C. HUNT.

ENGINE STARTER.

APPLICATION FILED FEB. 9, 1910.

990,135.

Patented Apr. 18, 1911.

2 SHEETS—SHEET 1.

Fig - 1 -

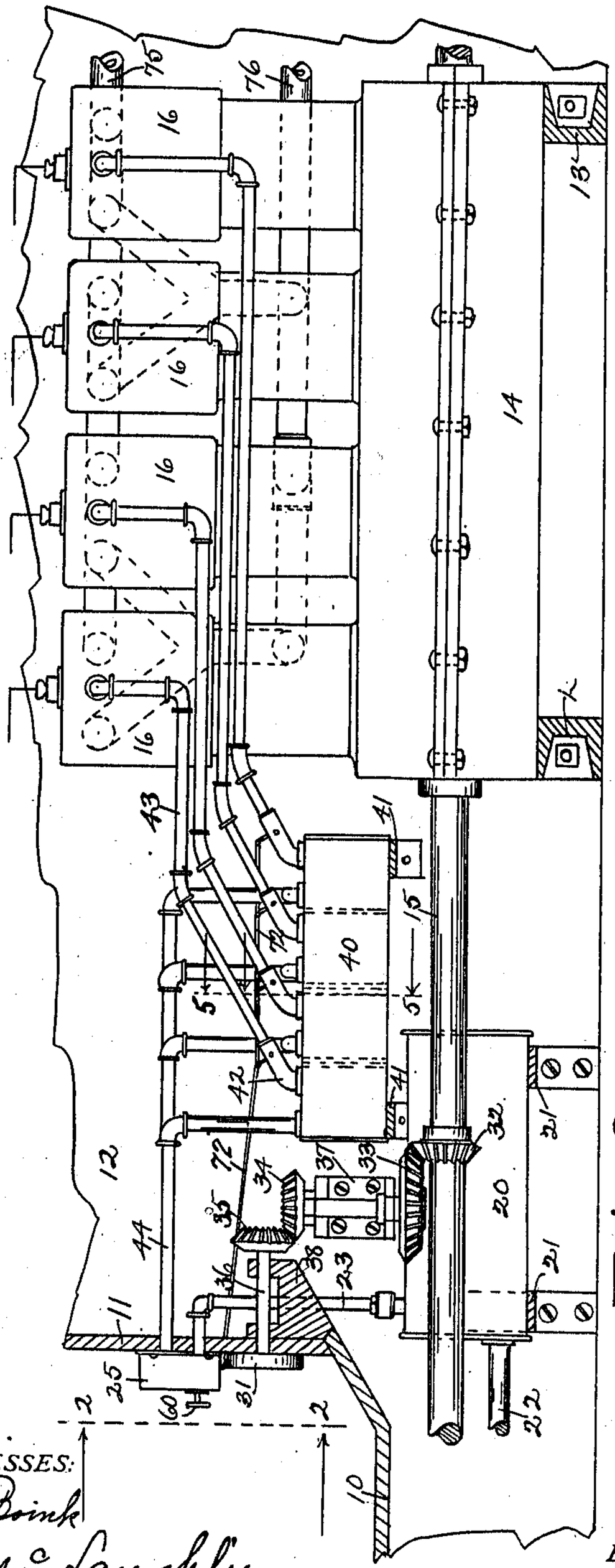


Fig - 4 -

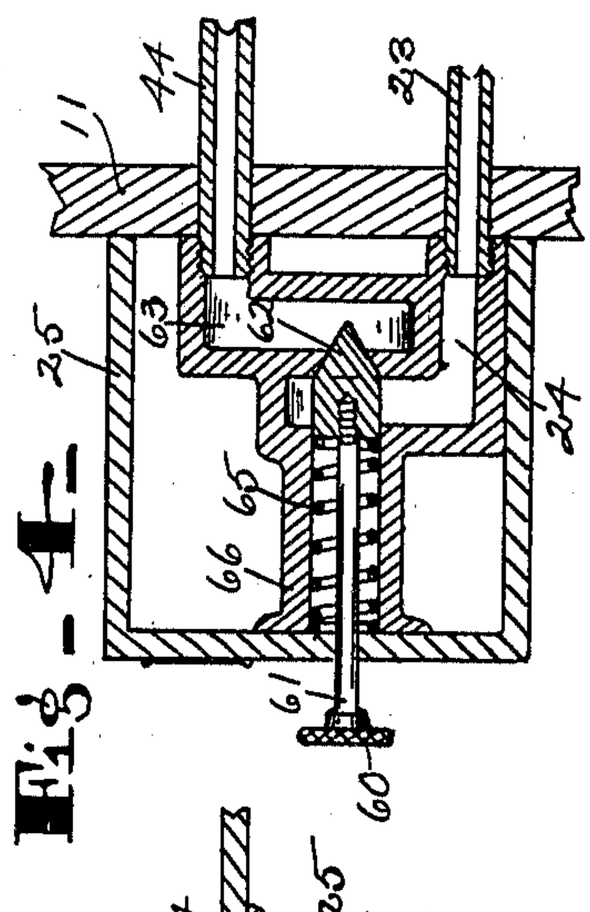


