Dec. 23, 1941. 2,267,272

J. BARRAJA-FRAUENFELDER ET AL

APPARATUS FOR THE CONTROL OF INTERNAL COMBUSTION ENGINES

Filed Nov. 4, 1939

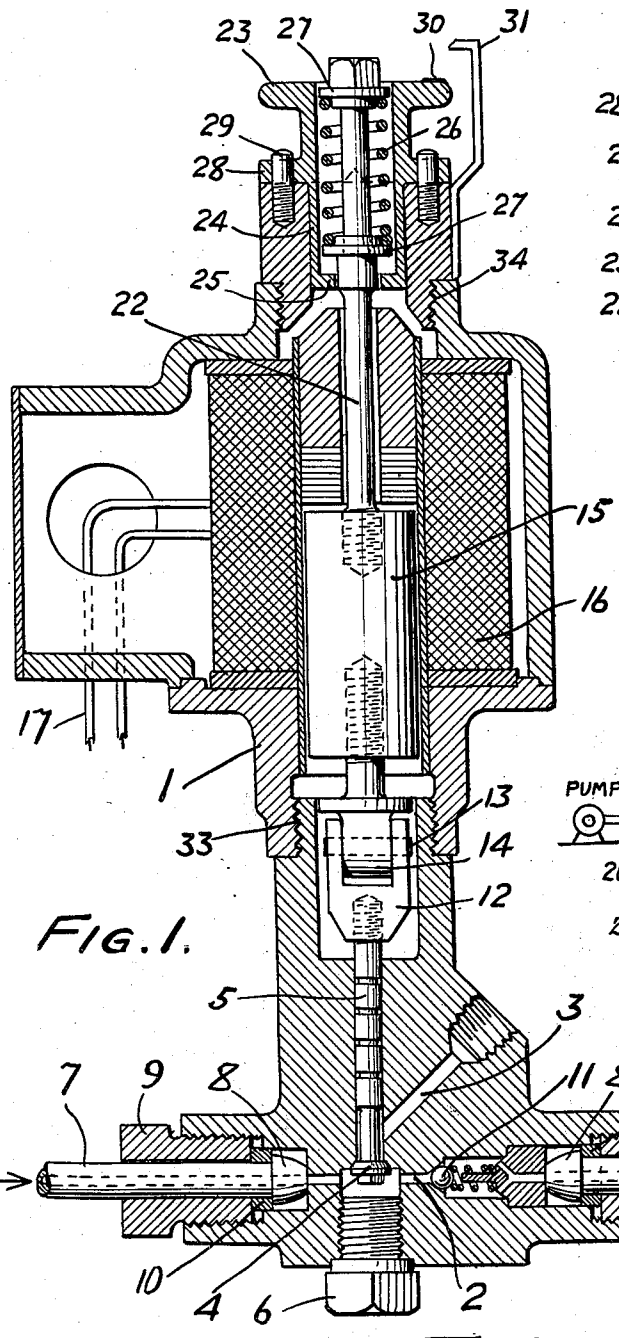

FIG. 1.

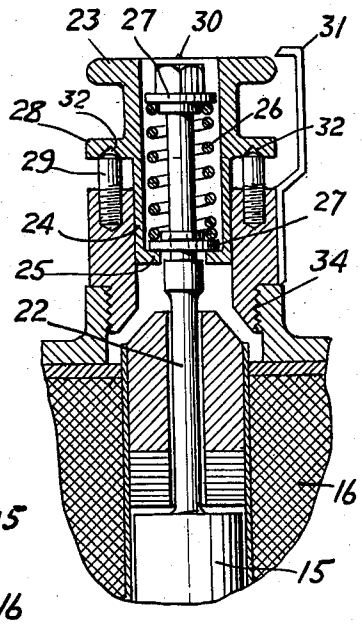

FIG. 2.

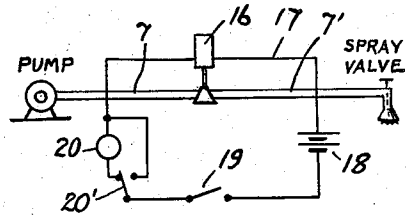

FIG. 3.

INVENTORS

Joseph Barraja-Frauenfelder
and Oscar G. Schrotte
BY
Burns & Harding
ATTORNEYS.

WITNESS:
Ruth Mitchell

Patented Dec. 23, 1941 2,267,272

UNITED STATES PATENT OFFICE

2,267,272

APPARATUS FOR THE CONTROL OF INTERNAL COMBUSTION ENGINES

Joseph Barraja-Frauenfelder, Swarthmore, and Oscar G. Schrom, Philadelphia, Pa., assignors to Sun Shipbuilding & Dry Dock Company, Chester, Pa., a corporation of Pennsylvania

Application November 4, 1939, Serial No. 302,828

5 Claims. (Cl. 123—179)

This invention relates to a method and apparatus for the control of internal combustion engines operating on the fuel injection principle, such as, for example, Diesel engines.

