R. M. HVID.

HYDROCARBON ENGINE GOVERNOR.

APPLICATION FILED DEC. 16, 1913.

1,165,674. Patented Dec. 28, 1915.

Fig. 2.

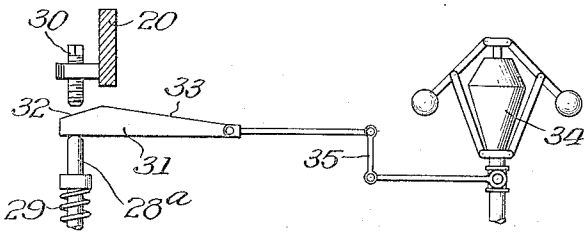


Fig. 1

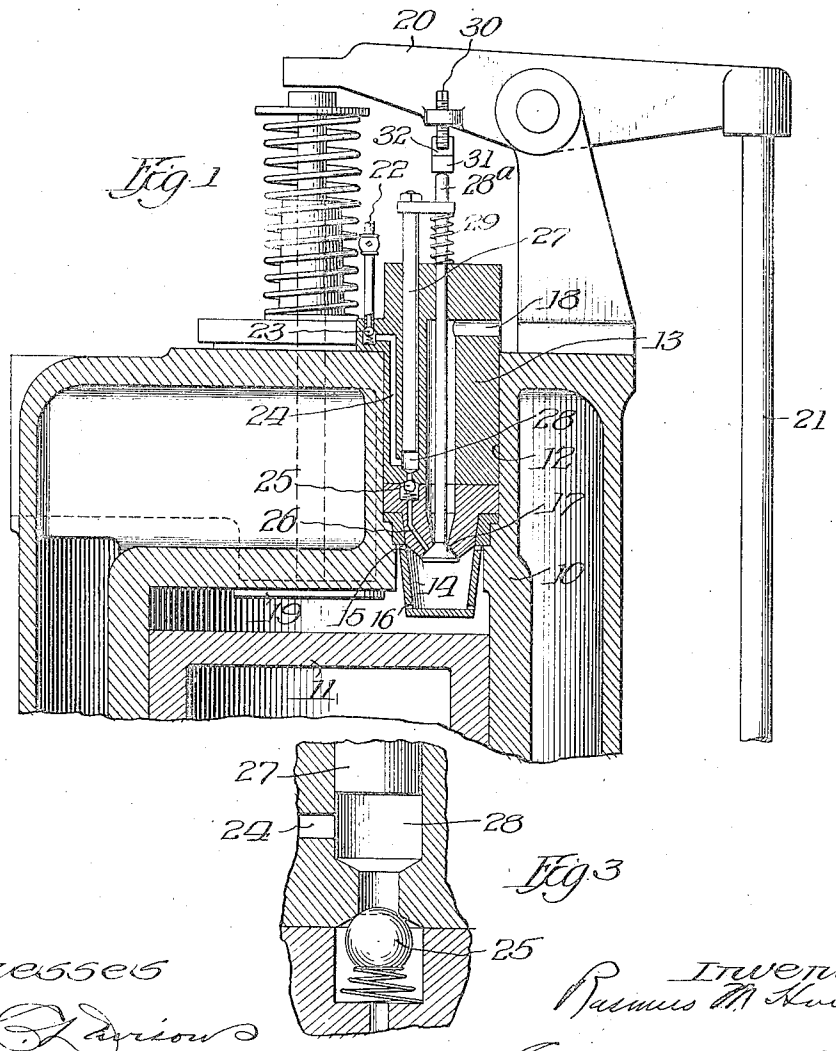


Fig. 3

Witnesses

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By

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UNITED STATES PATENT OFFICE.

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HYDROCARBON-ENGINE GOVERNOR.

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To all whom it may concern:

Be it known that I, RASMUS M. HVID, a citizen of the United States, and residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hydrocarbon-Engine Governors, of which the following is a specification.

My invention relates to hydro-carbon engines and has particular reference to novel means for controlling the supply of hydrocarbon fluid.

The apparatus of this invention is applicable to different types of engines but is particularly adapted for use in connection with engines such as claimed in my co-pending applications Serial Numbers 675,028 and 715,519. In the operation of engines of this type efficient and automatic governing is essential to economical and uniform service. The governing problem becomes more serious when the loads vary within a considerable limit. The governing action to be practical should be in the quantity of fuel supplied and as the volume of fuel supplied to a cylinder for each impulse is exceedingly small, attempts to vary such volume have been only partially successful in this type of engine.

My invention contemplates the utilization of any well-known type of primary governing device such as the common fly-balls together with an impulse fluid injector said injector having a differential stroke, the length of the stroke being controlled by the position of the fly-balls. Inasmuch as in my type of engine the hydro-carbon fuel is taken into the cylinders on the intake stroke of the piston this may be accomplished with very simple mechanism.

Specifically my invention may be said to consist in a cylinder having a valve-controlled fuel inlet, means for maintaining a column of fluid fuel in proximity to said inlet, a variable stroke plunger acting on said column of fuel, means for varying the stroke of said plunger, and means for actuating said plunger and opening said valve on the intake stroke of the engine piston.

The invention will be more readily understood by reference to the accompanying drawings wherein—

Figure 1 is a transverse vertical section through an engine constructed in accordance with my invention; Fig. 2 is a detail elevation showing the wedge controlled by the fly-ball governor which regulates the amount of fuel fed into the cylinder the parts being shown in idle position, and Fig. 3 is an enlarged sectional detail showing the ball valve for maintaining the column of fluid fuel.

