

Jan. 8, 1963

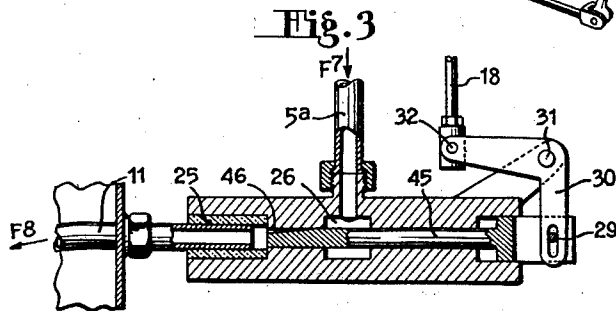
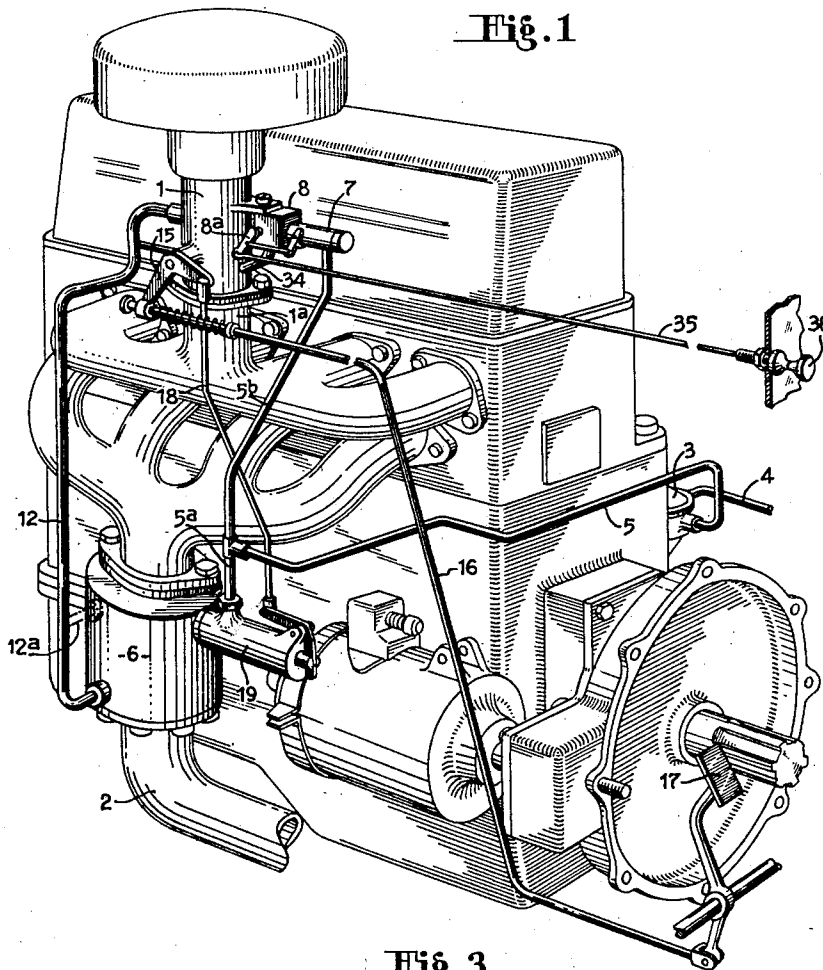
M. CHAMP

