J. SACHS.

CARBURETER.

APPLICATION FILED MAY 23, 1911.

1,171,145.

Patented Feb. 8, 1916.

3 SHEETS—SHEET 1.

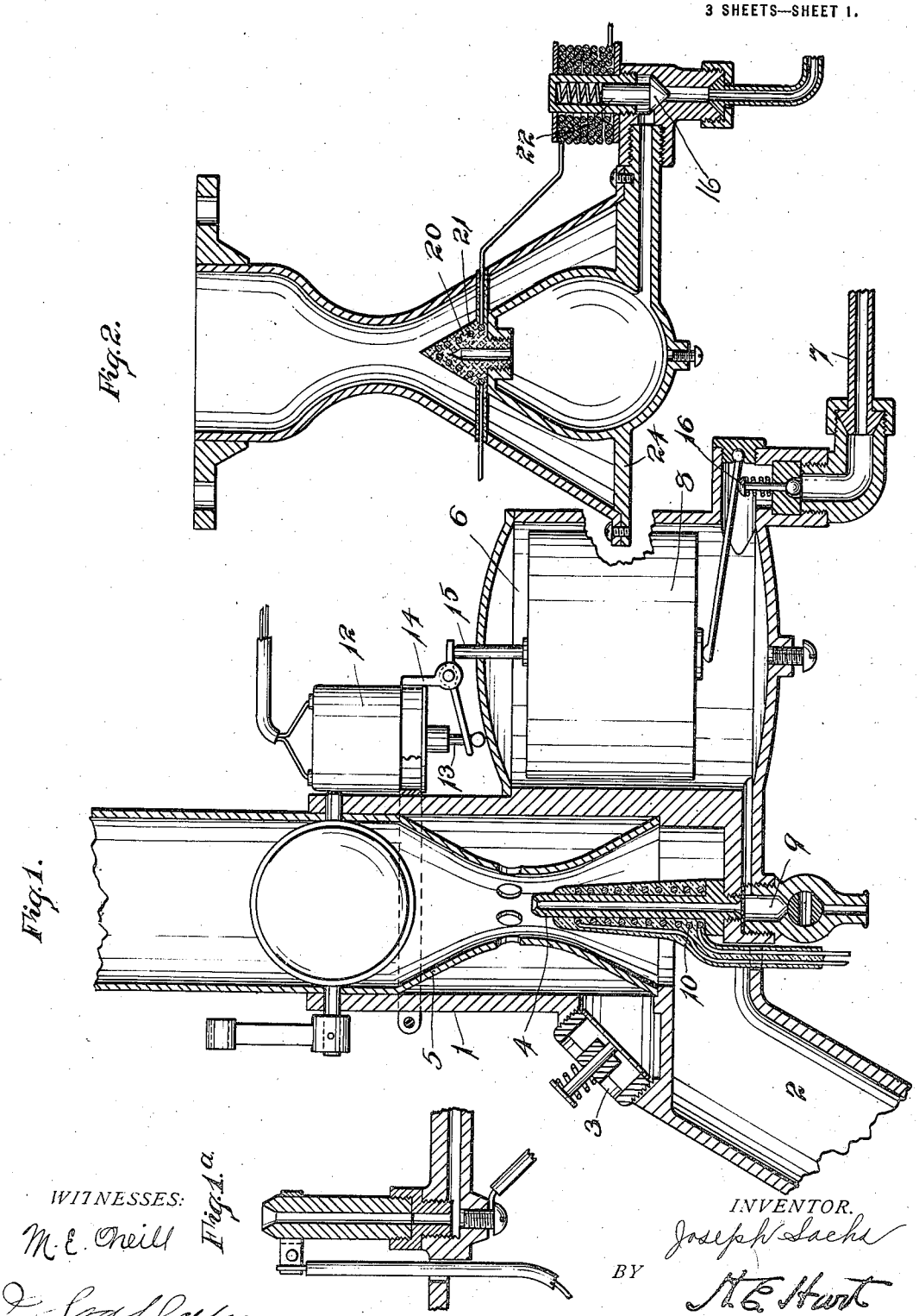


Fig. 2.

