No. 823,567. PATENTED JUNE 19, 1906.

W. L. WATERS.

GOVERNING MECHANISM FOR ENGINES.

APPLICATION FILED DEC. 5, 1904.

Fig. 2.

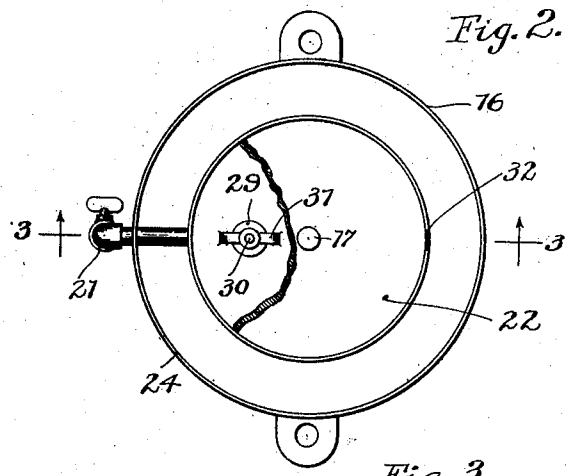


Fig. 3.

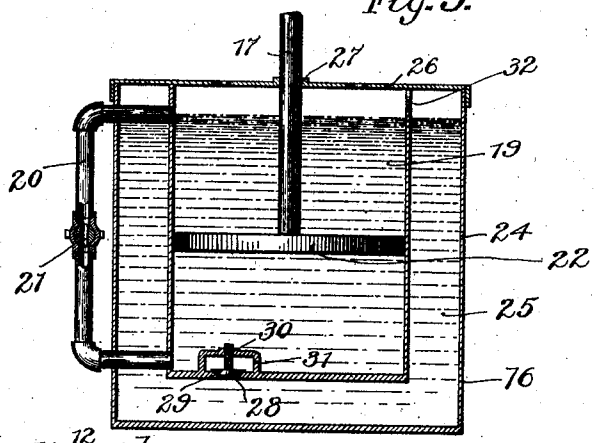
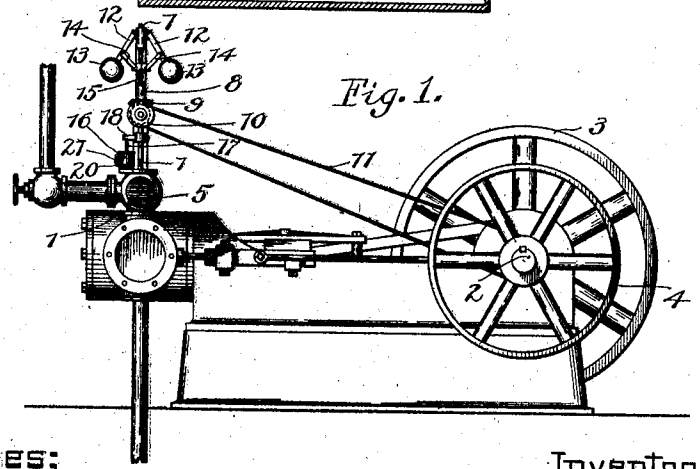


Fig. 1.



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GOVERNING MECHANISM FOR ENGINES.

No. 823,567. Specification of Letters Patent. Patented June 19, 1906.

Application filed December 5, 1904. Serial No. 235,458.

To all whom it may concern:

Be it known that I, WILLIAM L. WATERS, a subject of the King of England, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Governing Mechanism for Engines, (Case No. 12,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to governors and governing mechanism for engines; and its object is to provide improved dash-pot mechanism for controlling the action of the engine-governor.

It is very desirable in some classes of work to retard or dampen the action of the governor to cause more gradual control of the steam-supply, and this is usually accomplished by associating a dash-pot with the supply-valve stem or with some other part of the governor. The dash-pot is usually provided with a by-pass adapted to be adjusted to allow any degree of retardation or damping of the governor action. Where this damping is considerable and the engine is driving a heavy load, there will be a tendency for the engine to race as the load is suddenly taken therefrom, owing to the inability of the governor when thus damped to quickly control the valve to shut off the steam-supply. By my improved form of dash-pot mechanism I am enabled to overcome this disadvantage, and I employ an additional passage-way or valve by means of which the piston in the dash-pot will be allowed to move unimpeded upon a sudden tendency of the governor to effect closure of the supply-valve as the load on the engine is suddenly diminished.

My invention will be best understood with reference to the accompanying drawings, in which—

Figure 1 is an elevation view of an engine, showing the dash-pot mechanism associated with the governor. Fig. 2 is a plan view of the dash-pot mechanism, the cover thereof being removed and other parts being cut away to show valve construction; and Fig. 3 is a longitudinal sectional view taken on line 3 3 of Fig. 2.

