

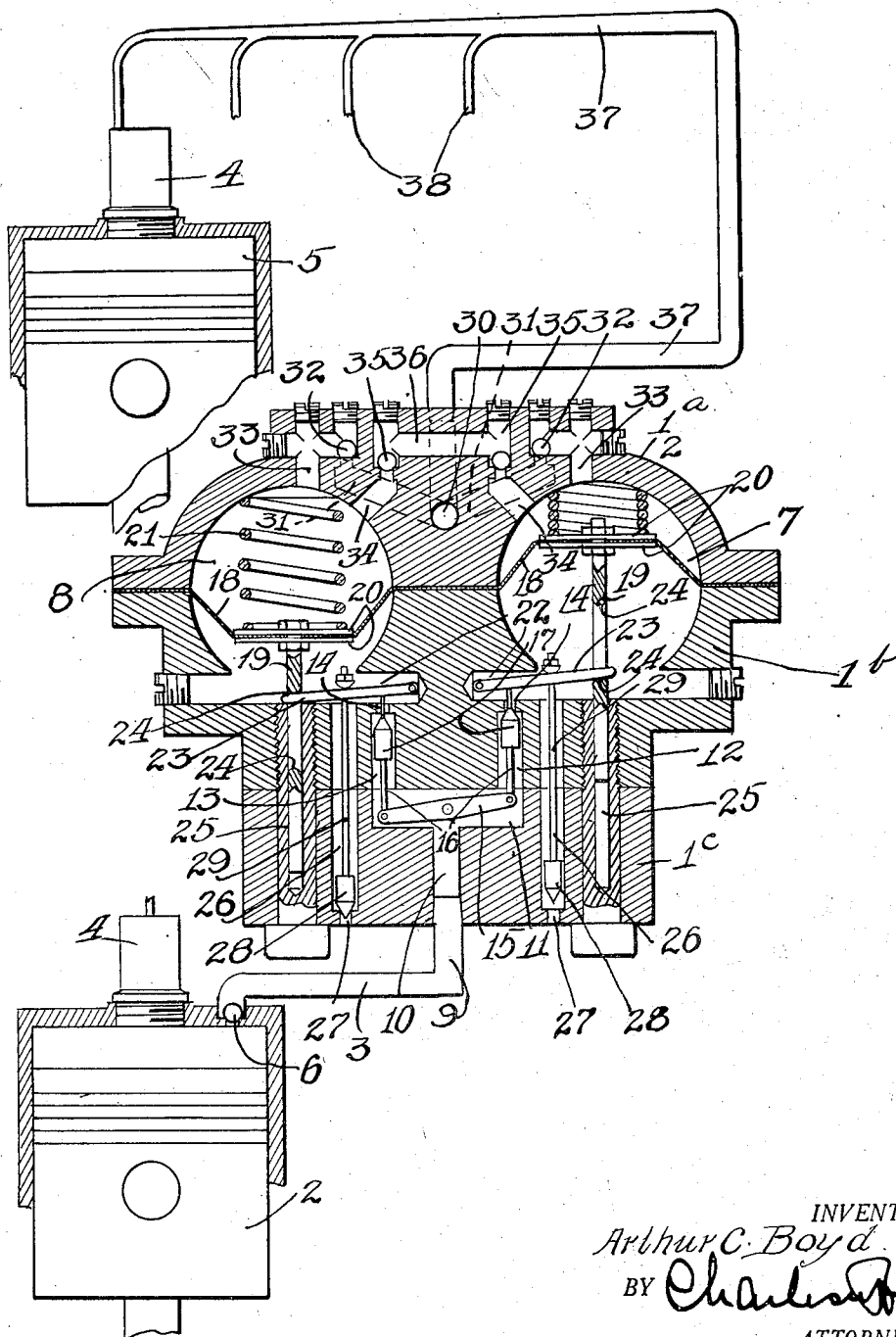
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INJECTING MECHANISM

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INJECTING MECHANISM

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8 Claims. (Cl. 103—152)

This invention relates to fuel injecting mechanism for engines, and concerns itself with a structure that utilizes the pressure in an engine cylinder for pumping or forcing the fuel into the cylinder, or a different cylinder.