Fig. 1.



Fig. 1a.

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3 SHEETS—SHEET 2.

Fig. 3.

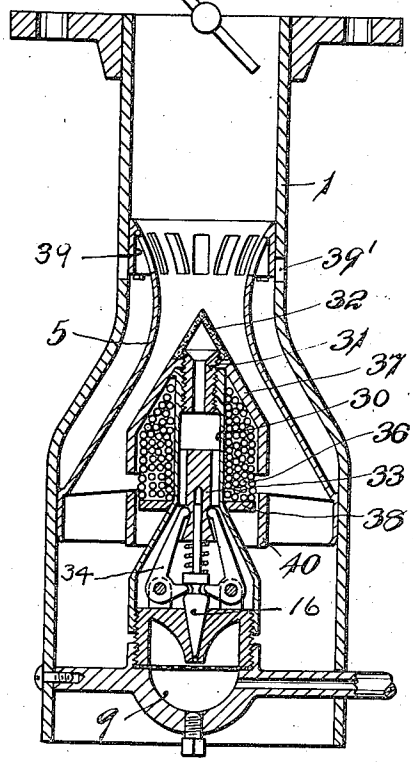



Fig. 5.

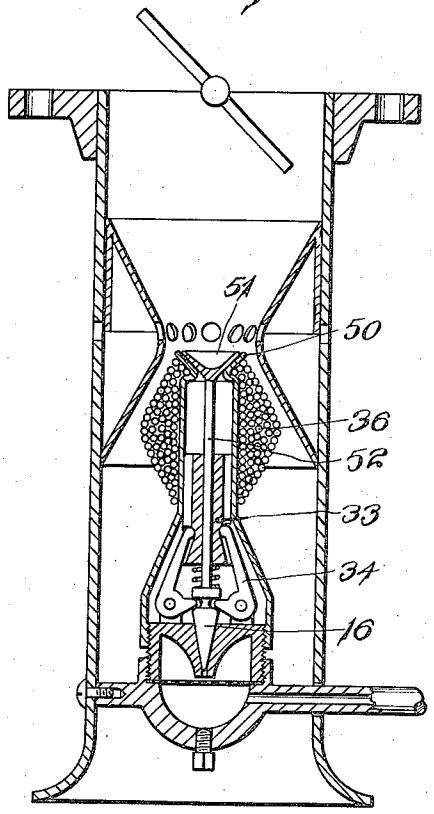
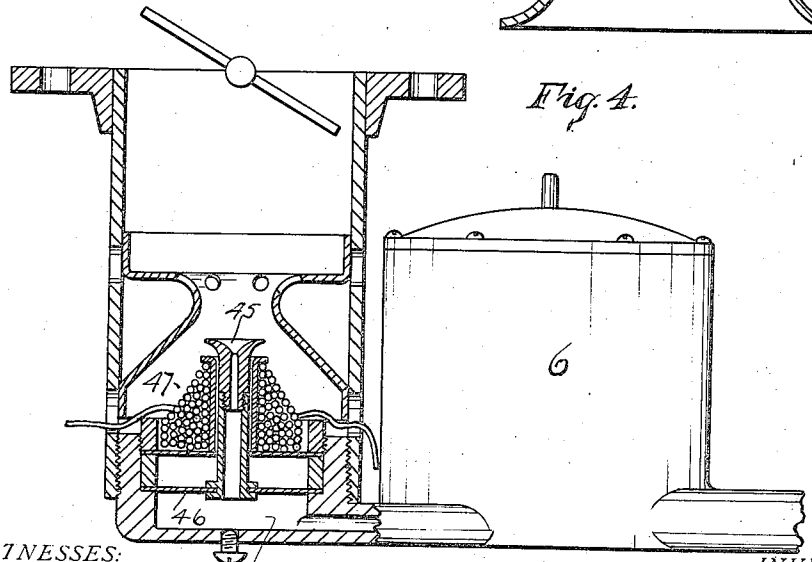



Fig. 4.

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3 SHEETS—SHEET 3.

Fig. 6.

