May 23, 1944. H. J. DE N. McCOLLUM 2,349,740

AUTOMOBILE HEATER

Filed Feb. 17, 1940

Fig. 1.

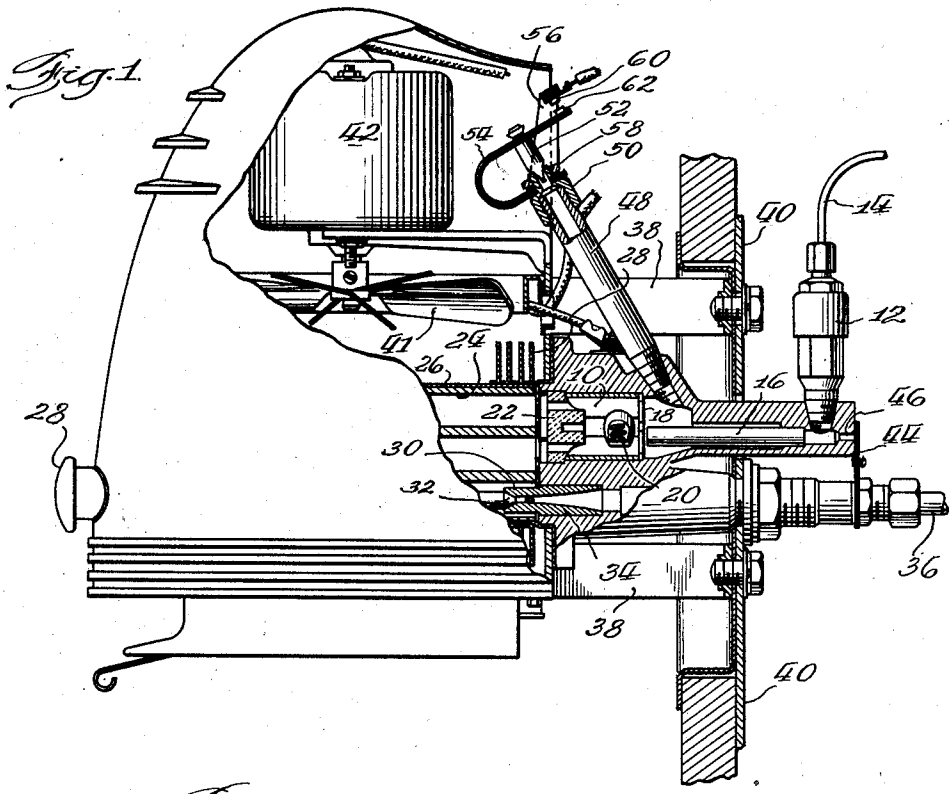
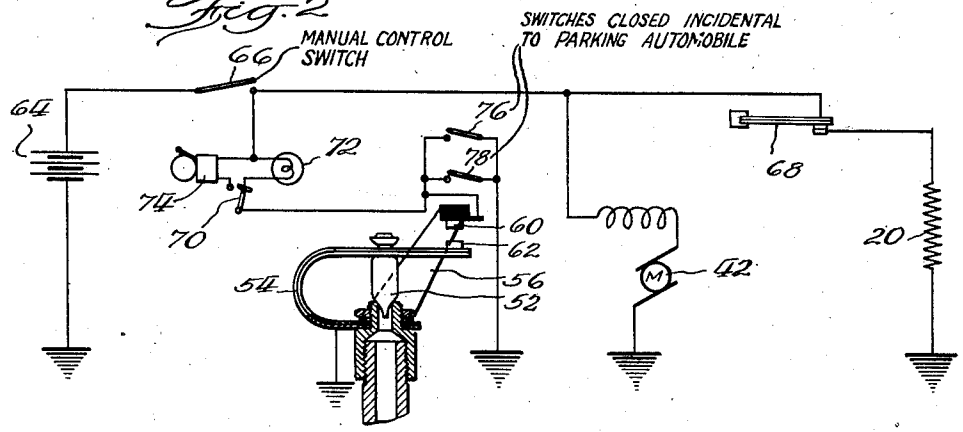


Fig. 2.



Inventor.
Henry J. De N. McCollum
By Williams, Bradbury
McCabe & Hinkle.
Attys.

