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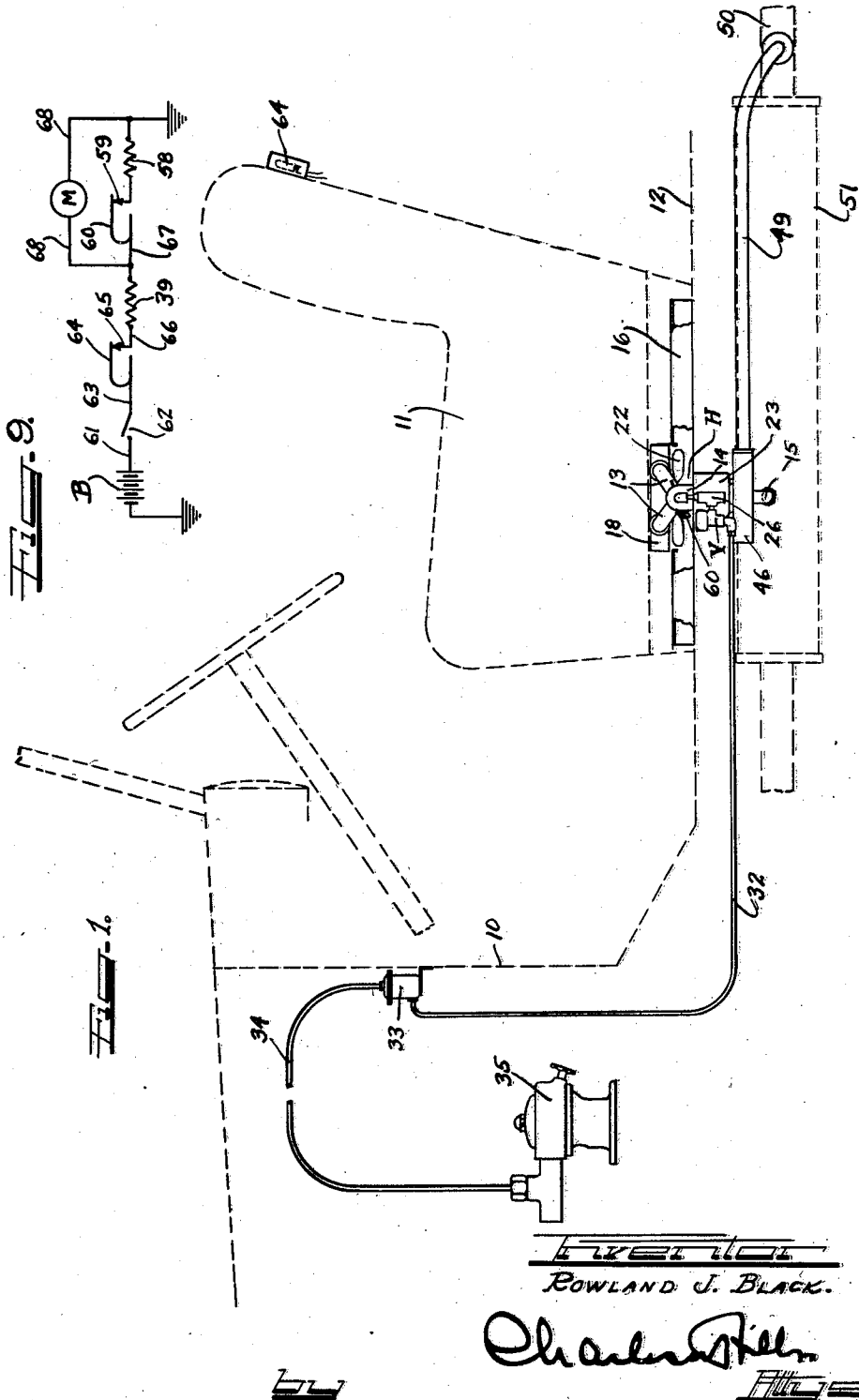
R. J. BLACK

2,207,776

AUTOMOBILE HEATING STRUCTURE

Filed Jan. 20, 1939

4 Sheets-Sheet 1



Rowland J. Black.

