994,658.

H. M. REICHENBACH.

CARBURETING SYSTEM.

APPLICATION FILED OCT. 19, 1909.

Patented June 6, 1911.

2 SHEETS—SHEET 1.

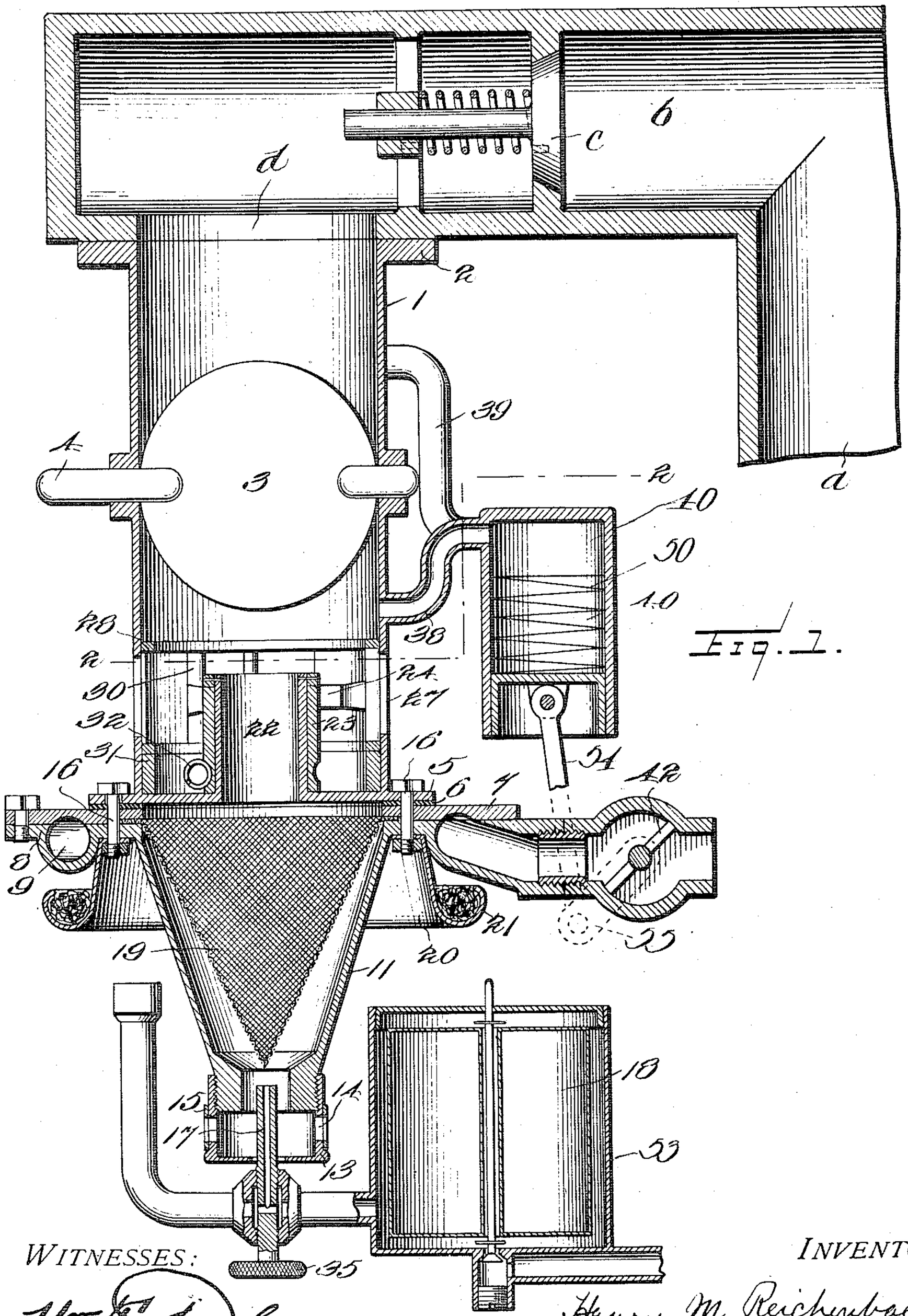


Fig. 1.