More particularly this invention has for its object the provision of a method and means whereby internal combustion engines of the type indicated may be automatically started and stopped from a point remote from the engine.

By virtue of this invention, as will be obvious, in various installations the necessity for the presence of an attendant at the engine, or for the availability of an attendant when the engine is to be started or stopped is obviated, since the engine from the standpoint of starting and stopping is made subject to remote control.

Generally speaking the apparatus according to this invention, from a description of which the method will be made clear, will comprise a spillway in communication with the fuel line of an engine, at a point between the fuel injection pump and the spray valve, and controlled by a spill valve arranged to be normally actuated by a solenoid, provision being made for manual operation in emergency.

In normal operation of the engine the spillway will be closed by the spill valve and the supply of fuel to the spray valve will be normal. However, when it is desired to stop the engine the spill valve will be opened and fuel will flow through the spillway, causing a pressure drop in the fuel line such that fuel will not pass into the cylinder through the spray valve. In turn when it is desired to start the engine the spill valve will be closed and the engine turned over.

More specifically, the spill valve will be actuated through connection with a solenoid, which when energized will close the spill valve and maintain it closed. At the same time, an electric starter may be placed in circuit with the solenoid so that when the solenoid is energized to close the spill valve for starting, the starter will be simultaneously actuated to turn the engine over until it starts.

Having now indicated, in a general way, the nature and purpose of this invention, we will proceed to a detailed description thereof with reference to the accompanying drawing, which illustrates a preferred embodiment and in which:

Figure 1 is a sectional view of a device embodying this invention in association with the fuel line of a Diesel engine.

Figure 2 is a fragmentary sectional view of the subject of Figure 1 showing a detail of construction.

Figure 3 is a wiring diagram.

In the several figures, 1 indicates a casing in the lower end of which is formed a fuel passage 2, from which leads a spillway 3, which may be connected by any suitable conduit to any suitable receiver or to the main fuel tank. The spillway 3 is controlled by a spill valve 4 adapted to seat on a suitable seat formed in the casing 1 and provided with a stem 5 fitted in a guide formed in the casing and provided with annular grooves for the reception of fuel oil for its lubrication. Beneath the spill valve an opening closed by a plug 6 is provided in the casing and serves as a clear out opening and for applying and removing the spill valve.

Connected to the casing and communicating with one end of the fuel passage 2 is a fuel line 7 leading from the fuel injection pump (not shown). The fuel line 7 may be connected to the casing in any usual or desired manner. Thus, as shown, for example, the end of the fuel line may have an enlarged head 8 and the line secured to the casing by a gland 9 tightened up against a collar 10 which in turn bears against the base of the enlarged head 8.

Connected to the casing and communicating with the other end of the fuel passage 2 is a fuel line 7' leading to the fuel spray valve of the engine. The fuel spray valve (not shown) may be of any well known or desired type. The connection of the line 7' with the casing may be made as in the case of the line 7, through the medium of the enlarged head 8', the gland 9' and the collar 10'.

Controlling the discharge end of the passage 2 is a ball check valve 11 adapted to prevent highly compressed air or gas in the working cylinder from flowing back through the fuel line. Where a spray valve of the spring loaded type is used, the provision of check valve 11 will not be necessary.

The stem 5 of the spill valve 4 is threaded into a yoke 12, which in turn is connected by a pin 13 to a member 14 in turn threaded into the lower end of the iron core 15 of a solenoid 16 in a circuit indicated by the wires 17, 17 and which is adapted to be closed through a source of current 18 from any remote point by, for example, a switch 19. An electric starter 20, for turning over the engine, is arranged to be connected into and disconnected from the circuit through the starter switch 20'. A knob 23 formed on the end of a sleeve 24, surrounding the rod 22 and having an internal flange 25 at its lower end, is adapted for manual closing of the spill valve 4, on failure of

electric current, through the medium of a coil spring 26 surrounding the upper end portion of rod 22 and retained between stops 27, 27 on the rod, the lower one of which is movable upwardly on the rod and will engage with the internal flange 25 on sleeve 24 when the spill valve 4 is in closed position.

Beneath the knob 23 and extending from the sleeve 24 is an annular flange 28 provided with holes, on opposite sides of the sleeve, through which, in normal operation, extend pins 29, 29 extending from the casing. At opposite sides of the sleeve 24 and at points 90° away from the holes in the flange 28, through which the pins 29, 29 normally extend, depressions 32, 32, for reception of the ends of pins 29, 29 are formed in the under side of the flange 25. An index mark 30 on the knob with respect to a fixed pointer 31, supported from the casing, indicates the position of the knob with respect to the pins 29, 29.

