July 11, 1933. C. H. KIRBY 1,917,591

CARBURETOR PRIMER

Filed Sept. 13, 1929

Fig. 2

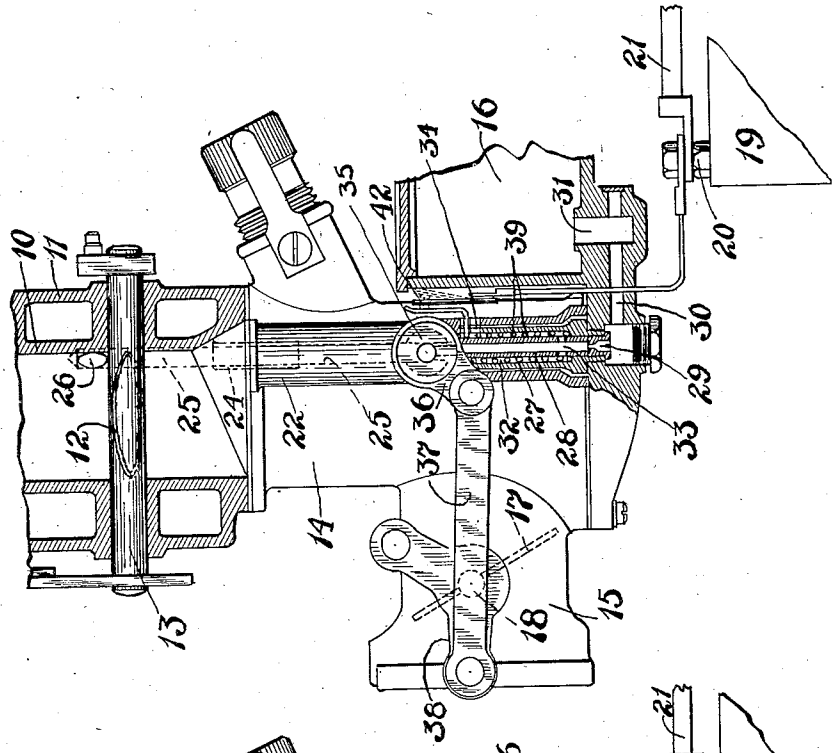
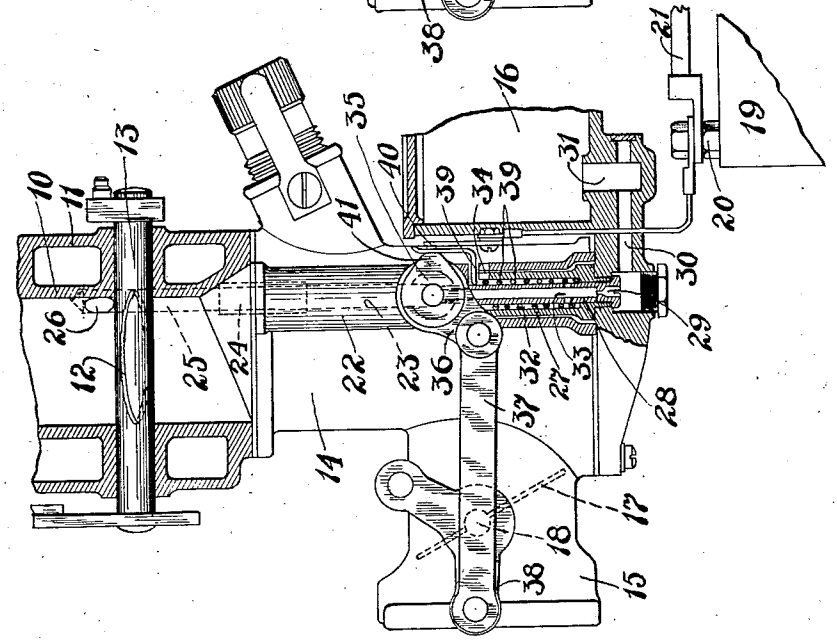


Fig. 1



Inventor

Charles H. Kirby

By Charles O. Wills Attys

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UNITED STATES PATENT OFFICE

CHARLES H. KIRBY, OF FLINT, MICHIGAN, ASSIGNOR TO MARVEL CARBURETER COMPANY, OF FLINT, MICHIGAN, A CORPORATION OF ILLINOIS

CARBURETOR PRIMER

Application filed September 13, 1929. Serial No. 392,311.

