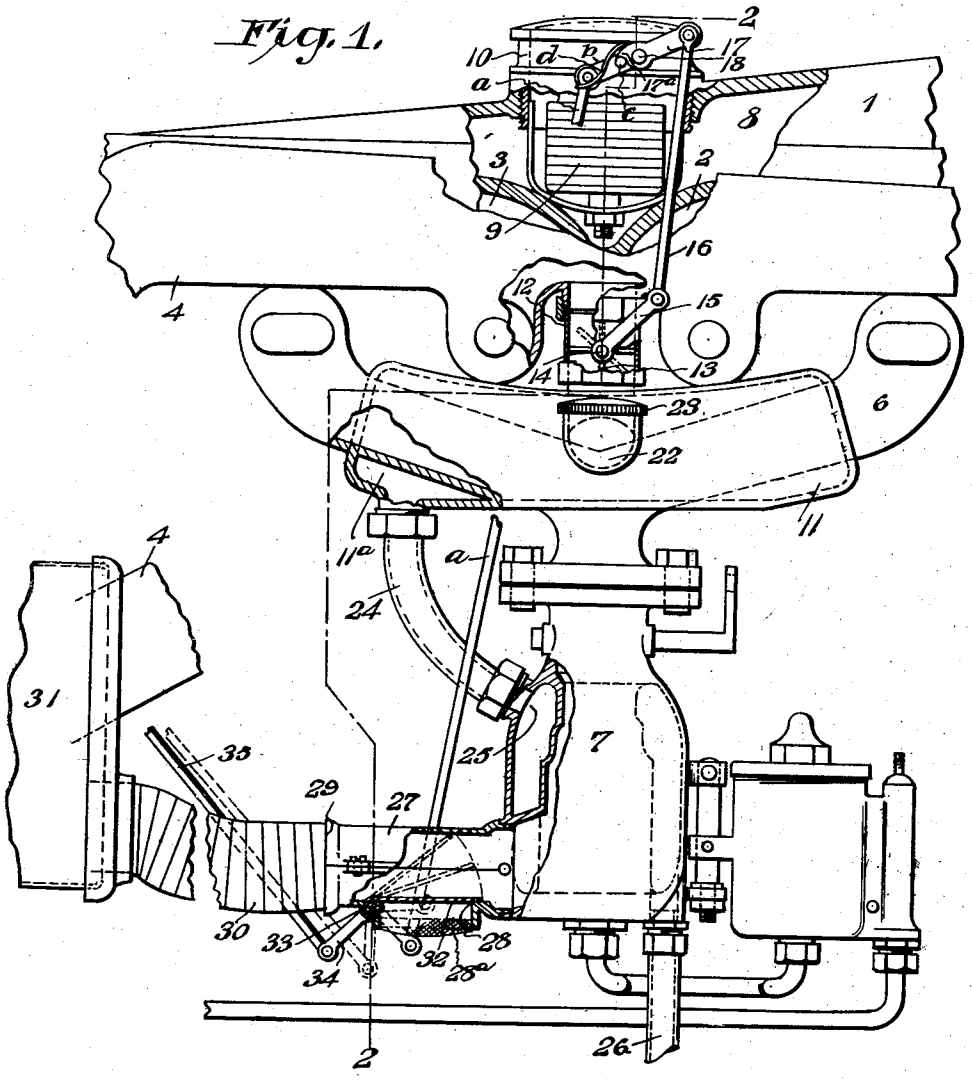
May 4, 1926. 1,583,584

G. W. DONNING

CARBURETOR

Original Filed Dec. 10, 1918 2 Sheets-Sheet 1

Fig. 1.



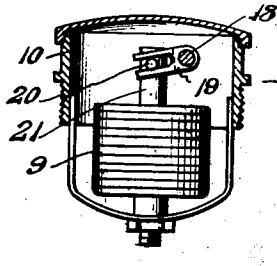


Fig. 3.

Inventor:
George W. Donning
by
Edmund H. Parry
Atty.