Fig - 3 -

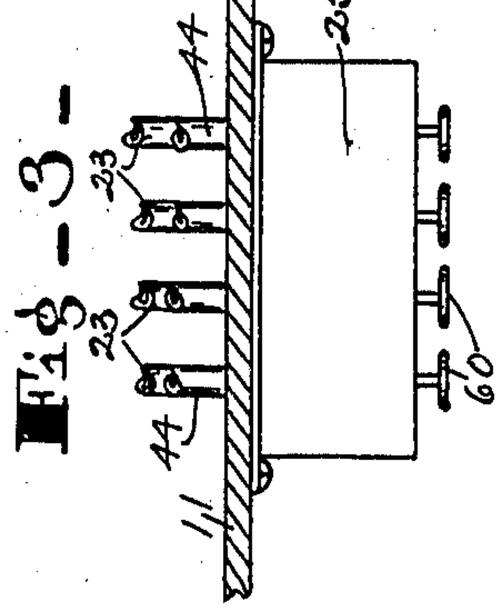
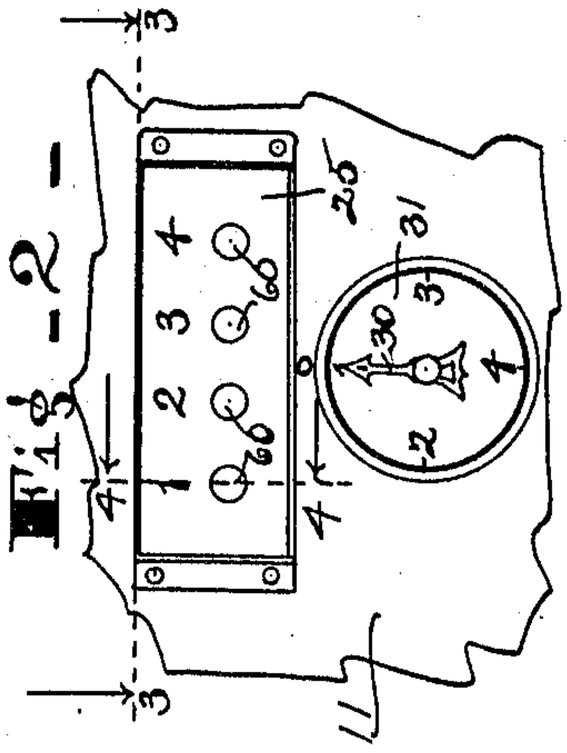


Fig - 2 -



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2 SHEETS—SHEET 2.

Fig. 6.

