

J. V. GIESLER.

CARBURETER.

APPLICATION FILED SEPT. 25, 1916.

1,392,141.

Patented Sept. 27, 1921.

2 SHEETS—SHEET 1.

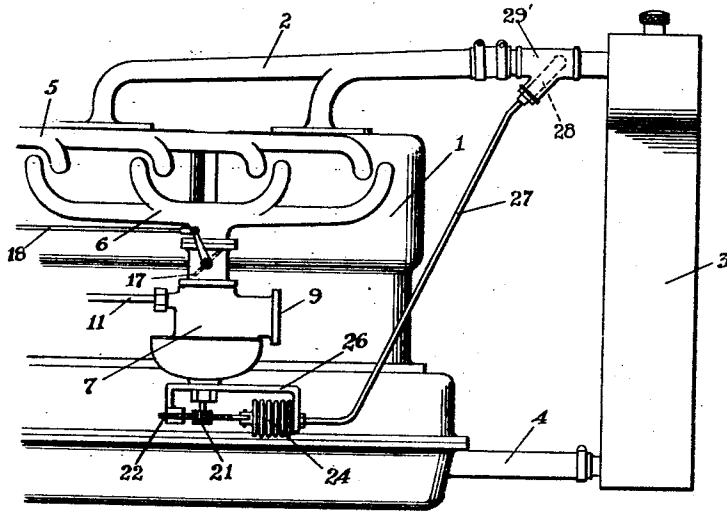


Fig. 1.

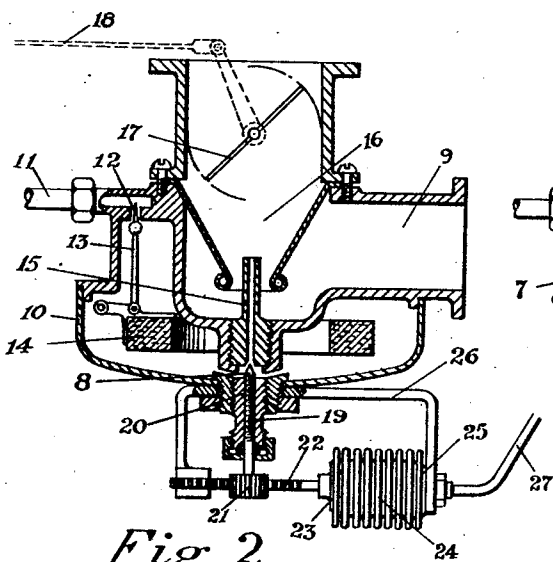


Fig. 2.

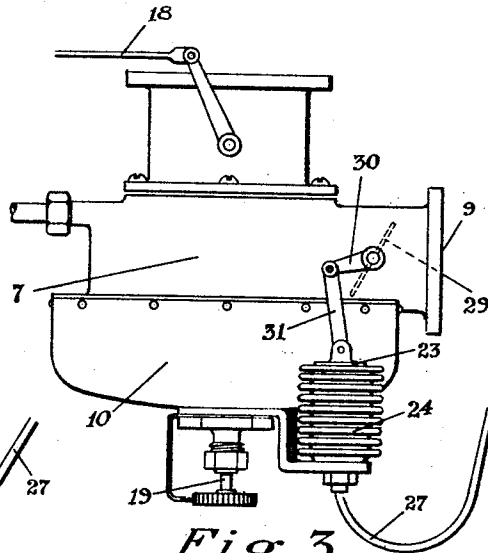


Fig. 3.

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2 SHEETS—SHEET 2.

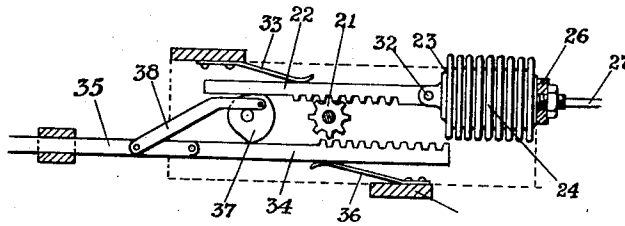


Fig. 4.

