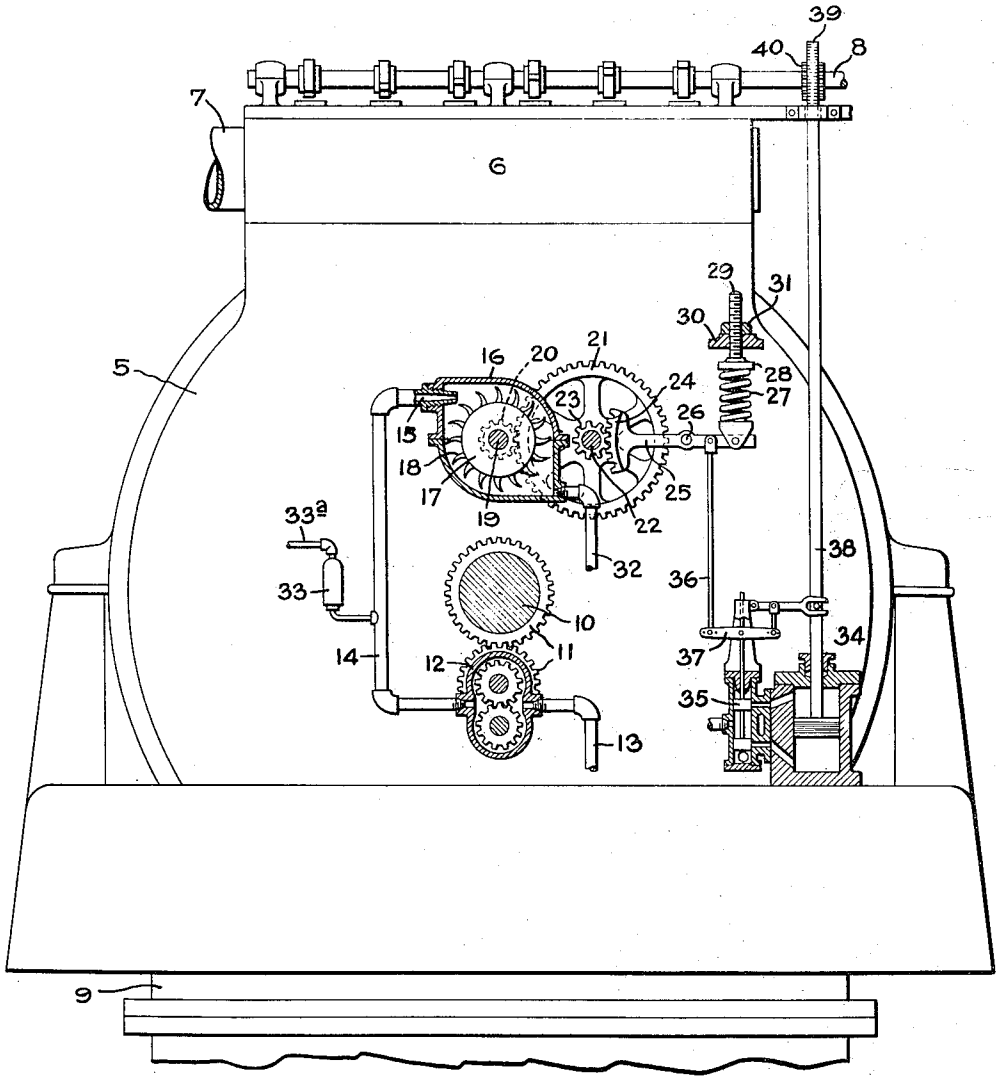
J. H. DORAN.

OIL GOVERNOR.

APPLICATION FILED AUG. 8, 1919.

1,411,992. Patented Apr. 4, 1922.



Inventor:
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UNITED STATES PATENT OFFICE.

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OIL GOVERNOR.

1,411,992. Specification of Letters Patent. Patented Apr. 4, 1922.

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To all whom it may concern:

Be it known that I, JOHN H. DORAN, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Oil Governors, of which the following is a specification.

In connection with the operation of prime movers, it is customary to provide a valve mechanism for controlling the admission of motive fluid to the prime mover and to place the said valve mechanism under the control of a governor which is responsive to the speed of or the load on the prime mover. The governor creates a force which is proportional to the speed of or the load on the prime mover and this force is used either directly or indirectly to actuate the valve mechanism.

The present invention relates to governors of this general type and the object of the invention is to provide a new and improved arrangement for providing a force proportional to the speed of or the load on the prime mover and a new and improved arrangement for transmitting this force to the valve mechanism.

According to my invention I provide a pump means which is actuated in accordance with the speed of the prime mover and which creates on its delivery side a pressure proportional to the speed at which it runs. The pump means may be in the form of a centrifugal pump or a suitable gear pump driven either directly or through gearing from the shaft of the prime mover, and it may pump oil or other suitable fluid. Associated with the pump means is a nozzle through which the fluid from the delivery side of the pump is fed and the stream of fluid discharged from this nozzle the velocity of which will depend upon the pressure as is well understood is made to impinge upon a movable member which is normally held from movement by a suitable restraining means which may be in the form of a spring corresponding to the governor spring of an ordinary speed governor. The stream of fluid from the nozzle striking against the movable member moves it against the action of the restraining means by an amount dependent upon the velocity of the fluid stream which in turn depends upon the pressure of the fluid supplied to the nozzle from the pump means. The movable member will thus be positioned in accordance with the speed of the prime mover, and it is suitably connected either directly or indirectly to the valve mechanism of the prime mover so as to position said valve mechanism in accordance with the movable member's position.

In the drawing, the figure is a diagrammatic view showing my improved governor mechanism applied to a steam turbine, it being understood that this is one form of prime mover in connection with which my governor may be advantageously utilized.