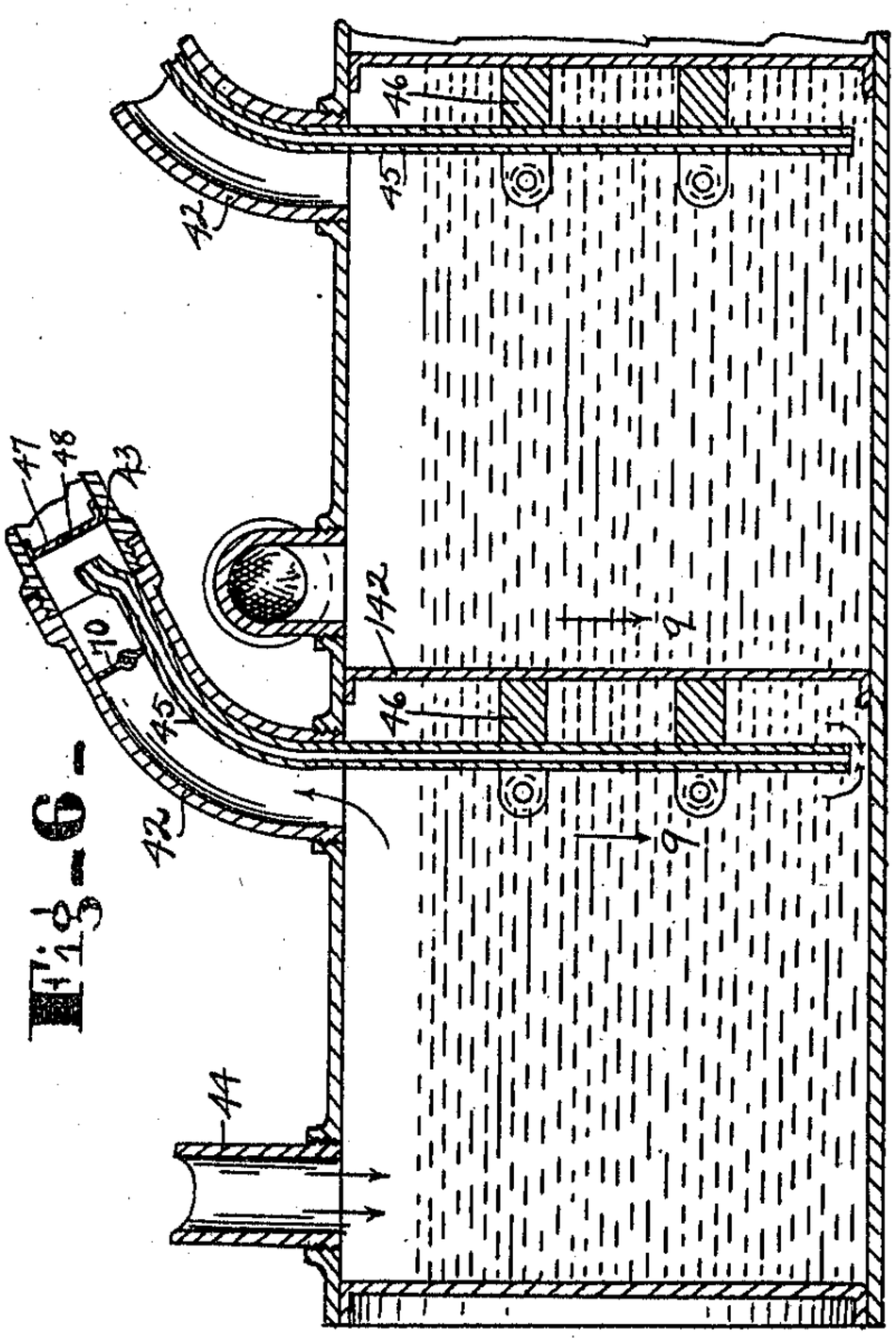


Fig. 10.