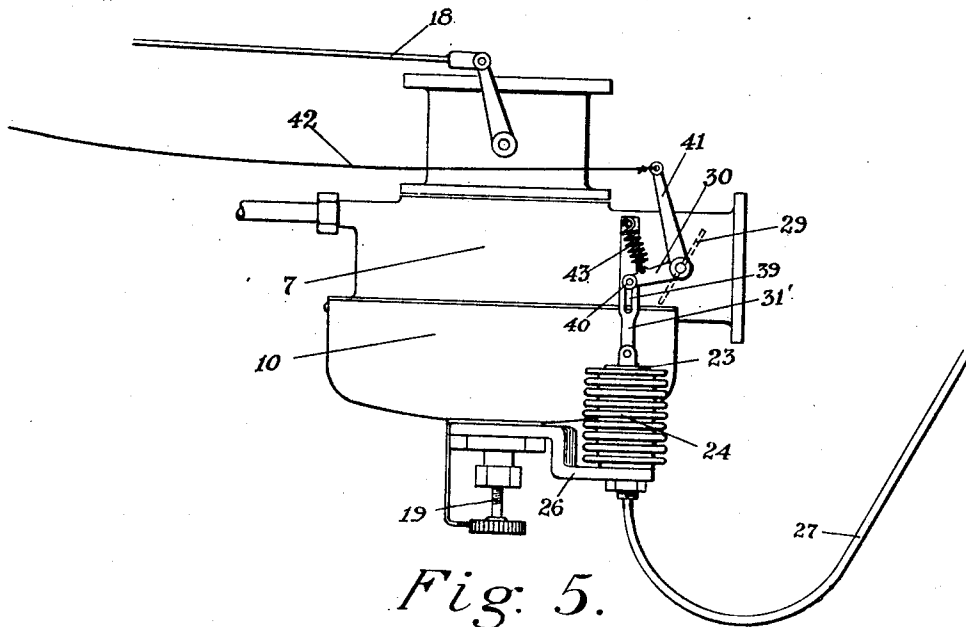


Fig. 5.

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UNITED STATES PATENT OFFICE.

JEAN V. GIESLER, OF KNOXVILLE, TENNESSEE, ASSIGNOR TO THE FULTON COMPANY,
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CARBURETER.

1,392,141.

Specification of Letters Patent. Patented Sept. 27, 1921.

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To all whom it may concern:

Be it known that I, JEAN V. GIESLER, a citizen of the United States of America, and a resident of Knoxville, Tennessee, have invented a new and useful Improvement in Carbureters, which invention is fully set forth in the following specification.

This invention relates to internal combustion engines, and is particularly designed for use with engines of this type in which a cooling medium is circulated in operative or heat-interchanging relation to the engine.

It is a well-known fact that when an internal combustion engine is started, the cylinder or cylinders being cold, more gasoline or other fuel per volume of air is required for satisfactory operation than when the cylinders have become warm. It has accordingly been the practice to provide a rich mixture of fuel and air when the engine is cold, and then manually vary the mixture to decrease the proportion of fuel to air as the engine warms up. It is an object of this invention to provide improved means whereby the proportion of fuel to air is automatically regulated by the temperature of the engine. It is a further object of this invention to provide means for regulating the proportion of fuel to air which is controlled by thermosensitive means subjected to the temperature of a cooling medium circulated in operative or heat-interchanging relation to the engine and which, preferably, is responsive only to the temperature of said medium. Yet another object of this invention is to provide a device of the type characterized with means whereby the regulation of the proportion of fuel to air supplied the engine may be manually effected independently of the automatic means for controlling said proportion of fuel to air. Still another object of this invention is to provide a device of the type characterized wherein the thermosensitive means is so constructed that on failure of the temperature control, as by leakage of the thermosensitive means, the device regulating the proportion of fuel to air supplied the engine is automatically moved to a position corresponding with that assumed when the engine is warm, leaving to the manual control the increasing of the richness of the mixture when necessary. Other objects relate to the provision of a device of the type set forth which is simple in construction, inexpensive

to manufacture, easy to install, and efficient in operation.