WITNESSES:

Wm. F. Roy Co.

B. B. Collings.

INVENTOR

Henry M. Reichenbach

BY

Wilkinson, Dickie & Witherspoon.

Attorneys

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2 SHEETS—SHEET 2.

Fig. 2.

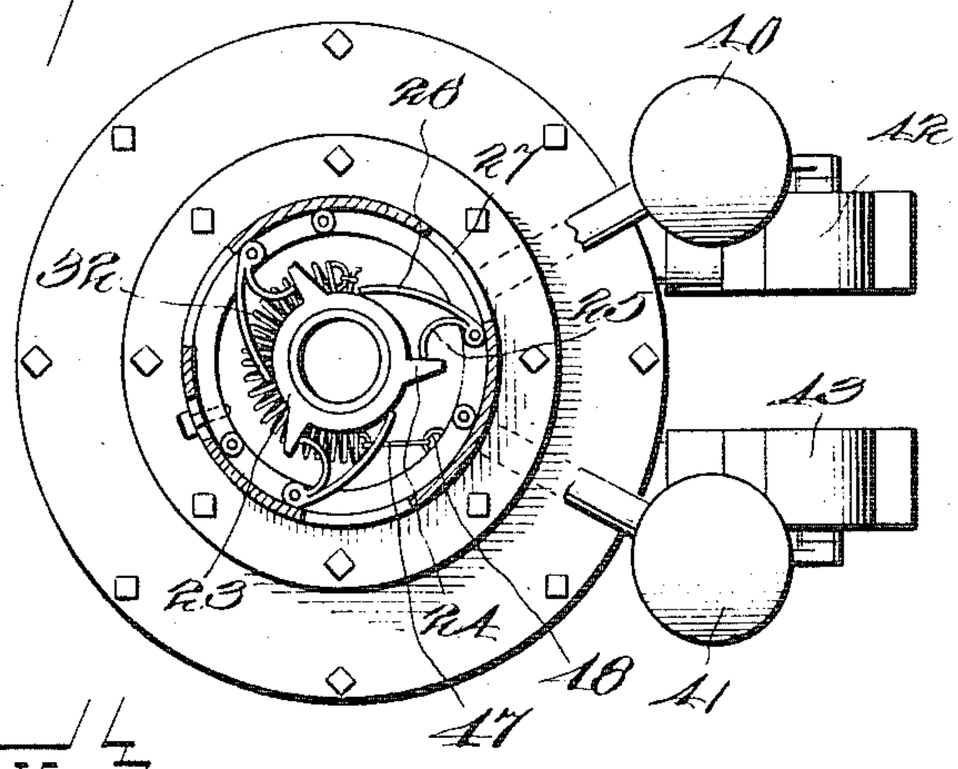



Fig. 3.

