May 22, 1923. 1,456,018

E. L. WIEGAND

INTERNAL COMBUSTION ENGINE

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FIG. 1.

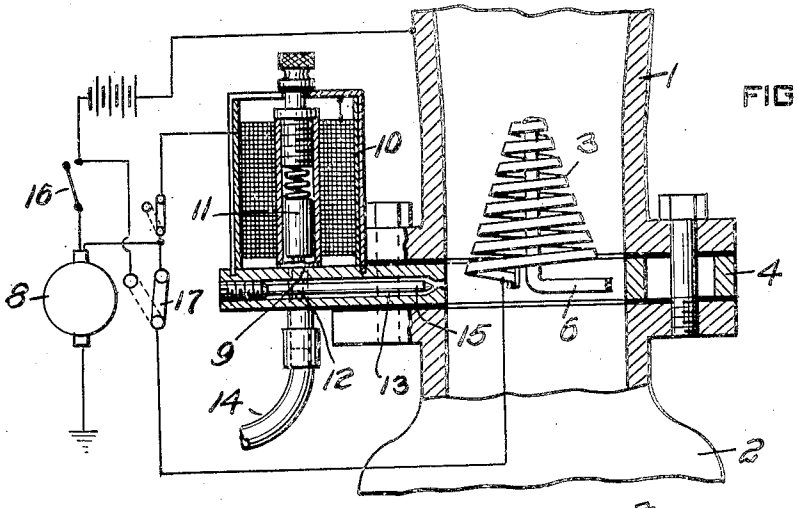


FIG. 4.

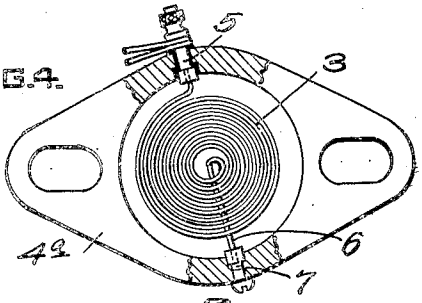


FIG. 3.

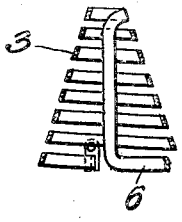


FIG. 5.

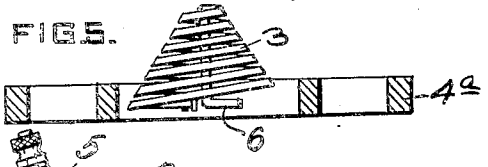
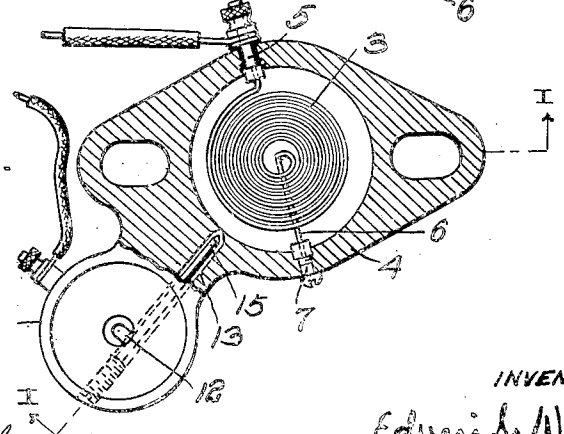


FIG. 2.



WITNESSES

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FIG. 6.

