

H. M. SHEER.
 STARTING DEVICE FOR ENGINES.
 APPLICATION FILED NOV. 22, 1912.

1,065,850.

Patented June 24, 1913.

3 SHEETS—SHEET 1.

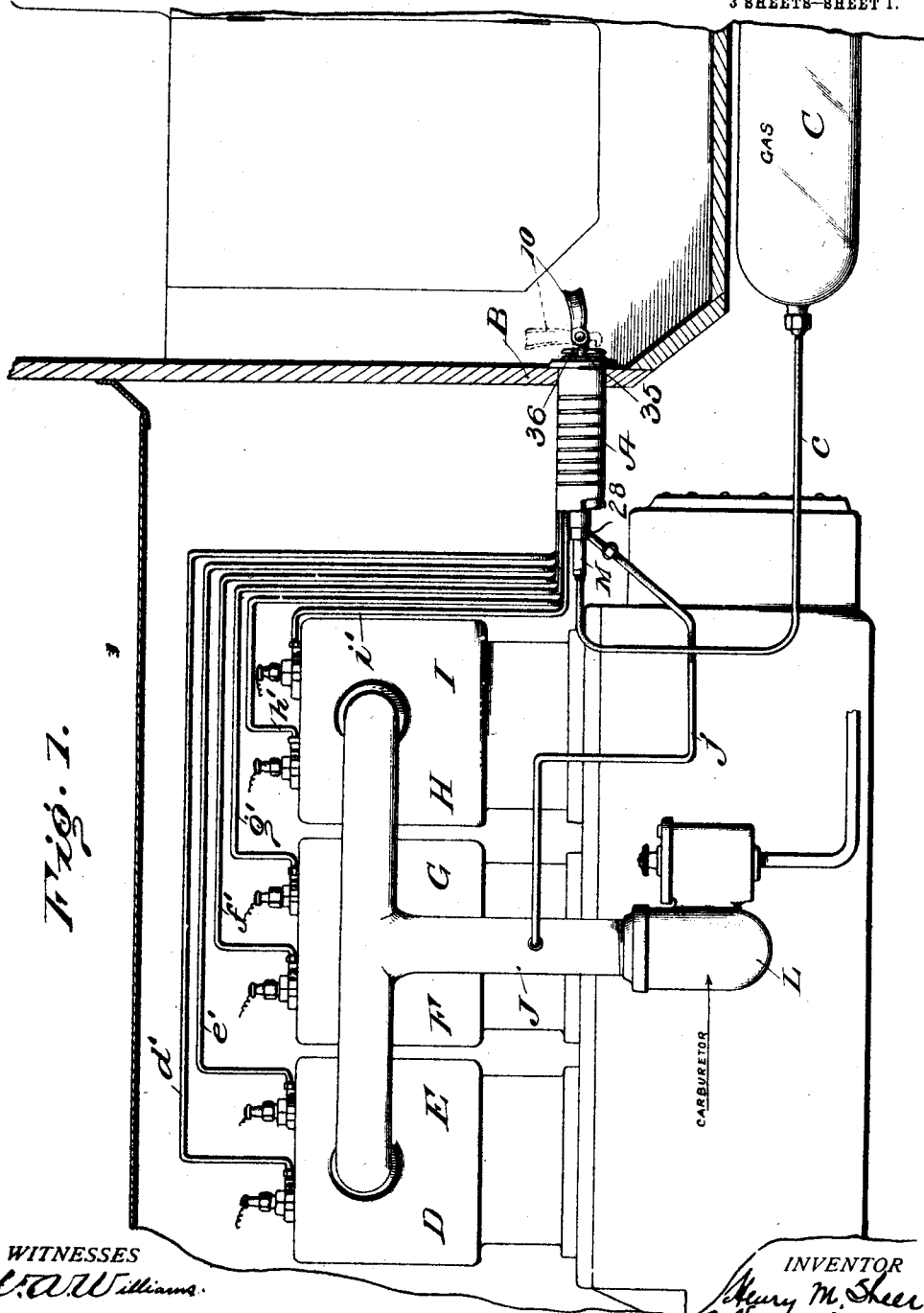


Fig. 1.

