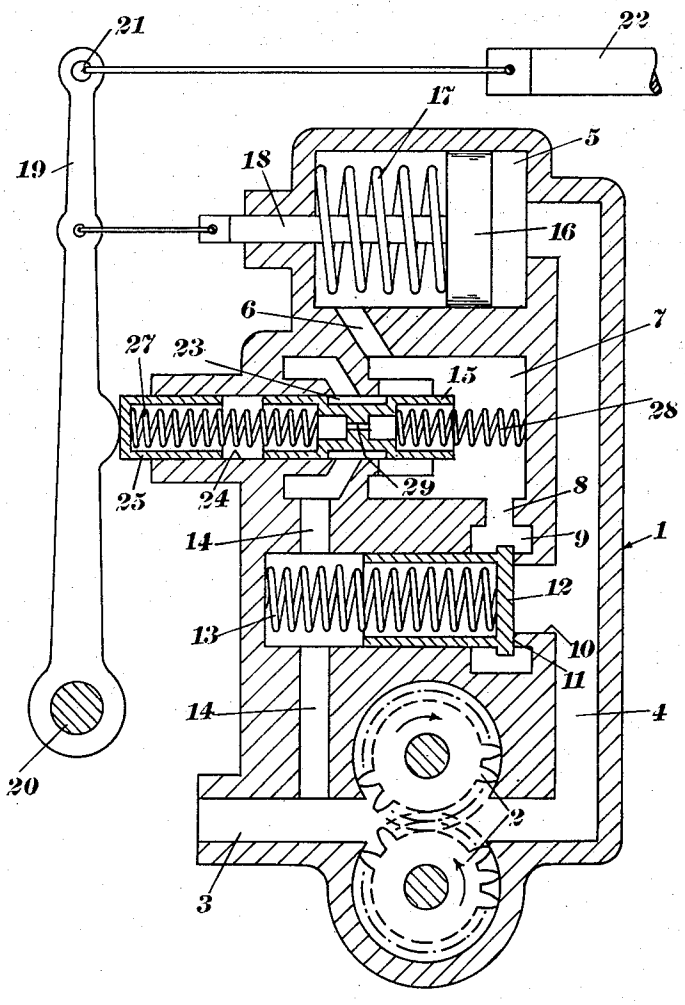
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HYDRAULIC GOVERNOR

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HYDRAULIC GOVERNOR

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This invention has for its object to provide an improved hydraulic governor for controlling the rate of supply of liquid fuel from a fuel pump to an internal combustion engine in response to variations in the speed of the engine.

The invention comprises the combination of a pump adapted to be driven by the engine, a circulatory system associated with the said pump, a movable member responsive to the fluid pressure in the system for actuating the regulating means of the fuel pump, an adjustable spring loaded control valve, and stabilising means including a dash pot and spring for imparting movement to the control valve in response to movements of the said movable member.

In the accompanying drawing the single figure is a sectional elevation, more or less diagrammatic, of a hydraulic governor for internal combustion engines constructed in accordance with the invention.

In carrying the invention into effect according to one convenient mode as illustrated herein, there is provided a hollow body or casing indicated generally at 1 in which are mounted a pair of gear wheels 2 forming a gear pump, the latter being adapted to be driven by the engine. At one side of the pump is provided a fluid inlet passage 3, and at the other side is provided a delivery passage 4 leading to one end of a cylindrical chamber 5 in the body part or casing. At the opposite end of the chamber 5 is a port 6 communicating with a chamber 7 herein termed the control valve chamber. A passage 8 leads from the chamber 7 to a valve chamber 9 having a passage 10 communicating with the passage 4, the passage 10 being provided with a seating 11 for a constant pressure valve 12 loaded by a spring 13. Between the pump inlet passage 3 and the control chamber 7 is provided a return passage 14, the communication between this passage and the said chamber 7 being effected by the control valve 15. The various passages referred to above constitute the circulatory system around which fluid can be caused to flow by the pump.

In the cylindrical chamber 5 is contained a piston 16 which is loaded by a spring 17 on the side remote from the passage 4 between the delivery side of the pump and the said chamber, and a rod 18 extending from the piston through the closed end of the chamber is connected to a lever 19. The lever is pivotally supported at one end 20, and at the opposite end 21 is connected to the regulating member 22 of the fuel pump, this member being, for example a slidable bar by

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movement of which the output of the fuel pump can be varied in any convenient and known manner.