Charles F. Hill

July 16, 1940.

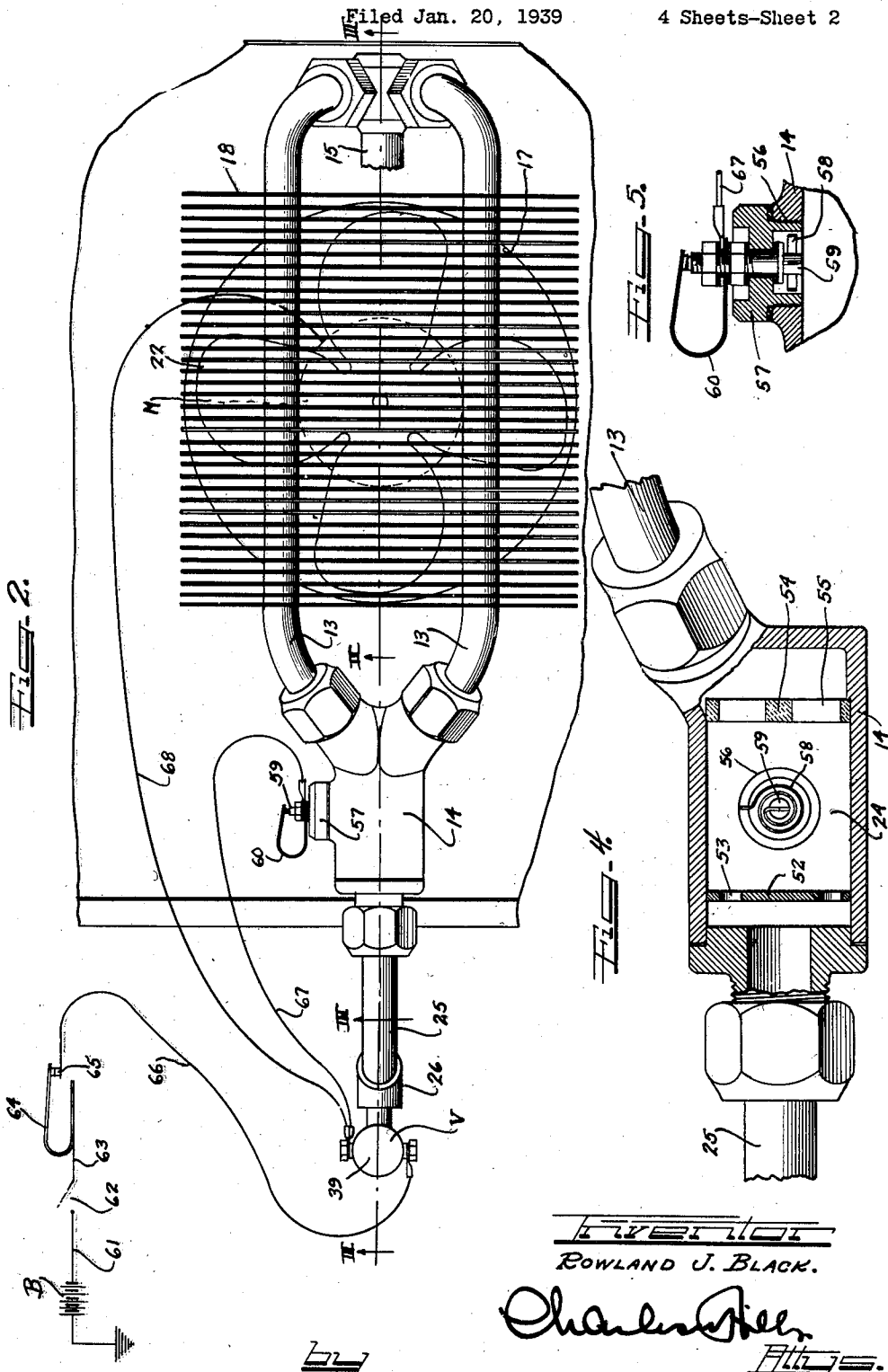
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AUTOMOBILE HEATING STRUCTURE

