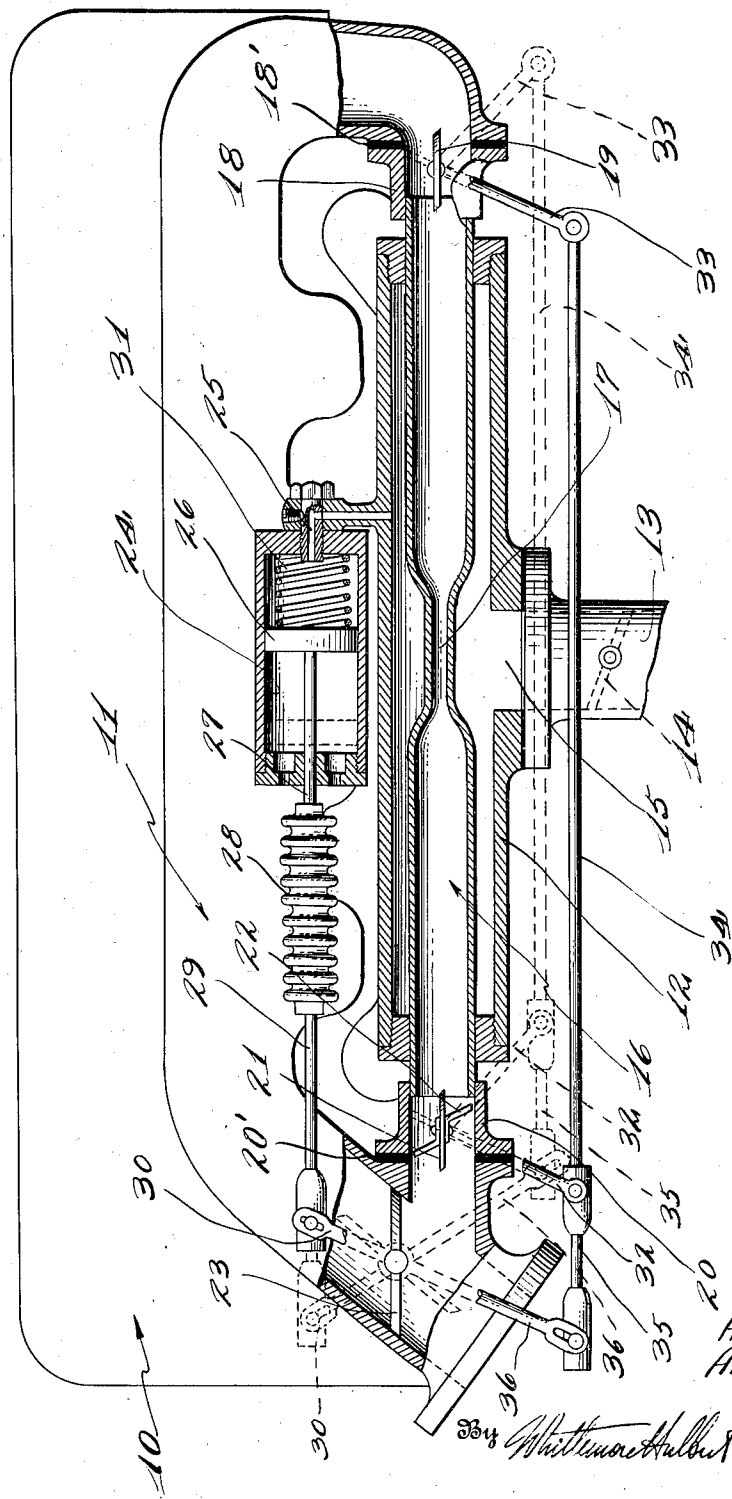
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MANIFOLD CONSTRUCTION

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MANIFOLD CONSTRUCTION

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This invention relates to a manifold construction and more particularly to an improved construction of this character including a novel arrangement of heat controlling means.