Stated briefly, the invention comprises, in combination with means for supplying fuel and air to an internal combustion engine, said means preferably taking the form of a carbureter having a fuel regulating valve and an air inlet cooperating with said valve, thermosensitive means for controlling the proportion of fuel to air supplied by said means, said thermosensitive means being controlled by the temperature of the engine, preferably by being subjected to the temperature of a cooling medium, circulated in operative or heat-interchanging relation to the engine, at substantially the temperature at which it leaves said engine. Means are also preferably provided for an independent manual control of the proportion-varying means, and the latter is furthermore preferably so constructed and actuated as to assume a position corresponding to that assumed during the normal operation of the engine, in case of failure of the temperature control.

The invention is capable of receiving a variety of mechanical expressions, two of which, for purposes of illustration, have been shown on the accompanying drawings, but it is to be expressly understood that these embodiments have been selected for the purposes of illustration only, and are not to be construed as definitions of the limits of the invention, reference being had to the appended claims for that purpose.

Referring to the drawings, wherein the same reference characters designate corresponding parts in the several figures,—

Figure 1 is an elevation of an internal combustion engine embodying the present invention;

Fig. 2 is a vertical section illustrating one manner of varying the proportion of fuel to air supplied the engine;

Fig. 3 is an elevation illustrating a second manner of accomplishing this result;

Fig. 4 is a plan of a portion of the mechanism of Fig. 2 illustrating connections for the manual control of the mechanism; and

Fig. 5 is an elevation illustrating the structure of Fig. 3 provided with a manual control.

Referring in detail to the drawings, 1 illustrates diagrammatically an internal

combustion engine of any preferred construction. The form shown is of a type commonly employed in automobiles, but while this invention will be described as embodied in an automobile engine, it is to be expressly understood that the invention is of utility when applied to engines employed for other purposes.

In the preferred embodiment of this invention, means are provided for circulating a cooling medium in operative or heat-interchanging relation to the engine. To this end, the cylinder or cylinders of the engine are shown as provided with jackets through which the cooling medium is circulated, said cooling medium flowing from the jackets through manifold 2 to and through any suitable form of radiator 3, and returning to the jackets through conduit 4. The exhaust manifold of the engine is illustrated at 5 and the intake manifold of the engine at 6.

7 represents, generally, any suitable form of carbureter, the same being shown as provided with a fuel-regulating needle valve 8 for controlling the admission of fuel and an air inlet 9.

In the carbureter shown, fuel, as gasoline, is supplied the vessel 10 by pipe 11 through an inlet 12, controlled by a needle valve 13 carried by a float 14. Fuel is drawn from the vessel 10 through the nozzle 15 into the chamber provided at 16, while air is drawn through the air inlet 9 to and around the exit of the nozzle 15 and into said chamber 16. Any suitable form of throttle valve 17 is provided in the outlet of the chamber 16, said valve being operated by any appropriate form of operating mechanism such as diagrammatically represented by the link 18. 19 represents the stem of the needle valve 8, the same being so mounted, as by any suitable form of gland 20, that the valve may be adjusted with respect to the nozzle to vary the amount of fuel drawn through the latter member.

In accordance with the present invention, means are provided for automatically varying the proportion of fuel to air supplied by the carbureter; said means may take the form of means for adjusting the needle valve, as illustrated in Fig. 2, or means for adjusting the air inlet, as illustrated in Fig. 3. In either event, the proportion-varying means is controlled by thermosensitive means whereby the means for varying the proportion of fuel to air is regulated in accordance with the temperature of the engine.

