

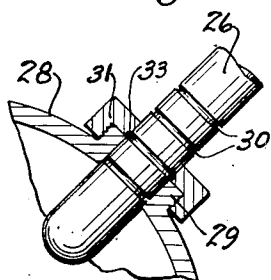
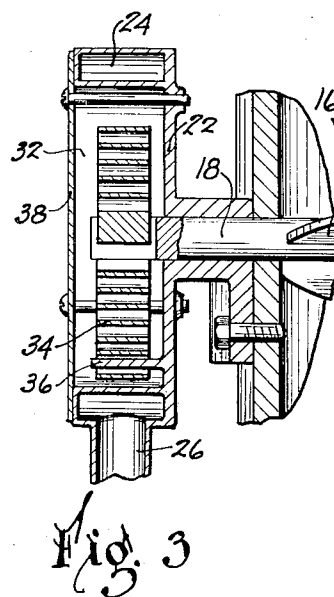
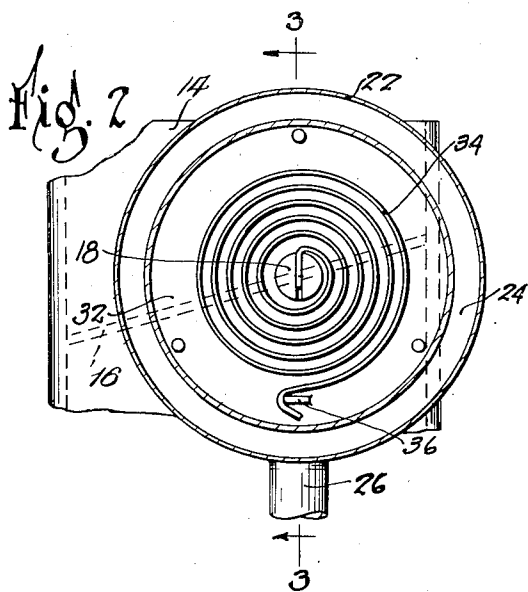
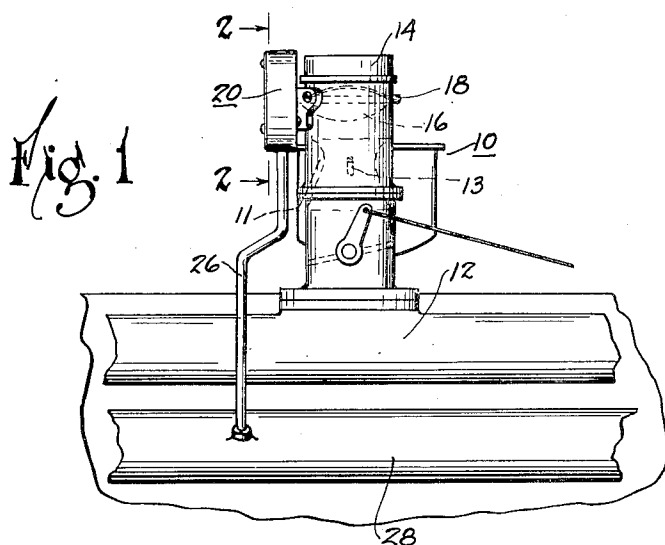
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2,109,113

CARBURETOR

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2,109,113

CARBURETOR

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11 Claims. (Cl. 123—119)

This invention relates to carburetors and more particularly to carburetor choke valves which are automatic in operation.

Internal combustion engines using liquid fuel are ordinarily equipped with carburetors having either manually or automatically operated choke valves for decreasing the air supply thereby enriching the fuel mixture to facilitate starting of the engine. The device of the present invention regulates the position of the choke valve in accordance with engine temperature. A well proportioned mixture is thereby obtained which will give best results for all operating conditions of the engine.

An object of the invention is to provide an automatic choke mechanism which will accurately and quickly proportion the quantity of air admitted to the engine so as to produce the most satisfactory operation of the engine while starting and warming up.

Another object of the invention is to provide an adjustable element whereby the time required to open the choke valve may be accurately regulated in accordance with the operating conditions of the particular engine on which the device is installed.

A still further object of the invention is to provide an automatic choke mechanism having a minimum of moving parts which will be less susceptible to maladjustment than similar devices of the prior art.

Another object of the invention is to provide an automatic choke mechanism in which the heat of the exhaust gases is transmitted to a mechanism operably connected with the choke valve instead of actuating the choke valve through a linkage connected with a thermostat element positioned at a distance from the choke valve.

Other objects and advantages of this invention will be more apparent from the following detailed description together with the accompanying drawing, which is submitted merely for purposes of illustration and is not intended to define the scope of the invention, reference being had for that purpose to the appended claims.