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4 Sheets-Sheet 2



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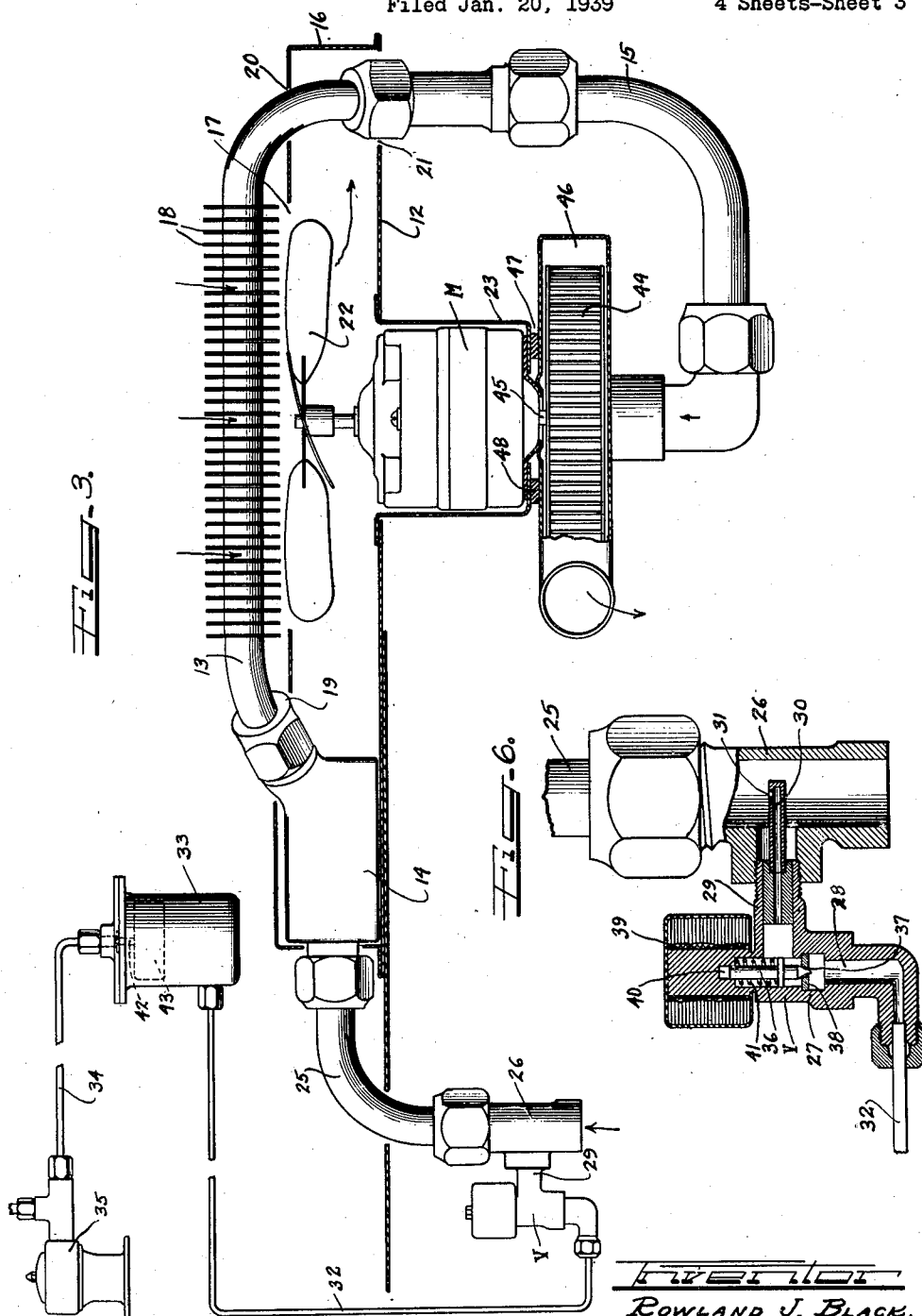
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AUTOMOBILE HEATING STRUCTURE