One of the objects of this invention is to provide apparatus of this character wherein means is provided for passing a heated fluid through the mixture generated by the carbureting device; for controlling the rate of flow of the heated fluid; for localizing the heat at the desired point or points with reference to the gaseous mixture; and to obtain these advantages without altering the proportions of the mixture.

Another important object of this invention is to provide apparatus of this character whereby the heat employed for controlling the temperature of the mixture generated by the carbureting device is controlled jointly by the operation of the engine and the under-hood temperature.

Another object of this invention is to provide apparatus of the herein described character wherein the amount of heat permitted to act upon the gaseous mixture may be automatically regulated and controlled in accordance with the operating conditions of the engine at that particular instant.

Still another object of the invention is to provide apparatus of this nature wherein the flow of the heat fluid is controlled by valves actuated by a suction device connected to the intake manifold of the engine, the effect of this suction device upon the valves being further controlled by a thermostatic device responsive to changes in the under-hood temperature.

Various other objects, advantages and novel details of construction of the present invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawing wherein our improved manifold construction is shown in combination with a conventional type of motor the parts being partly in elevation and partly in vertical section.

Referring now to the drawing wherein like reference characters indicate like parts it will be noted that there is illustrated fragmentarily a conventional type of motor 10 provided with an exhaust manifold 11 and an inlet manifold 12 connected to a carburetor 13. The reference character 14 indicates the usual butterfly valve located between the carburetor 13 and intake manifold 12. The gaseous mixture generated by the carburetor 13 enters the intake manifold 12 substantially centrally longitudinally thereof through the inlet opening 15.

Extending longitudinally through the intake manifold 12 is a heating device indicated generally by the reference character 16. This heating device consists essentially of a pipe or conduit which enters the inlet manifold 12 through one end thereof and passes longitudinally therethrough and out of the manifold through the other end. Exhaust gases are adapted to be passed through this heating element 16 in a manner to be more fully hereinafter described, but it will be apparent that by reason of this construction a thorough heating of the mixture from the carburetor will be obtained because the heating device extends throughout the entire length of the manifold.

It is desirable and expedient to localize the heat of the heating device at one or more points throughout the intake manifold and in the present embodiment the heat is localized adjacent the inlet opening 15 of the manifold. This is accomplished in the present instance by forming the heating device 16 with a restricted portion 17. Thus the passage of the exhaust gas through the heating element is retarded at the restricted portion 17 thus causing this restricted portion 17 to become more highly heated than the remaining portion of the heating element to thus localize the heat adjacent the opening 15 where the carbureted mixture enters the intake manifold. Obviously the heat may also be localized at any desired point or points throughout the length of the heating device by forming this heating device 16 with a portion or portions of different cross section or by having a portion or portions of greater size or diameter thus presenting a greater exposed area to the mixture being heated.

The heating element 16 is connected to one end of the exhaust manifold as indicated at 18 and a valve 19 is located adjacent this connection for controlling the passage of the exhaust gases from the exhaust manifold into this inlet end of the heating element. The other end of the heating element is connected as at 20 to the other end of the exhaust manifold and a valve 21 is located adjacent this connection for further controlling the passage of the exhaust gases through the heating element. Preferably associated with the valve 21 are baffle members 22 which act, even in the open position of valve 21 to retard the passage of the exhaust gases through the heating element to the exhaust manifold. The connection 18 between the heating element and the exhaust manifold at one end includes a washer or gasket 18′ of asbestos or other material which is a non-conductor of heat and the connection 20 between the heating element and the manifold at the other end includes a gasket or washer 20′ of asbestos or other material which is a non-conductor of heat. Thus the heat stored in the mass of metal which comprises the exhaust manifold cannot flow from this exhaust manifold through the heating device to the intake manifold to overheat this manifold and the carbureted mixture therein contained. This back-flow of heat frequently occurs, particularly after the motor has been driven hard or continuously and is stopped. Such back-flow to the heat intake manifold sometimes sufficiently overheats the carbureted mixture to prevent the ready starting of the motor again. By insulating the heating device and the exhaust manifold in the manner just described this objection is eliminated.