Patented May 23, 1944

2,349,740

UNITED STATES PATENT OFFICE

2,349,740

AUTOMOBILE HEATER

Henry J. De N. McCollum, Chicago, Ill.

Application February 17, 1940, Serial No. 319,556

1 Claim. (Cl. 177—311)

My invention relates generally to automobile heaters, and more particularly to electrical circuits and apparatus for controlling the operation of heaters and indicating their operating condition.

This application is a continuation in part of my copending application Serial No. 61,213, filed January 28, 1936, which has matured into United States Letters Patent No. 2,191,173 issued February 20, 1940.

It is an object of the present invention to provide improved means for indicating to the operator of an automobile equipped with an internal combustion type heater the fact that the heater has become abnormally hot.

A further object is to provide an improved apparatus for use in conjunction with automobile heaters of the internal combustion type to warn the operator of the vehicle that the heater is in operation upon his leaving the vehicle.

A further object is to provide improved indicating and control circuits particularly for use in conjunction with automobile heaters of the internal combustion type.

Other objects will appear from the following description, reference being had to the accompanying drawing, in which:

Figure 1 is a fragmentary sectional view of an internal combustion type heater showing the important parts thereof; and

Figure 2 is a schematic wiring diagram showing the improved electrical signalling and control circuits.

As shown in Fig. 1, the heater comprises a combustion chamber 10 to which a mixture of fuel and air is supplied by a carbureting device 12, the latter being connected to a suitable source of liquid fuel by a conduit 14. The mixture of fuel and air provided by the carbureting device 12 flows through a tube 16 and impinges upon a baffle plate 18 which has suitable openings formed along the periphery thereof. The combustible mixture in the combustion chamber 10 is ignited by means of an igniter 20 which is preferably in the form of a coil of high resistance wire, such as nichrome wire, and flows from the combustion chamber through passageways formed in a re-igniter plug 22 which is preferably made of a ceramic material. The products of combustion discharged through the passageways in the re-igniter 22 flow through a circuitous passageway formed in a radiator casting 24 which is preferably made of an alloy consisting of approximately 95% aluminum and 5% silicon. The casting 24 is surrounded by a shell 26 preferably made of copper and which has a plurality of fins 28 pressed thereover to provide adequate heat radiating surface for the casting 24. The flow from the end of the circuitous passageway through the radiator casting 24 is controlled by a control button 28 which is connected to a valve 30 cooperating with a seat 32 formed at the inlet end of a compensator nozzle 34 which has a Venturi-shaped passageway extending therethrough.

When the valve 32 is opened by pulling outwardly on the control button 28, suction is applied to the outlet end of the tortuous passageway through the radiator casting 24 through a conduit 36 which is connected to the intake manifold of the automobile engine, or other suction producing means, and which communicates with the passageway through the compensator nozzle 34. The heating unit is preferably mounted in the passenger compartment of the vehicle, being supported by a plurality of brackets 38 which are bolted to the dash or fire wall 40 of the vehicle which separates the engine compartment from the passenger compartment thereof.

Air from the passenger compartment is circulated downwardly over the radiator by means of a fan 41 driven by an electric motor 42. Means may be provided to admit additional air to make the mixture supplied to the combustion chamber more lean when the heater attains its normal operating temperature, such means being illustrated as a bimetal thermostatic valve 44 which, when cool, closes the end of a passageway 46, and when heated, opens to admit atmospheric air to make more lean the mixture flowing to the combustion chamber.

Means are provided to extinguish the flame in the heater should the fan motor 42 fail to operate normally, or should the heater become excessively hot for any other accidental reason. This means comprises a tube 48 threaded in the combustion chamber casting and carrying a valve seat fitting 50 at its outer end. A valve 52 is cooperable with the seat formed in the end of the fitting 50 and is normally held in engagement therewith by a U-shaped strip 54 of thermostatic bimetal. The bimetal strip 54 as well as a bracket 56 is secured to the valve fitting 50 by a nut 58. The bracket 56 carries a contact 60 which is suitably insulated from the bracket, and is adapted, upon flexure of the bimetal strip 54, due to excessive temperature of the heater, to make contact with a contact point 62 secured to the end of the bimetal strip. The bimetal strip is, of course, grounded through its connection with the metallic parts of the heater through the valve fitting 50 and tube

48, although, if desired, an additional grounding connection may be supplied.