WITNESSES
 W. A. Williams.

Gloyd W. Patch

INVENTOR

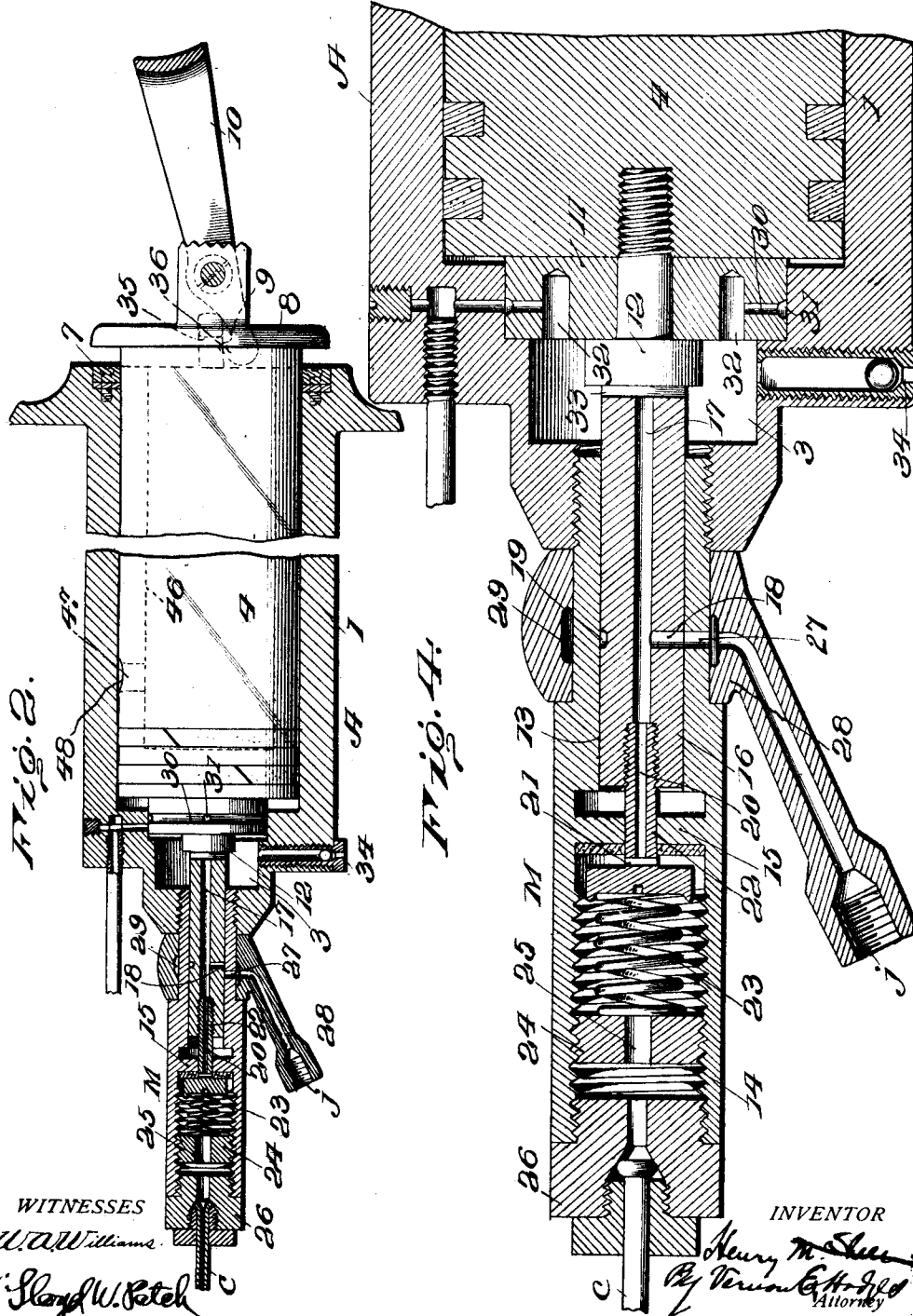
Henry M. Sheer
 By Vernon E. Hodges
 Attorney

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3 SHEETS—SHEET 2.