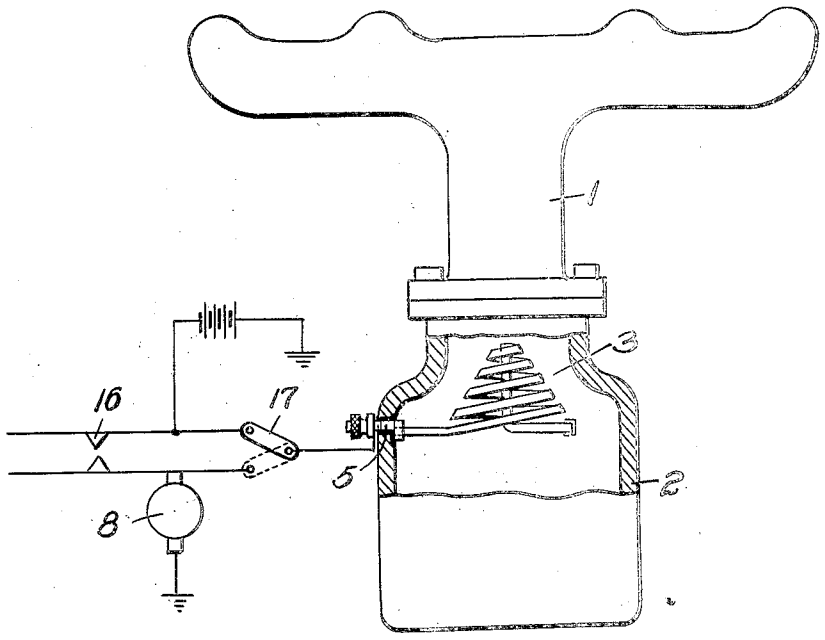
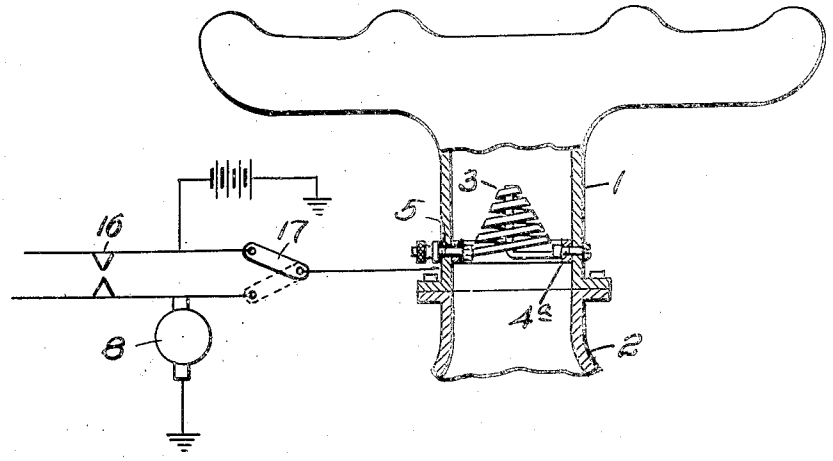


FIG. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

EDWIN L. WIEGAND, OF PITTSBURGH, PENNSYLVANIA.

INTERNAL-COMBUSTION ENGINE.

Application filed July 2, 1920. Serial No. 393,552.

To all whom it may concern:

Be it known that I, EDWIN L. WIEGAND, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Internal-Combustion Engines, of which improvements the following is a specification.

The invention described herein relates to certain improvements whereby the starting of internal combustion engines, especially automobile motors, may be generally facilitated under all conditions but especially in cold weather when great difficulty is encountered in obtaining a readily ignitible vapor. Various means have been suggested for overcoming this difficulty, such as applying heat externally to the cylinders and other parts of the motors, and heating the fuel itself prior to its entrance into the intake passages. While some of the means suggested for facilitating the starting of the motors have to a certain extent mitigated the trouble, they are generally lacking in practical efficiency.

The invention described herein has for its object the supplying of the cylinders with a dry warm highly ignitible vapor on the initial operation of the plungers, and maintain such supply until the motors begin to operate normally. In general terms, the invention consists in the interposition of means intermediate the combustion chamber and the fuel supply adapted to effect a vaporization and heating of the fuel prior to its entrance into the motor cylinders, this invention being especially applicable to use with motors of automobiles.

It is a further object of the invention to provide for the application of the vaporizing means to machines now in use, as well as to machines in course of manufacture. The invention is hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification, Fig. 1 is a view partly in section, showing a portion of a carbureter and pipe leading to the manifold of an internal combustion engine and having my improvement combined with a fuel spraying device applied thereto; Fig. 2 is a top plan view partly in section of the construction shown in Fig. 1, and Fig. 3 is a sectional elevation of a desirable construction of the mechanical and heat vaporizer; Fig. 4 is a sectional plan view showing the manner of supporting the mechanical and thermal vaporizer when used independently of the spraying means; Fig. 5 is a sectional elevation of the construction shown in Fig. 4; Figs. 6 and 7 are views similar to Fig. 1 showing the mechanical and thermal vaporizer arranged in the carbureter and the intake pipe respectively.

In the practice of the invention a device adapted to mechanically break-up or vaporize a spray of inflammable liquid and also to be heated so as to effect a further and thermal vaporization of the fuel, is so arranged in the connection leading from the carburetor 2 to the engines that the fuel may be vaporized and the vapor heated before entrance into the engine. In the construction shown, this device is made of wire or narrow metal strips coiled to form a conical helix 3 through which the fuel is drawn by the suction of the engine and thereby broken up into an approximately vaporous form and, by contact with the heated surfaces of the helix, completely vaporized and highly heated before passing into the engine. This helix is, in the construction shown in Figs. 1 and 2, supported on a plate 4 which can be removably secured between the carbureter 2 and the intake pipes 1 leading to the manifold of the engines (not shown). The helix has one terminal secured to a binding post 5 passed through the rim of the annular plate 4 but insulated therefrom. The other terminal of the helix has an extension 6 which passes through the helix and is bent to project radially and has its end secured to a plug 7 removably secured to the rim of the plate 4. The helix is thus entirely supported by the plate 4 and can be placed in or removed from operative position.

