Aug. 21, 1923. 1,465,474

K. J. E. HESSELMAN

FUEL PUMP FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 2, 1922

Fig. 1.

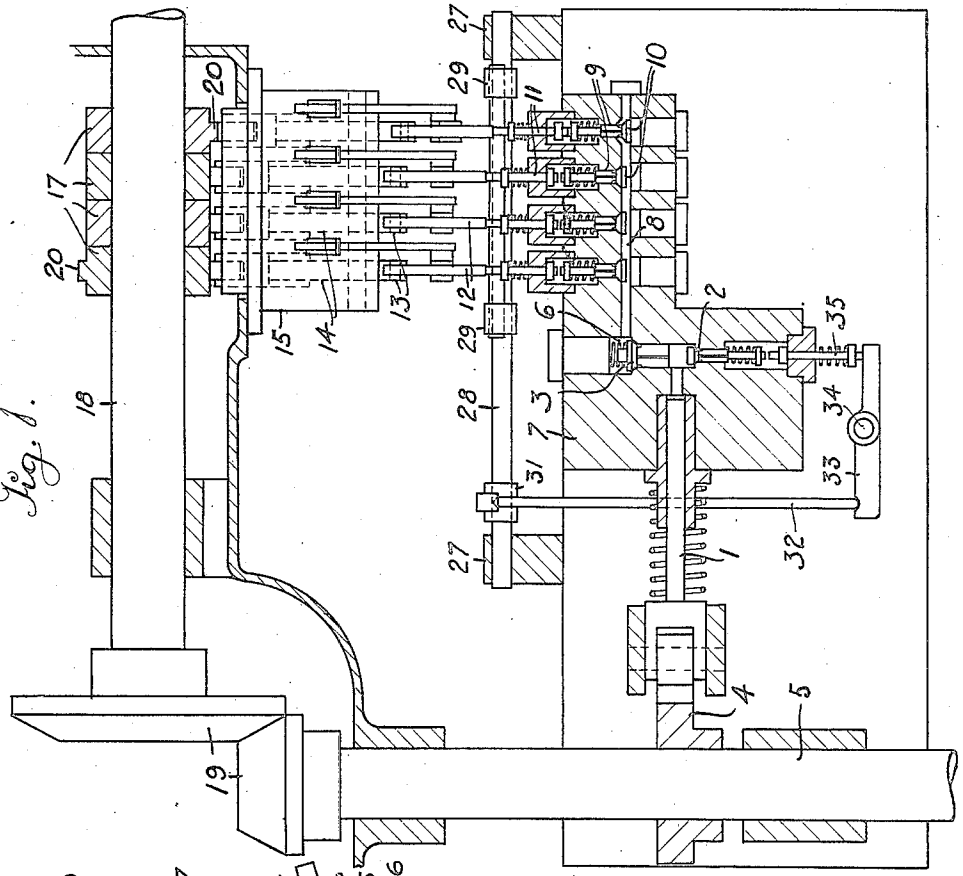


Fig. 2.

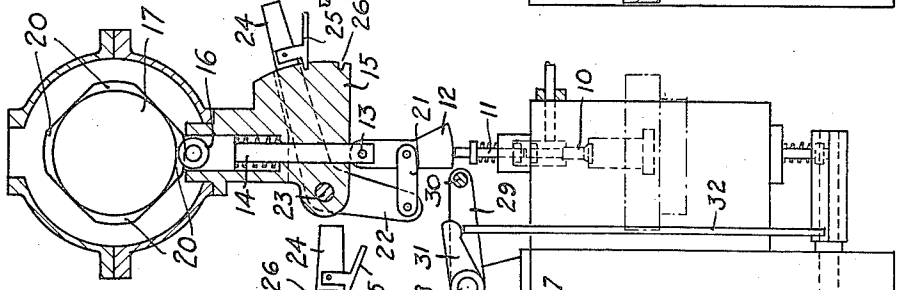
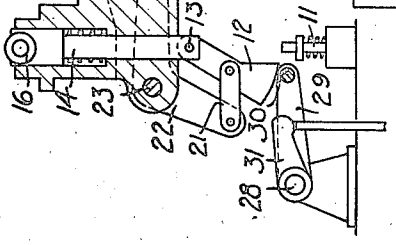


Fig. 3.



