated by the pumped fluid, combined with the piston and hollow piston-rod provided with a lateral passage and the secondary piston, and dash-pot cylinder and device controlling the flow of liquid in the dash-pot cylinder through the said piston-rod, substantially as described.

7. The main case divided by a partition into a lower reservoir and upper chamber, and the pump, causing a circulation of fluid from the former to the latter, combined with the piston in the said chamber, operated by the pumped fluid beneath it, and a return-passage from the chamber above the piston to the reservoir for the liquid leaking around or passing by the said piston, substantially as described.

8. The main case divided by a partition into a lower reservoir and upper chamber, and the pump causing a circulation of fluid from the former to the latter, combined with the piston in the said chamber, operated by the pumped fluid beneath it, and a return-passage from the chamber below the piston, and valve *f'* therein, consisting of a longitudinally-slotted screw operating in a threaded passage and governing the flow of fluid in proportion to the length of the slotted portion outside the said passage, substantially as described.

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

WM. B. MASON.

Witnesses:

JOS. P. LIVERMORE,

W. H. SIGSTON.