In the form shown in Figs. 1 and 2, the valve stem 19 is provided with a pinion 21 with which coöperates a rack 22. Rack 22 is carried by the movable end wall 23 of an extensible and contractible vessel 24, preferably constructed of corrugated resilient metal such as brass, and having a fixed end

wall 25 supported rigidly in position by any suitable form of bracket 26. Vessel 24 is in communication through conduit 27 with a bulb 28 subjected to the cooling medium as it flows from the jackets to the radiator. While any suitable form of means for mounting the bulb 28 in heat-interchanging relation to the cooling medium may be employed, the illustrated embodiment comprises a Y-coupling 29 intermediate the manifold 2 and the radiator 3, within one branch of which is received the aforesaid bulb 28. The thermostat constituted by bulb 28, conduit 27 and vessel 24 is charged with a thermosensitive or volatile fluid the liquid of which preferably fills the vessel 24 and conduit 27 and partly fills the bulb 28, leaving a vapor space in said bulb, in conformity with constructions well understood in the art, as see for example patent to Fulton, No. 1,102,035, granted June 30, 1914, whereby upon change of temperature of the cooling medium a change of pressure is transmitted to the movable end wall 23 of vessel 24 to regulate the aforesaid needle valve 8. Any other suitable form of thermostat, however, may be employed in place of that illustrated.

In the form shown in Fig. 3, the stem 19 of the needle valve 8 is designed to be locked in position, while the proportion of fuel to air is varied by regulation of the air inlet. In this embodiment of the invention as shown, the air inlet 9 is provided with a butterfly valve 29 operated through crank arm 30 and link 31 by the movable end wall 23 of the extensible and contractible vessel 24.

In order that the means for varying the proportion of fuel to air supplied the engine shall assume a position of safety upon failure of the temperature control, as would occur if the extensible and contractible vessel 24 leaked, the proportion-varying means is so constructed and actuated as to move, in such event, to a position corresponding with that assumed during the normal operation of the engine, *i. e.*, when the latter is warm. Thereby is insured that the richer mixture used when starting the engine shall not be supplied throughout the operation of the engine in case of failure of the thermosensitive means. To this end, the extensible and contractible vessel 24 is made of a resilient material or otherwise constructed so as to be expansible by a force of resiliency either inherent in the same or applied thereto, and the system comprising said vessel 24, the conduit 27 and the bulb 28 is preferably charged with the thermosensitive fluid at a pressure below that to which said vessel is exteriorly subjected. In the latter event under normal working conditions, said vessel is somewhat contracted by the pressure exterior thereto. If said vessel leaks, with a consequent equali-

zation of the pressure within and without the vessel, the force of resiliency tending to expand said vessel causes the movable end wall of the vessel to move to a position corresponding with the full extension of the vessel, if not already in that position, moving the needle valve to a position which decreases the amount of fuel supplied to the engine to that corresponding with the normal operation of the engine, on the one hand, or moving the butterfly valve 29 to a position which increases the amount of air supplied the engine to that corresponding with the normal operation of the engine, on the other hand.

It is also desirable that means be provided whereby the aforesaid proportion-varying means may be controlled manually independently of the temperature control. This becomes especially desirable when upon leakage, the proportion-varying means is designed to assume a position decreasing the proportion of fuel to air supplied to the engine, as in this event it becomes necessary to increase the richness of the mixture upon starting the cold engine. Any suitable means may be provided for accomplishing the independent manual control of the proportion-varying means. Referring in detail to Fig. 4, one construction is illustrated for accomplishing this result in connection with the embodiment of the invention illustrated in Fig. 2. In the form here shown, rack 22 is pivotally connected to the movable end wall 23, as shown at 32, and a spring 33 is provided for normally pressing the rack 22 into coöperative engagement with the pinion 21. A second rack 34 is pivotally connected to manual operating means 35, and is normally urged toward engagement with the pinion 21 by spring 36. A rotatable cam 37 normally retains rack 34 out of engagement with the pinion 21 against the tension of spring 36. Cam 37 is adapted to be rotated by crank arm 38 connected with the manually operated means 35. Upon moving the manually operated means 35 toward the left in Fig. 4, cam 37 will be rotated and move rack 22 out of engagement with pinion 21 and permit rack 34 to move into engagement therewith. Further movement of the manually operated means to the left produces, through reciprocation of rack 34, a corresponding rotation of pinion 21 and adjustment of the needle valve.

