

May 17, 1927.

E. FEROLDI

1,629,210

CARBURETOR

Filed July 1, 1922

2 Sheets-Sheet 1

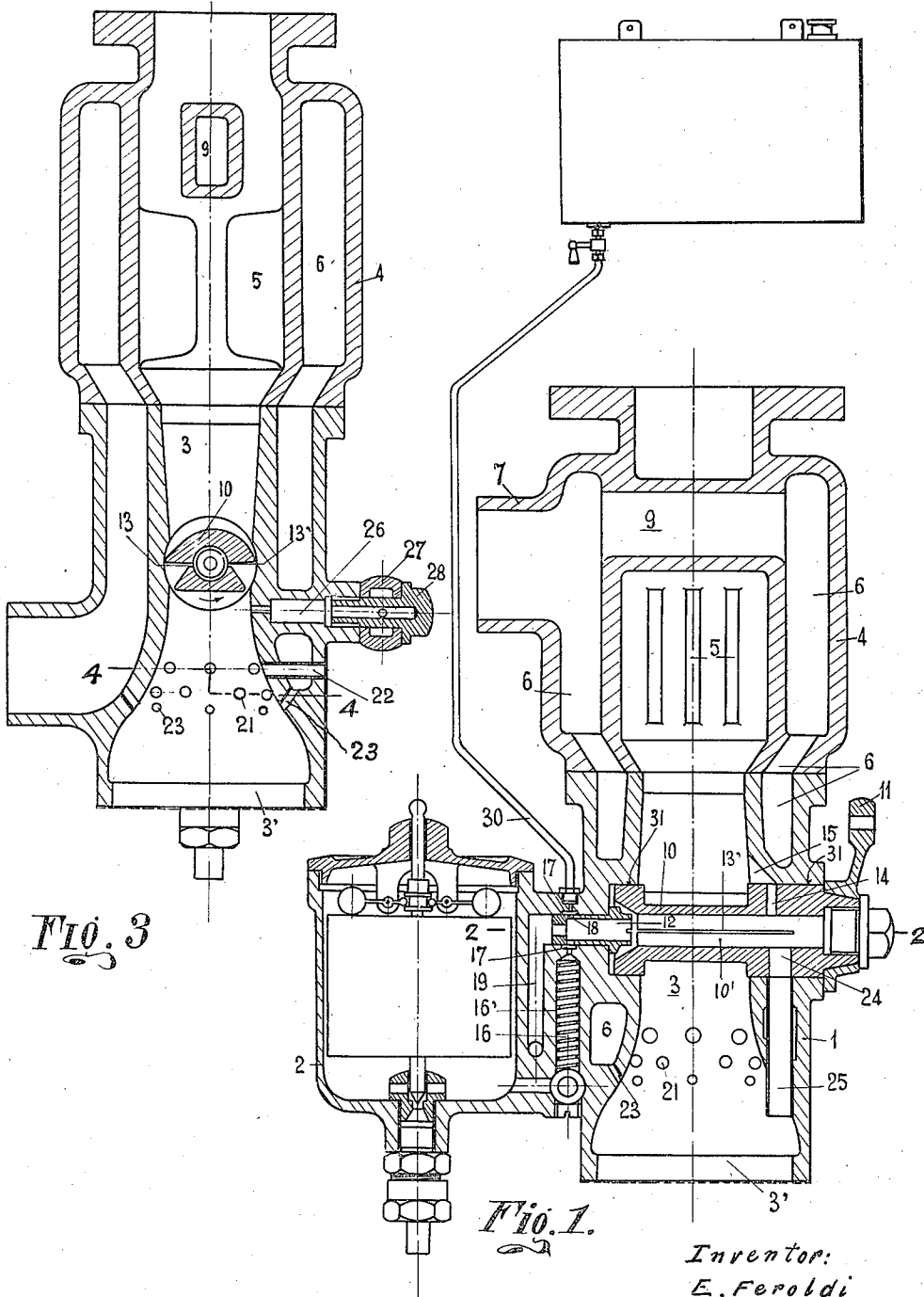


Fig. 3

Fig. 1.