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By [signature] Atty.

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FUEL PUMP FOR INTERNAL-COMBUSTION ENGINES.

Application filed October 2, 1922. Serial No. 591,947.

To all whom it may concern:

Be it known that I, KNUT JONAS ELIAS HESSELMAN, a citizen of the Kingdom of Sweden, residing at Saltsjo-Storangen, Sweden, have invented new and useful Improvements in Fuel Pumps for Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines and specially to a fuel pump arrangement used in internal combustion engines to supply fuel to a plurality of cylinders.

In fuel pump arrangements for internal combustion engines in which a common plunger is used to supply fuel to a plurality of cylinders in succession, it may be desired to set any of the cylinders out of operation without interfering with the working of the remaining cylinders, nor causing any disturbance at all of the operation of the pump. The simplest way to obtain this result seems to be to shut off the fuel supply to the cylinder to be set out of operation. As will readily be understood, this cannot be done as in such case undue pressures would be produced within the discharge or distributing chamber of the pump. Even if the oil is permitted to return through a safety valve in the stroke during which it should normally be impressed into the respective cylinder, there might easily be produced too heavy pressures within the said distributing chamber of the pump, and such pressures would disturb the operation of the remaining cylinders. To set a cylinder out of operation by a device that maintains the suction valve in open condition during the discharge stroke during which the fuel pump would normally supply oil to the respective fuel valve is not always sufficient. Let it be assumed, that the fuel discharge conduit cannot be maintained under pressure due, for instance, to the fact that the discharge pipe has been destroyed or any other accident has occurred, the oil stored up within the distributing chamber will be allowed to enter the discharge conduit upon the opening of the distributing valve thereby disturbing the operation of the cylinder following next. Thus, a combination of the two methods above referred to is necessary.

According to this invention such a combination is realized by the provision of a common control lever or another control member, adapted when operated to open the suction valve of the pump, at the same time closing a valve in the discharge conduit of the cylinder to be set out of action.

In the accompanying drawing forming part of this specification, Figure 1 shows a longitudinal vertical section of a pump arrangement according to this invention. Fig. 2 is an end-view, with part in section, of the means for operating the distributing valve individual to one cylinder. Fig. 3 is a similar view of the same means in another position with certain parts removed.

With reference to the drawing, the numeral 1 designates the plunger of a fuel pump designed to supply fuel to four cylinders of an internal combustion engine (not shown). 2 is the suction valve and 3 is the discharge valve of said pump. The plunger 1 is driven from a cam 4 on the power shaft 5. The discharge valve 3 is situated at the bottom of a boring 6 formed in a block 7. Extending from the boring 6 is a passage 8 forming a distributing chamber from which fuel is adapted to be led to the four cylinders of the engine (not shown) by way of four borings 9 extending from the said chamber 8 and each of which contains a spring-operated valve 10 controlling the communication between the chamber 8 and its corresponding boring 9. The valves 10 are each mechanically controlled by a rod 11 formed as a plunger. The four rods 11 are each controlled by a segment shaped lever 12. Each lever 12 is pivoted at 13 to a plunger-like rod 14 reciprocating in a boring formed in the rigid block 15. Each rod 14 carries at its opposite end an anti-friction roller 16 engaging a cam disc 17 on a shaft 18 connected, as by a pair of bevel wheels 19, 19, to the power shaft 5. Each of the cam discs 17 has one cam surface 20 formed on it, and the cam surfaces 30 of the four cam discs are preferably displaced 90° relatively to each other, as will appear from Fig. 2.

Each of the segment-shaped levers 12 is connected by a link 21 to one end of a bell crank lever 22 pivoted at 23 to the block 15 and shaped to form a control lever having a suitable handle 24 at its opposite end. Carried by the handle 24 is a pawl 25 adapted to engage two notches 26 formed in the block 15.