In the drawing, wherein similar reference characters refer to similar parts throughout the several views:

Figure 1 is an elevation view of a device embodying the invention;

Figure 2 is a vertical section taken on line 2—2 of Figure 1;

Figure 3 is a view taken on line 3—3 of Figure 2;

Figure 4 is a view taken at the juncture of the metal tube with the exhaust pipe.

It is desirable to control the mixture supplied by the carburetor in accordance with the temperature in the combustion chambers of the engine, and to do this automatically requires a thermostatic control for the choke valve (or other mixture controlling device, such as a fuel valve). Inasmuch as it is impractical to place a thermostat in the combustion chamber, previous attempts have been directed toward positioning the thermostat or other temperature control means next to the exhaust pipe or other element the temperature of which follows the temperature of the combustion chambers rather closely. In order to avoid undue heating of the carburetor it is necessary to position the carburetor at a distance from the exhaust pipe, thereby necessitating mechanical connections between the temperature control means and the choke valve or other mixture control means of the carburetor. Such mechanical connections necessarily involve moving parts which are likely to get out of adjustment and which in certain engines are difficult to install. Such moving parts also require energy which must be supplied by the thermostat or other automatic means, thus tending to make the device less sensitive.

The present device therefore contemplates mounting the thermostat adjacent the choke valve or other element to be controlled, and transferring heat thereto from the exhaust pipe with a minimum amount of time lag, so that the temperature gradient at the thermostat will closely follow the gradient within the combustion chamber itself. For this purpose a closed tube is employed containing a fluid which is liquid at atmospheric temperature and which is vaporized at the temperatures obtaining in the exhaust pipe, and the heat of vaporization of this fluid is utilized to transfer heat from the exhaust manifold to the thermostat.

Referring more particularly to Figure 1 there is shown a common type of down draft carburetor 10 secured to an intake manifold 12. The carburetor 10 is provided with the usual venturi and fuel nozzle 13, and has an air-horn 14 having an unbalanced choke valve 16 mounted on a shaft 18 journaled in the walls of air-horn 14. One end of shaft 18 is fitted with a thermostat control unit 20.

The thermostat control unit 20, illustrated in Figures 2 and 3, comprises a housing 22 which is formed, as by welding, into a sealed annular chamber 24 communicating with a metal tube

26. One end of tube 26 extends through the walls of the exhaust pipe 28 and contains a small quantity of a fluid, preferably alcohol or water, which at atmospheric temperature is a liquid and which at temperatures obtaining in the exhaust pipe will vaporize and thereby transfer heat to the thermostat in accordance with the principle of the present invention. The end of pipe 26 is provided with a plurality of grooves 30 so that the tube may be extended further into or withdrawn from the exhaust pipe 28 to vary the rate of heat transfer to the pipe 26. A boss 29 having the outer edge threaded is welded or otherwise attached to the surface of exhaust pipe 28 and cooperates with a threaded fastening member 31 and a snap ring 33 to hold pipe 26 in any desired position.

A hollow chamber 32 formed within the housing 22 receives a bimetallic thermostatic spring 34 having one end fixed to the choke shaft 18. The other end of spring 34 is formed as a hook which engages a stop member 36 carried by housing 22. Chamber 32 is closed by means of a cover 38 screwed to housing 22.

The operation of this device is as follows. When the engine is cold, thermostatic spring 34 tends to straighten out, moving the unbalanced choke valve 16 toward closed position, so that a relatively small quantity of air is admitted to the carburetor. When the engine is cranked, the pumping action of the cylinders is exerted upon the fuel nozzle 13 so that a rich mixture results suitable for starting the engine when it is cold.

When the engine has started, an increased suction is exerted upon the unbalanced choke valve 16 which is free to open against the force exerted by thermostatic spring 34. A varying quantity of air is thus supplied to the engine to assure proper operation while it is warming up. The end of pipe 26 projecting into exhaust pipe 28 will be heated very quickly because the exhaust gases are in direct contact therewith. The liquid contained in pipe 26 will vaporize quickly and the vapor thus formed will rise to annular chamber 24, surrounding thermostatic spring 34. Heat will then be transmitted to the spring, causing it to coil more tightly upon itself and exert a decreasing force upon the choke valve as the spring gets warmer. When the engine is operating at normal temperature the thermostatic spring 34 will exert no force on choke valve 16, and the choke valve will be moved to fully open position by the force of the air entering the air horn 14.

When the engine stops running and cools down the vapor contained in annular chamber 24 will condense and flow down pipe 26 ready for another cycle of operation when the engine is again started.

It is understood that the device of this invention may be used in conjunction with other automatic choke equipment and auxiliaries such as disclosed in my copending application Serial No. 707,942, filed January 23, 1934.