Referring more particularly to the drawings it will be seen I provide a cylinder 10 within which is mounted a piston 11. Within an elongated aperture 12 in the top of the cylinder is seated a member 13 containing the governing mechanism later to be described and beneath which is mounted a cup 14 provided with top and bottom openings 15, 16 respectively, these openings providing the sole communication with the compression space above the piston. I will not here enter into an elaborate description of the operation of the engine, reference being had for such description to my co-pending applications heretofore referred to.

Concentrically mounted for reciprocation within the member 13 is a valve 17 controlling the entrance of hydro-carbon fluid and an auxiliary supply of air, the auxiliary air inlet port being indicated at 18. The main air inlet port is controlled by the puppet-valve 19 which is opened and closed at the proper intervals through the medium of the lever 20 controlled by the push rod 21 as is well understood. The fluid fuel is admitted through a pipe 22, a ball check valve 23 controlling the exit of the fluid from the tube into a conduit 24 provided in the member 13. A second ball check valve 25 is provided which controls the passage of the fluid into the conduit 26 directly controlled by the valve 17. Also mounted for reciprocation within a vertical space in the member 13 is a plunger 27 terminating at a point above the lower end of the recess to provide an oil reservoir 28 therebeneath. The plunger 27 is in the present instance directly connected to the stem 28^a of the valve member 17,

both the plunger and the valve being held in raised position by means of a coiled spring 29. Reciprocation of the valve and plunger at the required intervals is caused by the lever 20 through contact with a set screw 30 mounted thereon with the top of the valve stem 28^a, there being interposed between the set screw and the valve stem a wedge member 31 as best shown in Fig. 2. This wedge member is provided on its upper surface with a somewhat abrupt inclination 32 and a more gentle inclination 33. The action of the wedge member is controlled by a fly-ball governor 34 connection being had by means of suitable links 35.

The parts are shown in normal idle position. In such position the fly-balls are in lowered condition and the wedge member is retracted to its full extent. As the engine is started into operation the downward movement of the lever 20, which movement takes place on the intake stroke of the piston will cause a downward movement of the valve member 17 and plunger 27 which will cause an ejection of a certain quantity of fuel into the cup 14. As the speed increases the higher portion of the wedge member will be projected between the set screw 30 and the valve stem 28 thus causing a still larger amount of fuel to be injected into the cup. However, from this point the wedge member will travel to the left as viewed in Fig. 2 due to the motion set up by the fly-balls and the movement of the plunger 27 will become shorter whereby less fuel will be fed into the engine. The double angle of inclination is useful particularly at the point of starting the engine into operation. At this time, of course, the fly balls of the governor will be in their lowermost position and, unless otherwise provided for, the cam 31 would be in such position that an amount of fuel would be fed to the engine equal to the amount fed when the engine was most heavily loaded, that is, a large amount of fuel would be fed when starting, which would not facilitate the starting operation, in fact, would hinder it. I obviate this by providing an abrupt reverse incline 32 on the slide 31, the abrupt incline being in action at the time of starting. As the engine is started the acceleration is slow, due to the fact that the application is to a heavy oil engine of the type which employs no ignition other than the heat of compression. As the speed increases, still larger quantities of fuel are fed until the speed has reached the normal and thereafter the amount of fuel is diminished. It will be seen that by the use of the two check valves 23, 25 a column of fluid fuel is maintained at all times ready to be acted upon by the plunger 27, the column being completed after a supply stroke by the suction created on the return of the plunger 27. By the use of the apparatus shown a very close regulation is secured all without the use of needle valves or any complicated mechanism. It will be seen that no small apertures are required which apertures might become clogged and that the apparatus is exceedingly simple and economical in first cost.

As heretofore stated, this invention is intended particularly for adaptation to engines of the type disclosed in my copending applications; that is, engines in which the sole means of ignition is the heat developed in compression. To carry out this idea I have found it essential to provide a cup or small receptacle communicating with the compression space by one or more relatively minute apertures, the fuel being directed into this cup. Initial combustion of the fuel occurs in this cup, but this combustion is limited, due to the small volume of air admitted with the fuel. However, the heat within this small space is immediately raised to a very high degree, which heat causes expansion of the gases and an ejection of highly heated unconsumed fuel into the compression space where complete combustion occurs.

It is obvious that the construction shown is capable of many modifications and such modifications as are within the scope of my claims I consider within the spirit of my invention.

I claim:

1. In a fluid fuel engine, the combination of a cylinder, a cup mounted in the cylinder and provided with a plurality of relatively minute apertures communicating with the compression space of the cylinder, a cam-controlled valve for admitting the fluid fuel and a small volume of air, and a pump operated simultaneously with said valve and adapted to inject the fluid fuel into said cup when said valve is open, substantially as described.

2. In a fluid fuel engine, the combination of a cylinder, a cup mounted in the cylinder within which initial combustion takes place and provided with a plurality of relatively minute apertures communicating with the compression space of the cylinder, a cam-controlled valve for admitting the fluid fuel and a small volume of air, and a pump operated simultaneously with said valve and adapted to inject the fluid fuel into said cup when said valve is open, substantially as described.

3. In a governing device for oil burning engines the combination of a cylinder and a piston, said cylinder being provided with a valved fuel inlet port, means for maintaining a quantity of fluid fuel at a point in proximity to said port, a plunger acting on said fluid fuel whereby to inject a frac-

tional portion thereof into said cylinder on the intake stroke of the piston, means for varying the stroke of said plunger, said means including a wedge member having an intermediate high point with angular approaches thereto, and a governor for moving said wedge member, the parts being arranged whereby the high point on said wedge shall control the action of said plunger at a point intermediate between idle and high speed conditions of said engine, substantially as described.

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Witnesses:
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