Dec. 21, 1926. 1,611,324

I. T. SWARTZ

INTERNAL COMBUSTION ENGINE

Original Filed Feb. 9, 1920

FIG. 1

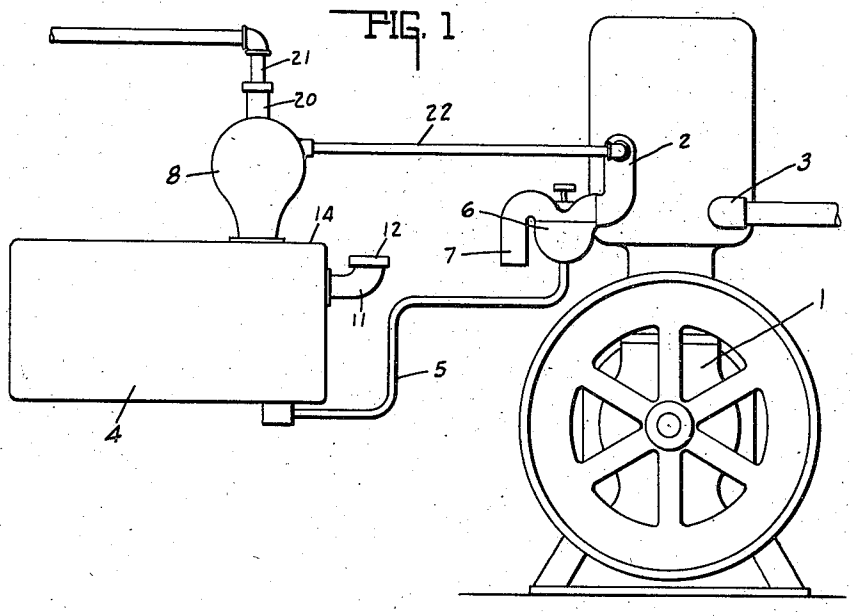


FIG. 2

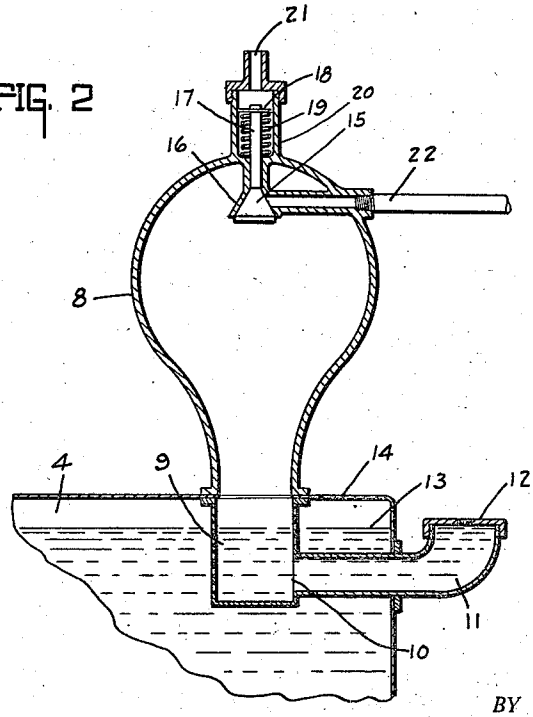
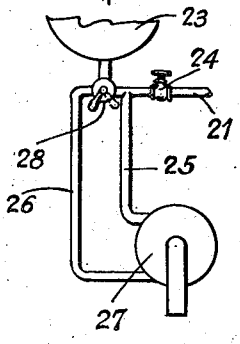


FIG. 3



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UNITED STATES PATENT OFFICE.

IRA T. SWARTZ, OF INDIANAPOLIS, INDIANA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SUSIE M. SWARTZ, TRUSTEE, OF INDIANAPOLIS, INDIANA.

INTERNAL-COMBUSTION ENGINE.

Application filed February 9, 1920, Serial No. 357,244. Renewed April 15, 1924.

This invention relates to internal combustion engines, more especially to means for readily starting the same, preferably automatically, particularly when the engine and the surroundings are cold, it being among the objects of this invention to produce a device which is simple, reliable and easy to operate.

In carrying the objects of my invention into effect, I provide a source of gaseous fuel, preferably in the form of a chamber in or above the liquid fuel tank of the engine to allow the vapors and "fixed gases" therefrom to accumulate in such chamber. I use this gaseous fuel for starting the engine and I contemplate modifying my device so as to utilize fixed gas from any independent source, and I may use any fluid fuel for the engine. The gas chamber is directly connected to the intake port of the engine cylinder.

Referring to the accompanying drawings forming a part hereof and in which similar reference characters denote similar parts,

Figure 1 illustrates my invention as applied to a single cylinder engine.

Figure 2, a detail cross sectional view of the gas chamber, and

Figure 3 shows a diagrammatic view of the connections from the compressed air receptacle to the engine.

