May 8, 1934. E. A. ROCKWELL 1,957,669

FUEL PUMP

Filed Jan. 12, 1931 2 Sheets-Sheet 1

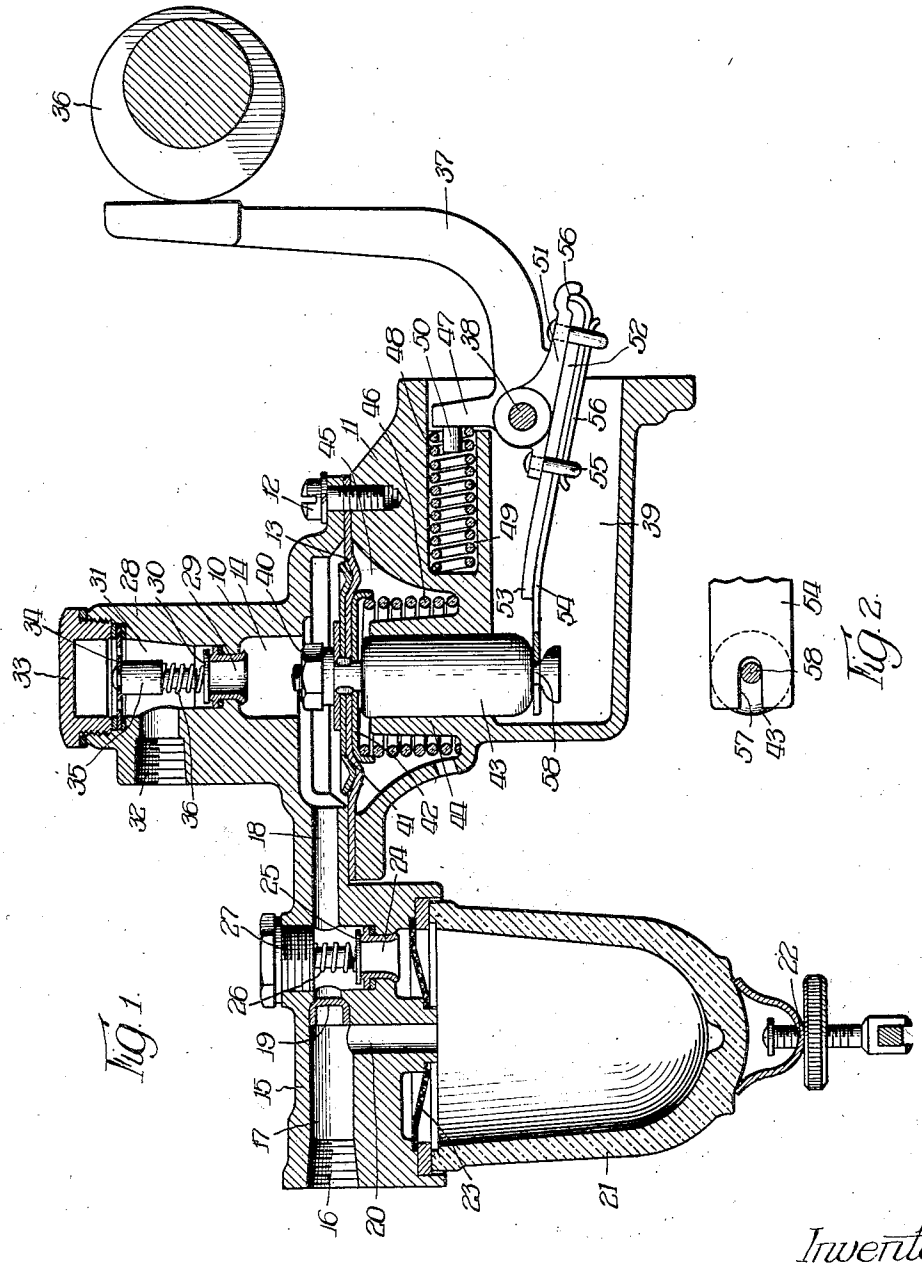


Fig. 1.

Fig. 2.

