

G. L. HENRY.
STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED OCT. 3, 1911.

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Patented Jan. 16, 1912.

2 SHEETS—SHEET 1.

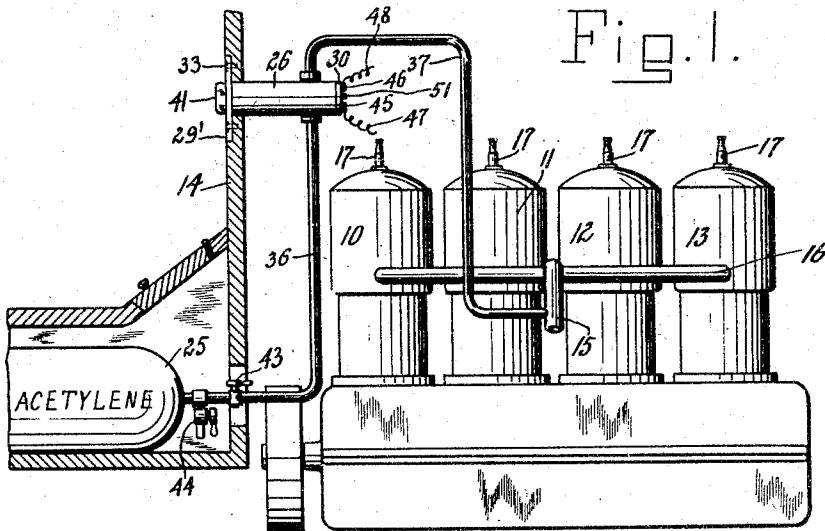


Fig. 1.

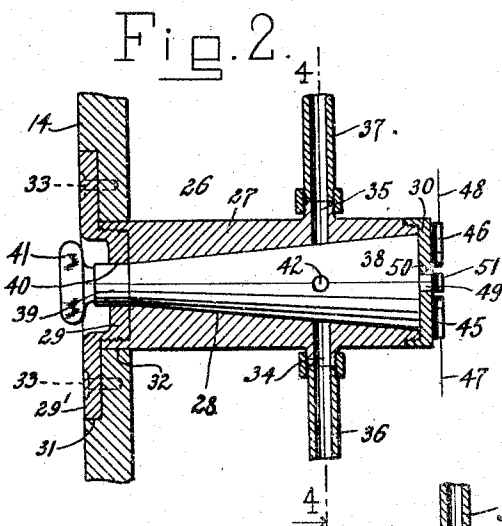


Fig. 2.

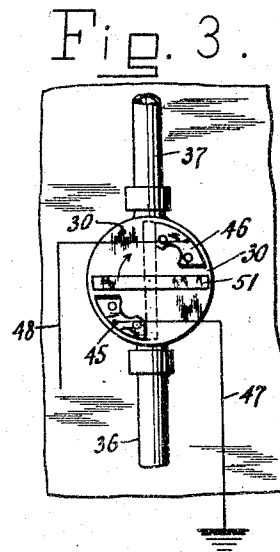


Fig. 3.

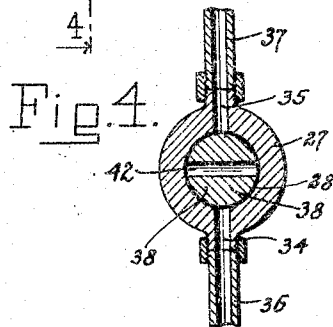


Fig. 4.

