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J. A. HARLAN

ENGINE

Filed March 2, 1923

2 Sheets-Sheet 1

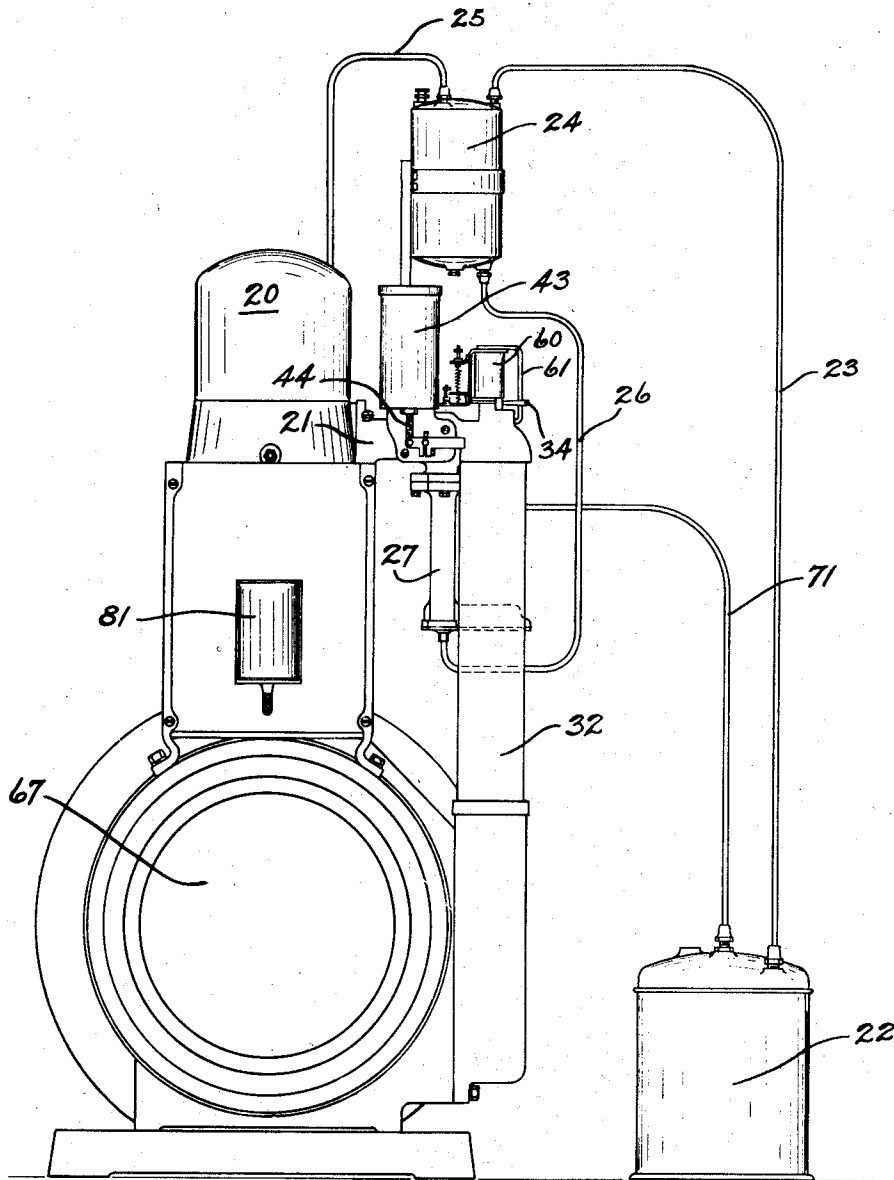


Fig. 1

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By

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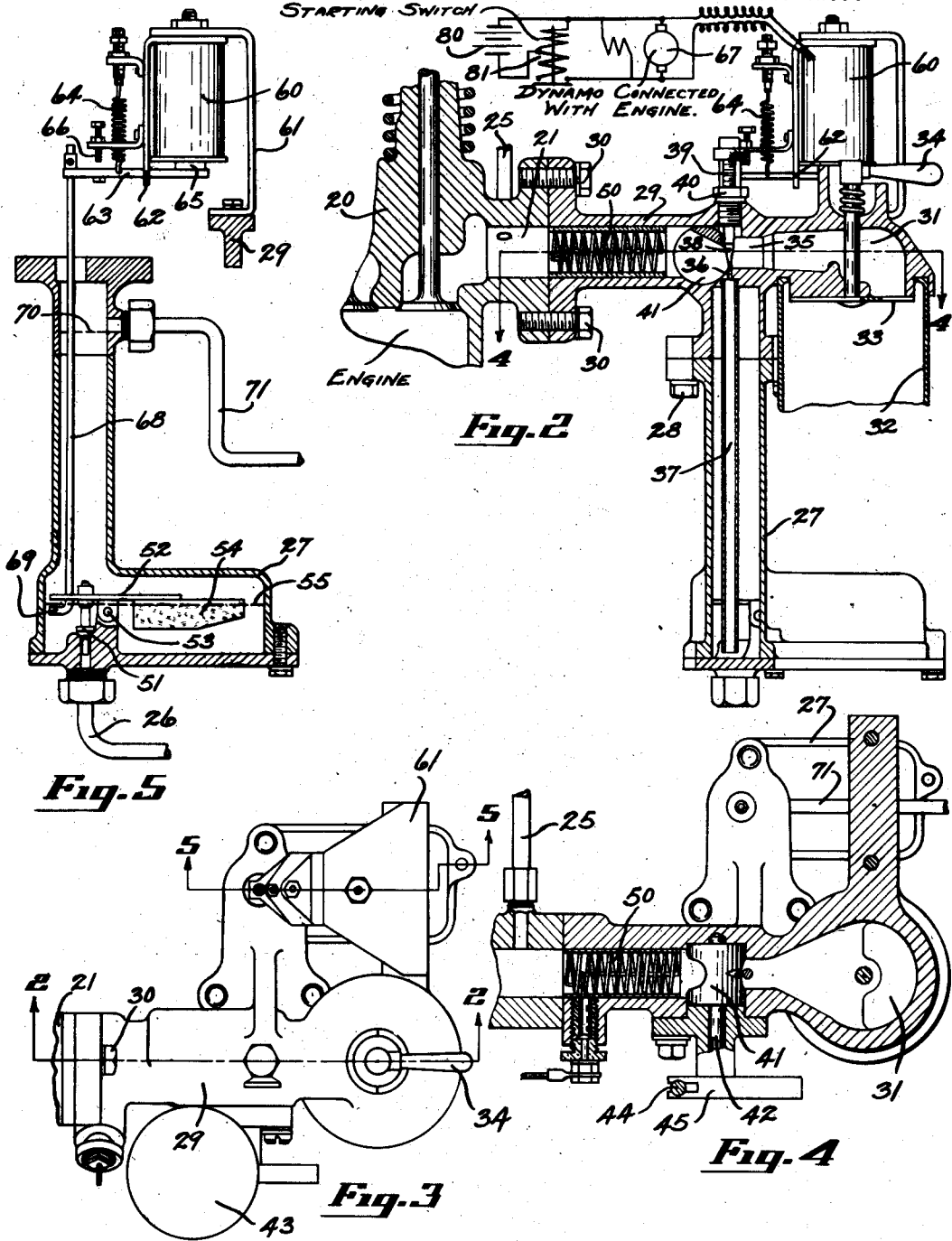
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

JOSEPH ALLEN HARLAN, OF DAYTON, OHIO, ASSIGNOR TO DELCO-LIGHT COMPANY,
OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

ENGINE.

Application filed March 2, 1923. Serial No. 622,377.

To all whom it may concern:

Be it known that I, JOSEPH ALLEN HARLAN, citizen of the United States of America, residing at Dayton, county of Montgomery, and State of Ohio, have invented certain new and useful Improvements in Engines, of which the following is a full, clear, and exact description.

