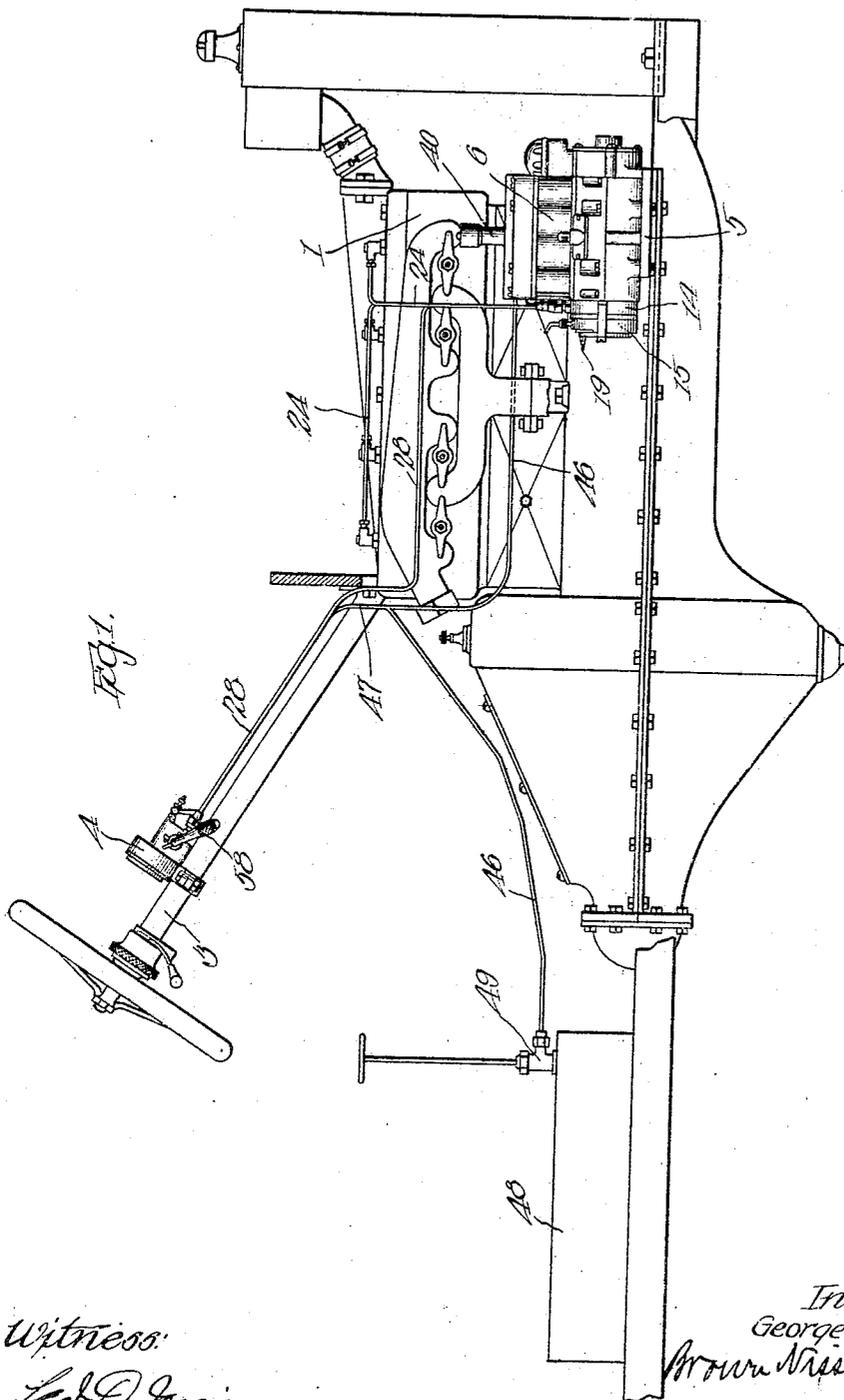


G. Y. LAUCHIN.
ENGINE STARTER.
APPLICATION FILED FEB. 21, 1916.

1,298,063.