WITNESSES
 W. A. Williams

Shay W. Ritch

INVENTOR

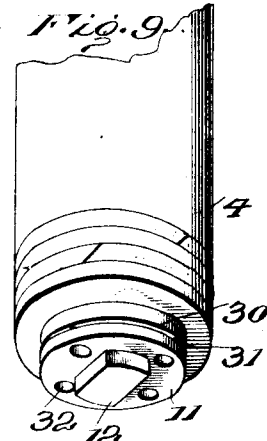
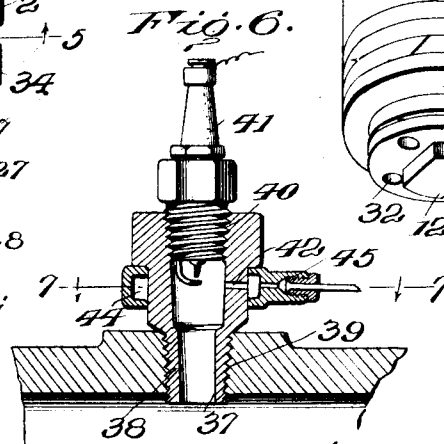
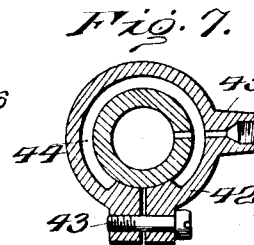
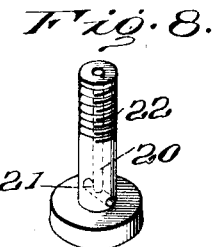
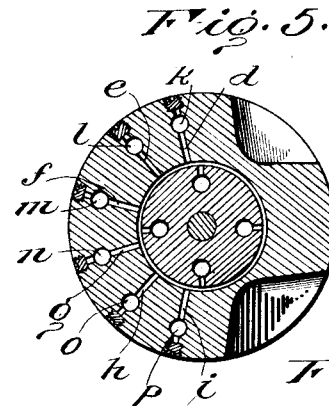
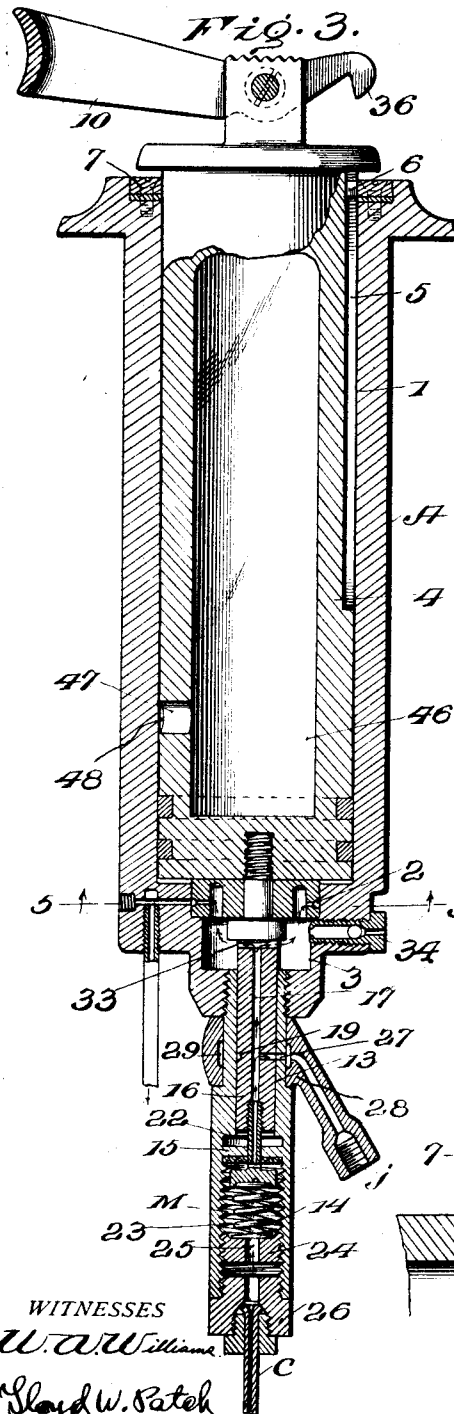
Henry M. Sheer
 By Vernon E. H. Gled
 Attorney