The control valve chamber 7 communicates with the return passage 14 by way of a cylindrical bore in which is slidable the control valve 15. This valve is of hollow cylindrical form, and around its exterior is formed a circumferential groove 23 by which the adjacent chamber 7 can be put into restricted communication with the return passage 14. In an extension 24 of the bore which contains the control valve 15 and which extends to the exterior of the body part is placed a hollow slidable plunger 25 having its closed outer end in contact with the lever 19 above mentioned, and between the plunger 25 and control valve 15 is placed a spring 27 for transmitting motion from the lever 19 to the said valve. The valve 15 is loaded at its other side by a spring 28 located within the said control valve chamber 7. Also within the valve 15 is formed a restricted orifice 29 whereby the space between the plunger 25 and the control valve is in communication with the control valve chamber 7 and is thus filled with fluid.

The arrangement is such that the piston 16 which actuates the regulating member 22 of the fuel pump is subject on one side to the pressure of the liquid at the discharge side of the circulating pump which is determined by the loading of the aforementioned constant pressure valve 12, and on the other side to the spring 17 and to the pressure of the fluid in the control valve chamber 7. According to the relative pressures exerted on the piston by its spring and the fluid, so the piston is caused to move in one direction or the other for moving the regulating member of the fuel pump. Under normal operating conditions the valve 12 is opened, by the pressure of the liquid delivered by the circulating pump 2, to an extent sufficient to equalise the pressures acting on the piston 16. Consequently the regulating member 22 of the fuel pump is stationary. Assuming that, due to an overload condition, the piston is moved by the spring 17, the lever 19 then imparts movement to the plunger 25 and this transmits movement to the control valve 15 through the associated liquid and spring 27 in the direction for increasing the flow from the valve chamber 7 to the return passage 14. The amount of movement of the valve 15 depends on the rate of movement of the piston 25 and on the rate at which liquid can flow through the restricted orifice 29 in the valve from the space between the plunger 25 and valve to the valve

chamber 7. Likewise when the piston moves in the opposite direction under the action of the fluid pressure, the lever 19 tends to move away from the plunger 25, and the latter is moved outwardly by the associated liquid and spring 27, causing the control valve 15 to receive a following movement of an amount depending on the rate of flow of fluid through the orifice 29. The valve 15 with its orifice 29 thus forms a dash pot device which in association with a spring constitutes means whereby movement of the control piston 16 is imparted to the control valve.

By the arrangement above described hunting of the governor is minimised, and the desired stability is obtained in a very simple and satisfactory manner.

The invention is not, however, restricted to the above example as subordinate details of construction or arrangement may be varied to suit different requirements.

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

1. A hydraulic governor comprising in combination a liquid circulating pump, a delivery passage communicating with the discharge side of said pump, means forming with a part of said delivery passage a circulatory path leading from the discharge side of said pump to the inlet side thereof, a spring loaded pressure valve arranged in said path at a position between said delivery passage and the inlet side of said pump so that said valve opens in response to the pressure of liquid delivered by said pump, a spring loaded stabilising valve arranged in said path at a position between said pressure valve and the inlet side of said pump, a chamber arranged out of said path and communicating at opposite ends respectively with said delivery passage and the part of said path between said pressure valve and said stabilising valve, a spring loaded pressure responsive member arranged in said chamber with its opposite sides exposed respectively to the liquid pressures in opposite ends of said chamber, a regulating member operable by said pressure responsive member for causing actuation of said stabilising valve and a dash pot device for controlling the rate of movement of the stabilising valve.

2. A hydraulic governor as claimed in claim 1, in which said stabilising valve and dash pot device together comprise a stationary member provided with a cylindrical bore forming a part of said circulatory path, a hollow cylindrical member slidable in said bore and having its ends in communication with each other through a restricted orifice in said cylindrical member, a plunger situated in said bore adjacent to one end of said cylindrical member, and operable by said regulating member, a spring located between said plunger and the adjacent end of said cylindrical member, and another spring acting on the other end of said cylindrical member.

WILFRID EDWARD WALTER NICOLLS.

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