In the form shown in Fig. 5, a manual control is applied to the embodiment of the invention of Fig. 3. In this construction the movable end wall 23 is provided with a pivoted link 31' having a slot 39, and crank arm 30 is provided with a pin 40 movable within said slot 39. A second arm 41, constituting a crank for the butterfly valve 29, which arm may desirably be made integral with the crank arm 30, is designed to be

operated by a pull member 42, as a cord. A spring 43 is provided between link 31' and crank 30 to normally maintain pin 40 at the upper extremity of the slot 39.

In operation, when the engine is started and the cylinders are cold, vessel 24 is contracted and the needle valve 8 or the butterfly valve 29 is in a position to proportion the supply of fuel to air so that a relatively rich mixture is admitted to the engine. As the engine cylinders become warm, the cooling medium circulated through the cooling system rises in temperature, and thereafter has a temperature as it leaves the engine jacket or jackets which is substantially proportional to the temperature of the engine cylinder or cylinders. As the cooling medium rises in temperature vessel 24 begins to extend or expand under the control of the thermosensitive fluid within the bulb 28 subjected to the temperature of the cooling medium. As said vessel 24 extends with the rise of temperature, it operates the needle valve through the rack and pinion to decrease the supply of fuel through the needle valve, on the one hand, or it opens the butterfly valve 29 to decrease the suction about the nozzle 15, on the other hand. In either event, the richness of the mixture is automatically decreased as the temperature of the engine rises, as determined by the temperature of the cooling medium circulated in operative or heat-interchanging relation thereto. As heretofore explained, if the vessel 24 leaks, said vessel extends or is extended to move the proportion-varying means to, or retain the same in, a position corresponding with that assumed when the engine is at its normal operating temperature. With either embodiment of the invention, the proportion-varying means may be manually adjusted independently of the temperature control by operation of the manual means 35 or 42, as heretofore explained.

While the illustrated embodiments of the invention have been described with considerable particularity, it is to be expressly understood that this invention is not to be restricted to the forms shown on the drawings for it is susceptible of embodiment in a variety of mechanical expressions, some of which will readily suggest themselves to those skilled in the art. Furthermore, certain features of the invention are capable of use without other features thereof. Accordingly, the limits of this invention are to be determined by reference to the claims hereto appended.

What is claimed is:

1. In an internal-combustion engine, in combination with a carburetor comprising a fuel-regulating valve and an air inlet co-operating therewith, means to vary the pro-