WITNESSES

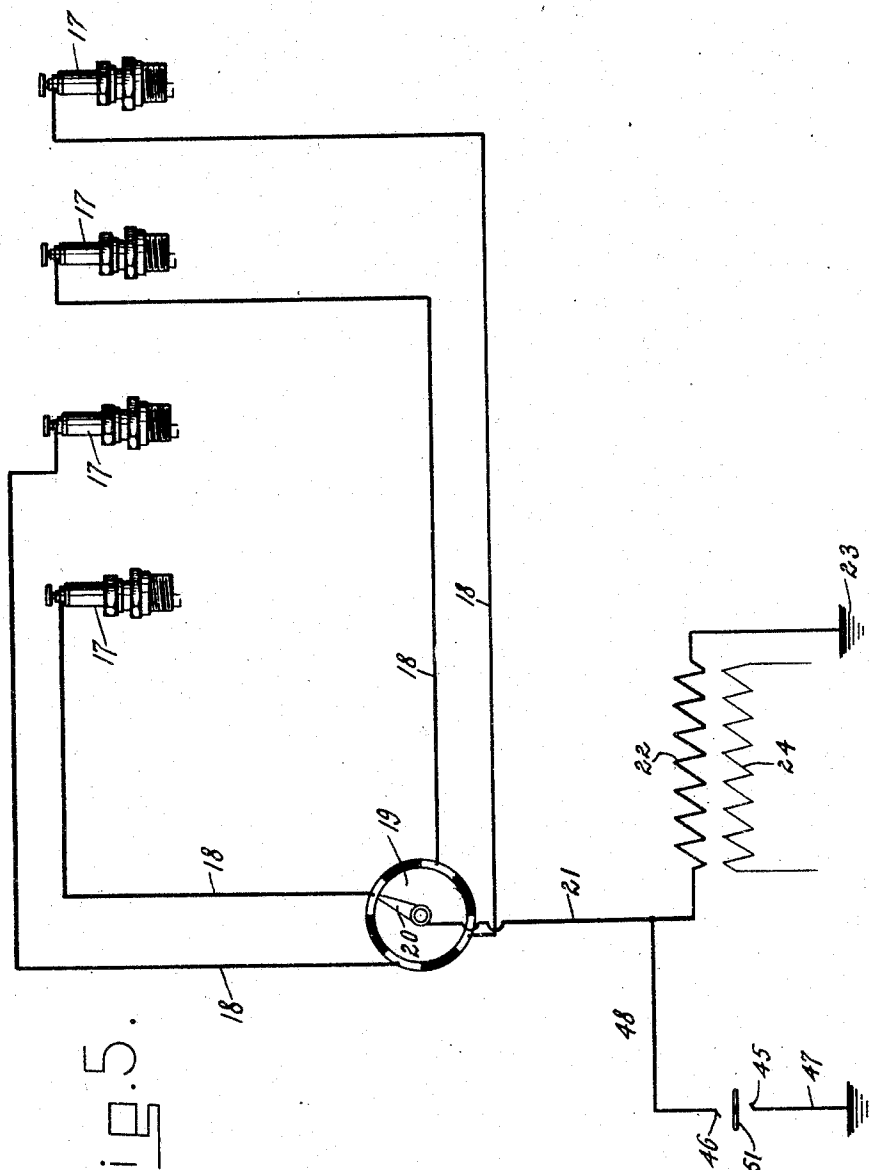
S. Birnbaum
J. A. Cook

George L. Henry INVENTOR
BY
Sigmund Herzog
his ATTORNEY

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WITNESSES
Dr. Klink
S. Birkbaum

George L. Henry INVENTOR
 BY *Sigmund Herzog* ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE L. HENRY, OF NEW YORK, N. Y., ASSIGNOR TO THE HENRY MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,015,272.

Specification of Letters Patent.

Patented Jan. 16, 1912.

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To all whom it may concern:

Be it known that I, GEORGE L. HENRY, a citizen of the United States, and resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Starting Devices for Internal-Combustion Engines, of which the following is a specification.

10 The present invention relates to devices for starting internal combustion engines, and is particularly adapted for use in connection with multi-cylinder engines used with automobiles.

15 More particularly it relates to engines into the cylinders of which an explosive mixture is introduced and ignited, the combustion and expansion of the mixture affording the energy by which the engine is 20 started.

In order to render such devices ready for action, it has been heretofore proposed to introduce into the cylinders of the engine an explosive mixture by the aid of compressed 25 air or otherwise through auxiliary inlets which are arranged in or near the top of the cylinders, and then to ignite the mixture so introduced in the cylinder, the piston of which is at or near its upper dead center. 30 It is obvious that in devices of this character either a separate valve must be used for each auxiliary inlet of the engine, or a distributor must be provided. For this reason, obviously, these devices are too 35 complicated, and too expensive to manufacture and to assemble.

