Dec. 22, 1925. 1,566,995

R. G. STANDERWICK

OIL GOVERNOR

Filed Jan. 14, 1924

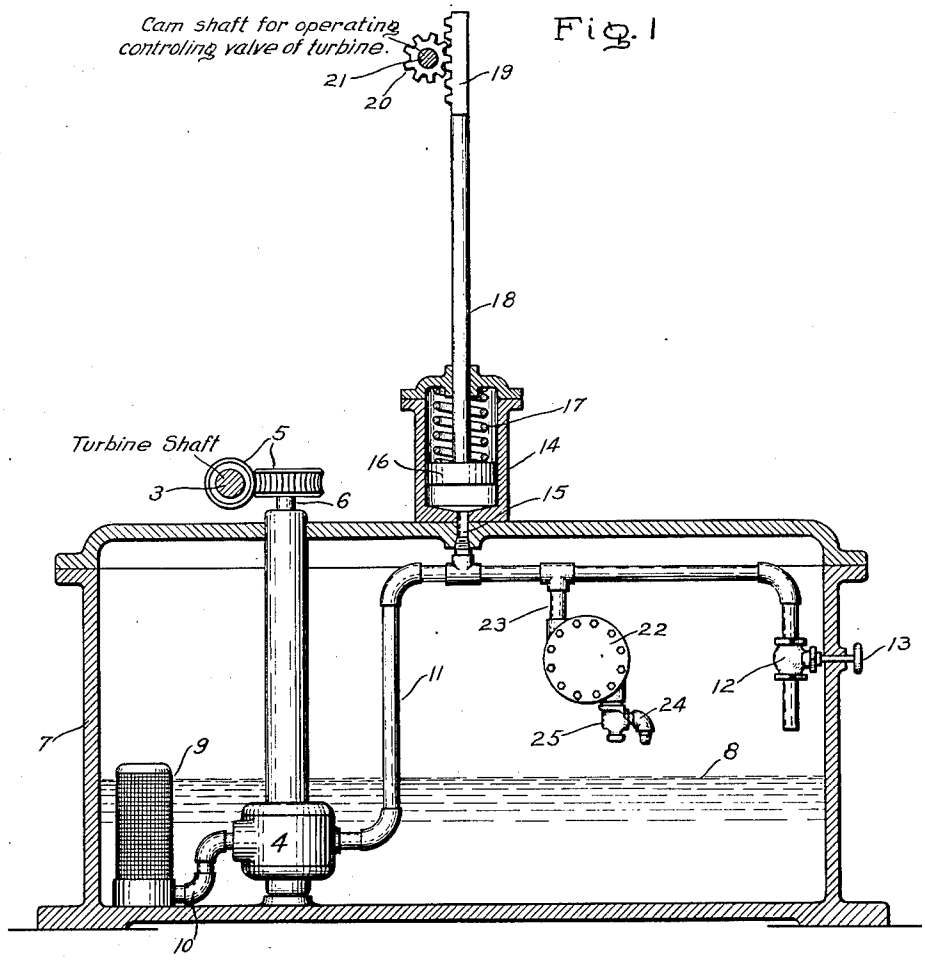

Fig. 1

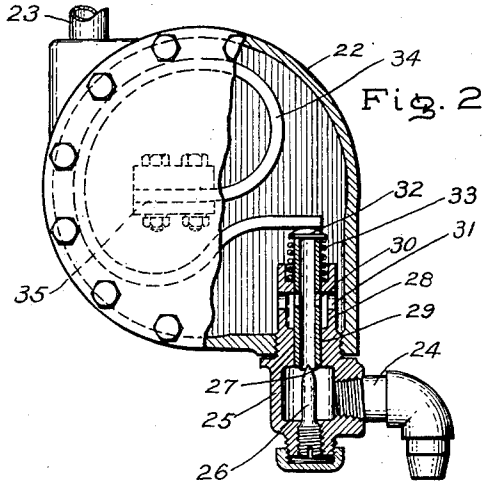

Fig. 2

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UNITED STATES PATENT OFFICE.