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4 Sheets-Sheet 3



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AUTOMOBILE HEATING STRUCTURE

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4 Sheets-Sheet 4

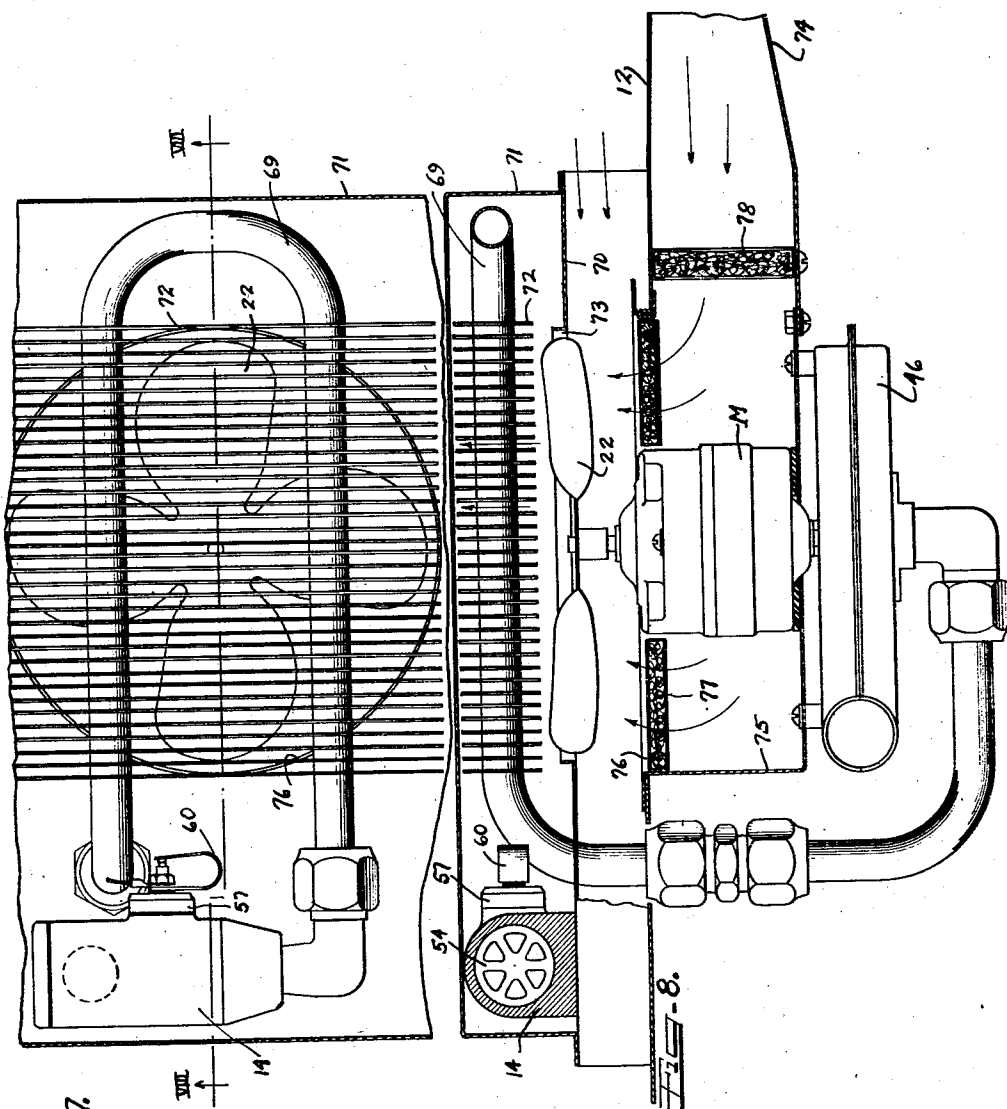


Fig. 7.