Mounted in suitable bearings 27, 27 is a

horizontal shaft 28 extending parallel to the row of rods 11 at a certain distance therefrom. The shaft 28 carries by means of two arms 29 a rod 30 parallel to the shaft 28, said rod 30 being situated at a short distance from the row of rods 11, as will appear from Figs. 2 and 3. The shaft 28 carries further an arm 31. Formed in the under side of said rod 31 near the end thereof is a small recess engaged by the tapering upper end of a rod 32 the lower likewise tapering end of which is in engagement with a small recess formed in the upper side of one arm of a two-armed lever 33 pivoted at 34 and engaging with its other arm with the lower end of a spring-operated rod 35 slidably mounted in a boring lying in axial alinement of the suction valve 2 and adapted to control said valve.

The operation of the apparatus described is as follows: In normal operation, that is, when all of the cylinders of the engine are in operation, the various parts of the apparatus are in the position shown in Fig. 2, in which the pawl 25 of each of the control levers 24 engages its corresponding upper notch 26. In this position each lever 12 is maintained in a position in axial alinement with its corresponding rod 11 so as to cause the latter to open the valve 10 when acted on by the cam 20 of its cam disc 17. When it is desired to set any of the cylinders out of operation, the corresponding control lever 24 is moved to the position shown in Fig. 3, in which its pawl 25 engages its corresponding lower notch 26. In this position the lever 12 in question is moved out of the path of its rod 11 so that the corresponding valve 12 will be maintained in closed condition by its spring and will not be opened when the lever 12 is acted on by its cam 20. The lever 12 as now positioned is in engagement with the rod 30 and will when acted on by its corresponding cam 20 depress the rod 30 thereby causing the latter to turn the shaft 28 through a certain angle. The shaft 28 when thus turned will by means of its arm 31 displace the rod 32 which will then cause the lever 33 to turn about its pivot 34 to a sufficient degree to cause the rod 35 to open the suction valve 2. The suction valve 2 will now be maintained in open condition as long as the lever 12 is operated by its cam 20. While the cam 20 thus operates the lever 12 the pump plunger performs the discharge stroke that would under normal conditions impress fuel to the cylinder to which the displaced lever 12 is individual. As, however, the distributing valve 10 individual to this cylinder is now in closed condition while the suction valve 2 is open it is apparent that no oil will be conveyed to the cylinder in question, and that no increasement of pressure will take place within the chamber 8, not within the passages connected thereto, as the oil is permitted to freely return into the suction conduit.

As will be apparent from Figs. 2 and 3, the segment-shaped lever 12 is of such a design that, when displaced by means of the lever 22, 24, it will come into engagement with the rod 13, before being brought out of operative relation with the rod 11. In such a displacement the lever 12, when acted on by its cam 20 may thus open the suction valve 2 and also open the valve 10, the latter being permitted to close only after the lever 12 has been brought completely out of the path of the rod 11.

While I have described and shown my invention in connection with a four cylinder internal combustion engine it should be understood that the invention may be applied to engines having any desired number of cylinders.

It will be further seen that many modifications may be made without departing from the principle and scope of the invention.

What I claim is:—

1. A fuel pump arrangement for multicylinder internal combustion engines, comprising in combination a single plunger to supply oil to all of the cylinders of the engine, a common suction valve, one distributing valve individual to each of the cylinders and connected to the discharge side of the pump, mechanical means to control said suction valve, mechanical means to independently control the said distributing valves, and adjustable means for each of said distributing valves to operate said two first-mentioned means in order to open said suction valve and close the respective distributing valve.

2. A fuel pump arrangement for multicylinder internal combustion engines, comprising in combination a single plunger to supply oil to all of the cylinders of the engine, a common suction valve, one distributing valve individual to each of the cylinders and connected to the discharge side of the pump, mechanical means to control said suction valve, mechanical means to independently control the said distributing valves, power driven means to operate said two first-mentioned means, and a lever to bring said power driven means into operative relation to either of said control means.

3. A fuel pump arrangement for multicylinder internal combustion engines, comprising in combination a single plunger to supply oil to all of the cylinders of the engine, a common suction valve, one distributing valve individual to each of the cylinders and connected to the discharge side of the pump, mechanical means to control said suction valve, mechanical means to independently control the said distributing

valves, power driven means to operate said two first-mentioned means, and a lever to bring said power driven means into operative relation to either of said control means, the arrangement being such that the power driven means when adjusted by said lever is brought into operative relation with one of said control means before its operative relation to the other control means is interrupted.

In testimony whereof I have signed my name.

KNUT JONAS ELIAS HESSELMAN.