It is now one of the objects of the invention to obviate these defects of the devices heretofore in use, and to provide a 40 simple and inexpensive starter for internal combustion engines, consisting of a single valve for controlling the admission of the explosive mixture through the regular inlet ports to all of the cylinders of the engine, and of means for short circuiting or rendering non-operative the ignition system of the engine during the time the mixture is admitted to the cylinders.

Another object of the invention is to combine the said valve with the short circuiting device in such a manner that by the act of opening the communication between the supply of fuel under pressure and the cylinders of the engine the electric circuit in

which the spark plugs are inserted is rendered non-operative.

With these and other objects in view, which will more fully appear as the nature of the invention is better understood, the same consists in the combination, arrangement and construction of parts hereinafter fully described, pointed out in the appended claim and illustrated in the accompanying drawings, it being understood that many changes may be made in the size and proportion of the several parts and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

One of the many possible embodiments of the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a side elevation, partly in section, of an internal combustion engine including means embodying the invention; Fig. 2 is an enlarged longitudinal section of the starting valve; Fig. 3 is a front elevation thereof; Fig. 4 is a section taken on line 4—4 of Fig. 2; and Fig. 5 is a diagrammatic view of an ordinary form of wiring showing how it may be controlled by the valve of the starting mechanism.

The invention is shown in the drawings as applied to a two cycle gas engine, having four cylinders 10, 11, 12 and 13, the engine being mounted immediately forward of the dash board 14 of an automobile, as usual in devices of this kind. A pipe 15 leads from the carbureter, not shown in the drawings, to the intake manifold 16, which connects through their inlet ports all the cylinders with the said pipe 15. Firing or ignition takes place from the usual spark plugs 17, from which conductors 18 lead to the respective segments of a distributor 19, the common contact terminal 20 of which is connected by a conductor 21 to one terminal of the secondary wiring 22 of a spark coil, its other terminal being grounded at 23, or rather connected with the metal frame of the automobile, thus completing the circuit. The primary wiring of the spark coil is denoted by the numeral 24, and is connected with the magneto or a battery in a manner well known in the art.

For starting the engine, a source of energy is used which is already provided on most automobiles and other motor vehicles;

more particularly, either acetylene or another gas which is used for the purpose of providing fuel to the lights of the vehicle. The gas is stored in a tank 25, and the admission of the same to the cylinders of the engine is controlled by a valve 26. This valve comprises a, preferably, cylindrical casing 27, having a conical bore 28 leading therethrough, and being screwed or otherwise attached to a cover 29, which is provided with a flange 29'. The other end of the valve casing is closed by a cover 30, held upon the casing in any suitable manner, for instance by providing it with screw threads meshing with the threads upon the casing. The valve casing 27 is attached to the dash board 14, for which purpose the latter is provided with a recess 31, in which the flange 29' is seated, the casing 27 projecting through an aperture 32 in the dash board toward the motor of the vehicle. Screws 33, 33 serve to fasten the flange to the dash board. The valve casing has an inlet port 34 and an outlet port 35, arranged, preferably, in diametrically opposite points of the casing, said inlet port communicating through a pipe 36 with the acetylene tank 25, and said outlet port through a pipe 37 with the pipe 15. The ports of the valve casing are controlled by a conical valve plug 38, which is seated in the conical bore 28 thereof. The inner end 39 of the valve plug projects through an opening 40 in the cover 29 of the valve casing, and has attached thereto outside of said valve casing a knob 41, to facilitate the operation of the plug. The plug is provided with a transverse conduit 42, which is adapted to register with the ports in the valve casing, thereby establishing a communication between the acetylene tank and the pipe 15 of the engine. In the pipe 36 is, preferably, inserted a cock 43 for shutting off the tank altogether, when it is desired to do so. A cock 44 is shown for controlling the lights of the vehicle.