Patented Mar. 25, 1919.

5 SHEETS—SHEET 1.



Witness:
Leif DuMuis

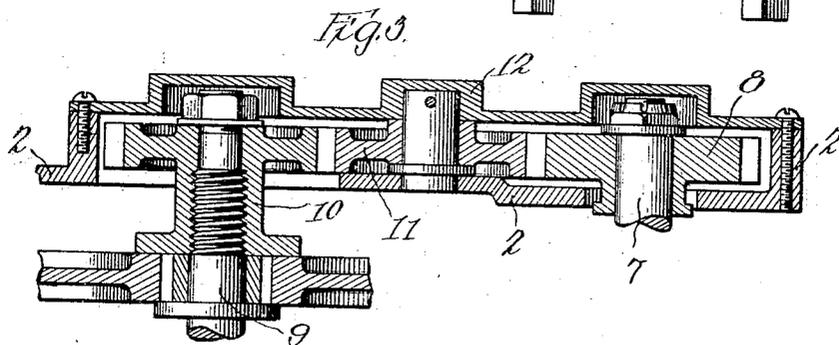
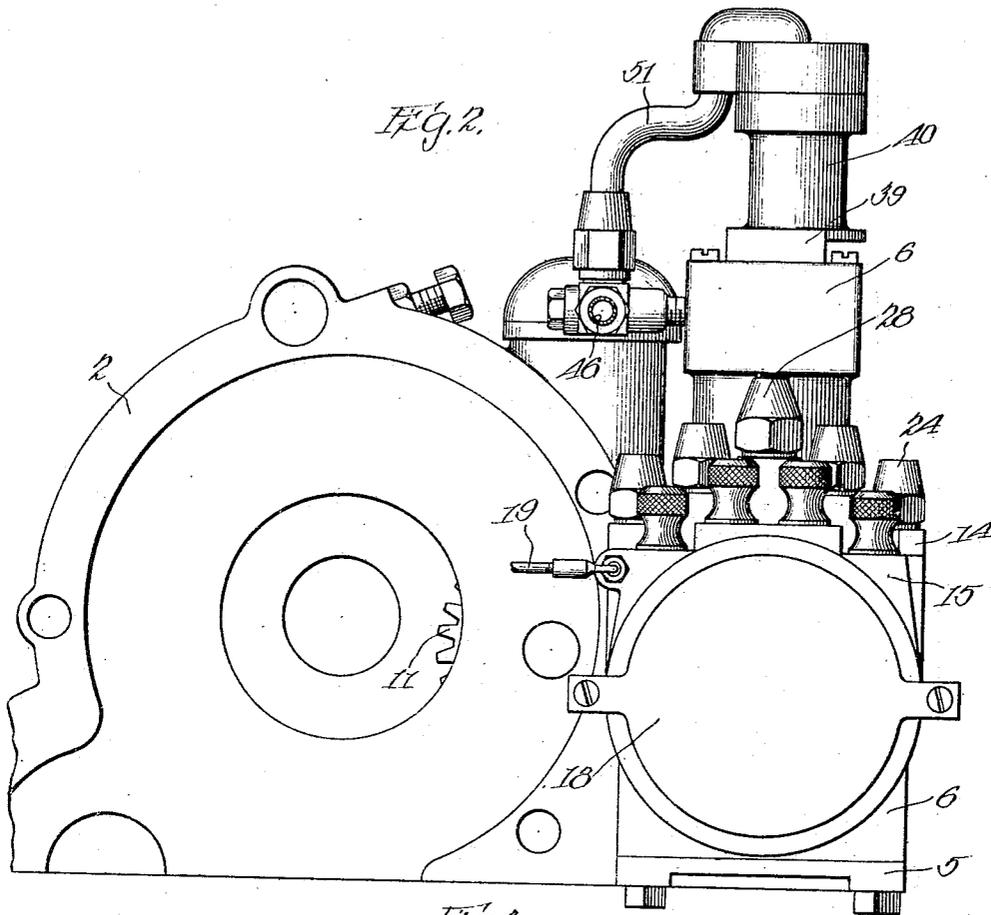
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 5 SHEETS—SHEET 2.