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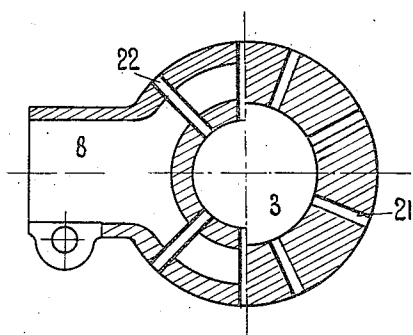
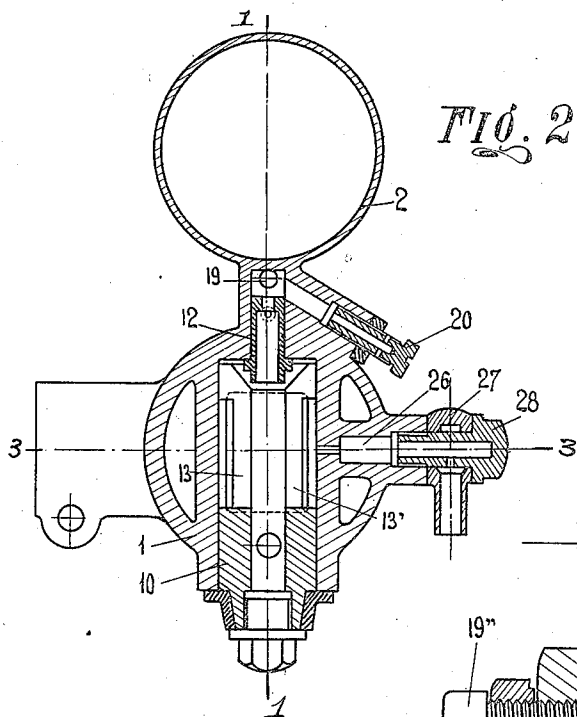
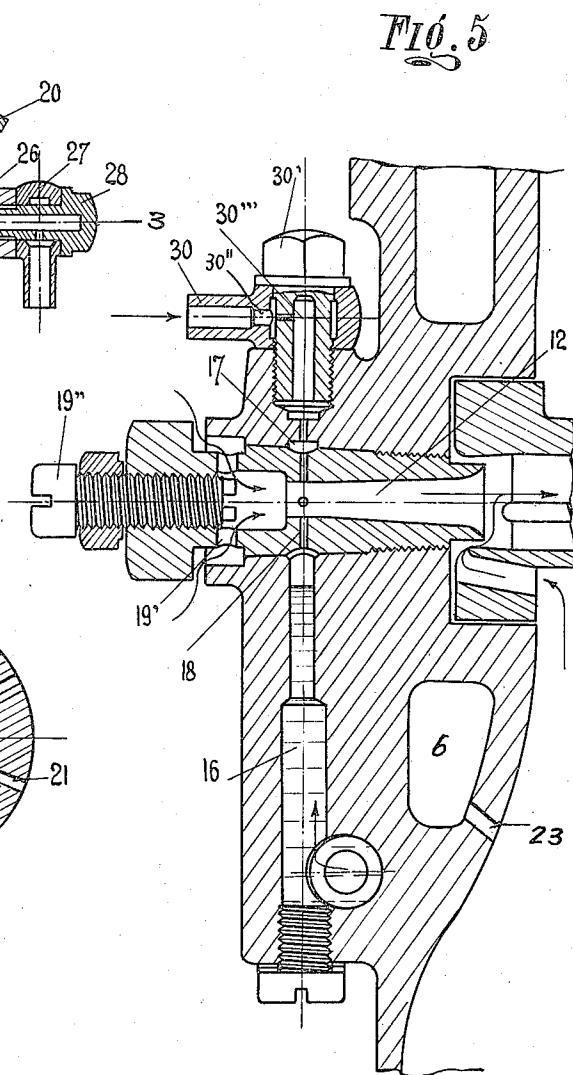


FIG. 4



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# UNITED STATES PATENT OFFICE.

ENRICO FEROLDI, OF TURIN, ITALY.

## CARBURETOR.

Application filed July 1, 1922, Serial No. 572,144, and in France July 8, 1921.

The present invention relates to carburetors for fuels heavier than petrol, such as paraffin, naphtha, benzol and the like, which are provided with means for an auxiliary supply of light fuel.