This invention relates to carburetors for internal-combustion engines and has among its objects the providing of an internal-combustion engine with a relatively rich fuel mixture in order to facilitate starting the engine, and then automatically providing the engine with a relatively lean mixture for engine running purposes.

Other and further objects and advantages of the present invention will be apparent from the following description of one form thereof, reference being made to the accompanying drawings.

In the drawings:

Fig. 1 is an elevational view showing an engine, a fuel feeding system therefor which leads to the carburetor including the present invention;

Fig. 2 is a longitudinal sectional view of the carburetor and a fragment of the engine, the section being taken substantially on the line 2—2 of Fig. 3;

Fig. 3 is a plan view of the carburetor shown in Fig. 1;

Fig. 4 is a sectional view taken substantially on the line 4—4 of Fig. 2; and

Fig. 5 is a sectional view taken substantially on the line 5—5 of Fig. 3.

The present invention is shown in conjunction with an automatic electrical generating plant disclosed in the copending application of Starr and Harlan, Serial No. 629,108, filed March 31, 1923. An internal-combustion engine 20, having an intake 21, is supplied with fuel from a tank 22 connected by pipe 23 with a vacuum tank 24 having a vacuum pipe 25 connected with the engine intake 21. The vacuum tank is of a type considerably used in automobiles for feeding fuel from a rear tank to the float bowl of the engine carburetor. Tank 24 is provided with a fuel outlet pipe 26 which is connected with a fuel bowl 27 attached by screws 28 to a fuel mixture body 29 which is attached to the engine 20 by means of screws 30. The body 29 provides a passage

31 through which air may flow from the outside or from a breather pipe 32 connected with the crank case of the engine. The entrance to passage 31 is controlled by a shutter valve 33 operated by a handle 34. The passage 31 includes a Venturi passage or restriction 35 for creating a partial vacuum just above a nozzle outlet 36 which communicates with a nozzle tube 37. Tube 37 is screwed into the body 29 and terminates just above the bottom of the fuel bowl 27. The nozzle outlet 36 is controlled by a needle valve 38 mounted on a screw threaded stem 39 having threaded engagement with a bushing 40 which is screwed into the body 29. A throttle valve 41, mounted on a shaft 42, controls the admission of fuel mixture to the engine. The throttle valve may be controlled manually or automatically by means of an electro-magnet which is enclosed within a housing 43 mounted on the body 29 which magnet cooperates with a plunger attached to a rod 44 which is attached to a lever 45 secured to the valve shaft 42. Where such an electromagnet is connected across the terminals of a generator driven by the engine, it is obvious that the speed of the engine will be limited.

The fuel intake passage 31 is provided with a heating coil 50 adapted to be heated by an electric current for assisting in vaporizing the fuel to facilitate engine starting.

The flow by gravity of fuel into the float bowl 27 through pipe 26 is controlled by a valve 51 attached to a lever 52 pivoted at 53 and carrying a float 54. During the running of the engine the float valve 51 will maintain a fuel level approximately at the line 55. The distance from this level 55 to the nozzle outlet 36 is such that during the normal operation of the engine enough liquid fuel will be elevated to this distance to supply the demands of the engine. By controlling the fuel level the float valve 51 therefore tends to regulate the fuel mixture for engine running.

During the running of the engine the float valve 51 remains operative to control the fuel level, but during the idle period of the engine, means are provided for rendering the float valve inoperative to control the fuel level so that a richer mixture can be provided for starting the engine. This means includes a rod 68 having a hook 69

for engaging the lever 52 and supported by an armature 63 pivoted at 62 on a magnet frame 61 mounted on body 29. A spring 64 tends to move the armature 63 against a stop screw 66. Means for rendering the rod inoperative includes a magnet 60 connected across the terminals of a dynamo 67 which is driven by the engine 20 by means not shown. Magnet 60 includes a core 65 supported by frame 61. It is intended that so long as the engine is operating magnet 60 will receive enough current to maintain the armature 63 in attracted position, thereby allowing the float lever 52 to operate normally free of obstruction by the hook 69.