The casing 1, as will be noted from observation of Figure 1, is formed in convenient sections threaded together, as at the points 33 and 34, for the convenient assembly and disassembly of the various parts of the apparatus.

From the following description of the operation of the apparatus above described, it is believed that the method according to this invention will be made clear.

Assuming that an engine equipped according to this invention is at rest with the circuit through the solenoid 16 open and the spill valves 4 in open position and it is desired to start the engine. The switch 19 is closed, thus energizing the solenoid 16 and activating the starter 20. When the solenoid is energized, the iron core 15 will rise and draw the spill valve 4 to its closed position, thus shutting off the spillway 3 and allowing free passage for fuel through line 7, passage 2 and line 7' from the fuel injection pump to the spray valve. Activation of the starter will effect a turning over of the engine and in due course it will fire and will continue to operate normally so long as the circuit through the solenoid remains closed and the solenoid is energized. The starter 20 may be arranged in any suitable manner to cut out when its function of starting the engine is accomplished.

With the engine in operation, when it is desired to stop the engine, it is only necessary to open the switch 19, which will result in de-energizing the solenoid 16 and dropping of the core 15 under its own weight and that of the spill valve 4, with resultant opening of the spill valve 4. With opening of the spill valve 4, fuel from the injection pump will be discharged through the spillway 3 to an extent such that the pressure in the fuel line 7' to the spray valve will be insufficient for the injection of fuel into the cylinder against the compression therein and the engine will stop.

Should the source of current fail and negative use of the solenoid 16 for closing the spill valve 4, the valve may be closed manually by lifting knob 23 against the tension of spring 26 to a point above the ends of pins 29, 29. The tension of spring 26 will close the spill valve and hold it to its seat and the condition will be continued by rotating the knob until the ends of the pins 29, 29 engage in the depressions on the underside of flange 28 and it rests on the ends of the pins, with the index 30 at 90° from the pointer 31, as shown in Figure 2.

To stop the engine under such conditions it is necessary only to rotate the knob 23 90° until the pins 29, 29 align with the holes in the flange 28 and lower it to the position shown in Figure 1, which will relieve spring 26 and permit the spill valve 4 to open under the weight of the iron core 15.

It will be appreciated that it is not intended that this invention be limited to the details comprising the above description of a preferred embodiment, since, as will be obvious, various modification in detail may be made without departing from the scope of the invention.

What we claim and desire to protect by Letters Patent is:

1. In an internal combustion engine of the fuel injection type, in combination, a fuel pump, a spray valve, a conduit leading from the fuel pump to the spray valve, a spillway communicating with said conduit, a valve arranged to control said spillway, and electrically actuated means for actuating said valve to its fully closed position, said valve being arranged to move to its fully open position when said electrically actuated means are inoperative.

2. In an internal combustion engine of the fuel injection type, in combination, a fuel pump, a spray valve, a conduit leading from the fuel pump to the spray valve, a spillway communicating with said conduit, a valve arranged to control said spillway, and electrically actuated means adapted when energized to position said valve to close said spillway and to maintain said valve in said position during operation of the engine, said valve being arranged to open to stop the engine when said electrically actuated means is deenergized.

3. In an internal combustion engine of the fuel injection type, in combination, a fuel pump, a spray valve, a conduit leading from the fuel pump to the spray valve, a spillway communicating with said conduit, a valve arranged to control said spillway, and a solenoid including a movable core arranged to actuate said valve to closed position when the solenoid is energized, said core being arranged to open said valve under the influence of gravity when the solenoid is de-energized.

4. In an internal combustion engine of the fuel injection type, in combination, a fuel pump, a spray valve, a conduit leading from the fuel pump to the spray valve, a spillway communicating with said conduit, a valve arranged to control said spillway, a stem on said valve, a solenoid including a movable core, said valve stem being connected to said movable core whereby when the solenoid is energized said valve will be moved to a position to shut off said spillway and when the solenoid is de-energized said valve will move under the weight of said core to a position to open said spillway.

5. In an internal combustion engine of the fuel injection type, in combination, a fuel pump, a spray valve, a conduit leading from the fuel pump to the spray valve, a spillway communicating with said conduit, a valve arranged to control said spillway, a solenoid including a movable core connected to said valve and adapted when the solenoid is energized to close said valve and when the solenoid is de-energized to permit said valve to open, a starting motor for the engine, a source of electric current, and a switch in circuit with said solenoid and starting motor.

JOSEPH BARRAJA-FRAUENFELDER.
OSCAR G. SCHROM.