3,072,113

FUEL FEED DEVICE FOR EXPLOSION ENGINES

Filed Nov. 28, 1960

2 Sheets-Sheet 1



INVENTOR
MARCEL CHAMP
LeBlanc & Shar
ATTORNEYS

Jan. 8, 1963

M. CHAMP

3,072,113

FUEL FEED DEVICE FOR EXPLOSION ENGINES

Filed Nov. 28, 1960

2 Sheets-Sheet 2

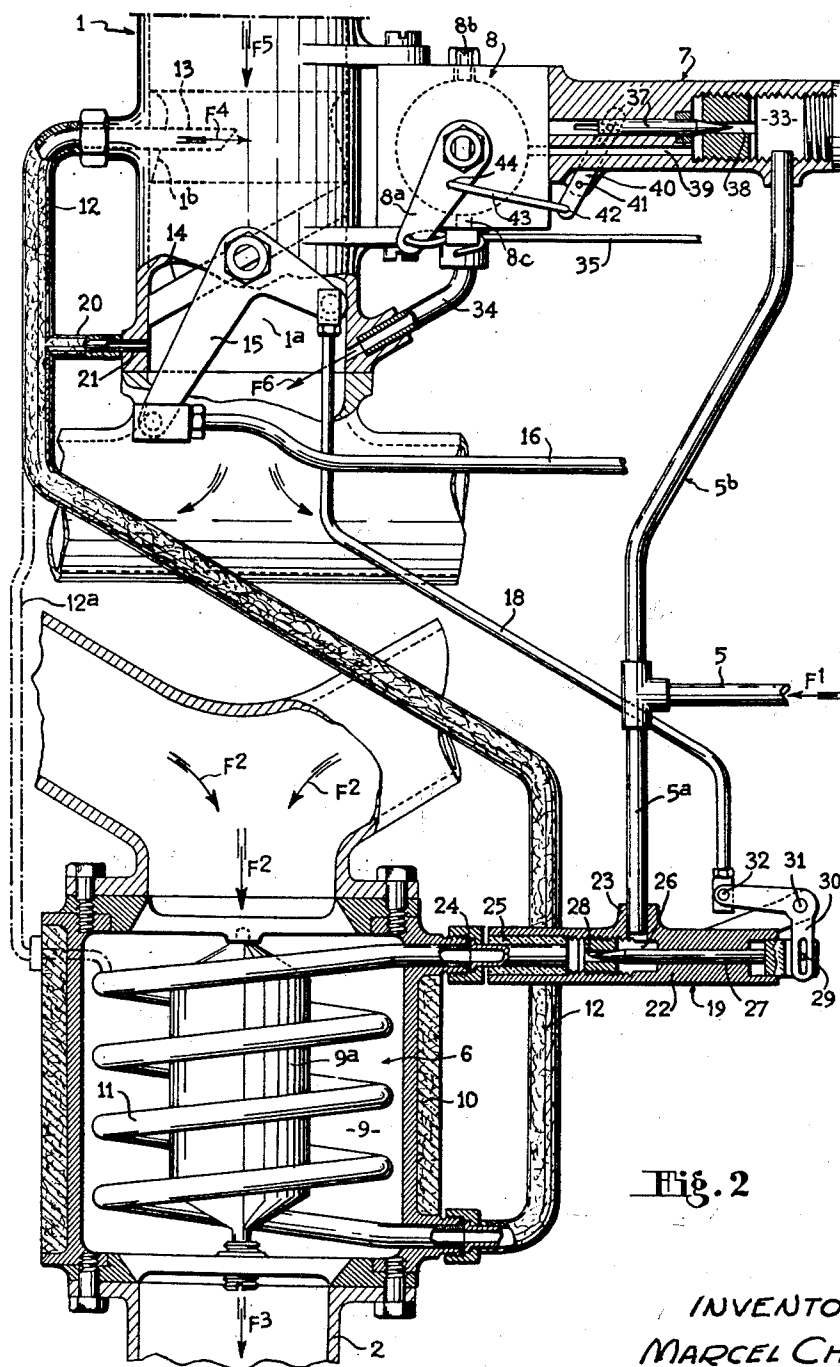


Fig. 2

INVENTOR
MARCEL CHAMP
LeBlanc & Shaw
ATTORNEYS

1

3,072,113
FUEL FEED DEVICE FOR EXPLOSION ENGINES
Marcel Champ, Route de Tinchebray,
Vire, Calvados, France
Filed Nov. 28, 1960, Ser. No. 72,111
Claims priority, application France Jan. 20, 1960
1 Claim. (Cl. 123-133)

In the U.S.A. patent S.N. 702,130 of December 11, 1957, now Patent No. 2,895,462, granted July 21, 1959, there is disclosed an improved feed device for an explosion engine allowing a considerable fuel economy, said device comprising in particular a main feed device of the fuel prevaporization type by the heat of the exhaust gas, for operation at normal running speeds of the engine.

An auxiliary device is used in this case for the starting and the idling speed of the engine and both feed devices are connected in parallel with a single feed manifold. An injection device enables the fuel to be injected into the vaporization chamber of the main feed device by means of a pump of the cylinder and piston type.