The present invention has for its object a carburetor of this kind in which means are provided for causing the supply of the light and heavy fuels, as well as that of water if desired, to depend upon the heating of the carburetor, this heating being by itself known in the carburetors for heavy fuels. The fuel supply is thus automatically controlled by the heating imparted to the carburetors and hence is controlled by the running of the engine.

In the accompanying drawings is shown by way of example a construction of a carburetor according to this invention, with a vertical carbureting chamber.

In said drawings:—Figure 1 is a vertical section on line 1—1 of Figure 2; Figure 2 is a section in plan on line 2—2 of Figure 1; Figure 3 is a vertical section on line 3—3 of Figure 2; Figure 4 is a sectional plan of the carburetors, taken on broken section line 4—4 of Fig. 1. Figure 5 is a fragmentary sectional view to an enlarged scale showing a modified fuel nozzle and the parts adjacent thereto.

In the construction illustrated, the carburetor comprises a body 1 provided with a float chamber 2 and including a carbureting chamber 3; in alignment with this chamber is mounted a sleeve 4 adapted for connection with the engine suction duct (not shown on the drawing), and provided with inwardly projecting ribs 5. This sleeve 4 could also be integral with the carburetor body 1.

In the walls of the body 1 and of the sleeve 4 are provided spaces 6 communicating with each other, and in which circulate the exhaust gases of the engine or other warm fluid which is admitted and discharged through branches 7 and 8.

The several spaces 6 are connected by a conduit 9, through which conduit the fluid is thus circulated.

In the example illustrated the working of the carburetor is regulated by means of a cock 10 mounted transversely in the carbureting chamber 4 and seated in two opposite recesses 31 having cylindrical surfaces, said cock being operated from the outside by means of a lever 11.

The cock plug has a hollow 10' into which

the fuel is projected in the axial direction by a sprayer 12, and two opposite slots 13 and 13', the former one for the passage of the air into the hollow of the plug, and the second for the escape of the mixture which is formed in the said hollow, when the cock is open.

For supplying the engine when running at slow speed, the cock plug 10 is further provided with a radial hole 14 which, when the cock is in the closed position as shown on the drawing, registers with a recess 15 (Figure 1) so as to establish communication between the chamber of the cock and the carbureting chamber, at the side connected to the suction duct of the engine.

In the body 1 of the carburetor, preferably close to one of the heated chambers 6, is provided a well 16 which communicates at its lower end with the float chamber 2, and at the top terminates in the interior of the sprayer 12 through throttled ports, for instance by means of a groove 17 outside of the sprayer, and radial holes 18. This well has a relatively small cross-section and a very large surface, and this may be obtained for instance by providing a screw thread on the inner wall of the well itself or by arranging in the same a helically wound wire 16' secured to the walls as shown.

In the body 1 of the carburetor is further provided a conduit 19 communicating with the atmosphere, for instance through a regulating plug 20 (Figure 2) and opening at the rear end of the sprayer 12.

During the usual running of the engine the heavy fuel contained in the receptacle 2 is heated in the well 16 to such an extent as to ensure an easy flow of said fuel. The fuel therefore arrives at the sprayer 12 in such conditions that it is completely atomized by the axial jet of air which passes into it after strongly heated through the conduit 19.

The suction of fuel depends on the depression produced by the engine in the sprayer 12, so that it changes in proportion to the different speeds of running of the engine.

Communication between the well 16 and the sprayer 12 is established through throttled openings, and they are so regulated as to allow the passage of the quantity of fuel required for the normal speed, and therefore at a speed which corresponds to the desired degree of heating.

It follows that at running speeds lower than the normal, the supply of fuel will be automatically reduced. In fact, as the supply of fuel is reduced, its heating becomes stronger in the well 16 and there is generation of vapours, and the latter produce a back pressure, the effect being to reduce the admission of fuel to the sprayer 12. At the lowest speed (when running dead slow) the supply of fuel is limited to the said vapours which make it possible to form a good mixture.

In order to heat also the main air supply reaching the carbureting chamber, the heated zone of the intake 3' is provided with holes 21, and in the chamber 6 are arranged tubes 22 establishing communication between the chamber 3 and the atmosphere so that the air drawn in through said holes and tubes, is submitted to a preliminary heating.

Moreover there are provided small holes 23 establishing communication between the chambers 6 and the carbureting chamber 3, and through the said holes into the said chamber passes a small portion of the hot gases, the effect of which is to heat considerably the air intended to form the final mixture.