- portion of fuel to air delivered by said carbureter, means for circulating a cooling medium in operative relation to the engine, and means automatically and solely controlled by the temperature of said cooling medium at substantially the temperature at which it leaves said engine for controlling said proportion-varying means.
2. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, means for circulating a cooling medium in operative relation to the engine, an extensible and contractible vessel operatively related to said proportion-varying means, and means directly controlled by the temperature of said cooling medium for causing extension and contraction of said vessel.
3. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, means for circulating a cooling medium in operative relation to the engine, an extensible and contractible vessel operatively related to said proportion-varying means, and a bulb communicating with said extensible and contractible vessel and charged with a thermosensitive fluid, said bulb being subjected to said cooling medium.
4. In an internal-combustion engine, in combination with a carbureter comprising a fuel-regulating valve and an air inlet cooperating therewith, means to vary the proportion of fuel to air delivered by said carbureter, and thermosensitive means controlling said proportion-varying means, said thermosensitive means being constructed to move said proportion-varying means, upon leakage of said thermosensitive means, to that position which corresponds with the normal operation of the engine.
5. In an internal-combustion engine, in combination with a carbureter comprising a fuel-regulating valve and an air inlet cooperating therewith, means to vary the proportion of fuel to air delivered by said carbureter, means for circulating a cooling medium in operative relation to the engine, and means automatically controlled by the temperature of said cooling medium at substantially the temperature at which it leaves said engine for controlling said proportion-varying means, said controlling means being constructed to proportion said fuel and air, upon leakage of said controlling means, to correspond with the normal running conditions of the engine.
6. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, means for circulating a cooling medium in operative relation to the engine, an extensible and contractible vessel operatively related to said proportion-varying means, and means controlled by the temperature of said cooling medium for causing extension and contraction of said vessel, said vessel possessing an inherent resiliency and being charged with a fluid at a pressure below that to which said vessel is exteriorly subjected whereby it will operate said proportion-varying means upon leakage of said vessel to proportion the fuel and air to correspond with the normal running conditions of the engine.
7. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, and thermosensitive means controlling said proportion-varying means, said thermosensitive means being constructed to operate said proportion-varying means and position the same to correspond with the normal running conditions of the engine upon leakage of said thermosensitive means.
8. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, means for circulating a cooling medium in operative relation to the engine, and means automatically controlled by the temperature of said cooling medium for controlling said proportion-varying means, said controlling means being constructed to operate said proportion-varying means upon leakage of said controlling means so as to proportion the fuel and air to correspond with the normal running conditions of the engine.
9. In an internal-combustion engine, in combination with a carbureter comprising a fuel-regulating valve and an air inlet cooperating therewith, means to vary the proportion of fuel to air delivered by said carbureter, thermosensitive means controlling said proportion-varying means, and means for manually controlling said proportion-varying means independently of said thermosensitive means.
10. In an internal-combustion engine, in combination with a carbureter comprising a fuel-regulating valve and an air inlet cooperating therewith, means to vary the proportion of fuel to air delivered by said carbureter, means for circulating a cooling medium in operative relation to the engine, means automatically controlled by the temperature of said cooling medium at substantially the temperature at which it leaves said engine for controlling said proportion-varying means, and means for manually controlling said proportion-varying means independently of said temperature control.
11. In an internal-combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of

fuel to air delivered to said engine, means for circulating a cooling medium in operative relation to the engine, an extensible and contractible vessel operatively related to said proportion-varying means, means controlled by the temperature of said cooling medium for causing extension and contraction of said vessel, and means for manually operating said proportion-varying means independently of said vessel.

12. In an internal-combustion engine, in combination with the needle valve for supplying fuel thereto, a pinion on the stem of said valve, a rack cooperating therewith, and thermosensitive means for operating said rack.

13. In an internal-combustion engine, in combination with the needle valve for supplying fuel thereto, a pinion on the stem of said valve, a rack cooperating therewith, means for circulating a cooling medium in operative relation to the engine, and means automatically controlled by the temperature of said cooling medium at substantially the temperature at which it leaves the engine for operating said rack.

14. In an internal-combustion engine, in combination with the valve for supplying fuel thereto, means for circulating a cooling medium in operative relation to the engine, an extensible and contractible vessel for operating said valve, and means directly controlled by the temperature of said cooling medium for causing extension and contraction of said vessel.

15. In an internal-combustion engine, in combination with a valve for supplying fuel thereto, thermosensitive means for regulating said valve to vary the amount of fuel supplied, said thermosensitive means being constructed to position said valve, upon leakage of said thermosensitive means, to correspond with the normal running conditions of the engine.

16. In an internal-combustion engine, in combination with the valve for supplying fuel thereto, means for circulating a cooling medium in operative relation to the engine, and means automatically controlled by the temperature of said cooling medium at substantially the temperature at which it leaves the engine for controlling said valve, said controlling means being constructed to position said valve, upon failure of said controlling means, to correspond with the normal running conditions of the engine.