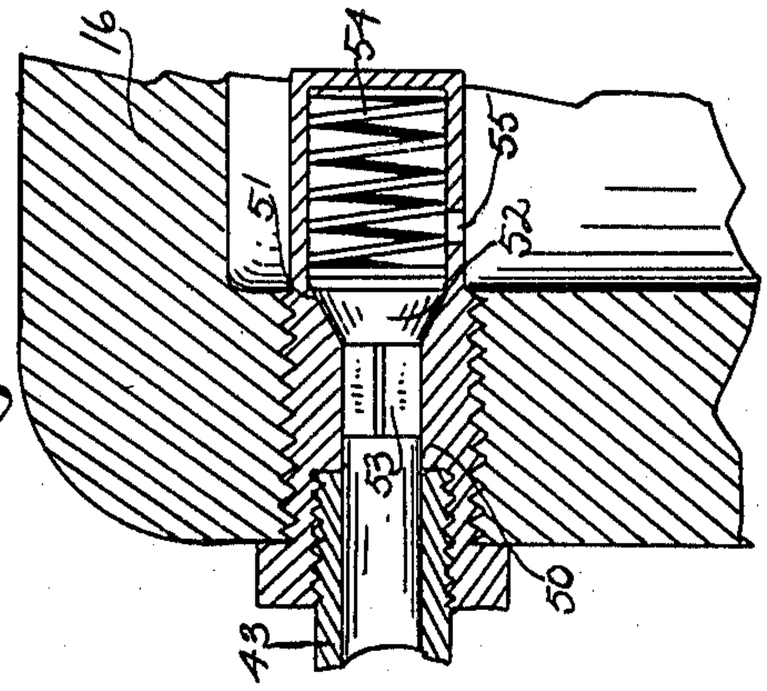


Fig. 8.

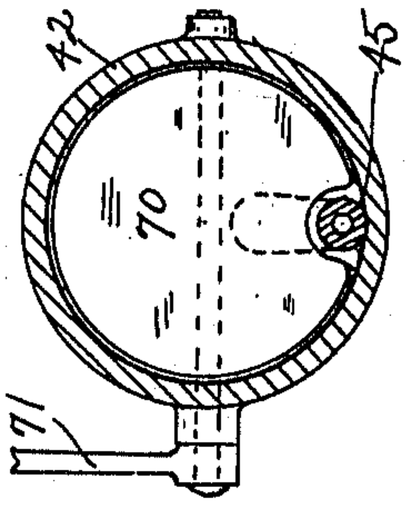


Fig. 5.

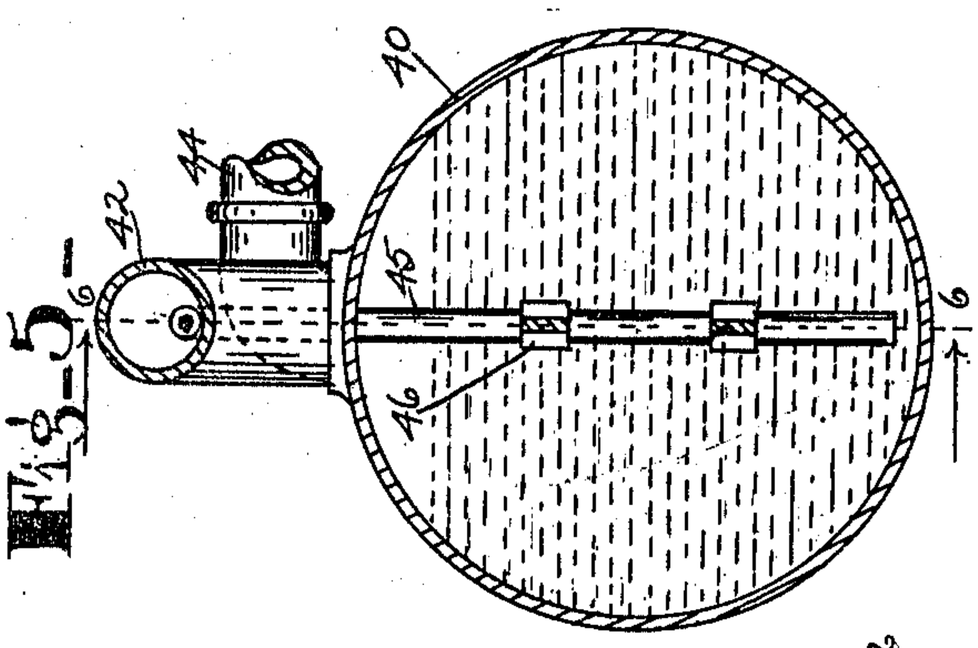


Fig. 7.