May 4, 1926. 1,583,584

G. W. DONNING

CARBURETOR

Original Filed Dec. 10, 1918 2 Sheets-Sheet 2

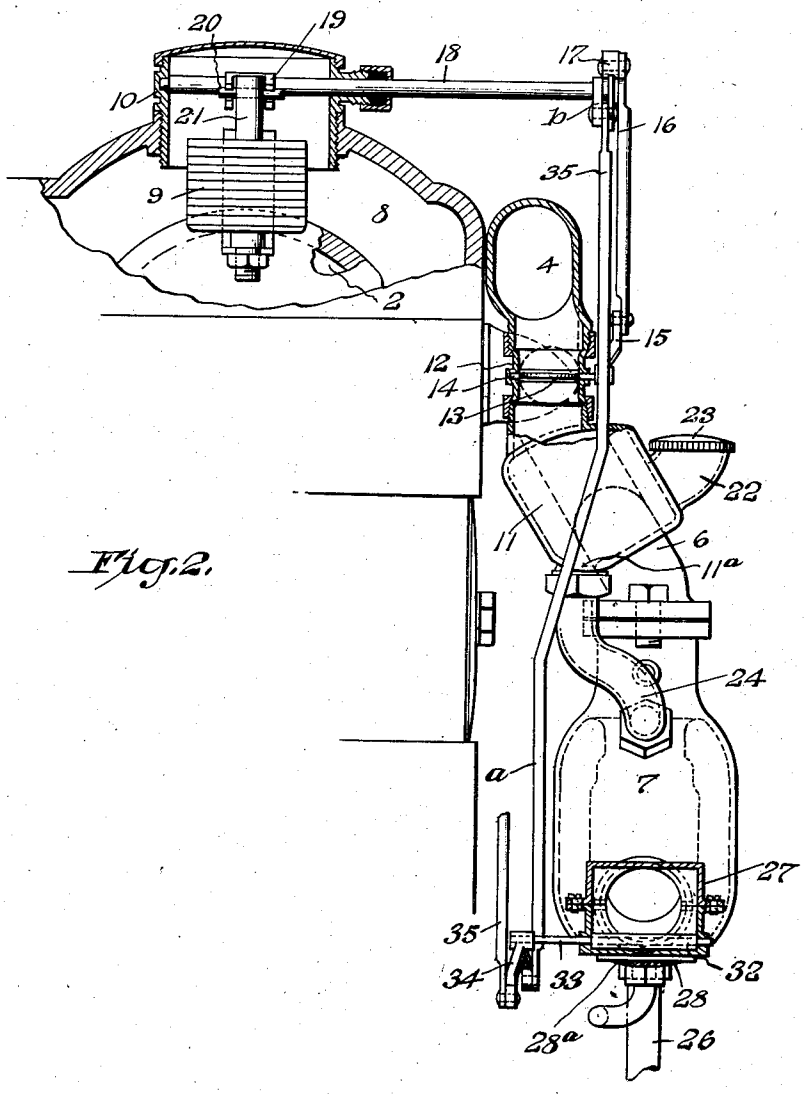


Fig. 2.

Inventor:
George W. Donning
by
Edmund A. Parry
Atty.

Patented May 4, 1926. 1,583,584

UNITED STATES PATENT OFFICE.

GEORGE W. DONNING, OF BRIDGEPORT, CONNECTICUT.

CARBURETOR.

Application filed December 10, 1918, Serial No. 266,089. Renewed September 25, 1925.

To all whom it may concern:

Be it known that I, GEORGE W. DONNING, a citizen of the United States of America, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Carburetors, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention primarily relates to carburetors and more particularly to a type thereof which contemplates the heating of its adjunctive intake-manifold or inlet and, also, of the carburetor itself preliminarily and, then, a further heating of the carburetor in accordance with requirements as such requirements may automatically be indicated by thermal conditions in the motor to which it is attached.