To the outside of the cover 30 are attached in any suitable manner two metallic contacts 45 and 46, electrically insulated from each other and from the cover. The contact 45 is connected by a conductor 47 with the ground, or rather with the metallic frame of the vehicle, while a conductor 48 connects the contact 46 with the conductor 21 which leads from one of the terminals of the secondary wiring of the spark coil to the contact terminal 20 of the distributor 19. To the valve 38 is fastened or with the same may be made integral, a cylindrical extension 49, which is arranged in the longitudinal axis of the plug, and projects through an opening 50 in the cover 30. To this cylindrical extension is attached a metallic switch 51, which is insulated from the extension, and is adapted to complete a circuit between the contacts 45 and 46. More par-

ticularly, it will complete the circuit by being turned into the dotted position, shown in Fig. 3 of the drawings, by turning the knob 41 of the valve plug 38, and in this position the conduit 42 in the valve plug will register with the inlet and outlet ports in the valve casing. When brought into the position shown in full lines in Fig. 3 of the drawings, the circuit between the contacts 45 and 46 will be interrupted and the communication between the inlet and outlet ports of the valve casing closed.

The operation of the device is as follows: Let us assume that the cock 43 is turned so that a communication is open between the acetylene tank and the casing of the valve 26. Normally the valve plug 38 is in the position shown in Figs. 2 to 4, inclusive, of the drawings, that is the communication between the ports 34 and 35 of the valve casing 27 is closed. When the operation of the motor is to be stopped, of course, the throttle of the motor is set to a minimum so that only a supply of combustible mixture will be introduced into the cylinders of the engine which is sufficient to actuate the pistons in said cylinders at a low speed. When now by means of the knob 41, the valve plug 38 is turned so that its conduit 42 will register with the ports 34 and 35 in the valve casing, the switch 51 will complete the circuit between the contacts 45 and 46, whereby so much of the current passes through the new path as to prevent the spark plugs from receiving an appreciable current. The greater part of the current will pass from the secondary winding of the spark coil through conductor 21, conductor 48, to contact 46, through switch 51, contact 45, and conductor 47 to the metallic frame of the automobile, and from there to the secondary winding 22 of the spark coil. The effect of this will be that the ignition system of the engine will be rendered non-operative and the explosive mixture drawn into the cylinders will not be ignited. This will result in a stopping of the engine. As, however, the momentum of the fly-wheel of the engine prevents the same from a sudden stopping, and since simultaneously with the closing of the circuit between the contacts 45 and 46, a communication is opened through the valve 26 between the acetylene tank and the manifold 16 of the motor, acetylene under pressure will be supplied through the manifold and the inlet ports of the cylinders to the latter. When the engine comes to a stop, one or the other of the pistons in the cylinders will be in or near its upper dead center, and contain a compressed mixture of acetylene and air, the air being furnished to the cylinders through the carbureter of the motor. In fact, the mixture contained in the cylinders will be a mixture of hydrocarbon fuel furnished by the carbureter and of acet-

ylene. As soon as the engine is at rest, the plug 38 of the valve 26 is brought into the position shown in Figs. 2 to 4 of the drawings, shutting off thereby acetylene from the cylinders.

To start the engine in motion, an electric current, from an additional battery, is furnished to the spark plugs, which will cause a firing in that cylinder the piston of which is in its upper dead center. After the first ignition has occurred, and an initial movement thereby given, the charge in the next cylinder will be fired in its proper order, the engine then continuing to run in the ordinary manner by drawing in combustible mixture through the carbureter. In other words, the starting charge is admitted to the engine at the time the same is stopped, and this charge, which is of a high explosive quality, is ignited by an additional battery in the usual manner.

It is of course, obvious that while herein a specific valve has been described for controlling the flow of the gas to the inlets of the cylinders of the engine, in combination with a switch for completing a shunt circuit, any other suitable means may be provided for the purpose at hand without departing from the invention, which lies mainly in

the provision of means for establishing a communication between a supply of fuel and the cylinders of the engine through their inlet ports, in combination with a switch of the character described.

What I claim is:—

The combination with an engine consisting of a plurality of working cylinders having inlets through which a supply of hydrocarbon fuel is supplied to the same, an intake manifold communicating with said inlets, an ignition system for the engine, a tank for gas under pressure, a valve casing, gas carrying connections leading from said valve casing to said tank and to said manifold, a valve plug in said casing for controlling the flow of gas therethrough, electric contacts upon said casing connected with the ignition system, and a switch carried by said plug adapted to complete a circuit between said contacts during the time that gas flows through said valve casing.

Signed at New York, in the county of New York and State of New York, this 27th day of Sept., A. D. 1911.

GEORGE L. HENRY.

Witnesses:

SIGMUND HERZOG,
S. BIRNBAUM.