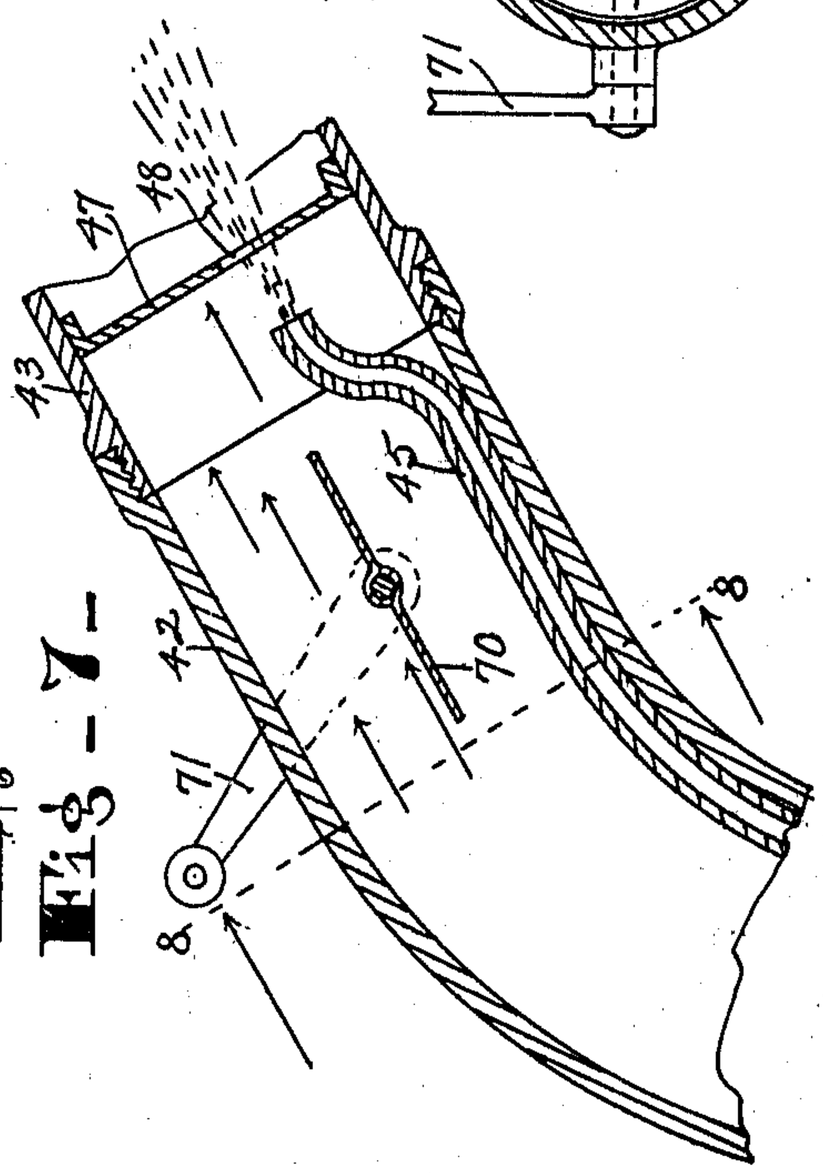
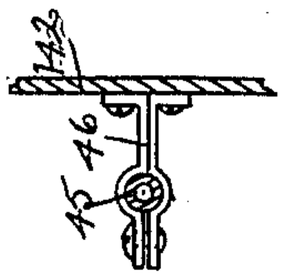


Fig. 9.



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UNITED STATES PATENT OFFICE.

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ENGINE-STARTER.

990,135. Specification of Letters Patent. Patented Apr. 18, 1911.

Application filed February 9, 1910. Serial No. 542,961.

To all whom it may concern:

Be it known that I, CARL HUNT, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Engine-Starter; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention is to provide a practical means for easily starting internal combustion engines.

The chief feature of the invention consists in providing means for forcing properly proportioned amounts of liquid fuel and air together and simultaneously into the combustion end of an engine cylinder preparatory to starting the engine, so that the fuel and air will mix while entering the cylinder and form an explosive gas sufficient to start the engine.

Another feature consists in employing compressed air for moving liquid fuel from a suitable reservoir to the cylinder preparatory to starting the engine, whereby air and fuel will be supplied together and mixed for forming the explosive gas.

Another feature of the invention consists in providing in connection with the plurality of engine cylinders a separate liquid fuel reservoir connected by a pipe with each cylinder, a compressed air tank, and a selective valve mechanism for controlling the admission of air to said fuel reservoirs so that air will be admitted only to the reservoir that is in communication with the cylinder which is ready to spark. To that end the tubes from the valve mechanism are numbered and a timer provided that is actuated by the engine shaft for indicating which cylinder is ready to spark. This timer may be a visual one to be observed by the chauffeur, for indicating to him which valve to operate, or there may be an automatic connection between the timer and valve mechanism. Only the former is herein shown.

The nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Figure 1 is a central vertical longitudinal section through the forward portion of an automobile showing the engine and associated mechanism and with the hood and other parts partly broken away. Fig. 2 is an elevation of the means for controlling the starting mechanism, viewed from the line 2—2 of Fig. 1, the dash being partly broken away. Fig. 3 is a horizontal section on the line 3—3 of Fig. 2. Fig. 4 is a vertical section on the line 4—4 of Fig. 2. Fig. 5 is a vertical transverse section on the line 5—5 of Fig. 1. Fig. 6 is a central vertical longitudinal section through a portion of the fuel reservoirs on the line 6—6 of Fig. 5. Fig. 7 is a central vertical section on a large scale through the air and fuel nozzle construction as shown in Fig. 6. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a section on the line 9—9 of Fig. 6. Fig. 10 is a section through one part of an engine cylinder showing the fuel inlet valve mechanism.

In detail 10 represents the floor of an automobile immediately in front of the seat on which the chauffeur sits.

11 is the dash, and 12 the hood.

13 are cross bars which support the crank case 14 containing the engine shaft 15.

16 are the engine cylinders.

A compressed air tank 20 is mounted on the cross bars 21 and is supplied with compressed air from a pump or other suitable source through the pipe 22. The tube 23 leads from said compressed air tank to the chamber or passageway 24 in the valve mechanism contained in the valve casing 25 that is secured to the rear wall of the dash-board so as to be plain and accessible to the chauffeur while seated.

The four cylinders and the condition thereof with reference to sparking is indicated by the hand or indicator 30 passing over the dial 31 which is secured on the rear surface of the dash-board under the casing 25. This dial has four numerals representing the cylinders, and the hand or indicator 30 is driven and controlled by the engine shaft 15 to the bevel wheels 32, 33, 34, 35 and shaft 36. The wheels 33 and 34 are on the same shaft mounted in the bearing 37, and the shaft 36 is mounted in the bearing 38 secured to the front wall of the dash. The gearing is such as to always cause the indicator 30 to point to the number of the cylinder ready to spark. In the form shown in Fig. 2 this cylinder is No. 1.

A tank 40 is mounted on the cross bars 41 and is divided up into four separate reservoirs by a partition 142, see Fig. 6. There is one reservoir for each cylinder and there is communication between the reservoir and its

corresponding cylinder through the nozzle 42 and pipe or tube 43. The nozzle 42 is an air nozzle which leads from the upper part of the reservoir, and air enters it because the compressed air tube 44 enters also the upper part of the reservoir, and the reservoir is not wholly filled with gasolene, so that, as shown in Fig. 6, compressed air will short-circuit from the pipe 44 into the nozzle 42. Within said air nozzle 42 there is also a fuel nozzle 45 that leads from the lower part of the reservoir, being mounted on brackets 46 and it hugs the lower wall of the nozzle 42 until it almost reaches the spray plate 47 at the end of the nozzle. This spray plate has an aperture 48 in it which is located immediately opposite but spaced somewhat from the end of the fuel nozzle 45, and the end of the fuel nozzle is bent so as to space it somewhat from the wall of the air nozzle 42. The action of this mechanism is such that as compressed air enters the reservoir it will increase the pressure on the body of the liquid and tend to force fuel out through the nozzle 45. Also the passage of air through the air nozzle 42 past the fuel nozzle 45 would tend to draw up liquid fuel through the latter and the air and liquid fuel will both pass through the aperture 48 in the spray plate 47, which will tend to spread the fuel and mix it with the air, and this mixing continues as the air and fuel passes through the entire length of the tubes 43 to the inlet to the cylinder, as shown in Fig. 10. The tube 43 screws into a threaded valve casing 50 in the cylinder which has a flaring valve seat 51 closed by a conical valve 52 with guide wings 53 thereon. The valve is closed by the spring 54 which is in the end of the valve casing 50 that projects into the cylinder. The extreme end of said valve casing is closed to furnish a seat for the spring, but there is a side port 55 for the issue of liquid fuel and air which have become or are fast becoming sufficiently mixed to constitute combustible gas.