This invention relates to priming devices for internal combustion engines for supplying supplemental fuel to assist in starting cold engines.

It is an object of this invention to provide a priming device adapted to deliver a supplementary mixture of fuel and air under starting conditions and to proportion the additional supply of fuel and air mixture to the severity of the operating conditions as indicated for example by the amount of choke required to enable the engine to start.

It is another object of this invention to increase the effectiveness of the priming device by providing heating means to vaporize the fuel, thus producing a dry mixture readily distributed through the manifold system of an engine under very cold weather conditions whereas a wet priming mixture would be thinned out by condensation on the cold walls of the manifold.

It is also an object of this invention to provide a simple and reliable control for the primer and heating means therefor so that the primer will be capable of independent operation.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawing.

The invention (in a preferred form) is illustrated on the drawing and hereinafter more fully described.

On the drawing:

Figure 1 is a side elevation of a carburetor with parts broken away to disclose one illustrative embodiment of the features of this invention.

Figure 2 is a view similar to Figure 1 disclosing a modified form of this invention.

As shown on the drawing:

The carburetor and manifold structure chosen to illustrate the embodiment of this invention comprises a manifold riser 10 having a heating jacket 11, the usual throttle valve 12 and shaft 13 being mounted in the riser instead of in the carburetor proper in order to simplify the latter. A carburetor body 14 is attached to the end of the riser, and for the purposes of this invention it is only necessary to identify the air inlet 15 and float bowl 16; the air inlet containing a choke valve 17 on a cross shaft 18. A fragment of the usual engine starting motor 19 is indicated together with its electrical terminal 20 and supply cable 21.

The structure of this invention comprises a boss 22 formed on the side of the carburetor and having a central passage 23 having a sealing coupling 24 connecting to a passage 25 formed in the wall of the intake riser; the passage having an outlet port 26 into the riser passage above the throttle position in order that the passages 23 and 25 will be subjected to this intake manifold suction under starting conditions with a nearly closed throttle, under which circumstances the suction in the carburetor below the throttle is insufficient to produce adequate atomization of the fuel.

The lower end of the passage 23 is much enlarged to receive a tubular sleeve 27 which in turn is spaced from an inner tube 28 forming a continuation of the passage 25 and containing a restricted fuel orifice 29 supplied with fuel from the passages 30 and 31. The inner tube 28 is in communication with the annular space 32, formed thereabout by the sleeve 27, through apertures 33 and also has an outside air inlet opening 34, so that suction acting on the passage 26 and tube 27 draws in fuel from the orifice 29 and air from outside the carburetor through the opening 34, annular space 32 and apertures 33. A plug valve 35 is mounted across the passage 23 above the top of the tube 27 and is provided with an operating lever 36 connected by a link 37 to a lever arm 38 on the choke valve shaft 18 in such a manner that the plug valve will be fully open when the choke valve is fully closed.

As the primer or vaporizer is primarily provided to assist in starting a cold engine it is convenient to control the primer from the choke valve, as the latter will not be fully closed for starting a warm engine which does not need the assistance of a vaporizer. To this end I provide an electric heating element 39 in the annular space 32, the circuit for the heating element being preferably

connected from the starting motor terminal 20 to a switch 40 and thence to one end of the heating element, the other end being grounded.

In Figure 1 the switch 40 is closed by a cam 41 formed on the valve operating lever 36, the cam being very abrupt and so positioned as to close the switch only when the choke valve is fully closed. A partial closure of the choke valve may partially open the plug valve 35 without bringing the heating element into use.

In Figure 2 the switch 40 has been replaced with a bimetal thermostatic switch 42, the cam 41 being omitted. This thermostatic switch is arranged to close in severely cold weather but opens under normal conditions, so that the heating element is then out of circuit, even through the primer may be supplying a mixture of fuel and air due to a nearly full closure of the choke valve.