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3 SHEETS-SHEET 3.



WITNESSES
W. A. Williams
Gloyd W. Patch

INVENTOR
Henry M. Sheer
By Vernon E. Hagedorn
Attorney

UNITED STATES PATENT OFFICE.

HENRY M. SHEER, OF QUINCY, ILLINOIS.

STARTING DEVICE FOR ENGINES.

1,065,850.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed November 22, 1912. Serial No. 732,974.

To all whom it may concern:

Be it known that I, HENRY M. SHEER, a citizen of the United States, residing at Quincy, in county of Adams and State of Illinois, have invented certain new and useful Improvements in Starting Devices for Engines, of which the following is a specification.

My invention relates to an improvement in starting devices for engines, and more particularly to that type of starting devices which is intended to be used with an internal-combustion engine upon motor vehicles, although it will, of course, be understood that it is applicable to engines used in other connections.

The object of this invention is to provide a device of the character described in which the combustible mixture is supplied to each of the cylinders and to the intake manifold, a spark in that cylinder about to fire igniting the mixture introduced thereinto, causing the crank-shaft to be turned and the ignition system to be operated so that the charge in each of the cylinders will be fired at the proper time. During this operation of the engine, additional charges of explosive mixture are drawn in from the intake manifold, and the gasoline or other fluid is agitated by the charge introduced into the manifold and the operation of the engine sufficiently that it will volatilize even in the coldest of weather.

A further object is in the provision of a device which may be operated to introduce air into the cylinders in case the mixture introduced is too rich and is not ignited by the spark.

I still further provide a device which will accomplish these objects and which may be operated with the foot without the necessity of the operator changing his position in the car.

This invention further consists in certain other novel features of construction and combinations of parts which will be hereinafter fully described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a view with parts broken away to show my invention applied to an automobile, Fig. 2 is a vertical sectional view through the pump casing showing the parts in their normal position, Fig. 3 is a view similar to Fig. 2 but showing the parts in the position at

which the gas is permitted to enter, Fig. 4 is an enlarged detail view of the gas control mechanism, Fig. 5 is a transverse sectional view on the line 5—5 of Fig. 3, Fig. 6 is a detail sectional view of a form of spark plug socket adapted for use with the starting device, Fig. 7 is a transverse sectional view on the line 7—7 of Fig. 6, Fig. 8 is a detail perspective view of the gas-valve screw, and Fig. 9 is a detail perspective view of the inner end of the pump plunger.

This device is more particularly adapted for use in connection with an acetylene gas tank to supply the combustible mixture, although, as will be evident from the description, it is equally applicable to any system in which a combustible gas is introduced under pressure, and with slight variations might be adapted for use with liquid fuel.