17. In an internal-combustion engine, in combination with a valve for supplying fuel thereto, thermosensitive means for regulating said valve to vary the amount of fuel supplied, and means for manually adjusting said valve independently of said thermosensitive means.

18. In an internal-combustion engine, in combination with the valve for supplying

fuel thereto, means for circulating a cooling medium in operative relation to the engine, means automatically controlled by the temperature of said cooling medium at substantially the temperature at which it leaves said engine for controlling said valve, and means for manually adjusting said valve independently of said temperature control.

19. In an internal combustion engine, in combination with a valve for supplying fuel thereto, thermosensitive means for regulating said valve to vary the amount of fuel supplied, said thermosensitive means comprising an extensible and contractible vessel normally contracted against a resilient force and adapted upon failure of the thermosensitive means to move said valve to a position corresponding with the normal operating conditions of the engine.

20. In an internal combustion engine, in combination with a valve for supplying fuel thereto, means for circulating a cooling medium in operative relation to the engine, and thermosensitive means subjected to and solely controlled by said cooling medium at substantially the temperature at which it leaves said engine and operatively connected to said valve for regulating the same.

21. In an internal combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, and thermosensitive means for controlling said proportion-varying means, said thermosensitive means comprising an extensible and contractible vessel normally contracted against a resilient force and adapted upon failure of the thermosensitive means to move said proportion-varying means to a position corresponding with the normal operating conditions of the engine.

22. In an interval combustion engine, in combination with a valve for varying the proportion of fuel to air supplied thereto, a pinion on the stem of said valve, racks adapted to engage said pinion, thermosensitive means operatively connected to one of said racks, manually-operable means operatively connected to the other of said racks, and means for simultaneously disconnecting either of said racks from said pinion and engaging the other rack therewith.

23. In an internal combustion engine, in combination with a valve for varying the proportion of fuel to air supplied thereto, a pinion on the stem of said valve, racks adapted to engage said pinion, thermosensitive means operatively connected to one of said racks, manually-operable means operatively connected to the other of said racks, and means operable by said manually-operable means for simultaneously disconnecting either of said racks from said pinion and engaging the other rack therewith.

24. In an internal combustion engine, in

combination with a valve for varying the proportion of fuel to air supplied thereto, a pinion on the stem of said valve, racks adapted to engage said pinion, springs normally urging said racks into engagement with said pinion, thermosensitive means operatively connected to one of said racks, manually-operable means operatively connected to the other of said racks, and a cam for simultaneously disconnecting either of said racks from said pinion and engaging the other rack therewith.

25. In an internal combustion engine, in combination with a valve for varying the proportion of fuel to air supplied thereto, a pinion on the stem of said valve, racks adapted to engage said pinion, springs normally urging said racks into engagement with said pinion, thermosensitive means operatively connected to one of said racks, manually-operable means operatively connected to the other of said racks, and a cam operable by said manually-operable means for simultaneously disconnecting either of said racks from said pinion and engaging the other rack therewith.

26. In an internal combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, means for circulating a cooling medium in heat-interchanging relation with said engine, and means automatically and solely controlled by the temperature of said cooling medium

at substantially the temperature at which it leaves said engine for regulating said proportion-varying means.

27. In an internal combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, thermosensitive means for controlling said proportion-varying means, and means for manually controlling said proportion-varying means independently of said thermosensitive means.

28. In an internal combustion engine, in combination with means supplying fuel and air thereto, means to vary the proportion of fuel to air delivered to said engine, thermosensitive means for controlling said proportion-varying means, means for manually controlling said proportion-varying means, and connections between said proportion-varying means and said thermosensitive and manually-operative means whereby either may be operated independently of the other.

29. In an internal combustion engine, in combination with a valve for supplying fuel thereto, thermosensitive means for regulating said valve, manual means for regulating said valve, and connections between said valve and said thermosensitive and manual means whereby either may be operated independently of the other.

In testimony whereof I have signed this specification.

JEAN V. GIESLER.