I claim:

1. In a carburetor having an air-horn, a choke shaft journaled in the walls of the air-horn, an unbalanced choke valve mounted on the choke shaft, thermostatic means operably connected with the choke shaft, a source of heat, and heat transmitting means utilizing the latent heat of vaporization of a liquid and including a closed conduit containing a supply of liquid one end of the conduit communicating with a sealed annu-

lar chamber surrounding the thermostat and the other end communicating with the source of heat.

2. In a carburetor for an internal combustion engine provided with an exhaust pipe, an unbalanced choke valve remote from the exhaust pipe, an automatic choke control comprising a housing fixed to the carburetor, a thermostatic spring in the housing and fixed to the choke valve, a fluid-tight chamber in the housing and surrounding the thermostatic spring, a closed tube communicating with the fluid-tight chamber and projecting into the exhaust pipe, and a small quantity of liquid in the tube.

3. In a carburetor for an internal combustion engine provided with an exhaust pipe, an unbalanced choke valve, an automatic choke device comprising a housing fixed to the carburetor, a thermostatic spring in the housing and fixed to the choke valve, a fluid-tight chamber in the housing and surrounding the thermostatic spring, a closed tube communicating with the fluid-tight chamber and projecting into the exhaust pipe, a small quantity of liquid in the tube, and means for adjusting the relation between the tube and the exhaust pipe to vary the rate of heat transfer to said tube.

4. In a carburetor for an internal combustion engine, an air inlet valve, thermostatic control means for said valve directly connected thereto, and means for transferring heat from a remote point to said thermostatic control means comprising a closed conduit communicating with a sealed chamber extending adjacent said thermostatic control means, and a small quantity of fluid in said conduit having a boiling point above ordinary atmospheric temperatures.

5. In a carburetor for an internal combustion engine having an exhaust conduit, an air inlet valve for the carburetor, a thermostat for said valve located adjacent the valve and remote from the exhaust conduit, a sealed chamber surrounding the thermostat and means utilizing the latent heat of vaporization of a liquid for transferring heat from said exhaust conduit to said sealed chamber comprising a closed conduit extending from the exhaust pipe to the sealed chamber and a quantity of liquid in said conduit having a boiling point above ordinary atmospheric temperatures and below the temperatures obtaining adjacent the exhaust pipe.

6. A carburetor having a choke valve, a temperature responsive member directly connected to the choke valve and influencing its movements, a source of heat remote from the temperature responsive element, a closed tube communicating with a sealed chamber surrounding the temperature responsive means and extending from the source of heat into heat exchange relation with the thermostat, and a volatile liquid in the tube adapted to vaporize and transfer heat from the source of heat to the sealed chamber surrounding the thermostat.

7. In a carburetor for an internal combustion engine, a pressure responsive air inlet valve, temperature responsive means for controlling the air inlet valve, a source of heat, a heat transfer device comprising a conduit having a small quantity of liquid therein and having one end in heat-exchange relation with the source of heat having at its other end a sealed housing surrounding the thermostat whereby heat is transferred from the source to the thermostat through

the latent heat of vaporization of the liquid with a time lag interposed.

8. A carburetor adapted for use with an internal combustion engine having a source of heat, a pressure responsive choke valve, temperature responsive means for controlling the choke valve, a heat transfer device comprising a conduit having a small quantity of liquid therein and having one end in heat-exchange relation with the source of heat and having at its other end a sealed annular welded housing surrounding the thermostat whereby heat is transferred from the source to the thermostat by the latent heat of vaporization of the liquid with a time lag interposed.

9. In a carburetor for an internal combustion engine, a control valve, temperature responsive means influencing the action of said control valve and positioned adjacent thereto, and means for transferring heat from a remote point to said temperature responsive means comprising a hollow heat radiating member positioned in heat-exchanging relation to the temperature responsive means, a closed conduit communicating with said member and having one portion at said re-

mote point, and a quantity of vaporizable liquid in said conduit adapted to be vaporized under normal operating conditions.

10. In a carburetor for an internal combustion engine, a choke valve, temperature responsive means positioned adjacent and controlling the choke valve, a source of heat remote from the temperature responsive means, and means for transferring heat from said source to the temperature responsive means comprising a housing having a quantity of liquid therein vaporizable by the source of heat and adapted to conduct heat to the temperature responsive means.

11. In a carburetor for an internal combustion engine, a choke valve, temperature responsive means positioned adjacent and controlling the choke valve, a source of heat below the temperature responsive means, and means for transferring heat from said source to the temperature responsive means comprising a housing having a quantity of liquid therein vaporizable by the source of heat and adapted to conduct heat to the temperature responsive means.

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