May 23, 1961 T. A. SEEGRIST 2,985,161

PRIMER FOR INTERNAL COMBUSTION ENGINE

Filed Oct. 20, 1960

FIG. 1.

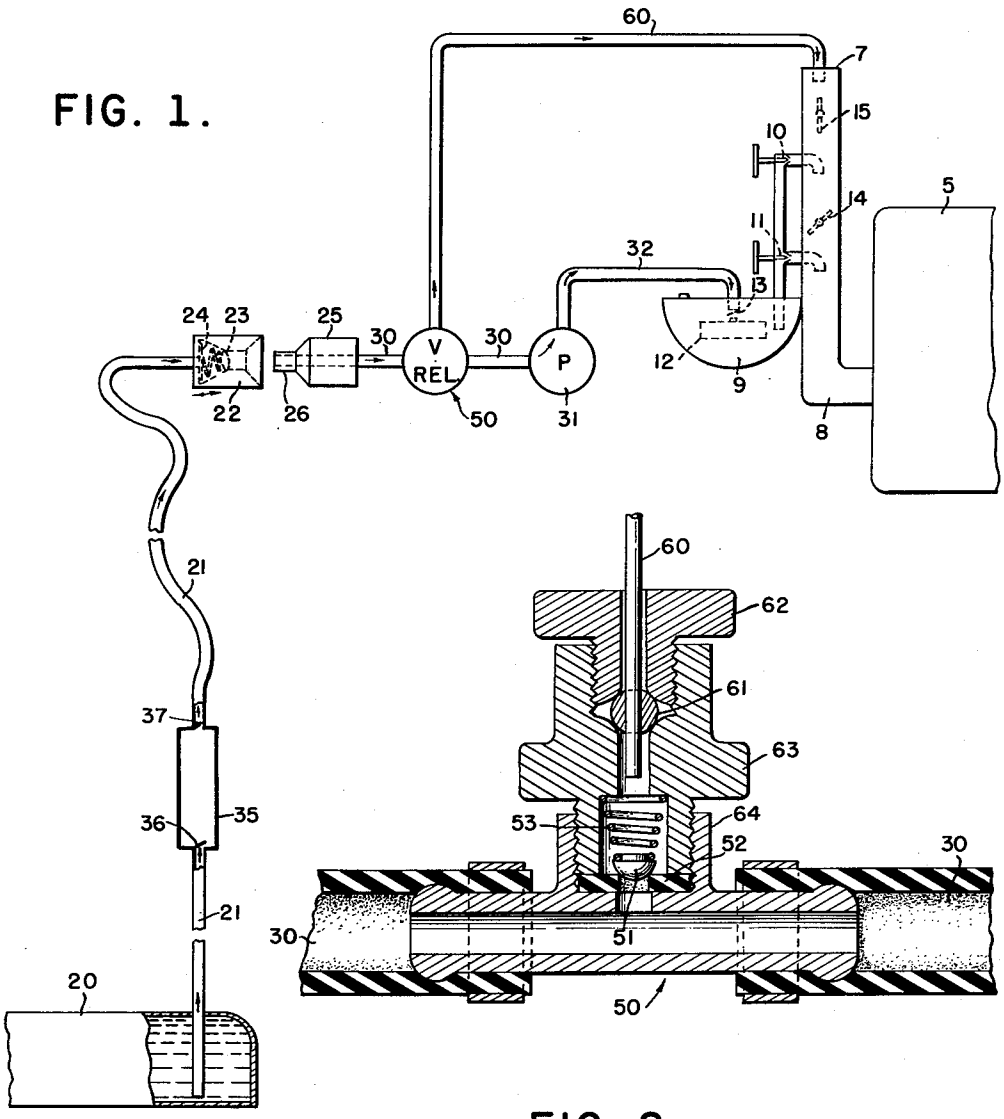


FIG. 2.

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United States Patent Office 2,985,161 Patented May 23, 1961

2,985,161

PRIMER FOR INTERNAL COMBUSTION ENGINE

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Filed Oct. 20, 1960, Ser. No. 63,864

5 Claims. (Cl. 123—180)

This invention relates to means especially adapted for priming a two-cycle internal combustion engine as an aid to starting the engine and has among its objects provision of structure which is economically added to the usual liquid fuel (gasoline) supply system of the engine, and which is simple to operate.

Essential features of the engine and primer are illustrated in the accompanying drawing in which:

Fig. 1 is a schematic illustration, and

Fig. 2 is a sectional view of a pressure relief valve and connections used with the priming means.

The usual two-cycle internal combustion engine is provided with a crankcase **5**, a carburetor having an air intake **7** and manifold **8** leading from the carburetor to the crankcase, the air-flow passage into the crankcase being through the air intake and manifold, gasoline being jetted into the air-flow passage from the carburetor bowl **9** through the carburetor high speed needle valve **10** and low speed needle valve **11**, the float **12**, float valve **13**, throttle valve **14** and choke valve **15** performing their normal functions.