The object of the present application is to provide modifications and improvements for this device, said modifications and improvements aiming more particularly at enabling the main feed device to be used when the engine is being run at idling speed, the auxiliary device being only employed for the starting of the engine. In the known device, the auxiliary feed device is provided with a carburetor of conventional design including a conventional float chamber supplying in the usual fashion the normal jet and the idling jet and which also supplies a well feeding in turn the vaporization chamber of the main device.

In the device designed in accordance with the present invention, the auxiliary feed device merely comprises an auxiliary self-starting carburetor of small capacity and of a generally known type currently used for the starting of engines. The vaporization chamber of the main feed device is comprised by a coil tube located inside a heating chamber, said coil tube being fed by a pulsating-diaphragm pump of conventional design, said coil tube ending by a tubular member extending into the engine air suction pipe, upstream of the throttle disc.

Further features of the invention will become apparent from the ensuing description when read in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of an illustrative embodiment of an explosion engine provided with the improved feed device, in accordance with the invention;

FIG. 2 is a diagrammatic showing of this device; and
FIG. 3 is a sectional view of a detail showing an alternative embodiment of one part of the invention.

The illustrative embodiment shown in FIG. 1, the invention is applied to an explosion engine of the four-cylinder type, including a suction tube 1, an inlet conduit 1a and a gas-exhaust manifold 2, said engine being fed by a pulsating-diaphragm pump 3 of a known construction and communicating through a pipe 4 with the fuel tank (not shown). This pump discharges fuel under pressure into a line 5 which is subdivided in two branches 5a and 5b adapted to feed the main feed device 6 and the auxiliary starting device 7, respectively. The latter device is mounted on the auxiliary self-starting carburetor 8 which may be of any well-known device including an outer lever 8a for controlling said auxiliary carburetor, and having an air inlet 8b and an air-fuel mixture outlet 8c.

The main feed device 6 comprises a chamber 9 (FIG. 2) interposed on the hot-gas exhaust manifold 2, said chamber being preferably heat-insulated by means of an insulating wall 10. Within this chamber is located a coil tube 11 surrounding a hollow body member 9a secured

2

along the axis of hot-gas stream and adapted to promote the heat radiation on the tube coil. This tube coil 11 is connected through a preferably-insulated conduit 12 with a tubular member 13 housed within the air-induction duct 1, and extending substantially into the axis of the neck portion of the venturi 2b, 1b thereof upstream of the throttle disc 14. The latter is connected through a double lever 15, on the one hand, with a linkage 16 controllable by the accelerator pedal 17 (FIG. 1) and, on the other hand, by a linkage 18 with a control means 19 for the liquid-fuel input into the coil tube 11.

The conduit 12 includes a by-pass 20 provided with a tube 21 extending into the inlet circuit 1 downstream of the throttle disc, this tube or nozzle 21 acting thus as an idling jet which, as will be seen, is further fed from the main feed device 6.

The control means 19 of liquid-fuel admission into the tube coil comprises a hollow body 22 connected, on the one hand, at 23 on the fuel inter conduit 5a and, on the other hand, at 24 on the end of the tube coil. An insulating sleeve 25 is interposed between the tube coil and the hollow body 22 to prevent heat convection therebetween.

The fuel arrives into an inner recess 26 communicating with the inner duct of the tube coil 11, and said communication is regulated by a needle valve 27 controlling the cross-sectional opening of a calibrated port 28, said needle valve being slidable in the block 22 and being connected at 29, by the end thereof exterior of this block, with a bell-crank lever 30 pivotable at 31 and pivotally connected at 32 with the linkage 18.

The branch line 5b of the conduit 5 extends into a chamber 33 of the auxiliary device 7, a conduit 30 establishing a communication between this chamber and the auxiliary self-starting carburetor 8. This self-starting carburetor 8 may be of any known design and is adapted to provide communication between the chamber 33 with the inner space of the inlet conduit 1a downstream of the throttle 14, said communication being effected through a pipe 34 where the auxiliary self-starting carburetor is controlled through its arm 8a, which arm is connected in a known manner through a rod 35 to any type of manual control member, such as a pull-button 36 (FIG. 1).

To this end, provision is made of a needle valve or any other plugging member 37 to control the opening or the closing of a calibrated orifice 38 which, through a conduit 39, establishes communication between the chamber 33 and the self-starting carburetor, which carburetor upon being actuated, brings into direct communication said conduit 39 with the conduit 34.