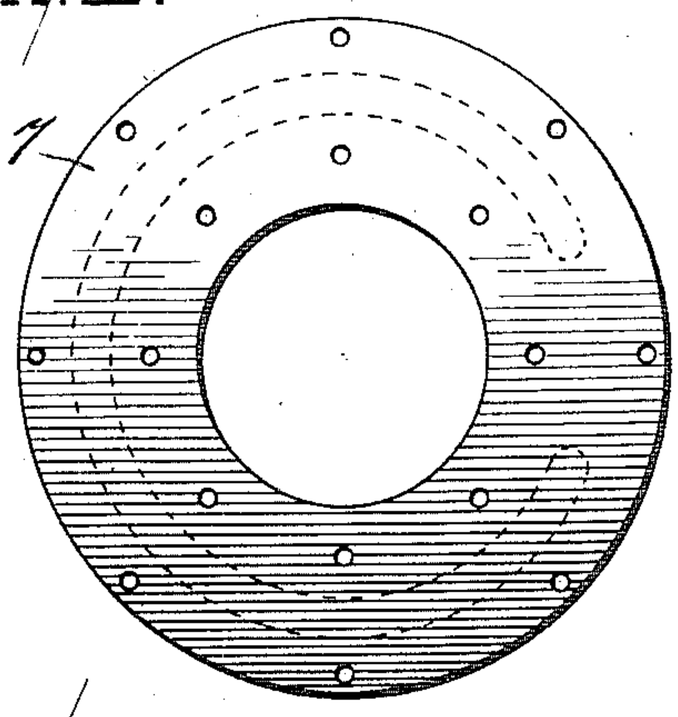



Fig. 4.

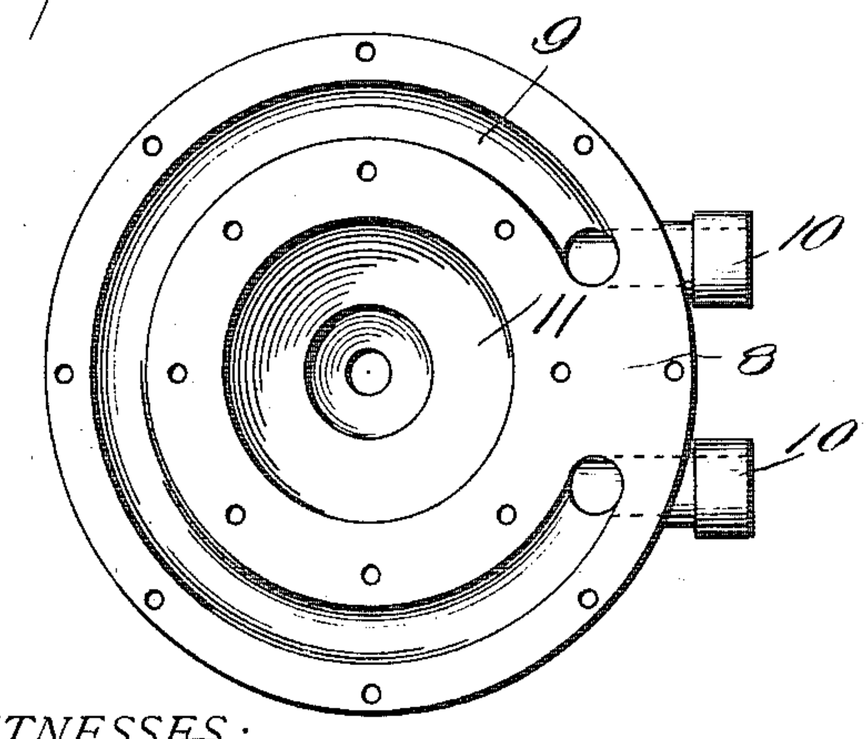



Fig. 6.

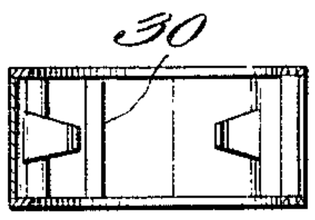



Fig. 7.

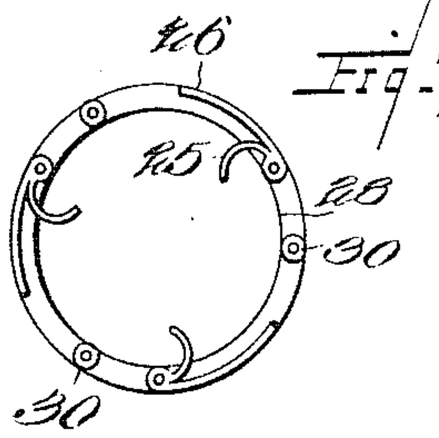



Fig. 8.