The invention comprises the novel structure and combination of parts hereinafter described, and more particularly pointed out and defined in the appended claims.

In the accompanying drawing which illustrates a preferred form of this invention and in which similar reference numerals refer to similar features in the different views:

The figure is a sectional view through the fuel injector with the connected pipes shown in elevation.

On the drawing:

In referring to the drawing, it will be noted that the injector mechanism, generally designated by the reference 1, is connected to an engine cylinder 2 by a pipe 3. The pressure arising through the compression and explosion in the cylinder 2 is transmitted through the pipe to the injector 1, as will later appear. A well-known check valve 6 connects the pipe 3 with the cylinder 2.

The injector housing may be constructed in any desired manner. In the drawing, it is shown as constructed from members 1a and 1b which are designed to provide fuel receiving chambers 7 and 8. A base member 1c is secured to the bottom of the member 1b to provide for passages and guideways for different operating parts of the injector.

The pressure pipe 3 has a branch pipe 9 that extends into a passage 10 leading into a chamber 11 in the injector casing. At the ends of the chamber 11 are passages 12 and 13 that terminate in restricted outlets 14 communicating respectively with the chambers 7 and 8.

Within the chamber 11, there is pivoted a lever 15 at its medial portion. At each end of the lever 15, there are pivotally connected the stems 16 of valves 17 having a tapering end. These valves 17 are designed to close the outlets 14. The stems 16, however, project above the valves 17 and into the chambers 7 and 8, respectively.

A diaphragm 18 extends across each chamber 7 and 8. The diaphragms are shown as fastened between the casing members 1a and 1b and as consisting of a single sheet. A plunger rod 19 is secured to the medial portion of each diaphragm 18 by means of discs 20, between which the medial portion of each diaphragm is confined. A coil spring 21 is located between each

upper disc 20 and the top of each chamber 7 and 8. These springs normally tend to force the diaphragms downwardly.

The chambers 7 and 8 are provided with inwardly directed recesses 22 in which levers 23 are pivoted at their inner ends. These levers 23 extend between spaced shoulders 24 on the plunger rods 19 and contact the upper ends of the valve stems 16 at intermediate points. The lower portions of the plunger ends 19 preferably extend into guideways 25 formed in sleeves extending vertically through the members 1b and 1c.

An exhaust passage 26 extends from each chamber 7 and 8 through the casing members 1b and 1c. The lower portions of these passages terminate in restricted outlets 27 alternately closed by the bevel ended valves 12. The valves 28 are provided with stems 29 that are connected to the levers 23. The arrangement is such that when a diaphragm is elevated, it will lift its plunger rod 19 for elevating the lever 23 connected thereto and open the discharge valve 28. At this time the valve 17 will be in closed position due to the fact that the other plunger rod is in its lower position and has opened the other valve 17.

The fuel is admitted to the chambers 7 and 8 above the diaphragms through an inlet passage 30 which connects with both chambers. Passages 31, shown in dotted lines, extend from the fuel inlet passage 30. These passages 31, which are controlled by check valves 32, communicate with passages 33 leading into the chambers 7 and 8 for supplying liquid fuel thereto. Each chamber 7 and 8 has a fuel outlet passage 34 controlled by a check valve 35 that discharges into a common duct 36 that communicates with a fuel injector pipe 37. The fluid injector pipe 37 may be provided with different branches 38 for connection to different cylinders. It is shown connected to an inlet valve housing 4 of cylinder 5.