These engines are frequently difficult to start, especially when cold, since the air-fuel mixture must charge through the crankcase before it is admitted into the engine cylinder for compression and combustion. Thus extended choking is required and it may be necessary to open the high speed needle valve considerably more than desired for normal operation of the engine and to crank the engine an excessive number of turnovers before a sufficiently rich air-fuel mixture will be fed to the engine cylinder to result in ignition and start of the engine. Furthermore, because of the choking the air supply rate is diminished, thus diminishing the rate the air-fuel mixture is delivered to the crankcase and increasing the number of turnovers required to supply a sufficient quantity of air-fuel mixture into the crankcase to start the engine.

After the engine starts, it is necessary to reset the needle valve to its proper feeding rate for normal running if best engine performance is to be obtained. Many persons who operate the engines are not capable to, or will not bother to, make the required adjustments.

A two-cycle engine in common use for an outboard motor is provided with a carburetor system equipped with an atmospherically vented fuel-supply tank **20**, which may be separated from the engine for filling and carrying, the tank having a flexible hose **21** as part of the fuel-line communicating with the bottom of the tank. The free end of the hose is provided with one member **22** of a two member hand coupling, member **22** having an internal normally closed valve such as a ball gate **23** pressed into engagement with an appropriate valve seat by a spring **24**.

The other member **25** of the coupling, which member is normally fixed to the engine, has a nozzle portion **26** which enters member **22** when the coupling members are hand coupled together, the end of the nozzle contacting the ball gate to open the valve. Thus, with the coupling

members coupled together, fuel is free to flow from the tank through the hose **21**, through the coupling and thence through section **30** of the fuel-line, through the usual fuel pump **31** for witdrawal of the fuel from the fuel-supply tank, and finally through the balance **32** of the fuel-line to the bowl **9** of the carburetor.

When the motor has not been immediately previously used, or when a newly filled fuel-supply tank is coupled onto the motor, the fuel-line, fuel pump, and carburetor bowl may be filled or partially filled with air. In order to withdraw fuel from the fuel-tank and force the fuel under pressure through the fuel-line to the carburetor to purge the system of air and fill the required parts with fuel, a hand operated pump **35** is normally positioned in the hose **21**. As a usual structure the hand-pump is a hand compressible bulb of resilient material provided with valves **36** and **37**. Hand pressure on the bulb to collapse it empties the bulb through valve **37** while valve **36** remains closed and release of the pressure permits the bulb automatically to expand to fill it through valve **36** while valve **37** remains closed.

In some structures the air vents automatically through the carburetor bowl. In other structures an air-vent valve, which may be hand operated, is provided. In any structure, once the air is purged from the system and the system is filled with fuel any further attempt to operate the hand-pump **35** builds up pressure in that portion of the fuel-line on the pressure side of the hand-pump.

The structures above described are conventional.

The present invention involves addition of a spring-closed pressure relief valve **50**, such as one having a valve gate **51** seated on a valve seat **52** made of oil resistant hard rubber like material, the valve being normally maintained closed by a compression spring **53** pressing the gate into seating position on the valve seat. The inlet of the pressure relief valve communicates with the fuel-line on the pressure side of the hand pump, as for example by being inserted in section **30** of the fuel-line, while the outlet communicates, as by a pipe **60**, with the crankcase, preferably through the air-flow passage of the carburetor. As illustrated in Fig. 2, pipe **60** is connected to the pressure relief valve with a conventional sealing bushing **61** of soft material such as copper compressed into place by nut **62**. Nut **63** is screw threaded into connector **64**, seals against seat **52**, and holds the valve gate **51** and spring **53** in place.

In use, priming of the engine is accomplished simply by pumping of hand-pump **35** in addition to the pumping required to purge the system of air and fill the fuel-line and carburetor with fuel. Preferably spring **53** is selected of a tension such that the pressure relief valve will open only by a noticeable build up of the pressure in the fuel-line by additional operation of the hand-pump after the system has been purged of air and filled with fuel. Thus the operator can easily determine by the feel of the hand-pump when the system has been air purged and when the priming fuel is being forced through the pressure relief valve.

As illustrated in Fig. 1, pipe **60** feeds priming gas directly into air intake **7**. This is a convenient structure, especially in case the air intake opens upwardly, and is operationally desirable since it provides efficient mixing of the raw priming fuel with the air as the air flows through the air-flow passage of the carburetor and into the crankcase.

Other points of entry of the fuel from the pipe **60** may be provided so long as the fuel is eventually admitted into the crankcase, for example by connecting the pipe **60** into the manifold **8**.

The choke valve can be omitted if desired since prim-

ing the engine results in an easy start without choking.