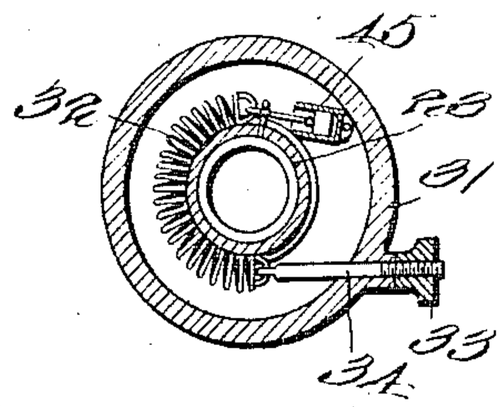
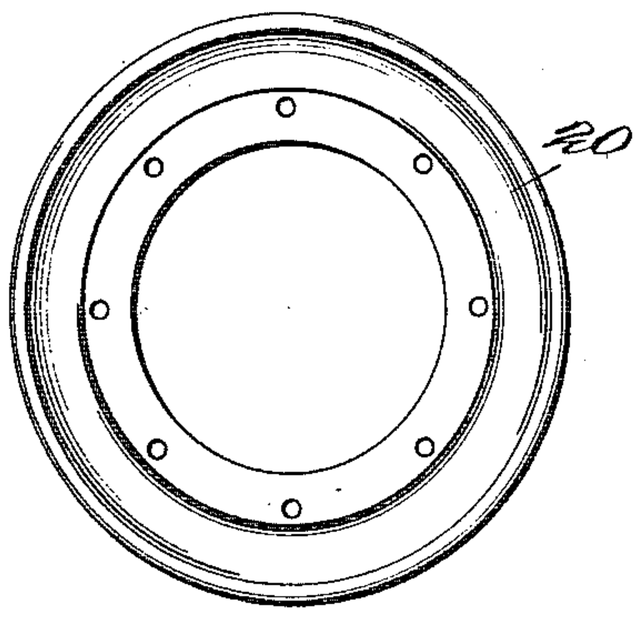



Fig. 5.




WITNESSES:

Wm. F. Hoge.

B. B. Collings.

INVENTOR

Henry M. Reichenbach

BY

Wilkinson, Fisher & Witherspoon

Attorneys.

# UNITED STATES PATENT OFFICE.

HENRY M. REICHENBACH, OF YONKERS, NEW YORK, ASSIGNOR TO REICHENBACH LABORATORIES CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## CARBURETING SYSTEM.

994,658. Specification of Letters Patent. **Patented June 6, 1911.**

Application filed October 19, 1909. Serial No. 523,534.

*To all whom it may concern:*

Be it known that I, HENRY M. REICHENBACH, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Carbureting Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in carbureting systems.

The object of my invention is to provide simple and economical means for volatilizing fuels for use in internal combustion engines, particularly those fuels of a comparatively high boiling point.

Other objects are to prevent the overheating of the intaken charge from reducing the efficiency of the motors and to prevent the volatilization of fuel in the feeding mechanism.

Any means for effecting these results may be used, provided that the heating chamber and fuel feeding device be thoroughly insulated from each other, so as to prevent the volatilization of fuel.

With these objects in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings, which illustrate one form of my invention:—Figure 1 is a cross-section showing a part of a cylinder of an internal combustion engine with my invention applied thereto. Fig. 2 is a cross-section thereof on the line 2—2 of Fig. 1. Figs. 3 to 8 show details of the operating mechanism, Fig. 8 representing a modified form.

*a* represents a part of a cylinder of an internal combustion motor, and *b* the intake pipe leading thereinto, provided with the usual spring-controlled valve *c*. The intake pipe *b* is provided with an opening *d*, through which the carbureted air is admitted into said pipe.

1 represents a casing, provided with a flange 2 adapted to fit up against and to be fastened to the intake pipe around the opening *d*.