The engine 1 carries the ordinary intake manifold 2 and exhaust manifold 3. A liquid fuel tank 4 is connected to the intake manifold 2 by fuel pipe 5 and carbureter or mixer 6 having air intake openings 7. I generally provide a throttle governor to control either the air or the explosive mixture entering the engine.

At the top of the tank 4 I fix a chamber 8 preferably dome-shaped having a perforated extension 9 extending into the tank and an opening 10 in the lower portion of extension 9 into which is fitted fuel supply pipe 11 through which fuel or liquid is entered into the tank and the outer end of said pipe is closed by cap 12 having a breather opening as usual. The top of fuel pipe 11 is placed in such a relation to the top 14 of the fuel tank 4 that the highest level 13 of liquid in the tank will be a considerable distance below the top 14 of the tank.

At or near the top of dome 8 is a valve 15 seated in valve casing 16 and has a stem 17 directed preferably upwards, the end of the stem carrying a piston 18 operating in cylinder 20 and closely fitting the walls thereof, a spring being provided to normally force valve 15 into closed position. A pipe 21 is provided to allow fluid pressure to bear on piston 18 to open the valve. A pipe 22 controlled by valve 15 leads directly into the cylinder of the engine through the manifold 2. Any other suitable means for controlling valve 15 may be used.

The above improvement is part of a system which I have developed which is capable of starting an internal combustion engine carrying an electric generator without the use of batteries. In order to accomplish this I provide an air compressor or turbine (not shown) which is attached to the engine and to a source of compressed air, preferably a tank. Suitable pipes and valves are arranged so that when it is desired to start the engine a valve is opened by hand allowing air from the compressed air tank to flow into the compressor which will operate the compressor and impart rotating action to the engine. At the same time the compressed air is introduced into the compressor or turbine a sufficient amount of compressed air is entered in the pipe 21 and onto the piston 18 to open valve 15 allowing the most explosive portion of the gaseous fuel to be drawn into the cylinder where it will be ignited by a spark generated by a magneto. The compressor or turbine is so arranged that it will continue to operate after the engine is started and pump air into the compressed air tank until it is fully charged when the compressor is automatically cut off, the hand valve being manually closed which will cut off the air from the tank to the turbine and to the pipe 21.

The means for turning over the engine and for simultaneously operating valve 15 are shown diagrammatically in Figure 3 and include a compressed air tank 23, a pipe 21 leading therefrom to the valve 15, a valve 24 in said pipe and a pair of pipes 25 and 26 leading to the compressor 27 which includes a turbine wheel on the engine shaft. A two-way valve 28, when turned in one direction, admits compressed air to the pipes 21 and 25 and when turned in the other opens the way from pipe 26 to the tank so that the proper degree of compression may be re-established in the tank.

Having thus fully described my said in-

vention, what I claim as new and desire to secure by Letters Patent, is:

1. Fuel supplying means for internal combustion engines comprising a tank for liquid fuel, an enlarged storage chamber above and in communication with said tank, an outlet pipe in the top of the chamber leading to the engine, another outlet at the bottom of the tank, a carbureter supplied from said outlet, and a spring pressed closed valve in said outlet pipe adjacent to said storage chamber, and pneumatic means for opening said valve, substantially as set forth.

2. Fuel supplying means for internal combustion engines comprising a tank for liquid fuel, an enlarged storage chamber above and in communication with said tank, said chamber located adjacent the air inlet of the tank, an outlet in the top of the chamber, another outlet at the bottom of the tank, a normally closed valve for said first named outlet, and common means for simultaneously opening said valve and starting the engine, substantially as set forth.

3. Fuel supplying means for internal combustion engines comprising a tank for liquid fuel, an enlarged storage chamber above and in communication with said tank, a restricted passage extending to the engine from a point in said chamber above the fuel level, a carbureter, a passage leading from the bottom of the tank to said carbureter, a normally closed valve for said first-named passage, and pneumatic means for opening the valve, substantially as set forth.

4. Fuel supplying means for internal combustion engines comprising a fuel tank, means for supplying air thereto below the fuel level, a reservoir connected with the tank by a restricted outlet above the fuel level, a carbureter connected to the engine, an ever-open passage connecting the carbureter to said tank below the fuel level, and a passage connecting said reservoir to the engine, substantially as set forth.

5. Fuel supplying means for internal combustion engines comprising a fuel tank, means for supplying air thereto below the fuel level, a reservoir connected with the tank by a restricted outlet above the fuel level, a carbureter connected to the engine, an ever-open passage connecting the carbureter to said tank below the fuel level, a passage connecting said reservoir to the engine, a valve in the last-named passage, and a spring normally closing said valve, substantially as set forth.

In witness whereof, I have hereunto set my hand and seal at Indianapolis, Indiana, this 7th day of February, A. D. nineteen hundred and twenty.

IRA T. SWARTZ. [L. S.]