There is a tube 44 leading to each fuel reservoir from the valve mechanism in the casing 25 so that there are four of said tubes corresponding to the four valve heads 60 to be seen in Fig. 2 and over which the numerals are placed corresponding with the numerals on the dial 31. The valve heads 60 are on valve stems 61 connected with conical valves 62 which control ports between the passageway or chamber 24 that is in communication with the tubes 23 from the compressed air tank 20, and the passageways or chambers 63 that are in communication respectively with the tubes 44 going to the fuel reservoirs. The spiral spring 65 within a tube or barrel 66 presses the valve 62 closed normally, as shown in Fig. 4.

The operation of the device is as follows: The fuel reservoirs are filled with gasolene to the extent substantially as shown in Figs. 5 and 6. Air is maintained compressed in the tank 20. When it is desired to start the engine the chauffeur pulls the valve head 60 that is under the numeral on the casing 25 corresponding with the numeral to which the indicator 30 points on the dial 31. In the drawings that numeral is "1". When this is done the valve 62 is opened and compressed air rushes through pipe 23, chamber 24, chamber 63 and pipe 44 to the first fuel reservoir and thence through the upper part of it and through the nozzle 42 where it brings fuel out from the nozzle 45, and the air and fuel pass through the pipe 43 to the first cylinder and charge it. Then by operating the ignition mechanism, gas thus introduced into said cylinder will explode and start the engine. As soon as this is accomplished the valve head 60 is released and the spring 65 closes the valve and the starting mechanism remains then in unused condition until it is desired to start the engine again.

In order properly to regulate the proportion of air and fuel that thus enter the cylinder to start it, there is provided the valve 70 in the nozzle 42 which is controlled by the crank 71 and all of said cranks are connected by the rod 72 so as to be operated readily by the chauffeur while seated. This can be adjusted or set and left in such condition until it requires readjustment.

A general fuel supply tube 75 is shown in Fig. 1 and also an exhaust tube 76 for the engine.

What I claim as my invention and desire to secure by Letters Patent is:

1. A mechanism for starting combustion engines including the combination with an engine cylinder, of a liquid fuel reservoir, a duct leading from the top thereof to the cylinder, means for forcing air under pressure into the top of said reservoir, a liquid fuel nozzle leading from the lower part of said reservoir to said duct, and a spray plate placed in said duct with an opening spaced from and opposite to the outlet end of said fuel nozzle.

2. A mechanism for starting combustion engines including the combination with an engine cylinder, of a liquid fuel reservoir, a duct leading from the top thereof to the cylinder, means for forcing air under pressure into the top of said reservoir, a liquid fuel nozzle leading from the lower part of said reservoir to said duct, and a valve in said duct preceding the end of said fuel nozzle for regulating the supply of air passing through said duct.

3. A mechanism for starting combustion engines including the combination of a plurality of engine cylinders, of a reservoir for each cylinder, a duct connecting each reservoir with its corresponding cylinder, a tube leading to each reservoir for conveying com-

pressed air thereto, and a valve mechanism for predetermining the tube into which compressed air shall enter.

4. A mechanism for starting combustion engines including the combination with a plurality of engine cylinders, of a liquid fuel reservoir for each cylinder, a tube leading from each reservoir to its corresponding cylinder, a compressed air tank, compressed air passages leading from said tank to each fuel reservoir, and valve mechanism with which the said compressed air passages are connected for selectively controlling the flow of compressed air therethrough.

5. A mechanism for starting combustion engines including the combination with a plurality of engine cylinders, of a liquid fuel reservoir for each cylinder, a tube leading from each reservoir to each cylinder, a valve in each tube for controlling the passage of compressed air therethrough, a compressed air tank, compressed air passages leading from the compressed air tank to each fuel reservoir, and valve mechanism with which the said compressed air passages are connected for selectively controlling the flow of compressed air therethrough.

6. A mechanism for starting combustion engines including the combination with a plurality of engine cylinders, of a liquid fuel reservoir for each cylinder, a tube leading from each reservoir to each cylinder, a valve in each tube for controlling the passage of compressed air therethrough, a compressed air tank, compressed air passages leading from the compressed air tank to each fuel reservoir, a valve for controlling the flow of compressed air through each passage, and timing mechanism for indicating which of said valves to operate.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

CARL HUNT.

Witnesses:
G. H. BOINK,
O. M. MCLAUGHLIN.