3 represents a butterfly valve, which is mounted on the shaft 4, which shaft may be provided with an operating handle (not shown), if desired.

The casing 1 has around its lower end a circular flange 5, through which bolts 16 pass, securing the lower part of the device thereto, this flange being separated from the lower parts of the device by an annular washer 6, made of asbestos or some other poor conductor of heat. Below the washer 6 is an annular disk 7, which covers the annular passage 9 in the annular disk 8. This disk 8 has attached to it, and projecting therefrom, a conical casing 11, and within this casing is a smaller cone 19, made of wire gauze. The object of the wire gauze cone is to atomize the fuel as well as to supply heat to it, as it is in thermal contact at its upper end, which is flanged over, with the heating chamber, the flange being held in contact with, or soldered to, the heating chamber.

The passage 9 in the disk 8 is nearly circular, as shown in Fig. 4, and with the ends of this passage communicate pipes 10, the upper one being the inlet pipe and the lower one the outlet pipe on said figure. To the lower end of the conical casing 11 is screwed a cap 13, having holes 14 in its sides for the admission of air, such admission being regulated by the circular, movable ring 15, which is also provided with openings. This ring may be rotated on the cap 13, this varying the amount of air supplied to the lower end of the cone 11, the inrush of air through these holes being caused by the partial vacuum in the casing 1 and the amount of air admitted through these openings being governed by the position of the ring 15 in relation to the cap 13. This cap 13 is also provided with an opening in its bottom, through which the fuel jet pipe 17 passes, but is should be noted that said fuel pipe does not touch the walls of the opening in the cap 13, through which it passes, nor the cone 11. This is for the purpose of preventing the conduction of heat to the fuel pipe, as pointed out more fully hereinafter. It is desirable that the fuel should be discharged from the upper open end of the pipe 17 as a liquid and not as a vapor.

20 represents an outwardly inclined shell, preferably made of spun metal, provided with a trough-shaped portion on its lower edge and secured to the heating chamber by

the bolts 16, which pass through the parts 5, 6, 7, and 8.

18 represents a float in the fuel supply tank 53, which tank is connected with the pipe 17, whereby fuel is supplied at a constant level to said pipe 17, as usual. The pipe 17 is adjustably secured by screw-threads in its support, and is provided with a milled head 35, so that the level of the upper end of said pipe may be adjusted as desired. The fuel tank 53 may be supported in any desired manner, but in the drawing I have shown a bent bracket 49, bolted to the rim 6 and to the tank 53. It is important that this tank should be thoroughly heat-insulated from the heating chamber, as it is one of the main objects of my invention to prevent the heat from being conducted to the tank 53, which unless stopped, might result in the volatilization of the fuel in said tank. The trough-shaped portion 21 of the shell 20 is filled with absorbent and non-combustible material, such as mineral wool, for example.

The lower portion of the casing 1 is closed except in the center, and around this central opening is provided an open-ended cylinder 22. 23 represents another cylinder, loosely surrounding the cylinder 22 and provided with lugs 24. In the sides of the casing 1, near its lower end, are a series of openings 27. These openings are controlled by the doors 26, best shown in Fig. 2, which doors are opened inwardly at intervals by the suction caused by the motor. These doors are pivotally mounted on the cage 28, as shown in Figs. 6 and 7, and are provided with curved extensions 25, against which the lugs 24 strike at intervals. As the doors 26 open, the extensions 25 strike against the lugs 24 partially rotating the cylinder 23 against the tension of the spring 32. When the charge in the engine cylinder is being compressed, the spring 32 rotates the cylinder 23 partially, closing the doors 26. One end of the spring 32 is connected to a pin 46, projecting from the cylinder 23, and the other end of which is connected to the ring 31, on which the cage 28 rests, by means of the link 47 and eye 48.