For
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Fig. 8.

UNITED STATES PATENT OFFICE

2,207,776

AUTOMOBILE HEATING STRUCTURE

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6 Claims. (Cl. 237—12.3)

This invention relates to automotive heating systems, more particularly of that type in which hydrocarbon fuel is burned in a heater and the products of combustion drawn through heater flues past which air is blown to be heated before delivery and distribution in the automobile body. The invention contemplates a number of improvements in the construction, arrangement and cooperation of heater structure elements, fuel supply means, and operation control.

The various features of the invention are shown incorporated in the drawings, in which drawings:

Figure 1 is a side elevation more or less diagrammatically illustrating the relative location and assembly of the heating system elements;

Figure 2 is an enlarged plan view of the heat producing structure and showing the circuit connections;

Figure 3 is a side elevation of the parts shown in Figure 2, with the housing in section on plane III—III Figure 2;

Figure 4 is an enlarged section of the combustion chamber on line IV—IV Figure 2;

Figure 5 is an enlarged section of the combustion mixture ignition element and a circuit controlling thermostat element mounted thereon;

Figure 6 is an enlarged section of the combustion fuel supply control element;

Figure 7 is a plan view of a modified arrangement;

Figure 8 is a section on plane VIII—VIII Figure 7; and

Figure 9 diagrammatically shows the circuit arrangement and connections.

Referring to Figure 1, 10 represents the vehicle body and 11 the front seat, the floor being indicated at 12.

The heat producing structure, designated as a whole as H, is located partly above and partly below the floor line underneath the front seat.

Referring to Figures 2 to 6, the heat producing assembly includes a heater comprising parallel flues or pipes 13 extending from the combustion chamber frame 14 and leading to an exhaust conduit 15. A flat comparatively shallow hood 16, preferably of sheet metal, rests on the floor 12 below the bottom of the seat 11 and has the opening 17 in its top below the flue pipes 13, these pipes being provided with radiating fins 18. The entrance and exit ends of the flue pipes extend through passages 19 and 20 respectively in the hood top wall, the exhaust pipe 15 extending downwardly through the passage 21 in the floor 12. The hood 16 is closed at its sides but is open at its front and rear to the car body above the floor 12 for emergence of heated air for heating of the car.

Within the hood 16 and directly below the opening 17 in the hood top is a fan 22 propelled by an electric motor M, the motor being sup-

ported in a sheet metal cup frame 23 depending from the vehicle floor 12. In the arrangement shown in Figures 1 to 6, the fan is rotated by the motor M in a direction to cause it to draw air downwardly past the flue pipes 13 and the fins thereon so that air is drawn by the fan from the car body through the space between the bottom of the seat and the top of the hood 16 and blown out back into the body through the front and rear open sides of the hood. The heat producing means may be the exhaust gases of the vehicle engine drawn through the flue pipes 13 so that the air passed around the flue pipe fins will be heated before discharged into the vehicle. Preferably the heating is accomplished by the combustion of hydrocarbon fuel, such as gasoline, in the combustion chamber 24 in the frame 14. The flue pipe circuit extends from the inner end of this frame 14, and connecting with the outer end of the frame is a conduit 25 with whose lower end a combustion mixture producing device or carbureter 26 is connected. Referring particularly to Figure 6, a valve structure B is provided for controlling the flow of the gasoline into the carbureter 26, the body 27 of the valve structure having the longitudinally extending passageway 28, and a laterally extending nipple 29 by which it is secured to the carbureter 26, a nozzle 30 supported in the nipple extending into the carbureter passageway and having the jet 31 in its upper side, the lower end of the carbureter bore being open to the atmosphere.