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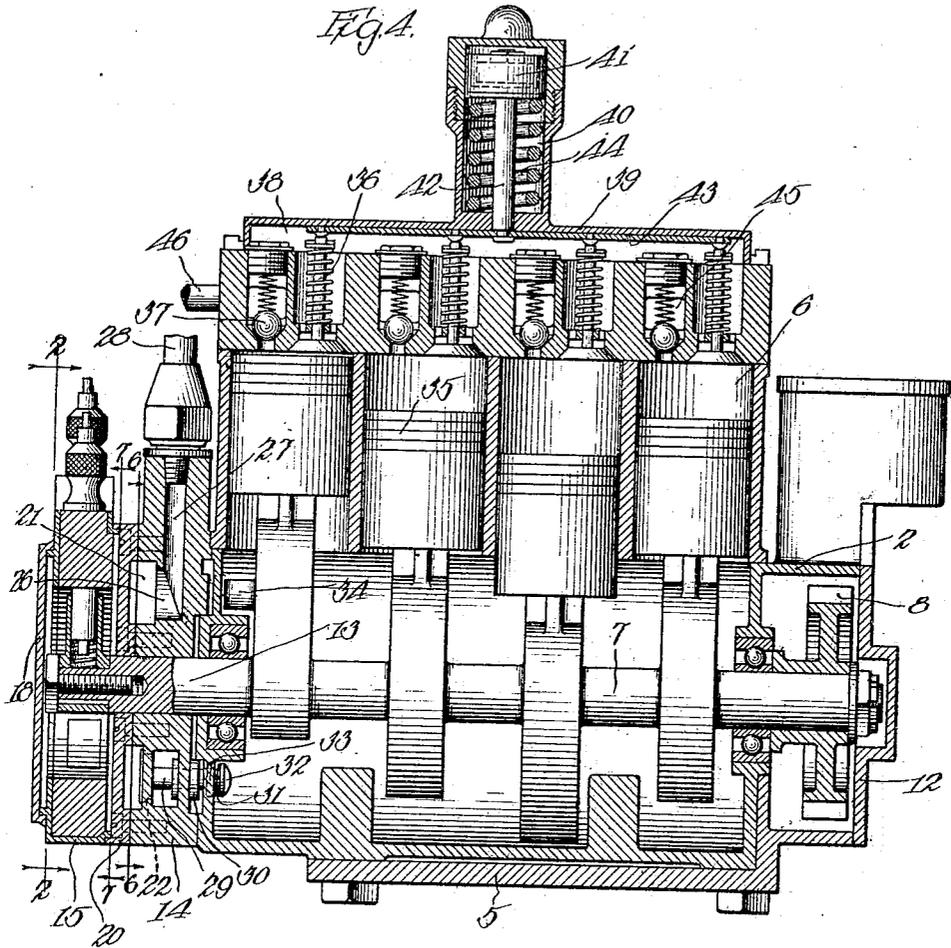
Attys.

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5 SHEETS—SHEET 3.