As shown in Fig. 8, means for adjusting the tension of the spring 32 may be provided by fastening one end thereof to the pin 34, which is adjusted by means of the milled head 33. Fluttering of the doors may be prevented by means of the dash-pot 45, shown in Fig. 8.

The cage 28 consists of two flat rings held together by means of columns 30.

The casing 1, both above and below the butterfly valve 3, is provided with openings which communicate by means of the tubes 38 and 39 with the pump cylinders 40 and 41, the pistons of which govern the motion of the valves 42 and 43, which act to control the supply and return of the hot exhaust fluid through the pipes 10. The pipe 39 is connected to the casing 1 above the valve 3 and the pipe 38 is connected to said casing below said valve 3.

As shown in Fig. 1, springs 50 are provided in the pump cylinders, bearing against the pistons therein and against a stop 51, adjustably secured in the cylinders by means of a screw 52, the construction being the same in both cylinders. The valves 42 and 43 in the inlet and outlet pipes 10 are connected, respectively, to the pistons in the pump cylinders 40 and 41 by means of a link 54, pivoted to the piston and also pivoted to an arm 55 on the shaft of the valve, which is a rotary valve. Either or both of these cylinders, however, may be dispensed with, if desired, and the valves 42 and 43 operated by hand, or, as shown in the drawing, the pistons in the cylinders may be balanced by springs, so that the opening of the valves is proportional to the suction in the cylinder.

It should be noted that the feeding mechanism, float valve, and fuel pipe are mounted independently of the heating chamber and insulated therefrom to prevent over heating of the fuel supply, as shown in Fig. 1.

The pistons in the cylinders 40 and 41 act as follows to maintain a supply of heating fluid in the annular chamber 9 commensurate with the amount of fuel used in the engine. When the throttle valve 3 is wide open, the vacuum in the casing 1 is practically equalized by the inrush of air into the lower part of said casing and the position of the two valves 42 and 43 will be exactly parallel, both of them being fully open, allowing a maximum circulation of the heating fluid and one that is at the same time proportional to the speed of the motor. If the throttle valve 3 be partially closed, the vacuum above this throttle valve being greater than the vacuum below it, the pistons in the cylinders 40 and 41 will act unequally upon the valves 42 and 43, thus causing said valves to rise to different heights to impede or practically cut off the supply of heating fluid to the annular chamber 9.

The operation is as follows:—Upon the absorbent material in the trough 21 a suitable quantity of alcohol or other inflammable fluid is poured and then ignited. This heats the metal cone 11 and the gauze 19 inside of it for the purpose of starting the carbureting process. The motor is then cranked in the usual way, and the vacuum in the casing 1 causes the fuel in the pipe 17 to be projected upward onto the heated gauze cone 19, air at the same time entering through the openings 14 and mixing with the volatilized fuel, the cone 19 operating not only to supply heat to the fuel, but also to sub-divide it. Then the suction due to the cranking of the engine causes an upward current of mixed vapor and air through the

opening in the cylinder 22, and as the mixture passes out of the top of this cylinder 22 it is properly diluted by the air entering the openings 27. After the motor is started, the heat is supplied by a portion of the exhaust gases passing through the curved passage 9.

Any desired kind of fuel feed may be used, provided that it is so mounted or supported as to be thoroughly heat-insulated from the vaporizing part of the apparatus to which the exhaust gases are supplied. Furthermore, the cylinders 40 and 41 and their connected parts may be omitted without departing from the spirit of my invention, as the valves 42 and 43 could be operated by hand or altogether omitted. The use of the insulating washer 6 prevents the heat from being directly conducted from the heating chamber to the parts immediately above it, containing the spring-operated doors.

I have described and shown my invention as applied to a single cylinder, but obviously it is equally applicable to a multiple cylinder engine, the parts being connected in series in the usual way.