The engine consists of a cylinder 1, the piston of which is suitably connected in driving relation with the shaft 2, carrying the fly-wheel 3 and driving-wheel 4. The controlling supply-valve 5 for the engine is interposed between the cylinder 1 and the piping 6, leading to a source of steam-supply. (Not shown.) The valve-stem 7 of the controlling-valve extends upwardly through a collar 8, said collar having no vertical motion. A bevel-gear 9, secured to the collar, meshes with a bevel-gear 10, which is driven by means of a belt 11, suitably connected with the main shaft 2, and thus as the engine operates the sleeves 8 will be rotated, the speed thereof depending upon the speed of the engine. As the sleeve 8 rotates the centrifugal force will throw the balls 14 outwardly a distance depending upon the speed of the engine and the valve-stem 7 will be moved accordingly to open or close to any degree the passage-way through the main valve 5, the outward motion of the valve-spindle serving to close the valve and the downward motion serving to open the valve. To retard the action of the governor and valve-stem, a dash-pot 16 is used, whose piston-rod 17 is connected to the valve-stem 7 by an arm 18. The dash-pot is filled with oil or other viscous substance 19, and a by-pass 20, leading into the upper and lower ends of the dash-pot, is provided with a valve 21, by means of which the passage-way through the by-pass may be adjusted, and thereby to cause any degree of retardation or damping of the governor and main valve connected therewith.

Under normal conditions the by-pass will afford sufficient passage-way of the oil or other substance; but upon a sudden diminution of the load on the engine the by-pass will be insufficient to allow sufficient rapidity of motion of the piston-head 22 within the dash-pot to shut off the steam-supply in time to prevent undue speed or racing of the engine. To overcome this difficulty, I construct the dash-pot mechanism as shown in detail in Figs. 2 and 3, and the dash-pot consists of an inner vessel 23, which forms the dash-pot proper, and an outer vessel 24, surrounding the inner vessel to form therewith a chamber 25. A cover 26 engages over the top edge of the outer vessel and has a bushing 27, through which passes the piston-rod 17, connected with the piston-head 22. Both vessels are filled with oil or other viscous substance 19, and the by-pass 20 connects the upper end with the outer end of the inner vessel to allow passage-way of the oil in either direction as the piston or plunger moves up or down within the vessel. The

valve 21 in the by-pass controls the passage-way therethrough, and thus any degree of retardation may be offered the plunger and the governor mechanism connected therewith.

The dash-pot mechanism thus far described is the arrangement usually heretofore employed; but this arrangement will prevent sufficiently rapid response of the governor mechanism to actuate the valve mechanism to prevent racing of the engine should its load suddenly be diminished. I therefore introduce an additional passage-way 28 in the lower part of the inner vessel, preferably in the bottom wall thereof, as shown, and this opening is controlled by a check-valve 29, whose stem 30 passes upwardly through the guiding-bridge 31. This check-valve prevents passage-way of oil through the opening 28 from the inner to the outer vessel, but will allow passage in the opposite direction. Upon the tendency of the engine to unduly and suddenly increase in speed there will be a tendency of the governor-balls to suddenly fly outwardly to pull the valve-stem to close the main supply-valve, and thus to prevent racing. Owing to the damping effect of the dash-pot, however, the governor would not respond quickly enough to prevent such racing if it were not for the passage-way 28. Upon tendency of the governor-balls to suddenly pull the valve-stem and plunger 22 upwardly the check-valve 29 will be raised and the oil from the vessel 24 may readily pass into the inner vessel 23 and allow unimpeded upward passage therein of the plunger and the valve-stem connected therewith, and the main supply of steam can be shut off in time to prevent racing of the engine. The oil suddenly carried upwardly by the plunger will be returned to the vessel 24 through the overflow-opening 32, and the by-pass will carry part of this oil to the lower part of the inner vessel. When the speed of the engine has again become normal, the oil will readily be carried by the by-pass and the governor damped as before, the check-valve 29 being actuated only upon sudden upper movement of the plunger.

I have thus provided improved dash-pot mechanism which under normal conditions may be adjusted for any degree of damping, so that the retardation of the governor will be sufficiently gradual to prevent sudden tendencies of the engine to drop in speed, while at the same time upon a sudden impulse of the engine to unduly increase in speed the dash-pot arrangement will allow the governor to act rapidly to reduce the steam-supply.

I do not wish to be limited to the exact construction and arrangement of the parts as shown, as modifications may readily be made without departing from the spirit of invention.

I claim as new, however, and desire to secure by Letters Patent—

1. In a dash-pot mechanism for engine-governors, the combination with an outer and inner vessel, of a plunger adapted to reciprocate within the inner vessel, an adjustable by-pass connecting the upper and lower ends of said inner vessel, and a valve in the lower part of said vessel adapted to prevent communication between the vessels during one direction of movement of the piston and adapted to open communication between the vessels during the opposite direction of motion of the piston.

2. In a dash-pot mechanism for engine-governors, the combination with an inner and outer vessel having communication at their upper end and both filled with fluid, of a piston for reciprocating within the inner vessel, an adjustable by-pass connecting the upper with the lower part of the inner vessel, and a check-valve in the base-wall of the inner vessel adapted to prevent communication between the inner and outer vessels upon downward stroke of the piston and to allow communication between the vessels upon upward stroke of the piston.

3. In a dash-pot mechanism for engine-governors, the combination with an inner and outer vessel having communication at their upper end and both filled with fluid, of a piston for reciprocating within the inner vessel, an adjustable by-pass connecting the upper with the lower part of the inner vessel, and a check-valve in the base-wall of the inner vessel adapted to prevent communication between the inner and outer vessels upon downward stroke of the piston and to allow communication between the vessels upon upward stroke of the piston, said check-valve being adjusted to be unresponsive upon slow speed of the piston and to be responsive to allow communication only upon sudden and quick movements of the piston in an upward direction.

In witness whereof I hereunto subscribe my name this 1st day of December, A. D. 1904.

WILLIAM L. WATERS.

Witnesses:

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