REGINALD G. STANDERWICK, OF MARBLEHEAD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

OIL GOVERNOR.

Application filed January 14, 1924. Serial No. 686,139.

To all whom it may concern:

Be it known that I, REGINALD G. STANDERWICK, a citizen of the United States, residing at Marblehead, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Oil Governors, of which the following is a specification.

The present invention relates to governors for elastic fluid turbines and the like of the type usually termed "oil governors" because the actuating means for the moving parts of the governor is oil pressure. In general, such governors comprise an oil pump of positive displacement driven at a speed which bears a definite relation to the turbine speed and delivering oil through an orifice of definite size. The pressure required to force the oil through the orifice increases and decreases as a function of the quantity of oil to be passed and since this varies directly with the speed of the pump, it follows that the pressure built up in advance of the discharge orifice is proportional to the turbine speed. It is this pressure which is utilized to operate the moving parts of the governor.

In general the oil used for actuating the governor is taken from the same source of supply as that used for the bearings and as a result its temperature varies from time to time under varying operating conditions. This means that the viscosity of the oil changes with the result that the pressure required to force a given quantity of oil per unit of time through the orifice varies somewhat, thus introducing an error into the governor.

The object of my invention is to provide in connection with a governor of this type an improved means for correcting for changes in the viscosity of the oil due to variations in temperature, and for a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawing, Fig. 1 is a diagrammatic view of an oil governor provided with a viscosity correcting means embodying my invention, and Fig. 2 is an enlarged view partly in section of the viscosity correcting device.

Referring to the drawing, 3 indicates a shaft which may be the shaft of an elastic fluid turbine for example, and 4 a pump driven from shaft 3 by gearing 5 and a shaft 6. The pump is located in the turbine oil tank 7 in which is a supply of oil 8 and it receives oil through a strainer 9 and pipe 10 and discharges it through a discharge pipe 11. Pump 4 is of the positive displacement type, such as a gear pump for example, and it may be the same pump which supplies oil to the bearings. In discharge pipe 11 is an adjustable orifice through which the oil flows back to tank 7 and it may take the form of a suitable valve 12 provided with an operating handle 13 located outside the tank. Connected to discharge pipe 11 in advance of valve 12 is a pressure responsive device which forms the movable part of the governor. It is here shown in the form of a cylinder 14 connected to pipe 11 by a conduit 15, and provided with a piston 16 which is moved by the oil pressure against the biasing action of a spring 17. Connected to piston 16 is a rod 18 provided at its upper end with a rack 19 which meshes with a gear wheel 20 on a shaft 21. Turning of shaft 21 opens and closes the regulating valve means for the turbine and any suitable arrangement may be used to effect this result. For example, a cam or cams on shaft 21 may actuate the regulating valve means through suitable levers or other connecting means as is well known in the turbine art. By varying the area of the orifice through valve 12 by means of hand wheel 13, the governor can be set for a desired speed as is well understood.

The drawing as so far described shows diagrammatically the essential elements of a governor of the type to which my invention relates and is to be taken as typical of any suitable governor of this type.

Now, in accordance with my invention, I provide in parallel with the discharge orifice formed by valve 12 a second discharge orifice the area of which is varied in accordance with the temperature of the oil de-

livered by pump 4, the arrangement being such that as the temperature increases the area of the second discharge orifice is decreased and vice versa. With this arrangement when the temperature of the oil increases a greater amount must pass through the orifice formed by valve 12 while when the temperature of the oil decreases a lesser amount must pass through such orifice, and the proportioning of the parts is such that the total discharge area of the two orifices is such as to maintain the desired pressure in the discharge pipe.