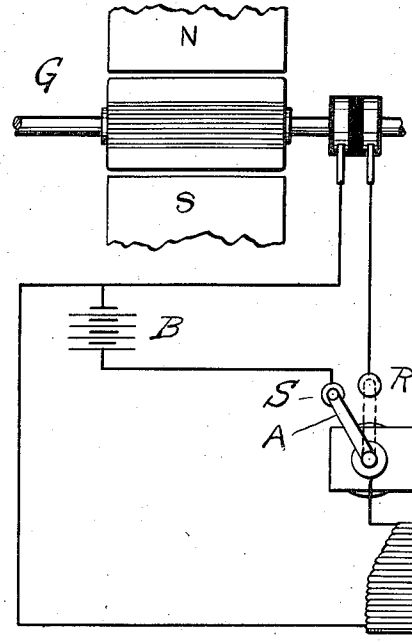



Fig. 8.

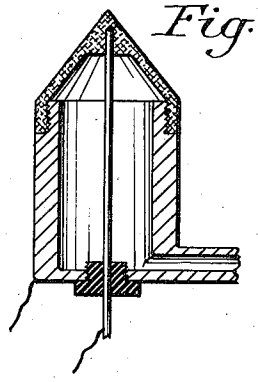


Fig. 9

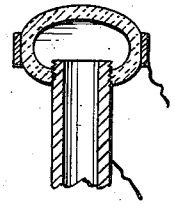
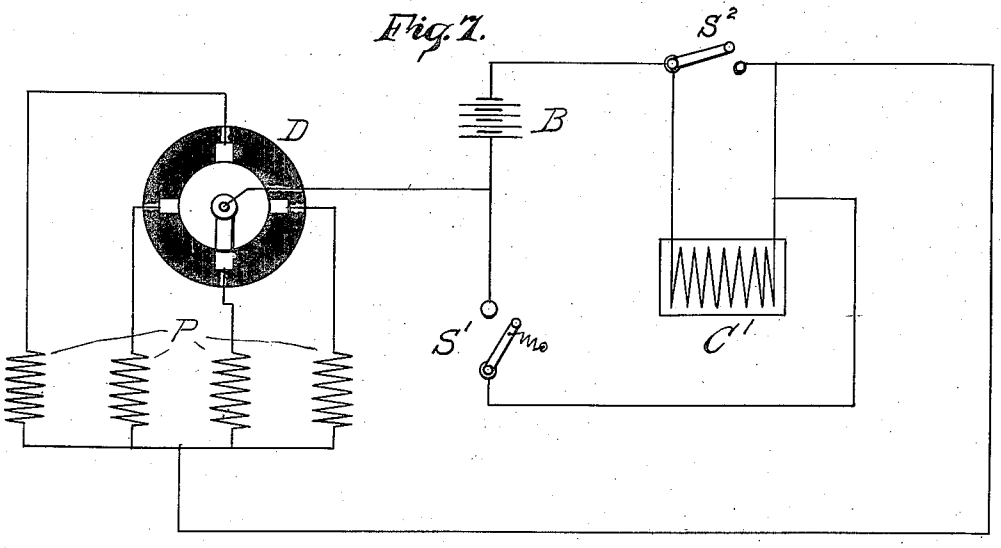


Fig. 7.

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# UNITED STATES PATENT OFFICE.

JOSEPH SACHS, OF HARTFORD, CONNECTICUT.

## CARBURETER.

1,171,145. Specification of Letters Patent. Patented Feb. 8, 1916.

Application filed May 23, 1911. Serial No. 628,982.

*To all whom it may concern:*

Be it known that I, JOSEPH SACHS, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

In explosive engines such as are used for driving motor propelled vehicles, the liquid fuel is supplied by means of what is known as a carbureter which consists of a vaporizing outlet for the fuel, an air supply with which the vaporized fuel is mixed, and a chamber in which this mixing occurs. These are the essential and necessary parts of a carbureter, although it has become customary to refer to a complete structure, including valves of various types and for various purposes, as a carbureter. It is convenient many times to locate the various valves in the carbureter housing, but in my use of the term carbureter in the following specification and claims, I refer merely to the vaporizing outlet, the air supply and the mixing chamber.