When the engine stops a storage battery 80 will discharge into the dynamo 67 and cause an automatic starting switch 81 to open. The magnet 60 will be deenergized allowing spring 64 to pull the rod 68 upwardly and cause the valve 51 to be held away from its seat. Fuel will rise from level 55 to level 70 and the excess will flow out of pipe 71 back to tank 22. The stopping of the engine therefore renders the float valve inoperative to limit the fuel level in the bowl to a certain low point; and, during engine idleness, the float bowl will be filled to a higher level to provide a richer fuel mixture for starting.

The dynamo 67 can function as a motor to crank the engine. The switch 81 is closed manually and current will flow to the dynamo 67 to operate it as a motor to crank the engine, and will flow to coil 60 to render the float valve operative. Therefore the cranking of the engine will effect the rendering of the float valve operative. When the engine becomes self-operative the automatic switch 81 maintains the charging circuit closed in the well known manner, but this switch opens automatically on battery discharge when the engine stops. Then coil 60 will be deenergized again.

There will be enough fuel between the levels 70 and 55 to supply the usual demands for a rich fuel mixture for engine starting.

By the time the fuel level has fallen to level 55, the engine will usually have been started and will have been well warmed up even with a low environment temperature. As the engine warms up after starting, the fuel mixture will gradually become leaner, and this will take place somewhat in direct proportion to the heating of the engine combustion chamber. This is due to the gradual lowering of the fuel level in the fuel bowl 27.

While the form of mechanism herein shown and described constitutes a preferred embodiment of one form of invention, it is to be understood that other forms might be adopted and various changes and alterations made in the shape, size, and proportion of the elements therein without departing from the spirit and scope of the invention.

What is claimed is as follows:

1. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel chamber and means for controlling the fuel level therein to regulate the mixture for engine running; of provisions operable when the engine is idle for preventing the operation of said means in order to provide a higher fuel level; and mechanism rendered operative when cranking the engine for rendering said provisions inoperative.

2. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel chamber and a float controlled valve for limiting the fuel level therein; of provisions operable when the engine is idle for rendering the valve inoperative to regulate the fuel level in order that the fuel level may be higher; and mechanism rendered operative when cranking the engine for rendering said provisions inoperative.

3. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel chamber and a float controlled valve for limiting the fuel level therein; of provisions operable when the engine is idle for rendering the valve inoperative to regulate the fuel level in order that the fuel level may be higher; and electromagnetic means rendered operative when cranking the engine for rendering said provisions inoperative.

4. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel chamber and a float controlled valve for limiting the fuel level therein; of provisions operable when the engine is idle for rendering the valve inoperative to regulate the fuel level in order that the fuel level may be higher; a current source; a motor for cranking the engine; and means rendered operative by connecting the current source and motor for rendering said provisions inoperative.

5. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel chamber and a float controlled valve for limiting the fuel level therein; of provisions operable when the engine is idle for rendering the valve inoperative to regulate the fuel level in order that the fuel level may be higher; a current source; a motor for cranking the engine; and an electromagnet connected with said source by the connection of said source and motor for rendering said provisions inoperative.

6. In a fuel supply system for internal-combustion engines, the combination with an engine and carburetor having a fuel bowl and float valve for limiting the fuel level therein; of means inoperative to prevent the action of the float valve when the engine is

running but rendered operative automatically by the engine stopping.

7. In a fuel supply system for internal-combustion engines, the combination with an engine and a carburetor having a fuel bowl and means for maintaining a certain low level of fuel therein; of means rendered operative by the engine stopping for ren-

dering the first means inoperative whereby to provide a higher fuel level in said bowl. 10

In testimony whereof I hereto affix my signature.

JOSEPH ALLEN HARLAN.

Witnesses:

MILDRED PEARE,
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