In Fig. 1, I have shown the device as applied to a six-cylinder motor, and in this connection the casing A is held in place to be easily accessible to the foot of the operator on the dash B of the car. Gas is supplied from the tank C, and from the casing A it passes to the cylinders D, E, F, G, H, and I, and also to the intake manifold J which has connected therewith the usual carbureter L. The pump casing A has a large bore 1, and two smaller bores 2 and 3 formed axially therein. The bores 1 and 2 are preferably ground smooth and the piston 4 is mounted to slide in the larger. This piston has the usual packing-rings, and on its lower side has a key-way 5 formed to receive a key 6 carried by the packing-ring 7 secured on the outer end of the casing. A head 8 is secured to the piston 4, and has a tread surface 9 formed thereon. A stirrup 10 is pivoted to the head 8 in position to fit over the foot when the foot engages the tread 9.

Transverse bores *d, e, f, g, h, and i* are formed through the wall of the casing A to communicate with the bore 2 and the transverse bores are plugged at their outer ends. Counterbores *k, l, m, n* and *o* are formed in the casing to communicate with the transverse bores *d, e, f, g, h* and *i*, and fuel leads *d' e' f', g', h', i'* are secured in the counterbores and extend to the cylinders D, E, F, G, H and I respectively. A valve 11 is secured on the inner end of the piston 4 by a screw 12 and is intended to fit into

the bore 2 of the casing in such a manner that the transverse bores *d, e, f, g, h* and *i* are closed when the piston is in its normal position. A gas supply chamber M is 5 screwed into the inner end of the casing A. This chamber is axially bored on two diameters 13 and 14 with a wall 15 separating them. A valve plunger 16 having a central bore 17 and a branch bore 18 connected with a circumferential groove 19 is 10 received in the bore 13 of the chamber M. This valve has endwise sliding movement in the bore 13, and screw 20 having a T-bore 21 is received in a bore 22 formed in the wall 15 and is screwed into the valve 16. 15 The bore 14 is screw-threaded. A spring 23 is received against the head of the screw 20 to hold the head tight against the wall 15 and the body of the screw in the bore 22, so that the ends of the T-bore 21 are closed 20 and the tension of this spring is regulated by a follower block 24 having an opening 25 therethrough. A plug 26 is screwed into the outer end of the bore 14, and a gas lead *c* extending from the gas tank C is connected therewith. A bore 27 is formed 25 through the wall of chamber M to communicate with the axial bore 13 and is so positioned that when the valve 16 is moved against the pressure of the spring 23, the 30 groove 19 will come into registry therewith. A collar 28 is received over the chamber M and has an internal groove 29 positioned to be in registry with the bore 27. This collar is secured to the chamber M in such a manner 35 that any leakage therebetween will be prevented, and a lead *j* connects it with the intake manifold J.

The valve 11 carried by the piston 4 has 40 a groove 30 formed circumferentially thereof and transverse bores 31 communicating with this groove and with the counterbores 32, which counterbores are so positioned that they open into the bore 3 of the casing A. 45 The end of the valve-plunger 16 extends from the bore 13 into the bore 3 of the casing A, and the screw 12 carried by the piston is in position to engage with this valve-plunger and depress it against the tension 50 of the spring 23 when the piston is moved to its innermost stroke. A slot 33 is moved across the end of the plunger 16 and communicates with the bore 17; thus, when the piston is moved to its innermost stroke, the 55 plunger 16 is forced inwardly against the tension of the spring 23, and the T-bore of the screw 20 is moved from the bore 22 of the wall 15, so that the gas can pass into the chamber formed by the bore 3 of the casing. Also when the parts are moved to 60 this position, as shown in Figs. 3 and 4, the groove 30 of the valve 11 is in communication with the transverse bores *d, e, f, g, h, i*, with which the fuel leads to the cylinders 65 are connected, and the gas is permitted to

pass to the cylinders through the transverse bore 31 and counterbore 32, which communicate with the chamber formed by the bore 3 to which the gas is supplied. A check-valve 34 is received through the casing 70 and also communicates with this chamber. This check-valve is open from the outer air and is intended to supply fresh air to be mixed with the gas. As a means of holding the piston in its normal position, 75 as shown in Fig. 2, so that the valve 11 will close the transverse bores *d, e, f, g, h, i*, hooks 35 are formed on the stirrup, on that side of the pivotal point away from the foot-loop, and loops 36 are carried by the casing 80 A in position to be engaged by the hooks as the foot is removed from the loop of the stirrup.