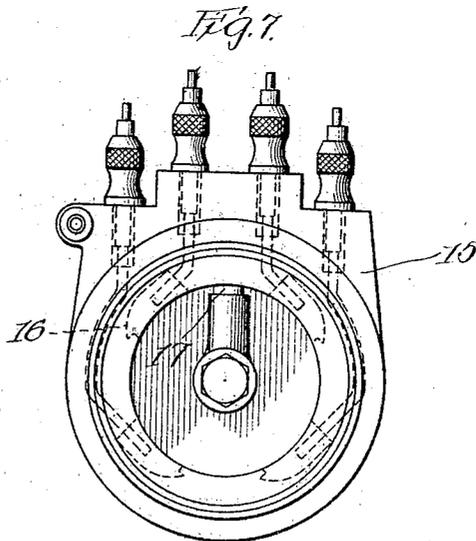
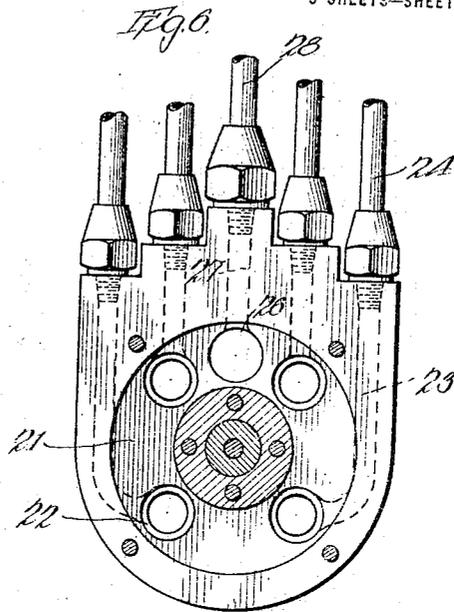
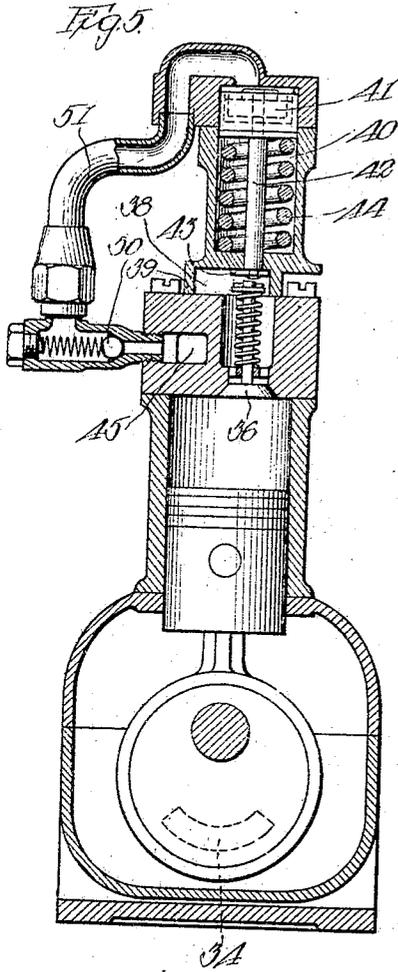
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 5 SHEETS—SHEET 4.



Witness:
Leo D. Main

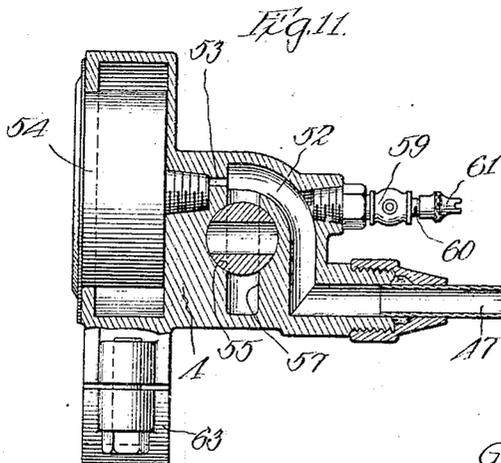
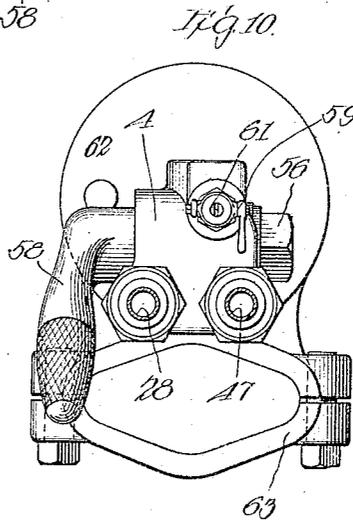
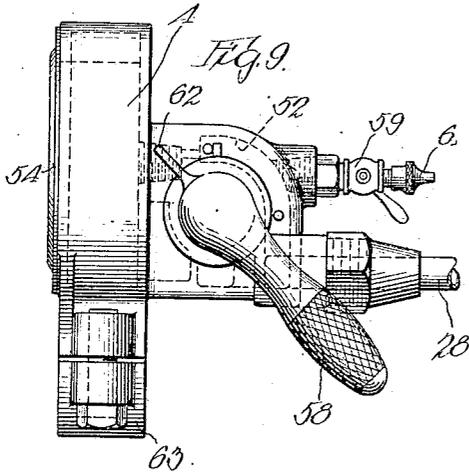
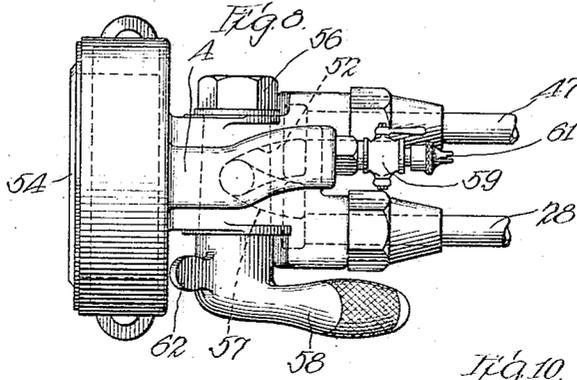
Inventor:
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G. Y. LAUCHIN.
 ENGINE STARTER.
 APPLICATION FILED FEB. 21, 1916.

