Jan. 19, 1932. F. F. STARR 1,841,386

VALVE

Filed March 27, 1924

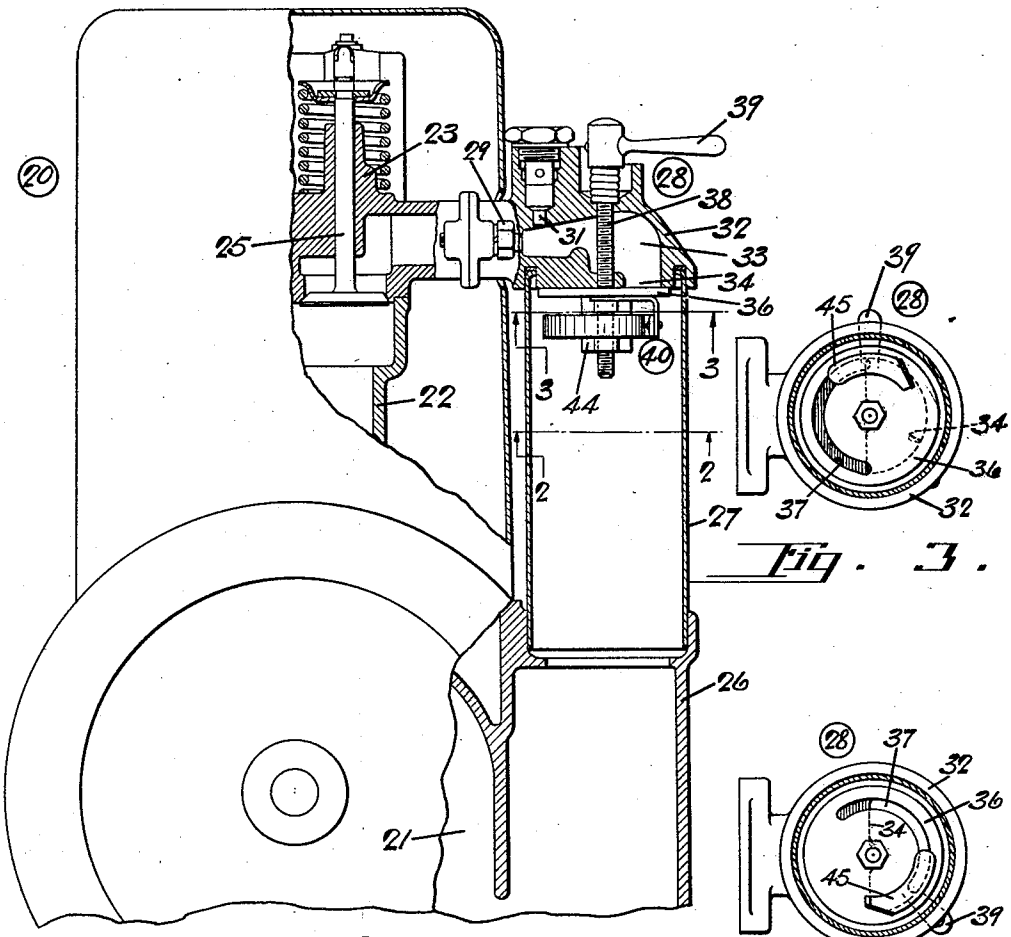


Fig. 1.

Fig. 3.

Fig. 4.

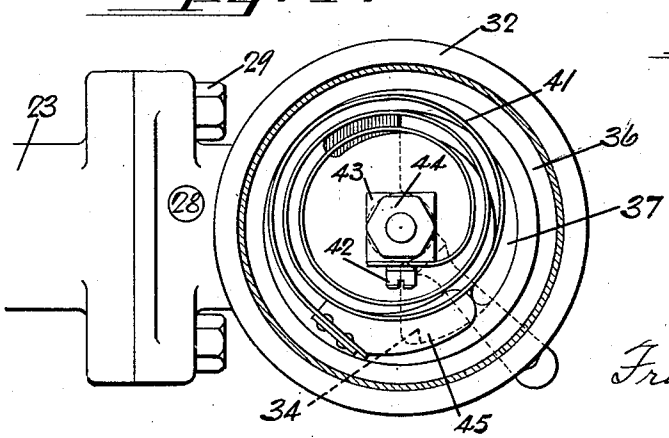


Fig. 2.

Inventor

Frank F. Starr

By Spencer Sewall and Hardman

his Attorneys

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UNITED STATES PATENT OFFICE

FRANK F. STARR, OF DAYTON, OHIO, ASSIGNOR TO DELCO-LIGHT COMPANY, OF DAYTON, OHIO, A CORPORATION OF DELAWARE

VALVE

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The present invention relates to the control of proportions of fuel mixture for an internal combustion engine, and particularly to a valve adapted to control the air inlet of the engine carburetor.