For the economical operation of an explosive engine two things are essential. First, that the mixture of vaporized fuel and air must be maintained in proper proportion. Second, that the amount of the explosive mixture supplied to the engine should vary in proportion to the demands of the engine.

As is well known the essential parts of the carbureter are the vaporizing outlet and the main and auxiliary air inlets by means of which the liquid fuel is vaporized and mixed with the proper proportion of air to produce an explosive mixture. When the proper composition of the explosive mixture has been determined it is desirable that it be maintained uniform. It is also essential that the carbureter be provided with suitable devices by means of which the amount of explosive mixture fed to the engine will be properly proportioned to the speed at which it operates. In other words it is necsary to the economical operation of an engine of this type that the composition of the explosive mixture be maintained constant while the quantity supplied to the engine should vary in proportion to its demands.

A very desirable feature in connection with the operation of carbureters particularly in conjunction with automobile engines is the provision of means whereby they can be easily and conveniently controlled by the operator from his seat in the vehicle.

The object of my invention is to produce a carbureter which is electrically controlled for either one or a number of the following purposes, namely, to control the proportion of the explosive mixture, the amount of the explosive mixture, the vaporization of the fuel, and the supply of the fuel. Broadly considered these results are accomplished by means of either the heating or magnetic manifestations of an electric current separately or combined. More particularly I propose to utilize the heating manifestations of the current for warming the fuel at or near the point where vaporization occurs and I employ the magnetic and heating effect either in the same or correlated devices to control the flow of fuel to the point at which it is vaporized and also, if desired, the auxiliary air supply. I also arrange the electrical circuits and connections and provide suitable current supply which may be the engine ignition system so that these electrically controlled means or devices may be manually or automatically operated.

I have selected for illustration various embodiments of my invention and parts thereof.

In the drawings: Figure 1 is a central vertical section showing a carbureter of the float feed type with certain features of my invention embodied therein. Fig. 1$^{A}$ is a detail view showing a modified form of a vaporizing outlet. Fig. 2 is a central vertical section of a second embodiment of my invention. Fig. 3 is a central vertical section of another form of carbureter in which structure there are embodied all of the controlling and regulating devices heretofore referred to. In Fig. 4 there is illustrated what may be termed a variable level type of float feed carbureter. Fig. 5 is a central vertical section of still another modifica-

tion. Fig. 6 is a diagrammatic view showing the circuit from a magneto or other generator operated by the engine and a starting battery. Fig. 7 is a diagrammatic view showing the circuits when the device is operated by a battery. Fig. 8 is a view of a modified form of a vaporizing outlet where the outlet is made of conducting material. Fig. 9 is a further modification of a vaporizing outlet having the characteristics similar to those ascribed to Fig. 8.

Although in the practical application of the various features of my invention the carbureter will require specially designed parts it is nevertheless true that the general structure and mode of operation of the carbureter is not changed. Each embodiment may have a carbureter casing or housing 1 with the main air inlet 2, an auxiliary air inlet 3, and the vaporizing outlet 4. Usually there is used what is called a Venturi tube indicated at 5 which restricts the size of the main air supply at or near the mouth of the outlet in order to effect a more complete and regular vaporization of the fuel. These parts are all old and well known and are used in various arrangements in carbureters of different types. When the carbureter is of the float feed type there is a float chamber 6 to which the fuel is supplied by a pipe 7 the supply being controlled by the float 8 the float chamber being in communication with the fuel chamber 9 in the carbureter from which it passes up through the central core of the vaporizing outlet 4.

One feature of my invention resides in provision of means for heating the fuel at or near the point where vaporization occurs and a simple method of accomplishing this result is indicated in Fig. 1 consisting of a coil 10 which as shown is embedded in enamel or other temperature resisting insulated material which is slipped down over the outlet, the terminals of the coil being connected to a suitable source of current supply. If preferred the vaporizing outlet itself can be made of resistance material one terminal being connected from a source of current supply at the lower end of the outlet and the other terminal near the upper end thereof, as illustrated in Fig. 1A. In the embodiment illustrated in Figs. 3, 4 and 5 the vaporizing outlet is heated by a coil surrounding it.