I claim:

1. An outboard motor having a two-cycle internal combustion engine, a carburetor with an air-flow passage for supplying a gas-air mixture into the crankcase of the engine, and an atmospherically vented liquid fuel-supply tank, the tank being provided with a flexible hose leading from the tank to one member of a hand coupling adapted to be coupled to a second member of the coupling fixed to the engine and communicating through a fuel-line with the carburetor thus to connect the tank to the carburetor for supplying fuel thereto, the hose having a hand operated pump therein for withdrawing fuel from the tank and forcing the fuel under pressure through the fuel-line to purge air from the fuel-line and carburetor and fill them with fuel preparatory to starting the engine, the engine being provided with a spring-closed pressure relief valve, the intake of the pressure relief valve communicating with the fuel-line on the pressure side of the pump and the outlet of the pressure relief valve communicating with the air-flow passage of the carburetor, the spring pressure of the pressure relief valve being such that the hand operated pump may be operated to purge air from the fuel-line and carburetor and fill them with fuel and further operation of the pump will cause the pressure relief valve to open and feed priming fuel into the air-flow passage.

2. A two-cycle internal combustion engine having a carburetor with an air-flow passage for supplying a gas-air mixture into the crankcase of the engine, an atmospherically vented liquid fuel-supply tank, a fuel-line leading from the tank to the carburetor, and a hand operated pump in the fuel-line for withdrawing fuel from the tank and forcing the fuel under pressure through the fuel-line to purge air from the fuel line and carburetor and fill them with fuel preparatory to starting the engine, the engine being provided with spring-closed pressure relief valve, the intake of the pressure relief valve communicating with the fuel-line on the pressure side of the pump and the outlet of the pressure relief valve communicating with the air-flow passage of the carburetor, the spring pressure of the pressure relief valve being such that the hand operated pump may be operated to purge air from the fuel-line and carburetor and fill them with fuel and further operation of the pump will cause the pressure relief valve to open and feed priming fuel into the air-flow passage.

3. A carburetor system having an air-intake and a manifold providing an air-flow passage for supplying an air-fuel mixture to an internal combustion engine, a fuel-supply tank, a fuel-line connecting the fuel-supply tank with the carburetor, a hand operated pump in the fuel-line for withdrawing fuel from the fuel-supply tank and forcing the fuel under pressure through the fuel-line to purge air from the fuel-line and carburetor and fill them with fuel preparatory to starting the engine, and a spring-closed pressure relief valve, the intake of the pressure relief valve communicating with the fuel-line on the pressure side of the hand operated pump and the outlet of the pressure relief valve communicating with the air-flow passage of the carburetor system, the spring pressure of the pressure relief valve being such that the hand operated pump may be operated to purge air from the fuel-line and carburetor and fill them with fuel and further operation of the pump will cause the pressure relief valve to open and feed priming fuel into the air-flow passage.

4. An outboard motor having a two-cycle internal combustion engine, a carburetor with an air-flow passage for supplying an air-gas mixture into the crankcase of the engine, one member of a hand coupling fixed to the motor, communicating through a fuel-line with the carburetor for supplying fuel to the carburetor from a fuel-supply tank equipped with a flexible hose leading from the fuel-supply tank to a second member of the hand coupling, thus to connect the tank to the carburetor for supplying fuel thereto when the coupling members are coupled together, said flexible hose having a hand operated pump therein for withdrawing fuel from the tank and forcing the fuel under pressure through the fuel-line to purge air from the fuel-line and carburetor and fill them with fuel preparatory to starting the engine, and a spring-closed pressure relief valve, the intake of which communicates with the fuel-line and the outlet of which communicates with the air-flow passage of the carburetor, the spring pressure of the pressure relief valve being such that the hand operated pump may be operated to purge air from the fuel line and carburetor and fill them with fuel and further operation of the pump will cause the pressure relief valve to open and feed priming fuel into the air-flow passage.

5. A spring-closed pressure relief valve for insertion in the fuel-line of a carburetor system having an air intake and a manifold providing an air-flow passage for supplying an air-fuel mixture to an internal combustion engine, a fuel-supply tank, a fuel-line connecting the fuel-supply tank with the carburetor and a hand operated pump in the fuel-line for withdrawing fuel from the fuel-supply tank and forcing the fuel under pressure through the fuel-line to purge air from the fuel-line and carburetor and fill them with fuel preparatory to starting the engine, the intake of the pressure relief valve being adapted to communicate with the fuel-line on the pressure side of the pump and the outlet of the pressure relief valve being adapted to communicate with the air-flow passage, the spring pressure of the pressure relief valve being such that the hand operated pump may be operated to purge air from the fuel-line and carburetor and fill them with fuel and further operation of the pump will cause the pressure relief valve to open and feed priming fuel into the air-flow passage.

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