In the use of this device, it is preferable 85 that the explosive mixture be introduced into the cylinder against the sparking terminals of the plugs, and for this purpose several devices are now in use which consist of sub-chambers or deflectors for turning the 90 gas against the end of the spark plug, but I have found that in many instances the connections with which the fuel leads connect are not in the proper position when the subchambers are screwed into the cylinder, 95 and even this connection will be on the opposite side from which the lead extends. As a provision against this difficulty I have provided an adjustable subchamber, as better shown in Figs. 6 and 7. The subchamber 100 37 is counterbored at 38, and has external screw-threads 39 on its one end to fit the opening intended for the standard spark-plug. On the other end, the bore is screw-threaded at 40 to receive the spark plug 41. 105 A port 42 is formed through the side of the chamber, communicating with the bore 38, and a split collar 42 is received around the portion of the chamber adjacent the port and is held clamped thereto by a clamp-screw 43. This collar has an internal groove 110 44, and a suitable connection 45 is provided to communicate with this groove and to which the leads may be connected.

The operation of the device is as follows:— 115 The operator places his foot against the tread 9, and in so doing raises the stirrup 10 sufficiently that the hooks 35 become disengaged from the loops 36. He then presses the piston inwardly which opens the valve and permits the gas to flow into the chamber 120 3 from whence it passes to the several cylinders and also through the lead *j* to the intake manifold. The operator then withdraws the piston from the casing, taking in fresh air through the valve 34, and at the 125 same time withdrawing a portion of the charge from each of the cylinders past the spark terminals. The piston is then forced in, forcing all of the fluid in the casing through the fuel leads into the cylinders, 130

and that cylinder which has the active spark-plug fires, causing the engine to start. If one cylinder has an active spark-plug and the engine does not start, it may be either that the mixture is too rich or not rich enough. In the first case, the operator would again withdraw the piston from the casing, taking in additional fresh air through the check-valve 34 and continue this operation until the mixture in the cylinders is sufficiently diluted to be of the proper proportion. If, on the other hand, the mixture is not sufficiently strong, the piston is moved to the position shown in Figs. 3 and 4, and an additional supply of gas is permitted to flow through the valve, which will make up for the deficiency of richness in the mixture supplied to the cylinders. As a convenient means of keeping the piston and the working parts always oiled, I have counterbored the piston at 46, and a port 47 communicates with the groove 48 on the exterior surface of the piston and with the counterbore 46. The chamber formed by the counterbore may be filled with oil, and as the piston is moved back and forth this oil will splash and pass through the port 47 into the groove 48 where it will come in contact with the walls of the bore 1 and effectually lubricate the parts.

It will thus be seen that I have provided a starting device which may be operated without the necessity of stooping, and which is entirely controlled by the foot of the person operating the machine; also that with the structure as disclosed but a single check-valve is needed, as the valve 11 closes the openings from the fuel-leads when the mixture is to be fired and prevents back-firing. Thus the parts are not likely to get out of order. Further it will be seen that this device may be applied to the standard automobile even after it has left the factory, and that, with the use of the subchamber as disclosed, it is not necessary to in any wise alter the engine or its connections.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is—

1. A starting device for engines, comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber secured to the casing, fuel leads connected with said piston chamber, and with each of the cylinders, means controlled by the piston for opening and closing said leads, and means extending from the gas chamber to a position to be actuated by the piston for controlling the passage of gas to the piston chamber.

2. A starting device for engines, comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber secured to the casing, fuel leads connected with said piston cham-

ber, and with each of the cylinders, means controlled by the piston for opening and closing said leads, means extending from the gas chamber to a position to be actuated by the piston for controlling the passage of gas to the piston chamber, and means whereby the piston may be actuated and controlled with the foot.

3. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber secured to the casing, fuel leads connected with said piston chamber and with each of the cylinders, a fuel lead from the gas chamber to the intake manifold, means controlled by the piston for opening and closing the leads to the cylinders, and means actuated by the piston for controlling the passage of gas to the piston chamber.

4. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber secured to the casing, fuel leads connected with said piston chamber and with each of the cylinders, a fuel lead from the gas chamber to the intake manifold, means controlled by the piston for opening and closing the leads to the cylinders, and means extending to a position to be actuated by the piston for controlling the passage of gas through the lead to the intake manifold, said last named means also controlling the passage of gas to the piston chamber.

5. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber secured to the casing, fuel leads connected with said piston chamber, and with each of the cylinders, means controlled by the piston for opening and closing said leads, means located in the gas chamber and extending to a position to be actuated by the piston for controlling the passage of gas to the piston chamber, said means so constructed that when the piston is on its innermost stroke a direct passage is formed from the gas chamber to each of the cylinders.

6. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the casing, fuel leads extending from said piston chamber to each of the cylinders, a valve carried by the piston in position to close over said fuel leads, and means extending from the gas chamber to a position to be actuated by the piston for controlling the passage of gas to the piston chamber.

7. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the

casing, fuel leads extending from said piston chamber to each of the cylinders, a valve carried by the piston in position to close over said fuel leads, means located in the gas chamber and extending to a position to be actuated by the piston for controlling the passage of gas to the piston chamber, and passages in said valve so located that when the piston is moved to a position to permit the passage of gas to the piston chamber the passages open into the fuel leads.

8. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the casing, fuel leads connected with said piston chamber and with each of the cylinders, a fuel lead extending from the gas chamber to the intake manifold, a valve carried by the piston in position to control the opening to the leads from the several cylinders, a valve located in the gas chamber and adapted to be actuated by the piston for permitting the passage of gas to the piston chamber, a bore in said valve communicating with the lead to the intake manifold when the valve is open, and passages in the valve carried by the piston positioned to communicate with the leads to the cylinder when the piston is moved to a position to open the gas valve and thus permit the passage of gas to the cylinders.

9. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the casing, fuel leads connected with said piston chamber and with each of the cylinders, a valve carried by the piston for closing said leads, a valve located in the gas chamber and adapted to be actuated by the piston for controlling the passage of gas to the piston chamber, and an air check valve connected with said piston chamber, said piston adapted to be actuated without opening said gas valve and to open said gas valve when on its innermost stroke.

10. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the casing, fuel leads connected with said piston chamber and with each of the cylinders, an air supply valve connected with the piston chamber, a fuel lead from the gas chamber to the intake manifold, a valve located in the gas chamber and adapted to be opened by the piston for permitting the passage of gas to the piston chamber, and through the fuel lead to the intake manifold, a spring for holding said valve normally closed, said valve extending into the piston chamber and adapted to form a stop for the normal instroke of the piston but constructed so that as pressure is applied to the piston the valve

is opened, and a valve carried by the piston in position to close the leads to the cylinders when the piston is on its normal instroke.

11. A starting device for engines comprising a pump casing having a piston chamber therein, a piston working in said chamber, a gas supply chamber connected with the casing, fuel leads connected with said piston chamber and with each of the cylinders, an air supply valve connected with the piston chamber, a fuel lead from the gas chamber to the intake manifold, a valve located in the gas chamber and adapted to be opened by the piston for permitting the passage of gas to the piston chamber, and through the fuel lead to the intake manifold, a spring for holding said valve normally closed, said valve extending into the piston chamber and adapted to form a stop for the normal instroke of the piston but constructed so that as pressure is applied to the piston the valve is opened, and a valve carried by the piston in position to close the leads to the cylinders when the piston is on its normal instroke, said piston adapted to be operated on its normal strokes and to be depressed by the foot, and means for holding said piston, when not in use, in a position that the valve closes the leads to the cylinders.