It is a generally recognized fact that, for some time past, the fuel for internal combustion-motors has been of a low grade and of low specific gravity and high-flash point, and that, moreover, the more volatile fuels are now and will more and more in the future be conserved for aeroplanes, submarines, and the like, while automobile, launch, tractor and stationary motors will consume the less volatile, low-grade types of gasoline, kerosene, alcohol, etc.

To obtain satisfactory and efficient results from the start, all carbureting-devices should be heated initially (that is, primarily) in order to vaporize and gasify the low-grade fuel and thereby facilitate the starting of the motor; and, then, before the initial heating becomes dissipated, it is necessary to secure heat, as from the running motor, to continue the vaporizing and gasifying of the fuel.

I am aware that it has heretofore been proposed to direct the heated gases of the motor-exhaust against the walls of the intake-manifold when the motor is to be started and especially when the latter is so cold as to be difficult if not impossible to start: In such a structure, the exhaust-gases are usually shunted through a suitable conduit to the housing which encompasses a portion of the manifold. A manually-operated valve controls the flow of the gases, but, in this instance, the operation of the valve is dependent upon no definite conditions except as the driver may be able to guess at them. At best, this makes for uncertainty and also more or less unsatisfactory results. Nevertheless, this structure has been widely and extensively exploited and has met with great commercial success.

But it is a primary object of my invention to eliminate this feature of uncertainty and to provide for automatically controlling the flow of the heated exhaust gases so that their application to the manifold and walls of the carburetor is in direct correspondence with the thermal conditions thereof and these conditions then are maintained with a tendency toward precise variability to accord with variations in the attached motor until such times as the motor is supplied with a properly vaporized gaseous mixture.

It is also an object within the contemplation of the invention to provide additional automatic means for heating the air introduced to the carburetor, such heating being also effected by the exhaust-gases, there being thermostatically-operated means for automatically controlling the flow of the same in precise accordance with thermal conditions prevailing in the carburetor. I, therefore, employ means for effecting the heating and which I may term a "primary heating device", and it is primary in the sense that it follows the initial heating already referred to. This primary heating-device is constructed in a manner to furnish ample heat in the coldest weather as well as during the long hot-weather period; and, while it will supply a maximum amount of heat at all times and, generally, greatly in excess of that required; provision is made for the control (preferably automatically) of the heating device.

Another object of the invention is to make this structure a permanent part of the equipment rather than as a mere attachment, because it is useful in any season of the year and whenever the motor-temperature is below ideal temperature-working conditions, as (for example) for the first cranking of the day or while moving against a cool-breeze, at night, and in the winter-time.

The invention has other objects in view and these and the resulting advantages thereof as well as the advantages arising from the other features, already adverted to, will be apparent from the following description.

With these several objects in view, the invention resides in the novel structure and in

the novel aggroupment of its components, all as hereinafter set forth.

In order that the invention may be readily comprehended, drawings are hereto appended, these showing (by way of illustration) a preferred embodiment of my invention; it being manifest therefrom that the invention is susceptible of a wide range of modification and variation without departing from its spirit or sacrificing any of its salient features and underlying principles.

In these drawings:

Figure 1 is a fragmentary view in sectional elevation of a combined motor, manifold, carburetor and my improvement incorporated in the combination;

Figure 2 is a fragmentary view in vertical transverse section, on the line 2—2, Fig. 1; and

Figure 3 is a detached view, in vertical section of a thermostat forming a component of the improvement.

Referring to these drawings, the reference numeral 1 designates a motor having firing-chambers, 2 and 3, and an exhaust 4. Communicating with the firing-chambers is an intake-manifold or intake-orifice 6, of any required type, and this is, as usual, operatively associated with a carburetor 7. The details of the carburetor here shown do not constitute a part of the present invention, and, since they are embodied in my co-pending applications, Serial Nos. 138,898 and 244,452 filed, respectively, Nov. 28, 1916, and July 11, 1918, I do not now describe them specifically.