The valve passageway 28 is connected by a pipe 32 with a fuel supply and storage tank 33 which is supplied with fuel through a pipe 34 from a pump 35 which also feeds gasoline to the carbureter (not shown) for the vehicle engine. As shown on Figure 1, the tank 33 may be located in front of the dashboard under the engine hood.

To control the flow of the fuel through the valve structure, I have shown a needle valve 36 cooperating with the port 37 in the disk 38 seated in the passageway 28 in advance of the passageway through the nipple 29. In order to control this valve from a distance, a magnetizing coil 39 surrounds the upper end of the valve body around the bore 40 into which the upper end of the valve stem extends. A spring 41 tends to keep the valve down to close the port 37 but upon current flow through the magnetizing coil the valve will be lifted for opening of the port and flow of the fuel through the valve body and through the jet tube 30.

In order that the tank 33 may be kept filled with fuel, it may be provided with an inlet valve 42 controlled by a suitable float 43. The tank will then always provide a constant pressure head for discharge of the fuel through the valve structure V and into the carbureter 26.

The combustion mixture in the form of air and

fuel may be drawn from the carbureter 26 into the combustion chamber 24 by vacuum pull, in which case the exhaust pipe 15 of the heater structure would be connected with the engine intake manifold. However, I prefer to use more positive propulsion means and I have shown a suction creating device connected with the pipe 15 and driven by the motor M. This suction producing device may be in the form of a centrifugal blower whose rotating or suction producing element 44 is connected to the lower end of the armature shaft 45 of the motor, to the upper end of which shaft the fan 22 is secured. The blower housing 46 is secured to the motor housing cup 23 and such securing may be by means of welding the blower housing at its central portion to the motor frame or to the cup 23, with insulating air space 47 and a washer 48 of asbestos or similar material interposed between the housings as clearly shown on Figure 3. The outlet end of the blower housing may communicate directly with atmosphere but preferably it is connected by a pipe 49 with the exhaust pipe 50 extending from the muffler 51, as clearly shown in Figure 1.

Referring to Figure 4, at the inlet end of the combustion chamber 24 is a cross wall in the form of a disk 52 having passageway 53 adjacent to its periphery so that the incoming air and fuel mixture from the carbureter 26 will be deflected laterally for flow through the passages 53 adjacent to the wall of the body 14. Adjacent to the outlet end of the chamber 24 is a cross wall in the form of a disk 54 provided with passageways 55, this disk being of refractory material which may become heated to incandescence by the combustion of the combustion mixture within the combustion chamber 24.

Referring to Figures 4 and 5, the combustion chamber body 14 has a side opening 56 for receiving a plug 57 for supporting the igniter element. The igniter element shown is in the form of a spiral coil 58 secured at its inner end to the lower end of a pin 59 extending through the plug 57 but insulated therefrom, the coil at its outer end being in contact with the body 14. A thermostat element 60 of bimetal and of U-form is secured by one of its legs to the pin 59 but is insulated therefrom, the other leg terminating above the upper end of the pin, the arrangement being such that when the thermostat is closed it will close to contact the pin and when it is heated to a predetermined temperature it will open or disconnect from the pin. When the coil 58 is heated by current flow therethrough, the combustion mixture drawn into the chamber 24 is ignited for combustion and the generation of intense heat, the combustion products being drawn through the flue pipes by the suction producing device 46 and discharged into the exhaust pipe of the vehicle muffler.