In the operation of the device, there will be an alternate movement of the diaphragm for pumping or ejecting fuel. The upper portion of chamber 8 is designed to contain fuel; the diaphragm being in its lowered position and the valve 17 controlling the flow of burned gases under explosive pressure to chamber 8 being open. The pressure of this fluid will raise the diaphragm and eject the fuel through the pipe 37 to a cylinder. As the said diaphragm is elevated, its rod 19 will also be elevated, and when the lower shoulder 24 thereon engages the lever 23 in said chamber, the valve 28 will be elevated to allow the burned gases from chamber 8 to escape. In the meantime, the fuel has entered chamber 7 and lowered

the diaphragm therein, and caused the lever 23 therein to be lowered to the position of the lever 23 shown in chamber 8, in which position the valve 17 controlling chamber 7 will be in open position and the other valve 17 will be in closed position. The burned gases from an engine cylinder may now enter chamber 7. Thus, it will be seen that the pumping parts of the injector are alternately operated by the burned gases under the pressure arising from combustion and an effective feed is always assured.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a pair of rods slidably mounted in said casing and respectively connected to said pumping elements, each chamber having a fluid inlet passage and a fluid outlet passage, valves in said passages, means operatively connecting the inlet and outlet valve of each chamber with the rod therein, and means for connecting said inlet valves for alternate movement thereof in opposite directions.

2. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a rod connected to each pumping element and slidably mounted in said casing, said casing having a fluid inlet passage provided with spaced branches leading respectively to said chambers, a fluid inlet valve mounted in each branch passage, a lever pivoted intermediate its ends with its ends pivotally connected to said valves and a connection between each valve and the rod in the adjacent chamber and fluid exhaust means associated with each chamber.

3. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber yielding means for urging said pumping elements in one direction, a source of fluid under pressure, and means for conducting said fluid under pressure to said chambers for urging said pumping elements in the opposite direction against the action of said yielding means, said means including an inlet passage in said casing having spaced branches leading respectively to said chambers, a valve in each branch, a connection between said valves for causing the same to move in opposite directions, a connection between each valve and a pumping element, and fluid exhaust means associated with each chamber.

4. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a rod connected to each pumping element and slidably mounted in said casing, each chamber having a fluid inlet and fluid outlet passage, a valve in each passage, a connection between the valves in the inlet passages, and a connection between the inlet valve and outlet valve of each chamber, said last mentioned con-

nections being operatively connected to said rods.

5. In a fuel feeding pump, a casing having a pair of chambers, a diaphragm extending across each chamber, a rod connected to each diaphragm and slidably mounted in said casing, yielding means acting upon said diaphragms for urging the same in one direction, fuel inlet means and fuel outlet means associated with said chambers upon one side of said diaphragms, a source of fluid under pressure connected with said chambers upon the other side of said diaphragms, the connection between said source of fluid under pressure and said chambers comprising a pair of inlet passages, a valve in each passage, a connection between each valve and diaphragm, each chamber having a fluid under pressure exhaust passage, a valve in each exhaust passage, a connection between each exhaust valve and the above mentioned connection, and a connection between said inlet valves for causing alternative movement thereof in opposite directions.

6. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a source of fluid under pressure, a connection between said source of fluid under pressure and said chambers, said connection including an inlet passage to each chamber, a valve in each inlet passage, means connecting each valve and a pumping element including a lever, a fluid under pressure exhaust passage extending from each chamber, a valve in each exhaust passage, means connecting each exhaust valve with one of said levers, and means connecting said inlet valves for alternate movement in opposite directions.

7. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a pair of rods slidably supported in said casing and respectively connected to said pumping elements, a source of fluid under pressure, a fluid pipe connecting said source of fluid under pressure with said casing, said casing having a passage with double branches extending respectively to said chambers, a valve in each branch passage, a connection between said valves for causing the same to simultaneously move in opposite directions, said casing having a fluid outlet from each chamber, a valve in each fluid outlet passage, and means connecting the fluid inlet valve and the fluid outlet valve of each chamber with the rod therein.

8. In a fuel feeding pump, a casing having a pair of chambers, a pumping element in each chamber, a pair of rods slidably supported in said casing and respectively connected to said pumping elements, a source of fluid under pressure, a pipe connecting said source of fluid under pressure with said casing, said casing having fluid inlet passages connecting said chambers with said pipe and having fluid outlet passages from said chambers and valves in said inlet and outlet passages connected to said rods and yielding means in said chambers acting upon said pumping elements in opposed relation to the action of said fluid under pressure.

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