The firing-chambers of the motor are surrounded by a water-jacket 8. Extending through the walls and within the effective zone of this water-jacket and of the firing-chambers is a thermostat 9, this being housed within a thermostat-housing 10. The thermostat may be of any type best suited for the purpose and adapted to act under the influence of the thermal conditions of the cooling-fluid circulating through the jacket and which fluid is, itself, influenced by the heat generated in the firing-chambers. Its function is, when actuated by said thermal changes, to operate certain mechanism presently to be described.

Encompassing a portion of the intake-orifice or manifold—and formed as an integral part thereof or made attachable thereto—is a gas-receiving jacket or housing 11 which is connected as by a conduit 12, to the exhaust. This conduit is a means for conveying heated gases from the exhaust into the jacket 11. The purpose of so introducing such gases into the jacket is to direct a heating medium against the walls of the manifold in order to heat the same and thereby maintain the gaseous-mixture in proper condition while passing from the carburetor into the firing-chambers. It is, of course, desirable to control the flow of these gases so that only a predetermined but variable degree of heat may be developed within the jacket: To that end, I provide a valve 13 in the conduit and, in this instance, I provide for automatic operation thereof, as by the thermostat 9. That is to say, the valve is fast on a shaft 14 which is journaled in the walls of the conduit. Upon one end of this shaft extending outside of the conduit, is a crank-member 15; and to this is pivotally connected one end of an actuating-rod 16, the opposite end thereof being pivoted to a crank-member 17 which is fast on a shaft 18 journaled in the walls of the thermostat-casing 10. Mounted on this shaft 18 is a bifurcated member 19 which embraces a pin 20 outstanding from a stem 21 secured to the thermostat-element 9. It will now be manifested that, when this thermostat expands, it will (through the stem 21, crank-members 17 and 15, and interconnecting rod 16) transmit movement to the valve 13 and operate it. Normally, the valve would be open to permit the flow of the gases from the exhaust into the jacket 11, to heat it and, thus, the mixture passing through the manifold into the motor; but, as soon as the motor reaches a certain, predetermined temperature it is advisable to cut off or partly cut off the heating-medium in order that it may not pass into the jacket. This is accomplished automatically by the thermostat and at just the proper moment, as when thermal conditions in the firing-chamber may require that the temperature of the mixture entering therein shall be raised or lowered.

The foregoing structure is what I may call a primary heater and is of course, that which is effective under conditions where the motor is operating and is developing a heating-medium—in the form of exhaust-gases—that may be utilized to heat the manifold. But it is equally essential to provide for an initial or preliminary heating of this manifold, as when the motor is cold and is to be started. To this end, I have arranged for the introduction of a heating-fluid into the manifold-jacket 11; and, to this end, have provided it with a filling-nozzle 22—protected by a cap 23—by which hot-water or the like may be supplied to the jacket to heat it. Subsequently, when the motor has been started and is running, it will provide its own heating-medium for the jacket, as already explained.

Not only is it important thus to heat the intake manifold, first initially and, then, automatically for the continued running of the motor; but it is a feature of my invention to provide for heating the carburetor also, both initially and automatically. With that aim in view, I provide the jacket 11 with a discharge-opening 11^a, with which connects