One of the objects of the present invention is to increase the efficiency of an internal combustion engine by automatically controlling the fuel mixture thereto in accordance with the temperature of the engine so that a rich mixture is obtained when the engine is cold, and providing mechanism whereby said mixture gradually becomes more lean as the engine becomes heated.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary view partly in section of an internal combustion engine with the present invention applied thereto.

Fig. 2 is a view taken on the line 2—2 of Fig. 1, showing the position of the elements when the engine is heated.

Figs. 3 and 4 are views taken on line 3—3 of Fig. 1, showing the position of the elements of the invention when the engine is being started and the position of the elements directly after the engine has become self-operative, respectively.

Referring to the drawings, 20 is an internal combustion engine including a crank case 21, a cylinder 22, and a cylinder head 23. The admission of fuel from the cylinder head 23 to the cylinder 22 is controlled by an intake valve 25. The crank case 21 merges into a tube 26 which carries a tube 27 which in turn is connected with a carburetor or mixing valve 28. Carburetor 28 is connected with the cylinder head 23 by bolts 29. Air for combustion purposes is withdrawn by suction of the engine from the engine crank case 21 through the tubes 26 and 27 into the carburetor 28. Fuel for the carburetor 28 enters through an orifice 31 suitably connected with a fuel supply not shown.

The carburetor 28 includes a body portion 32 having a passage 33 for air. The mouth 34 of passage 33 which constitutes a stationary valve seat and is formed in the lower portion of the body 32 is in communication with tube 27. A valve for controlling the mouth 34 comprises a plate 36 having an arcuate slot or port 37. Plate 36 is rotated by a stem 38 which extends through the upper portion of the body 32 and is provided with a handle 39. Movement of the handle 39 will cause an increase or decrease of flow of air in the passage 33.

A temperature responsive device 40 is carried underneath the valve plate 36 and is secured to the stem 38. The device 40 includes a spirally arranged bi-metallic strip 41 having its inner end secured by a screw 42 to a nut 43 which in turn is secured to the stem 38 by lock nut 44. The outer end of strip 41 carries a plate 45 located adjacent the plate 36. The strip 41 is attached in such a position with respect to the port 37 that when the engine is cold the plate 45 will cover a portion of the slot 37 as is shown in Figs. 3 and 4.

The operation of the device is as follows: To start the engine, the handle 39 is rotated to the position shown in Fig. 3 whereupon the plate 36 will cover mouth 34 in body 32 to cut off substantially all of the air to the carburetor whereby a rich mixture of fuel is drawn into the engine. After the engine becomes self-operative, the handle 39 is rotated to the position shown in Fig. 4. A portion of port 37 in plate 36 will then register with a portion of the mouth 34 in body 32 and the thermostatically actuated plate 45 will occupy substantially the position shown in Fig. 4. After the engine becomes heated, by heat conducted to body 32 from the cylinder heat, the bi-metal strip 41 will be heated causing the plate 45 to rotate clockwise as viewed in Figs. 2 and 4, thereby further uncovering the slot 37, as shown in Fig. 2, to permit more air to pass therethrough. In this manner the fuel mixture becomes more lean as the engine becomes heated.

With the present invention, the internal combustion engine is readily started and after the engine has once been started it is not nec-

essary again to adjust the fuel mixture. After once determining in what position the handle 39 must be in order to operate the engine most efficiently, it is only necessary for the attendant to swing the lever 39 to the starting position (Fig. 3) and then after the engine becomes self-operative to the determined efficient running position (Fig. 4), the fuel mixture being regulated automatically by the temperature of the engine.

The entire fuel control system including the carburetor and the thermostatic device 40 comprises a unit which can be assembled or detached from the engine for the ready adjustment or repair thereof. It is merely necessary to remove the bolts 29 whereupon the unit may then be taken off.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What I claim is as follows:

1. An internal combustion engine having a piston cylinder and a crankcase, an air passage from said crankcase to said piston cylinder, a carburetor in said passage in thermal contact with said engine, said carburetor being provided with an air intake in said passage, a valve for said air intake comprising a stationary valve seat member having a port, a movable valve member cooperating with the port in the valve seat member, means for moving said movable valve member, a second valve member movable with said first movable valve member for closing the port in the first movable valve member, and temperature responsive means bodily carried by said first movable valve member for moving the second valve member.

2. An internal combustion engine having a piston cylinder and a crankcase, an air passage from said crankcase to said piston cylinder, a carburetor in said passage in thermal contact with said engine, said carburetor being provided with an air intake in said passage, a valve for said air intake including a movable valve member, manually operated means for controlling said valve member for varying the fuel mixture proportions, a second valve member movable with said first named valve member for varying said proportions, and temperature responsive means bodily movable with said manual means and operatively connected with said second valve member.

In testimony whereof I hereto affix my signature.

FRANK F. STARR.