Located in the outlet end of the exhaust manifold is a main valve 23 the purpose of which is to cause more or less of the exhaust gas to flow through the heating element 16, this valve being located above the connection 20 between the outlet end of the heating element and the exhaust manifold. Obviously as valve 23 approaches closed position more of the exhaust gas is caused to travel through the heating element 16 and as valve 23 approaches open position the opposite conditions exist.

For controlling valves 19, 21 and 23 there is provided a suction device here shown as consisting essentially of a cylinder 24 connected at one end thereof by a conduit 25 with the intake manifold 12. A piston 26 reciprocates in cylinder 24 and is connected by means of a rod 27, a thermostat 28 and a second rod 29 to an operating lever 30 of valve 23. If desired, a bellows or bellow-like device may be substituted for the vacuum or suction device herein illustrated. The thermostat 28 may be in the form of a metallic bellows although obviously any desired type of thermostat may be employed. A coil spring 31 located within cylinder 24 acts normally to urge piston 26 to the left, as viewed in the drawing, against the action of the vacuum created in the right hand end of the cylinder by reason of its connection with the intake manifold. Valve 21 is provided with an operating lever 32 and valve 19 is provided with an operating lever 33 which are united as for instance by means of a link rod 34 so that they may operate in unison. A rod 35 connects the operating lever 32 of valve 21 to an arm 36 connected to valve 23. Therefore any movement of piston 26 simultaneously operates valves 23, 21 and 19.

In operation, when the engine is idling, the suction of the intake manifold 12 moves the piston 26 to substantially the full line position shown in the drawing to thus cause the valves 19, 21 and 23 to assume substantially the positions also illustrated in full lines. Under these conditions substantially all of the exhaust gases from the exhaust manifold are caused to flow through the heating element 16. As the throttle valve 14 is opened the suction effort exerted by the intake manifold is diminished in accordance with the increased speed of the motor and as a consequence spring 31 acts to move piston 26 toward the left to move the several valves toward their dotted line positions. Obviously as valve 23 approaches its full open position a greater percentage of exhaust gas is permitted to pass directly out through the exhaust manifold. This creates an ideal condition because under these circumstances a greater quantity of exhaust gas is passing through the exhaust manifold and consequently a smaller percentage of the total amount of the exhaust gas in the exhaust manifold will be sufficient to properly heat the heating device 16. Furthermore under these conditions less heat is required for the carbureted mixture because of the heat developed by the engine running at high speed.

The thermostat 28 is responsive to changes in the temperature of the air surrounding the motor or in other words to the underhood temperature. As this temperature rises, thermostat 28 extends and lengthens the connection between piston 26 and valve 23. Therefore, even though the piston 26 is moved to a position where valve 23 would normally be closed the lengthening of the connection between this piston and valve 23 will cause the valve to remain open more or less whereby less of the exhaust gas is caused to travel through the heating element. This also is an ideal condition because under these circumstances the heat of the motor is such that it is unnecessary or undesirable to highly heat the incoming mixture from the carburetor.

It will be noted that with the herein described construction the combustible mixture in the intake manifold is heated by passing

the heating fluid through the mixture without altering the proportions of this mixture and that further with the herein described construction the heat may be localized at any desired point.

It will be obvious that while one specific embodiment of the invention has been illustrated and described in detail various changes in many of the essential and all of the non-essential details of construction may be resorted to without departing from the spirit and scope of this invention and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

What we claim as our invention is:—

1. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for heating the charge passing through said intake manifold, said means including a conduit connected to said exhaust manifold and extending through said intake manifold, said conduit having means for localizing the heat at one point within said manifold.

2. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for heating the charge passing through said intake manifold, said means including a conduit connected to said exhaust manifold and extending through said intake manifold, said conduit having a relatively restricted portion at one point in its length, for the purpose set forth.

3. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for heating the charge passing through said intake manifold, said means including a conduit extending longitudinally through said intake manifold, said conduit having a flattened portion for localizing the heat at one point within the manifold, and means connecting said conduit to said exhaust manifold.

4. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of a heating element including a conduit extending through said intake manifold, valve controlled means connecting said conduit to said exhaust manifold, a valve in said exhaust manifold for directing exhaust gases through said conduit and a single suction actuated mechanism for actuating said valves.

5. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of a heating element including a conduit extending through said intake manifold, valve controlled means connecting said conduit to said exhaust manifold, a valve in said exhaust manifold for directing exhaust gases through said conduit, a single suction actuated mechanism for actuating said valves and thermostatic means for modifying the action of said suction means.

6. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of a heating element including a conduit extending through said intake manifold, valve controlled means connecting said conduit to said exhaust manifold, a valve in said exhaust manifold for directing exhaust gases through said conduit, a single suction device connected to the intake manifold and actuated in dependence upon the suction in said intake manifold and means connecting said suction device to said valves for actuating the latter.

7. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for heating the charge passing through said intake manifold including a conduit extending through said intake manifold, means connecting the inlet and outlet ends of said conduit to said exhaust manifold, valves controlling said inlet and outlet, a valve in said exhaust manifold for directing exhaust gases through said conduit, means connecting said valves for simultaneous operation and a suction device connected to said intake manifold for actuating said valves.

8. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for heating the charge passing through said intake manifold including a conduit extending through said intake manifold, means connecting the inlet and outlet ends of said conduit to said exhaust manifold, valves controlling said inlet and outlet, a valve in said exhaust manifold for directing exhaust gases through said conduit, means connecting said valves for simultaneous operation, a suction device connected to said intake manifold for actuating said valves and a thermo-responsive device for modifying the action of said suction means.

9. The combination with an internal combustion engine including an exhaust manifold, an intake manifold, and a charge forming device connected thereto, of means for heating the carbureted mixture including means for passing a heating medium through the carbureted mixture and for localizing the heat at a predetermined desired point.

10. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of means for passing a heating medium through the car-

bureted mixture for heating the latter and for restricting the passage of the heating medium at a predetermined point to localize the heat at the said point.

11. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of a heating device associated with said intake manifold, means for passing exhaust gas from said exhaust manifold to said heating device, a plurality of valves for controlling the passage of exhaust gas through said heating device, a pressure actuated device for actuating said valves, and thermoresponsive means for varying the actuation of said valves incident to a predetermined actuation of said pressure actuated device.

12. The combination with an internal combustion engine including an exhaust manifold, an intake manifold and a charge forming device connected thereto, of a heating device associated with said intake manifold, means for passing exhaust gas from said exhaust manifold to said heating device, a plurality of valves for controlling the passage of exhaust gas through said heating device, a fluid actuated device, a connection between said fluid actuated device and said valves for actuating the latter from the former, and thermoresponsive means for adjusting said connection.

13. The combination with an internal combustion engine including an exhaust manifold, an intake manifold, and a charge forming device connected thereto, of a heating device arranged in said intake manifold, a conduit for passing exhaust gases from said exhaust manifold through said heating device, a valve for controlling the flow of exhaust gases through said conduit, a suction device connected to the said intake manifold, a connection between said suction device and said valve for actuating the latter from the former, and a thermostat in said connection for modifying the control of the valve by the suction device.

14. The combination with an internal combustion engine including an exhaust manifold, an intake manifold, and a charge forming device connected thereto, of a heating device arranged in said intake manifold, a conduit for passing exhaust gases from said exhaust manifold through said heating device, a valve for controlling the flow of exhaust gases through said conduit, a suction device connected to the intake manifold, a connection between the suction device and the valve for controlling the latter from the former, and temperature controlled means for varying the effective length of said connection.

15. The combination with an internal combustion engine including an exhaust manifold, an intake manifold, and a charge forming device connected to the intake manifold, of a heating device associated with the said intake manifold, a conduit for conducting exhaust gases from said exhaust manifold to said heating device, a valve for controlling the flow of exhaust gases through said conduit, a suction device connected to the intake manifold, a connection between the suction device and the valve for actuating the latter from the former, and temperature responsive means for adjusting said connection.

In testimony whereof we affix our signatures.

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