The second discharge orifice comprises a casing 22 connected to discharge pipe 11 by a pipe 23 and to tank 7 by a conduit 24. In conduit 24 is a valve comprising a casing 25 into which projects a pin 26 having a tapered end 27 which forms a sort of valve seat. Casing 25 is provided with a sleeve 28 which projects into casing 22 and forms a guide for a hollow valve member 29 the lower end of which cooperates with the tapered end of pin 26. The interior of valve member 29 is connected to casing 22 through openings 30 in its wall and openings 31 in sleeve 28. The upper end of valve member 29 is closed by a head 32 between which and the top of sleeve 28 is arranged a spring 33 which serves to bias the valve member toward open position. In casing 22 is a thermostatic member 34 having one end fixed as indicated at 35 and the other end in engagement with head 32. Any suitable type of thermostatic member may be used the essential thing being that it be so arranged that as the temperature of the oil increases it expands to move valve member 29 toward seat 27 to decrease the oil flow through conduit 24, and as the temperature of the oil decreases it contracts to permit spring 33 to move valve member 29 away from seat 27 to increase the oil flow through conduit 24.

In operation valve 12 is set so that when the turbine is running at the desired speed, pump 4 will maintain a pressure in pipe 11 which pressure, acting on piston 16 will keep the turbine controlling valve means in a position to hold such speed. The oil delivered by pump 4 is discharged through the orifice defined by valve 12 and also through the orifice defined by valve member 29, the escape through the latter orifice being by way of pipe 23, casing 22, openings 31 and 30 and thence past valve seat 27 to tank 7. There is thus a continuous circulation of oil through casing 22 so that thermostatic member 34 is always subjected to oil of the same temperature as that being handled by the pump. It will move, therefore, to set valve member 29 in accordance with such temperature. This operation of valve member 29 is automatic and the arrangement is such that the valve member is moved by the thermostatic member to vary the area of the opening to correct for changes in the viscosity of the oil due to changes in temperature.

From a consideration of the foregoing it will be seen that in the embodiment of my invention illustrated I provide two discharge orifices in parallel one of which has a fixed area and the other an area which is varied in accordance with the temperature of the oil so as to correct for changes in the viscosity of the oil. By this means I am enabled to eliminate error due to viscosity changes.

I have particularly described my invention as being used in connection with a governor employing oil as the actuating fluid as this is the fluid usually met with. It will be understood, however, that it is not necessarily limited to use with this particular fluid. Also it will be understood that the invention is not necessarily limited to use with turbine governors but may be used in connection with other apparatus to which it may be found applicable.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In combination, a machine having a shaft, a pump driven in accordance with the speed of the shaft, a conduit to which the pump delivers fluid, means forming a discharge orifice for the conduit which serves to build up pressure in the conduit, regulating means for the machine operated by such pressure, means forming a second discharge orifice in parallel with the first-named orifice, and means responsive to variations in the temperature of the fluid for varying the area of said second discharge orifice.

2. The combination with an oil governor comprising a pump, a conduit having an orifice through which the pump discharges, and means responsive to the pressure built up in said conduit in advance of the orifice, of means forming a second discharge orifice in parallel with the first-named orifice, and means responsive to the temperature of the oil for regulating the area of said second-named orifice.

3. The combination with a fluid governor comprising a pump, orifice means through which the pump discharges fluid, and a regulating member which is positioned by the pressure of the fluid in advance of said orifice means, of means responsive to the tem-

perature of the fluid for varying the area of such orifice means.

4. The combination with an oil governor comprising a pump, a conduit having an orifice through which the pump discharges, and means responsive to the pressure built up in said conduit in advance of the orifice, of means forming a second discharge orifice in parallel with the first-named orifice, said means comprising a casing connected to the conduit, a valve regulating the flow from said casing, and a thermostatic member in said casing for positioning the valve.

In witness whereof, I have hereunto set my hand this eighth day of January, 1924.

REGINALD G. STANDERWICK.