1,298,063.

Patented Mar. 25, 1919.

5 SHEETS—SHEET 5.



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Inventor:
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 Atty.

UNITED STATES PATENT OFFICE.

GEORGE Y. LAUCHIN, OF CRYSTAL FALLS, MICHIGAN, ASSIGNOR OF ONE-HALF TO
EDWARD H. SENSIBA, OF CRYSTAL FALLS, MICHIGAN.

ENGINE-STARTER.

1,298,063.

Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed February 21, 1916. Serial No. 79,544.

To all whom it may concern:

Be it known that I, GEORGE Y. LAUCHIN, a citizen of the United States, residing at Crystal Falls, in the county of Iron and State of Michigan, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

This invention relates particularly to a gas engine starter and although designed and intended for use in connection with the "Ford" engine and for "Ford" automobiles, it may of course, have a more general application to any engine to which it is applicable to. The invention consists in the feature of novelty in the construction, combination and arrangement of the several parts.

In the accompanying drawings,—

Figure 1, is a side elevation of an engine to which a starter embodying the principles of this invention is applied.

Fig. 2, is an end view of a supporting plate for the starter, which may be bodily removed from the engine, as taken on line 2—2 of Fig. 4.

Fig. 3, is a sectional view showing the driving connection between the engine and the starter.

Fig. 4, is a sectional view of a combined pump, timer and air distributor.

Fig. 5, is a cross sectional view of the pump construction.

Fig. 6, is a sectional view taken on line 6—6 of Fig. 4.

Fig. 7, is a sectional view taken on line 7—7 of Fig. 4.

Figs. 8, 9, and 10, are different views of a combined gage and starting valve.

Fig. 11, is a sectional view of the gage and starter valve.

This invention comprises a combined pump, timer and air distributor driven by an engine, together with a necessary gage and pressure reservoir by means of which, fluid under pressure may be automatically stored in a suitable reservoir and then by means of the distributor, directed to the separate engine cylinders to actuate the motor in starting.

Referring more particularly to the drawings, the reference numeral 1, designates generally a combustion engine of the type to which this invention is applicable. The engine is provided with a crank case having upper and lower parts and an end plate (not

shown) for which an end plate 2, shown in Fig. 2, is substituted in carrying out the present invention. This engine 1, is shown as an automobile engine, which is the chief type to which the present invention would be applied, and a starting post 3, is also shown in Fig. 1, upon which the combined gage and valve 4, is mounted.