Another feature of my invention is the electrical control of the fuel supply and a simple embodiment of this invention is illustrated in Fig. 1 where 12 denotes an electromagnet, the core 13 operates a member as the lever 14 which engages a stem 15 on the float 8. When the coils of the magnet 12 are energized the core 13 is drawn up depressing the float 8 and opening the supply valve 16. If this electromagnet receives its current from the magneto or a separate generator operated by the engine the supply of fuel to the float chamber and consequently to the vaporizing outlet will be regulated according to the speed of the engine and as the speed increases and the engine demands more mixture a larger supply of fuel will be provided. If desired this electromagnet can, of course, be connected up with the heating coil 10 in series or in any other convenient and practical manner.

By reference to Fig. 2 it will be noted that the vaporizing outlet in this embodiment of the invention is in the form of a cap 20 of porous material in which the heating coil 21 is embedded and that the fuel supply valve 16 is carried by the core 22 of an electromagnet which as shown is connected in series with the heating coil of the cap 20. The supply of fuel to the fuel chamber 9 of the carbureter is controlled according as the magnetic effect of the electromagnet is increased or diminished. 24 denotes one of a set of arms by means of which the fuel chamber is supported in the bottom of the casing, the main air supply being through the bottom of the casing.

In Fig. 3 there is illustrated another embodiment of the invention wherein the carbureter is completely controlled by the magnetic and heating effect of the coil. Supported on the fuel chamber 9 of the carbureter is a tubular sleeve 30 to the upper end of which is secured a core 31 on which is mounted the cap 32 of porous material. In the lower end of this tubular sleeve is a movable core 33 which actuates the supply valve 16 through the medium of the levers 34 the core 33 being fluted and the core 31 being apertured to permit of the upward travel of the fuel to the cap 32. On this core there is mounted the magnetic coil 36. Near the upper end of the tubular sleeve there is secured the cap 37 which partly incloses the coil 36 and underneath the coil there is secured to the tubular sleeve the disk 38. The Venturi tube 5 is mounted to slide in the casing 1 and has at its upper end a shutter 39 to control the auxiliary air passages 39′ and at its lower end a sleeve armature 40. The terminals of the coil are, of course, connected to any suitable current supply as batteries, magneto or a separate generator run by the engine. As this coil is energized the heat generated will be imparted to the fuel as it passes through the outlet thus assisting vaporization. The core will be drawn up opening the supply valve 16 and the armature 40 will be attracted opening the auxiliary air passages 39. If the coil is excited by mechanism operated by the engine the carbureter will be operated to supply sufficient mixture to the engine according to its requirements.

The embodiment of my invention illustrated in Fig. 4 is in connection with a float

feed carbureter and is what may be termed a variable level type. The vaporizing outlet is formed in part of magnetic material and has a flaring mouth 45, the lower end of the outlet being fastened into a diaphragm 46 which forms the top of the fuel supply chamber 9 of the carbureters. The coil 47 is located about the outlet on a suitable support. When the diaphragm is in normal position the bottom of the flaring mouth of the outlet is at about the level of the fuel in the float chamber and consequently but a small surface area of fuel is subjected to vaporizing action. As the coil becomes energized the outlet is heated and is also drawn down depressing the diaphragm and as the level of the liquid will remain the same it will be seen that a larger area of fuel is presented for the vaporizing action, thus providing an increased supply of explosive mixture.

In the embodiment illustrated in Fig. 5 the vaporizing outlet has a widely flaring mouth 50 which is adapted to be closed by the cap 51 which is connected by the rod 52 to the supply valve 16 which is operated through the levers 34 by the core 33 when it is attracted by the coil 36. It will be seen that the cap 51 is raised with the valve 16 permitting of the passage of a larger amount of fuel from the mouth of the vaporizing outlet.