As shown in Fig. 1, the improved vaporizer and heater may be used in connection with means for supporting the fuel for the initial operation of the motor at a point intermediate the carbureter and the manifold but as shown in Figs. 6 and 7, the improved vaporizer can be arranged either in the carbureter or in the intake pipe 1 and used to further vaporize and heat fuel drawn from the carbureter alone.

When using fuel from an auxiliary source for starting purposes, any suitable means may be employed for injection of the fuel

into the passage leading to the manifold in a plane slightly below the helix 3, so as to be drawn through the helix 3 by the suction of the engine. It is preferred to employ means controlled by the switch controlling the starting motor indicated at 8, which switch also controls the circuit including the helix 3. To this end the annular plate 4 is provided with an extension 9 on which is supported a solenoid 10 having its armature 11 connected to a valve 12 adapted to control the flow of fluid through a passage 13 formed in the extension 9 and extending to the opening through the plate 4 so as to direct liquid in a plane slightly below the helix 3 as shown in Fig. 1. This passage 13 is connected by a pipe 14 to a suitable source of inflammable fluid and the flow of fluid through the passage is regulated by an adjustable valve 15.

As will be seen by reference to Fig. 1 the solenoid and the helix are preferably in parallel with the starting motor 8 so that by closing the circuit by shifting the switch 16, the motor is started, the solenoid excited to lift the valve 12 and thereby permit of the induction of a spray of fluid immediately below the helix. By the action of the piston in the cylinders of the engine the sprayed material is drawn through the helix and by impact thereon is further broken up into an approximately vaporous form, and as the circuit through the helix also was closed by the shifting of the switch, it will be heated so that a completion of vaporization and a heating of the vapors is effected as they are drawn through the helix. It will be observed by reference to Fig. 1 that the circuits are so arranged that by suitably shifting the switch 17 a circuit is formed through the helix alone so that it and adjacent parts of the motor mechanism may be heated preliminarily. After the engine reaches normal operation the switch may be so shifted that only by the closure of the switch 16 current will flow through the starting motor, the solenoid 10 and the helix. By shifting this switch 17 to neutral position, the helix will be cut out of circuit.

As hereinbefore stated, the improved vaporizer and heater may be used without a spraying device in which it is supported on an annular plate 4^a, as shown in Figs. 4 and 5, said plate being adapted to be removably secured in the joint between the carbureter and the intake pipe 1. If desired, the helix may be arranged in the carbureter as shown in Fig. 6 or in the intake pipe 1 closely adjacent to its carbureter end as shown in Fig. 7.

It is characteristic of the improvement described and claimed herein that a combined vaporizer and heater is arranged in the path of movement of fuel from the carbureter to the combustion chamber, and is so constructed that while capable of operating efficiently to vaporize the fuel and heat, the vapors so formed to a degree at which they will quickly ignite, such device will not materially check or impede the flow of fuel from the carbureter to the combustion chamber under normal operating conditions. The helix is preferably formed of a strip of metal rectangular in cross section and wound to form a conical helix so that the convolutions will decrease in diameter from its lower end. It is also preferred that the strip should be so wound that planes tangent to the inner and outer surfaces of the convolutions which are spaced substantial distances apart, will form acute angles with the axis of the coil, so vapors must flow laterally in order to escape from the inverted cup formed by the coil. The heating element is preferably so constructed that the flow of vapors and air therethrough will cause a rapid vibration which it is believed will materially assist in the vaporization of the fuel. It is further characteristic of this invention that it enables the motor to be promptly and readily started by the use of a fuel mixture not substantially richer than that employed in normal operation of the motor.

I claim herein as my invention:

1. The combination with an internal combustion engine of an electric starting motor, of means for spraying an inflammable fluid into a pipe connected to the combustion chamber, an electrically controlled means for controlling the spraying means, an electrically heated device, arranged in said pipe intermediate the point of entrance of the spray and the engine and a switch for controlling said several mechanisms.

2. The combination of an annular plate adapted to be removably secured in a connection intermediate the carbureter and an internal combustion engine, an electric heater carried by said plate, a passage for the introduction of a spray of fluid into the opening through said plate, a valve controlling said passage and a solenoid secured to said plate for shifting said valve.

In testimony whereof, I have hereunto set my hand.

EDWIN L. WIEGAND.