This end plate 2, is formed with a supporting shelf 5, upon which is mounted a pump 6, as shown in detail in Fig. 4, and preferably comprising a plurality of cylinders. This pump has a crank shaft 7, and connected to it at one end, is a driving gear 8. The engine has a cam shaft or half-time shaft 9, as shown in Fig. 3, which extends parallel to the crank shaft 7, and at the front end, adjacent the plate 2, a gear 10, is threaded on the end of the shaft 9, which is connected by means of an idler 11, with the driving gear 8, the bearing for this shaft being formed by the end plate 2, and by a cover plate 12, which extends over the ends of the other shafts 7 and 9. At the other end of the pump crank shaft 7, is an extension 13. Mounted at this end of the pump 6, is a distributor 14, and a timer 15. The timer is shown in plan in Fig. 7, and comprises a plurality of contacts 16, corresponding in number to the cylinders of the engine and embedded at equal distances in insulating material and arranged in the circumference of a circle, so that the contact maker 17, carried by the shaft 7, will make successive connection with the contacts 16, to make a spark in the proper cylinder of the engine at the proper time, in a well known manner. This timer is rotatably supported between the distributor 14 and an end plate 18, which is secured to the distributor 14 at the sides thereof, as shown in Fig. 2, so that the timer may be advanced or retarded by means of a flexible connection 19, to advance or retard the spark.

The distributor 14, has a cover 20, secured thereto which forms an annular chamber 21, in which are a plurality of valve seats 22, corresponding in number to the cylinders of the engine, each formed with a passage 23, which leads to a connecting pipe 24, extending to the proper cylinder with which it is connected. An opening 26, is also provided in the distributor, which communicates through a passage 27, with a

tubular connection 28, extending to the valve and gage 4. For each of the openings 22, is a valve 29, which has a guiding portion 30, for centering it with respect to its valve seat, a spring 31, for normally holding it on the seat, and a head 32, which extends through an opening 33 in the adjacent casing of the pump, so that the head extends just within the pump casing, but is movable toward it against the pressure of spring 31 to open the valve. In order to open the valves 29 in proper succession, a cam 34, is provided either in connection with the crank shaft 7 of the pump, or on some member secured to the crank shaft, which engages the heads 32 of the valves as the pump crank shaft is rotated. It is obvious that this opens the valves to the proper cylinders in succession, just as the electrical connections are made for the proper cylinders by the timer.

Each cylinder of the pump 6, is of course, provided with a piston 35, operated by the crank shaft 7, and each cylinder is also provided with a spring pressed valve 36, and a spring pressed ball valve 37. These valves 36, have openings communicating with a chamber 38 open to the atmosphere, formed by a casing 39, at the top of the pump. The upper portion of this casing is provided with a cylinder 40, in which is a piston 41, with a rod 42, connected to a bar 43, in the chamber 38, and arranged to engage the stems of the valves 36, for all of the pump cylinders. A spring 44, tends to keep this bar 43 out of engagement with the valve stems. The valves 37, communicate with a common chamber 45, (see Fig. 5), which is connected by a tubular member 46, to a pressure reservoir 48, through a valve 49, and also with the combined gage and valve 4, through the tubular connection 47.

A spring pressed ball valve 50, (see Fig. 5), is also preferably inserted between the common passage 45 and the tubular connection 46, and a tubular connection 51, extends from the spring side of the ball valve 50, to the top of the cylinder 40, where the pressure is applied against the piston 41, tending to force it against its spring 44. The operation of this construction is, that as soon as the pressure in the reservoir 48 and in the tubular connection 46 becomes sufficiently great, the spring 44 will be compressed, and the bar 43 will be forced downwardly against the stems of valves 36, causing them to open. This will allow the pump cylinders to oscillate freely, but will prevent them from discharging any fluid under pressure through their ball valves 37. Since the pump pistons are oscillating idly, there is little or no opposition to their movement, and practically no wear to the parts.