Figures 2 and 9 show the circuit arrangement. The source of current may be the vehicle battery B whose one pole is grounded. A conductor 61 leads from the other pole of the battery to a main switch 62 which may be mounted on the instrument board of the vehicle. A conductor 63 connects the switch with a thermostat element 64 which normally engages a contact 65 connected by conductor 66 with one terminal of the magnetizing winding 39 for the valve structure V, the other terminal of this winding being connected by conductor 67 with the thermostat element 60 associated with the ignition coil 58, this thermostat element normally contacting the pin 59 which is connected with one terminal of the ig-

niton coil 58 whose other terminal is connected with ground through the body 14 of the combustion chamber. A conductor 68 extends from the terminal of the magnetizing winding 39 to ground and includes the motor M, the motor being thus in a circuit path which is in bridge of the path which serially includes the thermostat 60 and the ignition coil 58.

The connection of the battery with the heater system is controlled by the main switch 62 which is manually operable, and automatically by the thermostat 64 which may be mounted on the back of the front seat at substantially the middle part of the vehicle, the thermostat switch being normally closed but being open when the heat in the vehicle reaches a predetermined maximum. When the heater system is to be started, the switch 62 is closed and the current then flows from the battery through the thermostat 64 and the magnetizing winding 39, part of the current then flowing through the motor and part through the thermostat 60 and the ignition coil 58. The fuel supply valve 36 is opened and the motor is operated to create suction in the combustion line so that fuel and air are drawn in through the carbureter 26 and into the combustion chamber 24 for ignition by the ignition coil 58. The thermostat 60 is subjected to the heat given off by the combustion chamber and when this temperature reaches a predetermined point the thermostat 60 opens to disconnect the ignition coil from circuit, and the wall 54 of ceramic or other refractory material, which has become heated to incandescence, will now function to ignite the combustion mixture within the combustion chamber 24.

The resistance of the ignition coil 58 may be made such that while this coil is connected in circuit by the thermostat 60, there will be sufficient current flow through the branch circuit containing the motor M for comparatively slow operation of the motor. The combustion mixture and combustion product will therefore be comparatively slowly drawn through the ignition and combustion chambers and the heater flues for thorough combustion and economical and efficient starting of the heat producing operation. After the system has thus been efficiently started, the thermostat 60 will respond to the generated heat and will disconnect the ignition coil from circuit and the incandescent disk 54 will then take care of the ignition. As soon as the thermostat opens, the motor M will receive normal current flow and the fan will be operated at full speed for drawing cold air from the vehicle and returning the air after heating thereof. The comparatively slow preliminary operation of the fan is advantageous in that it creates a slow draft through the heater tubes and fins and prevents a building up of an excessive heat area at the heater and the sudden blowing of such excessive heat into the vehicle, which condition might happen if the fan were not started until after such heat accumulation.

Should the temperature in the vehicle rise above a predetermined maximum, the thermostat 64 will open the main circuit, or the main switch 62 may be manually opened for stoppage of heat generation.

Figures 7 and 8 show a modified arrangement. The heater, instead of comprising two flues in parallel as in Figure 2, comprises a U-shaped tube 69 connected at one end with the combustion chamber structure 14 and at its other end communicating with the housing 46 of the suc-

tion producing element whose rotor is driven by the motor M which also drives the fan 22. The fan 22 is within a rectangular hood 70 mounted on the car floor 12, the hood at its sides being open to the car body above the floor for the inflow of air. Over the hood 70 is the hood 71 in which the heater coil 69 is disposed with the radiator fins 72 thereon above the opening 73 in the top wall of the hood 70, in which opening the fan 22 operates to blow air from the hood 70 into the hood 71 for heating thereof and for delivery into the car body through the open front and rear ends of the hood 71. The combustion chamber structure 14 is also located within the hood 71.

Fresh air may be introduced into the vehicle from the outside thereof. As shown a fresh air duct 74 may extend inwardly from the sides of the vehicle to the housing 75 surrounding the motor 10, this housing having the passageway 76 into the hood 17 in which the fan is located so that the fan will also draw air from the outside of the vehicle in addition to the air drawn in from within the vehicle, for delivery, after heating, to the car interior. A wall of filtering material 77 may be interposed in the opening 76, and a filter structure 78 may also be interposed between the air inlet duct 74 and the housing 75 for filtering the outside air before delivery into the car body. The proportion of fresh outside air to the recirculated air could be readily properly proportioned as desired.