It will be obviously required that the opening of the port 38 and the operation of the self-starting carburetor take place simultaneously and, to this end, the needle valve is pivotally connected with a lever 40 pivotable at 41 and whose end 42 is articulated on a rod 43 which is in turn pivotally mounted on the arm 8a of the carburetor 8.

The improved device disclosed in the present addition is operated as follows:

Under normal running conditions, the liquid fuel arriving (FIG. 2) in the direction shown by the arrow F1 (FIG. 2) into the conduit 5, is fed through the branch 5a to the chamber 26 and, should the needle valve 27 be operated by means of the accelerator pedal, fuel penetrates into the tube coil 11, which coil is heated by coming into the contact with hot gasses which flow through the exhaust duct in the direction of arrows F2 and F3. This tube coil is further heated by the radiating heat from the wall of chamber 9 and from the hollow body 9a. This fuel which is by then vaporized, is induced by the tube 1 (arrow F4) and flows into the duct 1a where it is mixed with air arriving in the direction F5, the inlet

being regulated by the throttle 14, as known per se, by means of the rod 16 which is operated by the accelerator pedal simultaneously with the rod 18, whereby the supply into the coil tube 11 and the gaseous fuel input to the tube 13 are always effected simultaneously.

With the engine idling and the throttle closed, the sole supply is effected through the idling jet 21. It is shown by experience that the use of gaseous fuel for feeding the engine during slow-speed running offers the advantage of eliminating the evolution of fumes and of unpleasant and noxious smells which are inherent to conventional internal combustion engines, when passing from normal to idling speed.

It will be clear that the main feed device cannot be used for the self-starting since the chamber 9 is at ambient temperature. The starting is effected by means of the auxiliary device 7 which is fed under the pressure supplied by the diaphragm pump 3, which pressure is sufficient for the fuel to be injected into the conduit 39 when the auxiliary self-starting carburetor 8 is operated, whereupon the rotation of the arm 8a and hence of the lever 40 causes the needle valve 37 to open. The liquid fuel is injected through the auxiliary carburetor by the tube 34 into the injection conduit, as shown by the arrow F6.

After the engine has been running for some time and the chamber 9 has been brought to a sufficient temperature for the fuel vaporization to take place normally in the tube coil 11, the arm 8a may be returned to its normal operative position and the engine is running under normal conditions being fed from the device 6.

In the control device 19, the flow-rate control member which is embodied in FIG. 2 by the needle valve 27, can be of a different type, such as for example a spool with a variable section port. In FIG. 3 is shown a specific alternative embodiment wherein the control member is comprised by a spool 45 consisting of a rod having a groove 46 formed therein, whose cross-section is increasing such that a rightwardly shift of the rod 45

gradually increases the cross-sectional passage of the liquid fuel (arrow F7) towards the tube coil 11 (arrow F8).

It was found that with certain type of engines and for certain operating conditions thereof, a gas build-up may take place in the tube coil 11 resulting in a phenomenon similar to the well-known ram effect. Although this occurrence is not considered as a major drawback, it can be prevented according to the invention, in an alternative embodiment of which the upper portion of the tube coil is connected with the air-induction conduit through the tube 12a, shown in dash-dot in FIGS. 1 and 2.

This tube 12a, as well as conduits 12 and 20, is preferably heat insulated.

It is to be understood that the invention is not restricted to the embodiments thereof which have been shown and described merely by way of examples, and various modifications can be made therein without falling outside the scope of the appended claim.

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

A running carburetor for running an explosion engine at normal speeds and idling speed, said running carburetor comprising: a vaporization chamber adapted to be so mounted on the engine as to be traversed by the flow of the exhaust gases of said engine, a coil tube in said chamber, a fixed heat-radiating body surrounded by the coils of said coil tube in said vaporization chamber, and tube connecting means for connecting said coil tube to a fuel feed conduit and to a vapor feed conduit.

References Cited in the file of this patent

UNITED STATES PATENTS

1,060,042	Wales	Apr. 29, 1913
1,377,529	Trotter	May 10, 1921
1,728,323	Bartley	Sept. 17, 1929
2,895,462	Champ	July 21, 1959