There are only two tubular members connected with the combined gage and valve 4,

one of them, the tubular member 28 extending to the distributor, and the other member 47, making connection with the tubular connection 46, which is the pressure line from the pump to the reservoir 48. In the casing of the combined gage and valve 4, is a passage 52, connected with the pressure member 47, which has an open tubular connection 53, with the gage proper 54, so that the gage will at all times show the pressure in the pressure line 46, and in the reservoir 48, when the valve 49 is open. The valve proper, comprises a perforated stud 55, which extends through the casing and is held in place by a nut 56. In the casing is a passage 57, which forms a communication which extends between the tubular member 28 and the passage 52, and the perforation of the stud 55, opens a communication between the pressure chamber 52 and the tubular member 28, when the stud is rotated. A handle 58, is provided for rotating the stud which thereby constitutes a simple valve for opening the pressure line from the pressure receptacle 48 to the distributor 14.

For convenience, a valve 59 is connected to the passage 52 of the combined gage and starter casing, which has a threaded stem 60 and a cap 61, by means of which, a flexible rubber hose or the like, may be attached to inflate tires and the like.

This apparatus is simple in construction and operation, and is very easy to install as a part of the engine to which it is applied. It is simply necessary to take off a plate from the front of the engine crank casing and to substitute for it, the present plate 2. The engine operates exactly as before, and the starter parts are connected without interfering with any other part or operation of the engine. The timer is placed at the end of the pump shaft for its operation, which is just the same as before the starter is applied.

In operation assuming that there is fluid under pressure in the receptacle 48, the valve 49 is opened if it has been closed, and the valve handle 58 is operated. This opens the pressure line 46 from the pressure receptacle 48 to the tubular member 28, which communicates with the distributor. The annular passage 21, receives the pressure of the reservoir through its opening 26 and valve 29, which is opened because of the engagement of the cam 34 therewith, directly opens connection from the pressure line 46 to the proper engine cylinder. This causes the operation of the engine in the proper direction and causes the corresponding rotation of the pump shaft 7, which as the engine continues to operate, opens the proper valves 29 in succession to keep the engine in operation until it is started. The replenishing of the fluid under pressure in the tank 48 is effected automatically when the engine is in operation. As long as the pressure in

the tank 48 is sufficient, the bar 43 will be pressed down to open the valves 36, but as soon as the pressure is decreased to a predetermined amount, the spring 44 will cause the piston 41 to rise, carrying the bar 43 with it, which closes the valves 36. The operation of the engine then actuates the pump to replenish the fluid under pressure in the tank 48 until it has sufficiently increased the pressure to operate the piston 41 against the pressure of its valve 44, as before explained.

The valves and tubular connections are usually sufficient to maintain fluid under pressure in the tubular connections at all times, but as a further safeguard to maintain fluid under pressure in the tank 48, the valve 49 may be closed when the engine is at rest, or is put up for a time, which must first be opened to start the car.

20 What I claim is:—

1. The combination with a timer, a pump, and a fluid pressure distributor all having a common operating shaft; of a gas engine to which the shaft is connected; a pressure reservoir connected to the pump; a check valve between the pump and the reservoir; automatically operating means dependent upon the reservoir pressure for rendering the pump but not the shaft ineffective; and means for connecting the reservoir with the engine through the distributor.

2. The combination with a pump, and a fluid pressure distributor having a common operating shaft; of a gas engine to which the shaft is connected; a pressure reservoir connected to the pump; a check valve between the pump and the reservoir; an atmospheric valve for the pump; automatically operating means dependent upon the pressure in the reservoir to open the atmospheric valve; and means for connecting the reservoir with the engine through the distributor.

3. The combination with a gas engine, of a fluid pressure distributor and a pump having a common shaft connected with said engine; a pressure reservoir; the pump comprising cylinders each connected with said reservoir; a check valve between the pump and the reservoir; an atmospheric valve for each cylinder; a fluid pressure device including a piston and a cylinder automatically actuated by the reservoir pressure, and a bar moved thereby to open the atmospheric valves; and means for connecting the reservoir with the engine through the distributor.

4. In a gas engine starter, the combination with a distributor and a pump directly and continuously connected to the engine, a fluid pressure reservoir connected with the pump, fluid pressure means for automatically rendering the pump but not the distributor ineffective when there is a predetermined pressure in the reservoir; and means including

a manually operable valve for directing fluid from the reservoir through the distributor to the engine in starting it.