Referring to the drawing, 5 indicates an elastic fluid turbine upon which is mounted a valve chest 6 to which motive fluid is fed by a conduit 7. In valve chest 6 is a suitable valve mechanism controlled by a turning movement of a shaft 8. The valve chest and mechanism indicated is one of a known type and is shown only by way of example, it being understood that any suitable type of valve mechanism may be utilized. 9 indicates the exhaust outlet of the turbine which may connect with a condenser in the usual manner and 10 indicates the shaft of the turbine.

Driven from shaft 10 of the turbine by means of a suitable gearing 11 is a gear pump 12 which may be of any suitable structure. Connected with the suction side of gear pump 12 is a suction conduit 13 which may draw its supply of fluid such as oil from a tank or other source of supply (not shown). The delivery side of gear pump 12 is connected by a discharge conduit 14 to a nozzle 15, the discharge end of which is located in a casing 16. In casing 16 is located a movable member against which the stream of fluid from nozzle 15 is directed. In the present instance this movable member is shown in the form of a turbine wheel 17 provided with buckets 18 and mounted on shaft 19, journaled in casing 16. Nozzle 15 is so arranged in casing 16 as to direct the stream of the fluid discharged from it against buckets 18. On shaft 19 is a pinion 20 which meshes with a gear wheel 21 mounted on a shaft 22. On shaft 22 is a second pinion 23 which meshes with a gear segment 24 on one end of a lever 25. Lever 25 is pivoted at 26 and at the end remote from gear segment 24 is connected to a governor spring 27 which tends to prevent such

end from moving in a downward direction. The tension of governor spring 27 may be adjusted by means of movable abutment 28 having a threaded shank 29 which threads into a fixed abutment 30. 31 is a locknut for locking the governor spring in adjusted position. It will thus be seen that the rotation of turbine wheel 17 is opposed by spring 27. Connected with the lower portion of casing 16 is a drain-pipe 32 which may lead back to a source of supply for pipe 13 or to other suitable points. In pipe 14 is a relief valve 33 which prevents the building up of excessive pressure in pipe 14. The discharge pipe 33ª for relief valve 33 may lead to any desired point such as a supply tank.

Governor lever 25 may be connected either directly or indirectly to the valve mechanism. In the present instance it is shown as being connected thereto through a suitable servo motor 34, the pilot valve 35 of which is connected to lever 25 by a rod 36 and floating lever 37, the connections being such as to provide a follow-up device for the governor mechanism of the usual and well-known type. The stem 38 of servo motor 34 has a rack 39 at its upper end which meshes with a pinion 40 on shaft 8 so that as the piston of the servo motor moves up and down shaft 8 will be turned to actuate the valve mechanism.

In operation shaft 10 will drive the gear pump 12 at a speed proportional to its speed and this will create a fluid pressure on the delivery side of gear pump 12 which is proportional to the speed of or the load on the prime mover, 5. Nozzle 15 is so constructed and arranged that the velocity of the stream discharged from it will bear a definite relation to the pressure in pipe 14 and hence to the speed of the prime mover, 5. The stream of fluid discharged from nozzle 15 impinges against blades 18 turning the turbine wheel 17 in a clockwise direction. This will turn gear wheel 21 and pinion 23 in an anti-clockwise direction thus tending to raise the left hand end of lever 25 and lower the right hand end. Lowering the right hand end of lever 25 puts spring 27 under tension and a point is reached where the tension of spring 27 just balances the force of the fluid impinging on turbine wheel 17. The turbine wheel will then come to rest and the valve mechanism of the prime mover will have assumed a certain definite setting. If now the speed of the prime mover increases, then the speed at which the gear pump 12 is driven increases which results in increase of the pressure on the delivery side of the gear pump and hence the pressure of the supply to nozzle 15. The effect will be that the stream of fluid discharged from nozzle 15 will increase in velocity thus moving turbine wheel 17 further against the action of spring 27 and lowering the right hand end of lever 25. This actuates pilot valve 35 which results in the servo motor actuating the valve mechanism to decrease the amount of motive fluid admitted to the prime mover. On the other hand, and in like manner, a decrease in the speed of the prime mover causes a diminution in the velocity of the fluid discharged from nozzle 15 with the result that the right hand end of lever 25 is raised slightly and the valve mechanism is actuated to admit more elastic fluid to the prime mover to bring the speed back to normal.

My improved governor has the advantages that it is comparatively simple in structure and has few moving parts. It is furthermore not of a delicate nature and may be made comparatively free from friction; also the power available for operating it is considerable. In operation there will be a continuous, slight oscillating movement of the movable member which will act to prevent the parts from sticking.

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 is only illustrative and that the invention may be caried out by other means.

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

1. The combination with a prime mover having a valve mechanism, of a governing means comprising a nozzle, a pump driven by the prime mover to provide a fluid pressure proportional to the speed of the prime mover, a conduit connecting the discharge side of the pump to said nozzle, a rotatable member against which the fluid discharged from said nozzle impinges, a pivoted lever, gear means connecting said lever to said rotatable member, a spring means which opposes movement of said lever, and means connecting said lever to said valve mechanism.

2. The combination with a prime mover having a valve mechanism, of a governing means comprising a nozzle, a pump driven by the prime mover to provide a fluid pressure proportional to the speed of the prime mover, a conduit connecting the discharge side of the pump to said nozzle, a turbine wheel having blades against which the fluid discharge from said nozzle impinges, a pivoted lever, gear means connecting said lever to said turbine wheel, a governor spring connected to said lever and arranged to oppose movements of said turbine wheel, and means connecting the lever to said valve mechanism.

In witness whereof, I have set my hand this 7th day of August, 1919.

JOHN H. DORAN.