The operation is as follows:

The electric heating element may be operated in parallel with the starting motor, and is preferably controlled either through the switch 40, or by a thermostat as shown in Figure 2, in order that the heating element may not be brought into operation except when needed for cold weather starting. A partial closure of the choke valve, as when starting in moderate weather, will result in a partial opening of the plug valve 35 thus supplying a mixture of fuel and air through the primer although the heating element is not in operation to vaporize the fuel. A nearly full closure of the choke valve causes the cam 41 to close the switch 40 in Figure 1, thus both heating the incoming air, prior to its entry into the inner tube, and the mixture of fuel and air passing up the tube 27.

It will thus be seen that I have provided an improved carburetor primer which supplies a supplemental charge of fuel and air mixture to assist in starting, and under severe weather conditions assists starting by heating the air prior to mixing with the fuel and also heats the mixture during its passage to the engine.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted, otherwise than necessitated by the prior art.

I claim as my invention:

1. In combination with a carburetor a priming passage discharging into the carburetor passages and having a restricted fuel supply leading thereto, an air bleed passage surrounding said priming passage for a portion of its length and discharging into said priming passage, and an electric heating element in said air bleed passage whereby to heat the air supplied through said air bleed passage as well as said priming passage.

2. In combination with a carburetor a priming passage discharging into the carburetor passages and having a restricted fuel supply leading thereto, an air bleed passage surrounding said priming passage for a portion of its length and discharging into said priming passage, an electric heating element in said air bleed passage whereby to heat the air supplied through said air bleed passage as well as said priming passage, and means for controlling said priming passage.

3. In combination with a carburetor and a choke valve therefor a priming passage discharging into the carburetor passages and having a restricted fuel supply leading thereto, an air bleed passage surrounding said priming passage, an electric heating element in said air bleed passage whereby to heat the air supplied through said air bleed passage as well as said priming passage and means operated by said choke valve to close said priming passage except when said choke valve is closed.

4. In combination with a carburetor, a liquid fuel vaporizer comprising a priming passage discharging into the carburetor outlet passage, an air bleed connection discharging into the priming passage and a heating element adapted to simultaneously heat both the air bleed prior to its connection to the priming passage and the priming passage.

5. In combination with a carburetor, a liquid fuel vaporizer comprising a priming passage discharging into the carburetor outlet passage, an air bleed connection discharging into the priming passage, a heating element adapted to simultaneously heat both the air bleed prior to its connection to the priming passage and the priming passage and a valve for controlling said priming passage.

6. In combination with a carburetor, a liquid fuel vaporizer comprising a priming passage discharging into the carburetor outlet passage, an air bleed connection discharging into the priming passage, a heating element adapted to simultaneously heat both the air bleed prior to its connection to the priming passage and the priming passage, a valve for controlling said priming passage and means for simultaneously controlling the priming passage and said heating element.

7. A liquid fuel vaporizer comprising a fluid discharge passage, an air bleed passage, surrounding said first mentioned passage and opening thereinto, a heating element positioned about said fluid discharge passage within said air bleed passage and means for simultaneously opening said fluid discharge passage and energizing said heating element.

8. In combination with a fuel mixing device, a tube forming a delivery passage into said device for a fuel and air mixture, a tubular member surrounding said tube in spaced relationship thereto and having an air inlet and a delivery outlet into said tube,

means for delivering fuel to said tube, heating means in the space between the tube and tubular member whereby to heat both the air in said space and the fuel and air mixture in said tube, and thermostatic means controlling said heating means.

9. In combination with a fuel mixing device a tube forming a delivery passage into said device for a fuel and air mixture, a tubular member surrounding said tube in spaced relationship thereto and having an air inlet and a delivery outlet into said tube, means for delivering fuel to said tube, heating means in the space between the tube and tubular member whereby to heat both the air in said space and the fuel and air mixture in said tube, valved means controlling the passage of the fuel and air mixture through said tube, and thermostatic means controlling the passage of the fuel and air mixture through said tube.

In testimony whereof I have hereunto subscribed my name at Flint, Genesee County, Michigan.

CHARLES H. KIRBY.