12. A device of the character described comprising in combination with a multiple cylinder engine and an auxiliary fuel supply, a pump casing having a piston chamber therein, a piston working in said chamber, fuel leads from said piston chamber to each of the cylinders, an air valve connected with the piston chamber for supplying air thereto during the normal operation of the piston, a gas supply chamber connected with the casing, a supply pipe from the auxiliary fuel supply to the gas chamber, and a valve adapted to be actuated by the piston for permitting the passage of gas to the piston chamber.

13. A device of the character described comprising in combination with a multiple cylinder engine and an auxiliary fuel supply, a pump casing having a piston chamber therein, a piston working in said chamber, fuel leads from said piston chamber to each of the cylinders, and an air valve connected with the piston chamber for supplying air thereto during the normal operation of the piston, a gas supply chamber connected with the casing, a supply pipe from the auxiliary fuel supply to the gas chamber, a fuel valve lead connected with the gas chamber and extending to the intake manifold, and a valve opened by the piston for permitting the passage of gas through said lead to the intake manifold and into the piston chamber.

14. A device of the character described comprising in combination with a multiple

cylinder engine and auxiliary fuel supply, a pump casing having a piston chamber therein, fuel leads connected with said piston chamber and with each of the cylinders, a piston working in said chamber, an air supply valve adapted to supply air to said chamber during the normal operation of the piston, a gas chamber connected with said casing, a connection between the auxiliary fuel supply and said chamber, a fuel lead from the gas chamber to the intake manifold, a spring closed valve adapted to form a closure to the lead to the intake manifold and to the passage of gas to the piston chamber, said valve adapted to form a stop to the normal instroke of the piston and to be depressed against the spring by additional pressure on the piston for opening the passage to the piston chamber and to the lead to the intake manifold.

15. A device of the character described comprising in combination with a multiple cylinder engine and auxiliary fuel supply, a pump casing having a piston chamber therein, fuel leads connected with said piston chamber and with each of the cylinders, a piston working in said chamber, an air supply valve adapted to supply air to said chamber during the normal operation of the piston, a gas chamber connected with said casing, a connection between the auxiliary fuel supply and said chamber, a fuel lead from the gas chamber to the intake manifold, a spring closed valve adapted to form a closure to the lead to the intake manifold and to the passage of gas to the piston chamber, said valve adapted to form a stop to the normal instroke of the piston and to be depressed against the spring by additional pressure on the piston for opening the passage to the piston chamber and to the lead to the intake manifold, a valve carried by the piston in position to close the leads to the cylinders when the piston is at its normal instroke, passages in said valve

adapted to open communication between the piston chamber and the fuel leads to the cylinders when the piston is depressed to open the gas valve.

16. A device of the character described comprising in combination with a multiple cylinder engine and auxiliary fuel supply, a pump casing having a piston chamber therein, fuel leads connected with said piston chamber and with each of the cylinders, a piston working in said chamber, an air supply valve adapted to supply air to said chamber during the normal operation of the piston, a gas chamber connected with said casing, a connection between the auxiliary fuel supply and said chamber, a fuel lead from the gas chamber to the intake manifold, a spring closed valve adapted to form a closure to the lead to the intake manifold and to the passage of gas to the piston chamber, said valve adapted to form a stop to the normal instroke of the piston and to be depressed against the spring by additional pressure on the piston for opening the passage to the piston chamber and to the lead to the intake manifold, a valve carried by the piston in position to close the leads to the cylinders when the piston is at its normal instroke, passages in said valve adapted to open communication between the piston chamber and the fuel leads to the cylinders when the piston is depressed to open the gas valve, and means whereby the piston can be normally operated for pumping air to the cylinders or depressed for opening the communication from the fuel supply to the cylinders and intake manifold by the foot of the operator.

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

HENRY M. SHEER.

Witnesses:

GERHARD G. ARENDS,
HENRY DAMHORST.