In my improved heating system, the positively driven suction means for drawing in the fuel and circulating the combustion product will adapt the system for heating operation independently of the running of the vehicle engine, the fuel supply tank 33 being of sufficient capacity to provide sufficient fuel for a considerable length of time after the vehicle engine stops running.

The unitary assembly including the suction blower, the fan and the common driving motor therefor is simple, compact, and efficient and assures proper cooperation of the combustion products circulation and the air circulation.

I have shown a practical and efficient embodiment of the various features of my invention but I do not want to be limited thereto as changes and modifications may be made without departing from the scope of the invention.

I claim as my invention:

1. Automobile heating structure comprising a heat radiator located above the floor of the vehicle, means for supplying heat producing medium for said radiator, a suction producing device below the car floor connected with said radiator to cause the heating medium to flow therethrough, a fan between the car floor and said heat radiator for propelling air to be heated past the radiator, and an electric motor suspended below the car floor and having driving connection with said fan and said suction producing device.

2. Automobile heating structure comprising a combustion chamber, means for supplying combustible fuel for said combustion chamber, a heat radiator for receiving the products of combustion from said combustion chamber, a suction producing device connected with said heat radiator for drawing the combustion fuel into said combustion chamber and the products of combustion out of said heat radiator, a fan for propelling air past said heat radiator, an electric

motor for driving both said fan and said suction producing device, an ignition element for said combustion chamber, a thermostat subjected to the temperature of said combustion chamber, a source of current, parallel circuits receiving current from said source, one of said circuits including said motor and the other circuit serially including said ignition element and said thermostat, the resistance to current flow of said ignition element including circuit being such that when said circuit is closed said motor circuit will receive only sufficient current flow for comparatively slow driving of said fan and suction producing device and when said ignition element circuit is opened by said thermostat said motor will receive current flow for full speed operation thereof.

3. Automobile heating structure comprising a heat radiator located above the floor of an automobile, means above the floor for supplying heating medium for said radiator, means below the floor for causing heating medium to flow through said radiator, a hood between the floor and radiator having a passageway below the radiator, a fan within said hood at said passageway, a supporting frame depending from the floor, and an electric motor mounted in said frame for driving said fan and said flow causing means.

4. Automobile heating structure comprising a heat radiator adapted to receive heating medium, a fan between said radiator and the automobile floor, a supporting frame depending from said floor and an electric motor supported thereby having driving connection with said fan, and a blower structure for causing the heating medium to flow through said heat radiator, said blower structure comprising a housing secured to and supported by said motor supporting frame and a rotary element driven by the motor.

5. A vehicle heater structure comprising a combustion chamber above the vehicle floor, means below the floor for supplying combustible fuel to said chamber, means for igniting the fuel in said chamber, a heat radiator above the floor connected to receive the products of combustion from said chamber, a suction producing device below the floor connected with said heat radiator for producing suction to draw the combustible mixture into said combustion chamber and the products of combustion out of said radiator, a fan adjacent to said radiator for distributing the heat and air, and a common driving motor for said suction device and said fan located below the vehicle floor.

6. A vehicle heating structure comprising a motor chamber below the vehicle floor, a fan chamber above the vehicle floor connected with said motor chamber, a motor in said motor chamber and a fan in said fan chamber, said fan chamber having an outlet, a heat radiator located above said outlet, a combustion chamber for supplying heat producing medium for said radiator, a blower structure comprising a housing secured to the under side of said motor chamber and a rotary element in said housing, said motor having driving connection with said fan and with said rotor for causing said rotor to force the heat producing medium through said radiator and to cause said fan to blow heated air past said radiator, and air inlets for said motor chamber and said fan chamber.

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