In Fig. 6 I have shown diagrammatically the electrical control system as it would be connected in one form of actual installation. The electrical controlling means for the carbureter, which may be of any one of the forms hereinabove illustrated and described or any other proper embodiment, is indicated at C. One terminal of this electrical controlling means is connected to one terminal from the electric generator G which may be a separate machine operated by the engine or the magneto used for ignition or other purposes. The other terminal of the electrical controlling means passes through a time contact T which in this particular case consists of a clock work mechanism similar to that used in messenger call boxes and constructed so that the contact arm A when brought into contact with the starting or battery terminal S will remain in this position for a short time sufficient to pass a current from the battery B through the controlling means to produce the proper starting condition in the carbureter. After this condition has been obtained the lever A is moved by the clock work back to the so called running position on the contact R connecting the electrical controlling means into the generator circuit. Of course, this time contact switch may be located in any convenient position preferably within easy reach of the operator, also other switches may be provided in case it is desired to operate the electrical controlling mechanism entirely from the battery under any particular conditions.

In Fig. 7 which is a diagrammatic representation of a practical installation when the energy for the electrical controlling devices is produced by a battery. C′ denotes the controlling device, B the battery, D the distributer by means of which the current from the battery is supplied to the primaries P of the induction coils from the secondaries of which (not shown) the high tension current is carried to the spark plugs (not shown). The controlling device C′ is connected in series with the primaries of the induction coils. S′ is a spring controlled switch by means of which the controlling device may be directly connected across the battery when the engine is being started. When the engine is to be started the switch may be closed manually against the spring and the current is allowed to pass through the controlling device until proper conditions have been produced to insure the easy starting of the engine. For instance, the engine is now started and the current is supplied from the battery to the primaries of the induction coils in succession and as the controlling device C′ is in series it will also receive the current impulses and continue to operate as by heating the vaporizing outlet. If this effect is no longer desired the controlling device may be short circuited by means of the switch S″. The switches S′ and S″ can be connected in case controlling device C′ is desired only for the starting of the engine or where a combined battery and magneto construction is used the controlling device may be switched off from the battery to the magneto after the engine has been started.

While I have illustrated and described a number of different embodiments of the various features of my invention I am aware that the invention is susceptible of other embodiments and I desire it to be clearly understood that I do not intend to limit myself to any one or all of the exact embodiments herein illustrated and described or to any of the various combinations of the separate features of the invention. I desire it to be further understood that my invention contemplates the use of either the heating or magnetic manifestations of the electric current either separately or together to accomplish the desired results. For instance, the supply valve can be thermally operated due to the expansion of a coöperating part caused by the heating effect of the coil, I also desire it to be understood that the terms used herein are terms of description and not of limitation.

I claim:—

1. In a primer for explosive engines, a vaporizing chamber, an electric heating device in the chamber, means for admitting

volatile fuel to the chamber comprising a valve mechanism, a solenoid controlling the valve, an electric circuit containing both solenoid and heating devices, and means to close the circuit to operate both solenoid and heating devices.

2. In a primer for explosive engines, in combination, hydro-carbon supply means, a valve adapted to control the passage of the hydro-carbon to a motor, means for heating the hydro-carbon, and controlling means common to said valve and heating means for governing the operation of the same.

3. In a primer for explosive engines, in combination, hydro-carbon supply means, a heater for the hydro-carbon, a casing having a passage connecting the hydro-carbon supply means with said heater, a valve normally closing the passage, and means common to the heater and the valve for starting said heater and operating said valve.

4. A carbureter including a vaporizing nozzle, a valve to control the supply of fuel to said nozzle, and a single means actuated by thermal and magnetic manifestations of an electric current for controlling the action of said valve and the vaporization at the nozzle, and a source of supply of electric current.

5. A carbureter comprising a vaporizing nozzle and a main air supply, a valve to control the supply of fuel thereto, an auxiliary air supply and a valve therefor, a conductor of electric current, means actuated by thermal manifestations of the current to control the vaporizing effect, and by the magnetic manifestations of the current to control the action of said valves, and a source of supply of electric current.

6. In a vaporizer for explosive engines, a hydrocarbon fuel passage, a valve in said passage, a heater associated with said passage and controlling means operable for governing the actuation of said valve and heating means either simultaneously or consecutively.

JOSEPH SACHS.

Witnesses:
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H. E. HART.