If a hot fluid other than the exhaust gases of the engine circulates in the chamber 6, the holes 23 will be dispensed with, or they may establish communication between the carbureting chamber and a separate conduit into which are admitted the exhaust gases of the engine.

In order to heat also the air which is added to the mixture during the running at slow speed, opposite the conduit 14 is provided in the cock 10 another conduit 24 which comes opposite a small tube 25 opening into the intake 3' and mounted in one of the chambers 6 where it is surrounded by the hot circulating gases.

It is known that in carburetors of this type a supply of water is frequently used. For this supply when such is provided, the body 1 is provided with a conduit 26 which may be connected by means of a union 27 and a hollow screwthreaded plug 28, to a receptacle containing water.

The conduit 26 is constituted by walls provided in one of the chambers 6 in which circulates a hot fluid, so as to be strongly heated, and the said conduit communicates with the chamber 3 through a small hole 29 opening below the cock 10.

Also in this case, as in the case of the fuel supply, the cross-sectional area of passages for the water is regulated in such a manner that at the normal speed of running, the water passes through the conduit 26 with a speed corresponding to the desired heating.

Consequently when the suction decreases at the lowest speeds, the water remains for

a longer time in the conduit 26 and being heated more strongly, it generates steam which interrupts or stops altogether the supply of water. In this way, admission of water into the carbureting chamber when its presence is not desired, is automatically avoided.

To ensure the formation of a combustible mixture when starting the engine, the carburetor as is well known, must be provided with an auxiliary feed for light fuel, generally petrol.

According to this invention, this auxiliary feed (Figure 1) comprises a tube 30 coming from a tank (not shown) which is at a higher level than the sprayer 12 and opening into the groove 17 which communicates with the sprayer 12.

When the engine is running at low speed and the temperature of the carburetor is comparatively low, in sprayer 12 flows light fuel which is atomized by said sprayer. During this period the flow of heavy fuel is substantially prevented, because owing to thickness or density and viscosity of the same, it cannot flow easily through its duct and the suction is not sufficient to draw it. When the carburetor body is heated, however, the heavy fuel flows easily and reaches groove 17 and passages 18, while the light fuel, as a result of the heating imparted to it while it is flowing along passage 30, forms bubbles of vapor which restrict the arrival of further amounts of light fuel in the groove 17.

Such a working which contributes to ensuring automatically the exclusion of the light fuel as soon as the engine runs at normal speed, may be assisted by providing for the light fuel a small well in communication with the tube 30 and the groove 17, the walls of the said well being strongly heated. In the case of Figure 5 the atomization of the fuel is improved by the fact that the air enters the nozzle through holes 19' provided in the nozzle 12 at the rear of the passage 18 for the supply of the fuel therein; the passage of the air through said hole 19' may be adjusted at will by the screw 19''.

With the cock 10 in the position shown in Figure 3, the engine works at the minimum speed, and its suction acts in the interior of the cock 10 through the hole 14 by drawing into it air and fuel through the sprayer 12 and additional air through the tube 25.

When the cock is opened by turning it in the direction of the arrow (Figure 3) the suction acts on the slot 13' and air passes from the mouth 3' through the slot 13 into the hollow in the cock plug 10, which air is heated by contact with the hot walls as well as by the direct action of the hot gases escaping from the holes 23. If there is a

water supply, the said water escapes through the hole 29 in proportion to the suction.

5 Attention is called to my applications Serial Nos. 341,350 and 477,469 in respect of the features shown on the annexed drawings but not claimed per se as forming the subject matter of said other patents and patent applications.

10 What I claim as my invention and desire to secure by United States Letters Patent is:—

15 A carburetor for internal combustion engines adapted to operate on heavy fuel, comprising a carbureting chamber, separate

means for containing a heavy fuel and a light fuel, separate ducts connecting said means with said chamber, said ducts having restricted portions so as to prevent the passage of the heavy fuel when the carburetor 20 is cold and to prevent the passage of the light fuel when the carburetor is heated by restricting the flow of vapor, and means for heating said carburetor by a fluid the temperature of which depends upon the operation of the engine to control the flow of the 25 two fuels to the carbureting chamber.

In testimony whereof, I have signed my name to this specification.

ENRICO FEROLDI.