Referring to Fig. 2, the controlling and indicating circuits operate from a source 64 of electrical energy, which will ordinarily be the storage battery of the automobile, and the operation of the heater is initiated by manually closing a switch 66 which may be operated independently of the control button 28 or may be arranged to be closed by the latter whenever it is pulld outwardly to open the valve 30.

Closure of the switch 66 results in energization of the igniter 20 provided a thermostatistically operated switch 68 is closed.. The switch 68 is arranged to close when cold and to open as the heater approaches normal operating temperature. This thermostatic switch is preferably connected to the combustion chamber casting and is preferably located outside of the path of air driven by the fan 41.

The closure of the switch 66 also results in energization of the motor 42. In addition, closure of the switch 66 conditions the signalling circuits for operation. The fixed contact 60 of the thermostatic switch 60, 62, is connected to a two-way switch 70 which is adapted to connect either to a signal light 72 or to an audible signal device 74, or both of these signal circuits, in the circuit which includes the thermostatically operated switch 60, 62. Thus, upon over-heating of the heater, the thermostatic element 54 will flex upwardly to complete the circuit through either the warning lamp 72 or the audible signalling device 74, or both, thereby to apprise the operator of the unusual condition.

In Fig. 2 are also shown a pair of switches 76, 78, which are connected in circuits to bridge the contacts 60, 62. It will be apparent that closure of either of the switches 76 or 78 will result in giving a warning signal. The switches 76, 78 are preferably connected so that they will be closed by some normal operation performed by the driver of the vehicle incidental to parking it. For example, the switch 76 may be controlled in such manner that when the usual ignition switch of the vehicle is opened, the switch 76 will be closed. The switch 78 may be operated by the front door of the vehicle, the operating connections being so arranged that when the door is opened the switch 78 will be closed. Or, the switch 78 might be positioned beneath the driver's seat and so arranged that it would be opened by the weight of the driver upon the driver's seat and closed by spring pressure when the driver left the seat. Any other suitable arrangement could be provided for closing either the switch 76 or the switch 78, as for example, one of these switches could be closed whenever the parking brake is applied.

In normal operation, the switch 66 will be closed and the switches 76 and 78 will be open so that the signalling means 72 and 74 will not be energized unless for some accidental reason, as for instance, by stoppage of the motor 42, or for any other reason, the bimetal thermostat 54 becomes heated sufficiently to close the contacts 60, 62. If the operator of the vehicle inadvertently leaves the vehicle without opening the switch 66, one of the switches 76, 78, which are closed by the operator as an incident to his leaving the vehicle, will be closed, and thus energize either or both of the signalling devices 72, 74, depending upon the position of the switch 70. The operator will thus be warned that he is leaving the vehicle with the heater in operation.

While I have shown and described a particular embodiment of my invention, it will be apparent to those skilled in the art that numerous modifications and variations of the invention may be made without departing from the underlying principles thereof. I therefore desire by the following claims to include within the scope of my invention all such similar modifications and variations whereby substantially the results of my invention may be obtained by the use of substantially the same or equivalent means.

I claim:

In an electrically controlled heater of the internal combustion type for the passenger compartments of automotive vehicles, the combination of a combustion chamber, a source of electricity, a circuit connecting said source to said heater, a manually operable switch in said circuit, an electrical alarm device, a circuit for said alarm device, said circuit including said manually operated switch, a second switch in series with said manually operated switch in said alarm device circuit, means operated incidentally to parking the vehicle to close said second switch, thereby to complete the circuit including said alarm device to warn the operator of the vehicle that said manually operated switch is closed, thermostatic means responsive to abnormal temperature conditions in said heater, a valve operated by said thermostatic means and opening to extinguish the flame in the heater by admitting air to the combustion chamber thereof, and a third switch operated by said thermostatic means, said third switch being in parallel with said second switch and closing contemporaneously with the opening of said valve.

HENRY J. DE N. MCCOLLUM.