5. In a gas engine starter, the combination with a distributor and a pump directly and continuously connected to the engine, a fluid pressure reservoir to receive fluid under pressure from the pump, means for automatically rendering the pump ineffective, and a combined gage and valve of which the gage indicates the pressure in the reservoir at all times and the valve of which is operable to direct fluid from the reservoir through the distributor to the engine in starting it.

6. In a gas engine starter, the combination with a pump and a fluid pressure distributor having a common actuating shaft directly connected with the engine, the distributor comprising a common chamber and tubular connections leading therefrom to each of the engine cylinders, a valve for each tubular connection having a portion extending within the pump, a cam carried by the pump shaft for engaging the said portions of the valves extending within it to open the valves in succession, a fluid pressure reservoir connected with the pump valve, and means for directing fluid under pressure to the common chamber of said distributor.

7. The combination with an ignition timer, a pump and a fluid pressure distributor all having a common actuating shaft of a gas engine having a rotating part with which the said shaft is directly connected, of a fluid pressure reservoir connected with the pump, valvular means for connecting the distributor with each of the engine cylinders, a cam for opening the said valvular means in accordance with the position of the shaft, a control valve for directing fluid under pressure from the reservoir to the distributor, and means comprising a fluid pressure device having a tubular connection with the pressure reservoir for rendering the pump ineffective in supplying fluid under pressure to the said reservoir.

8. The combination with a gas engine, of an ignition timer, a fluid pressure distributor, and a pump, all arranged adjacent each other and having a common actuating shaft directly connected with the engine, the said distributor comprising a common chamber and tubular connections extending therefrom to each engine cylinder, a valve for each tubular connection having a stem projecting into the casing of the pump, a cam carried by the said shaft within the pump housing adapted to engage the said valve stems in succession to open the valves, a fluid pressure reservoir connected with the pump, valvular means to direct fluid under pressure from the reservoir to the common chamber of the distributor, means for ren-

dering the said pump ineffective, said means comprising a spring pressed valve for each pump cylinder normally held in closed position, a fluid pressure device comprising a piston and cylinder, a bar connected for movement with the piston and adapted to engage all of the said spring pressed valves to open the pump cylinders to the atmosphere, and a tubular connection from the fluid pressure reservoir to the said fluid pressure device for operating it at a predetermined pressure.

9. In a gas engine starter, the combination with a pump, a fluid pressure reservoir, a fluid pressure chamber adjacent the pump, a spring pressed valve in each pump cylinder communicating with said chamber, a tubular connection between the chamber and the said pressure reservoir, a spring pressed valve in the said tubular connection, a fluid pressure device for automatically rendering the said pump ineffective comprising a cylinder connection with the said tubular connection between its valve and the pressure reservoir, a piston in said cylinder, another valve for each pump cylinder, an operating bar carried by the piston for opening the last named cylinder valves simultaneously, a spring for said piston opposing the pressure of the reservoir in the said device, and means to direct fluid under pressure from the reservoir in starting the engine.

10. The combination with a pump and a fluid distributor, both having a common operating shaft, a gas engine to which said shaft is connected, a pressure reservoir connected to the pump, a check valve between the pump and reservoir, means for automatically rendering the pump but not said shaft or distributor ineffective, means including an operating valve for connecting the reservoir with the engine through the distributor, and a separate valve to shut off the reservoir from the operating valve and the pump.

11. The combination with an ignition timer, a pump, and a fluid pressure distributor all having a common operating shaft, of a gas engine to which the shaft is connected, a pressure reservoir connected to the pump, means for automatically rendering the pump but not the said shaft ineffective, and means for connecting the reservoir with the engine through the distributor.

In testimony whereof I have signed my name to this specification, in the presence of subscribing witnesses, on this 7th day of February A. D. 1916.

GEORGE Y. LAUCHIN.

Witnesses:

THOMAS F. BEHAN,
JOSEPH O. LEONARD,
LORETTA C. MITCHELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."