a pipe 24 that leads into a jacket 25 which encompasses the carburetor. The contents of this jacket are discharged, as into the atmosphere, through a pipe 26 which extends into the lower part of the jacket. As will now be understood, when the heating medium—whether it be hot water or the hot-gases from the exhaust—is introduced into the manifold-jacket 11, it performs its required function of preheating the manifold first and, then, passes through the pipe 24 into the jacket 25 where it heats the carburetor to insure proper temperature of the air which is therein mixed with the fuel. This I may call a preheater. The valve 13 operates automatically to control the passage of the heating-medium and, thus, by reason of the action of the thermostat controls the temperature of the gaseous mixture which passes through the manifold into the motor. When the fuel and air are first brought together, in the carburetor, vaporization thereof causes more or less refrigeration; hence, to develop the requisite heat for completing gasification, the mixture, as it passes through the manifold, must be, and by the instrumentalities here provided is, superheated, so to speak, while the motor may be cool or below ideal working conditions. It is to be understood, of course, that the heating of the carburetor may be dispensed with and only the manifold be heated; or the carburetor may be heated by the introduction of pre-heated air into the carburetor and its temperature controlled automatically or otherwise. That is to say, I provide the carburetor with an air-intake 27 formed with ports 28 and 29. The port 28 opens to the atmosphere and is preferably protected by a mesh 29^a; while the port 28 leads into a conduit 30 which extends to a heating-box 31 that encompasses a portion of the exhaust 4. The ports 28 and 29 are controlled by a valve-member 32, hinged at 33 and operated by a crank 34 which is pivotally connected to an actuating-rod 35 that may extend to the car-dash for manual operation, or be pivotally connected, by an actuating-rod *a*, to the shaft 18 of the thermostat 9 and be operated thereby; and, hence, the valve would then be automatically operated and in accordance with thermal conditions existing in the motor 1; all as more fully described in my application, filed herewith, Serial No. 266,088. The connection between the actuating-rod *a* and the shaft 18 involves a crank-member *b* which carries an outstanding stud *c* adapted to be engaged by an extension 17^a formed on the crank-member 17. A spring *d* maintains the crank-members 17 and *b* normally in engagement. Movement of the thermostat will tend to close the valve 13 and open the port 27 while the valve-member 32 will be raised by the movement of the rod *a*. Should it be desirable, however, to close the valve-member 32 without disturbing the thermostat, a pull on the dash rod 35 will close the valve member 32 and, at the same time, draw down on the connecting rod *a* and, thus, disengage the stud *c* from the extension 17^a on the crank-member 17. The moment that the dash rod 35 is released, the spring *d* will re-engage the extension 17^a and the stud *c* to the position predetermined by the action of the thermostat.

It will be perceived from the foregoing that it is an important object of my sense-concept to furnish the carbureting-device 7 or the manifold 6, or both, with an excess amount of heat while the motor is cold, or while warming up, and then gradually lower the temperature within the carbureting-device, motor inlet-orifice, etc., while the motor-temperature is rising from warm to hot. There are times when the firing-chambers of the motor are hot enough completely to gasify the mixture, as during the suction and compression strokes. At such times, the automatic regulation herein contemplated is such that the carbureting and gasifying device 7 should act as an atomizer only. It is during the initial warming up of the motor, or during cold weather, that the device, through the ample means provided, not only vaporizes but actually gasifies the fuel, and this increases the efficiency of the motor (although it may be cool), and insures continuous instead of ragged or alternate explosions in the cylinders. Besides avoiding waste of fuel, the production of carbon is practically nil.

Another equally important object, and one which means much to the motor-operator is the fact that by the use of the aforementioned pre-heater and the primary heater, and by locating the thermostat in proximity to the firing-chamber, I am enabled to manufacture a carburetor devoid of adjustments. With a predetermined temperature secured, I am able to calculate the fuel-to-air proportions so closely that all the usual adjustments are eliminated, and the parts are permanently established.

In the event that the carbureting-device 7 is to be used with more than one grade of fuel, such as gasoline and kerosene, or gasoline and alcohol, mechanism similar to that employed in my Patents Nos. 1,233,763, 1,242,926, 1,258,881 and 1,269,689, may be utilized to retard the action of the device and the mixture passing therethrough into the motor by reason of additional heat being produced where fuel less volatile than gasoline is utilized.

What I claim is:

1. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit

connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve, said means including a jacket on the firing-chamber; a thermostat disposed adjacent the firing-chamber and partially within the jacket at a point directly influenced by the temperature of the firing-chamber; and an operating connection mechanism between the thermostat and valve, said connection including a lost-motion mechanism which permits manual operation of the valve independently of the thermostat.

2. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; and a valve operable to control the introduction of hot and cold air to the carburetor.

3. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; a valve operable to control the introduction of hot and cold air to the carburetor; and means for automatically actuating the valve which controls the air inlets, said means including mechanism connecting the thermostat and valve.

4. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; a valve operable to control the introduction of hot and cold air to the carburetor; means for automatically actuating the valve which controls the air inlets, said means including mechanism connecting the thermostat and valve; and means associated with the air inlet valve for manually actuating the valve.

5. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; a valve operable to control the introduction of hot and cold air to the carburetor; means for automatically actuating the valve which controls the air inlets, said means including mechanism connecting the thermostat and valve; and means associated with the air inlet valve for manually actuating the valve, said means including a lost-motion mechanism which permits manual actuation of the valve independently of the actuation by the thermostat.

6. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket, a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; a jacket on the carburetor; and a conduit communicating with the carburetor jacket and intake-manifold-jacket for leading heating medium to the carburetor-jacket.

7. In combination with a motor having a firing chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; a jacket on the carburetor; a conduit communicating with the carburetor jacket and exhaust-manifold-jacket for leading heating medium to the carburetor-jacket; and a filling member associated with the carburetor-jacket whereby a heating medium may be introduced to the jacket independently of the exhaust-manifold heating.

8. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the in-

take-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; and a single valve associated with the hot and cold air inlets and operable to regulate the flow of each therethrough.

9. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and the intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; means directly influenced by the temperature of the firing-chamber for automatically actuating the valve; an air heating device associated with the conduit and carburetor; a single valve associated with the hot and cold air inlets and operable to regulate the flow of each therethrough; and mechanism connecting the thermostat and air inlet valve whereby the amount of hot or cold air introduced to the carburetor will be varied inversely in proportion to the changes in temperature of the firing-chamber.

10. A structure of the kind described including a carburetor, an intake-orifice in operative communication therewith, an exhaust operatively associated with the intake-orifice, a valve-device for controlling the flow of heated gases from the exhaust into heating relation with respect to the orifice, a thermostat operatively connected with the valve-device, a connection between the valve-device and the thermostat, an air-intake communicating with the carburetor, and manually operated means for controlling the passage of air through the air-intake for regulating the air flowing therethrough while the thermostat momentarily holds the valve-device in an adjusted position.

11. As a new article of manufacture for internal combustion-motors, a carburetor provided with inlet and outlet orifices, heating means associated with the orifices, valve-mechanisms disposed as specified for controlling the temperature of fluids passing through the inlet and outlet orifices, means influenced by the temperature of the contents of the motor for operating the valve-mechanisms, and manually-operative means for effecting movement of one of the valve-mechanisms independently of the other.

12. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds; an instrumentality associated with the intake-manifold for heating the mixture passing through the intake-manifold at a point between the carburetor and firing-chamber; mechanism associated with the carburetor for introducing hot and cold air to the carburetor; an automatic instrumentality for regulating the temperature of the mixture at a point between the carburetor and intake; and means at the firing-chamber and directly influenced by the temperature of the firing-chamber for varying the temperature of the air entering the carburetor inversely in proportion to the variations in temperature of the firing-chamber.

13. In combination with a motor having a firing-chamber, a carburetor, an exhaust-manifold, an intake-manifold associated therewith and receiving heat therefrom, means for varying the degrees of heat of said intake, mechanism in communication with the carburetor for supplying hot and cold air thereto, means for varying the temperature of the air, and an automatic instrumentality for regulating the said intake heating and air-regulating means.

14. In combination with a motor having a firing-chamber, a carburetor, and intake and exhaust manifolds associated therewith; a heating jacket associated with the intake-manifold; a conduit connecting the exhaust-manifold and intake-manifold heating jacket; a valve for regulating the passage of heating medium from the exhaust-manifold to the jacket; mechanism associated with the carburetor for introducing hot and cold air thereto; and means, including a thermostat at the firing-chamber and directly influenced by the temperature of the firing-chamber, for varying the temperature of the mixture entering the intake-manifold inversely in proportion to variations in temperature of the firing chamber.

In testimony whereof I affix my signature.

GEORGE W. DONNING