I claim:—

1. The combination of an internal combustion engine and a carbureting system therefor, including a compartment provided with a throttle valve, heating devices supported by said compartment, heat insulating means separating said heating devices from said compartment, a feeder for supplying liquid fuel to said heating devices, said heating devices being heated by the exhaust from the engine, and means for varying the flow of said exhaust fluid through said heating devices depending upon the suction of the engine, substantially as described.

2. The combination of an internal combustion engine with a carbureting system therefor, including a compartment provided with a throttle valve, heating means connected thereto, heat insulating means separating said heating means from said compartment, a fuel feeder for supplying liquid fuel to said heating means, connections whereby the exhaust from said engine passes through said heating means, and means for varying the amount of the exhaust fluid supplied to the heating means, depending upon the suction of the engine and the position of the throttle valve, substantially as described.

3. A carbureter for an internal combustion engine, including a compartment provided with a throttle valve, heating means supported thereby, a heat insulator separating said compartment and said heating means, a fuel feeder for supplying liquid fuel through said heating means, and means for admitting air into the base of said compartment, said means being provided with doors which automatically open as the charge is taken into the engine and automatically close during the compression stroke, substantially as described.

4. A carbureter for an internal combustion engine including a compartment provided with a throttle valve, heating means open in the center, said means being supported by said compartment, a heat insulator between said compartment and said heating means, and a fuel feeder for delivering liquid fuel into the central part of said heating means, but heat insulated therefrom, substantially as described.

5. The combination of an internal combustion engine and a carbureting system connected to the intake thereof, said system including a compartment provided with a throttle valve, said compartment being provided with openings for the admission of air, swinging doors normally closing said openings, a revoluble cylinder provided with lugs against which said doors strike as they open, thereby partially rotating said cylinder, and spring operated means for rotating said cylinder and thereby closing said doors during the compression stroke of the engine, substantially as described.

6. A carbureting system for internal combustion engines including a casing, a vaporizer connected thereto but heat insulated therefrom, means for delivering fuel into said vaporizer, said casing being provided with a series of openings, pivoted doors or valves normally closing said openings, each of said doors being provided with a projection, a rotatable cylinder having lugs adapted to engage the projections on said doors, a spring attached to said cylinder and normally tending to rotate it to keep said doors closed, and a throttle valve rotatably mounted in said casing, substantially as described.

7. In a carbureting system, the combination of a casing, a throttle valve located therein, a vaporizer attached to said casing, a heat insulating washer located between said vaporizer and said casing, means for causing the exhaust of the engine to circulate through said vaporizer, means for initially heating said vaporizer, and a fuel feed adapted to deliver fluid into the interior of said vaporizer, but heat insulated therefrom, substantially as described.

8. In a carbureting system, the combination of a casing provided with openings for the admission of air near one end thereof and open at both ends, a throttle valve rotatably mounted in said casing, a cage supported in said casing, a series of doors pivotally mounted in said cage and adapted to normally close the openings in the casing, each of said doors being provided with a projection, a rotatable cylinder provided with lugs adapted to engage the projections of said doors, a spring attached to said cylinder and adapted to normally hold said doors closed, a vaporizer connected to said

casing and provided with a passage through which hot fluid is adapted to circulate, pipes connected to the passage in said vaporizer, a cylinder connected to said casing, a piston mounted in said cylinder, a valve in the circulating pipe, connections between said valve and said piston, and means for feeding liquid fuel into said vaporizer, substantially as described.

9. The combination of an internal combustion engine with a carbureting system connected to the intake thereof, said system including a casing provided with a throttle valve, heating means provided with a passage, said means being supported by said casing but heat insulated therefrom, a fuel feeding device delivering liquid fuel into said heating means, pipes connected to said heating means and to the exhaust of the engine, cylinders connected to said casing one above and one below said throttle valve, valves in said pipes, pistons in said cylinders, and connections between said pistons and said last named valves, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

HENRY M. REICHENBACH.

Witnesses:
ALDYTH REICHENBACH,
R. C. BAURICH.