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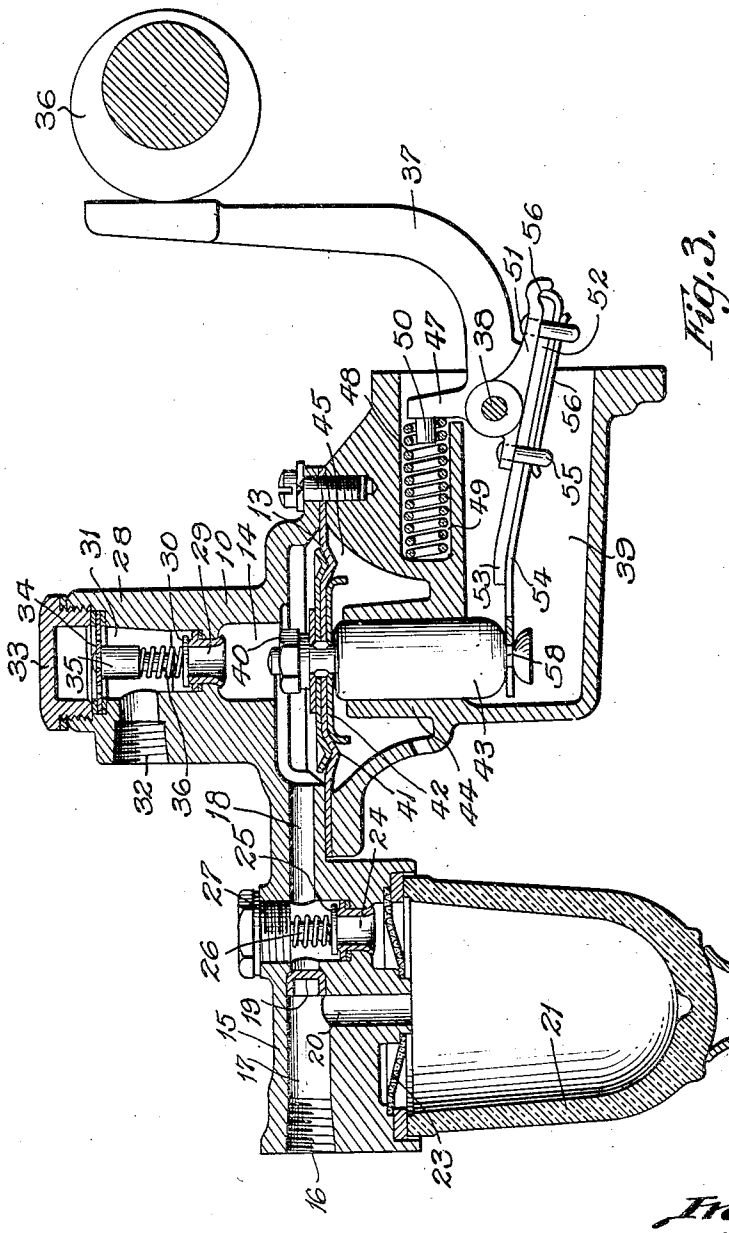


Fig. 3.

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FUEL PUMP

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1 Claim. (Cl. 103—38)

This invention relates to improvements in fuel pump construction of the type which is used for feeding fuel from a supply tank to the carbureter of an internal combustion engine.

Fuel pumps of the diaphragm type cam-actuated from the engine are well known in which the engine driven cam acts upon a constant lever pivoted to one part of the pump casing and is connected to the reciprocable stem of the diaphragm in such a manner that the positive stroke of the lever produces a suction stroke of the pumping diaphragm and the diaphragm is resiliently urged in a discharge direction through the force of a compression spring acting directly upon the diaphragm and so arranged that the diaphragm may have a variable discharge stroke while the operating lever continues to have a constant stroke.

An object of the present invention is to provide an engine-driven fuel pump in which the movement of the constant stroke lever is transmitted to the reciprocable stem of the diaphragm through a resilient lever spring which tends to absorb shocks.

It is further an object of the present invention to so connect the resilient leaf spring to the lever that it is relatively stiff in transmitting a suction stroke to the diaphragm but will readily bend upon movement of the lever in a discharge direction to thereby absorb lost motion due to a variable discharge stroke of the diaphragm.

It is further a feature of the invention to mount the follower spring which acts to produce the return stroke of the lever above the fulcrum of the lever and perpendicular to the axis of the pump stem.

Further improvements in the present invention will be more readily understood and specifically described in the following detail description taken in connection with the attached drawings in which—

Figure 1 is a longitudinal section of the fuel pump construction, and

Figure 2 is a detail sectional view of the connection of the resilient leaf spring to the pump stem.

Fig. 3 is a view similar to Fig. 1 showing a modified construction.

The pump casing arrangement is quite similar to previous designs of fuel pumps and includes an upper casing part 10 and a lower casing part 11 which are clamped together by bolts 12 and serve to retain a pumping diaphragm 13 which cooperates with a pumping chamber 14 on the opposite side of the diaphragm and formed by a recess in the upper casing part. The upper casing part has an off-set extension 15 having an inlet connection 16 and a horizontal flow passage 17, the first portion of which is separated from a second portion 18 by a plug 19 so that the fuel is caused to flow downwardly through a passage 20 into a fuel receiving and sediment trapping chamber 21 which is detachable secured by means partially shown and indicated 22. The chamber 21 serves to retain a filter member 23, which serves to filter the fuel before it flows upwards through a passage 24 towards an inlet check valve 25 normally retained in seated position by a spring 26 positioned by a threaded plug and depending stem 27.

Fuel after passing the inlet valve 25 flows through the passage 18 and directly into the pumping chamber from which it is delivered upwardly through an extension 28 having a passage controlled by an outlet check valve 30 above which the fuel flows into an upwardly enlarged chamber 31 and from which it is delivered through an outlet connection 32. The top of the chamber 31 is closed by a cap member 33, which serves to retain a perforated vapor separating plate 34, secured to the stem 35 for seating the spring 36 of the outlet check valve. The cap member 33 forms a vapor dome to maintain an even pressure on the fuel being fed to the carbureter.

The fuel pump is driven by an engine-driven cam 36 acting upon a lever 37 carried by a fulcrum pivot 38 in a cavity 39 of the lower casing part 11, which may be mounted on an engine casing so that the lever 37 extends into the engine casing for thrust engagement with the engine-driven cam. The diaphragm 13 is clamped by a nut 40 between inflexible disk members 41 and 42 to the upper end of a reciprocable pump stem 43 guided for reciprocable movement by a boss 44 of the lower casing part 11.

The lower casing part 11 has a cavity 45 immediately beneath the diaphragm in which is mounted a compression discharge spring 46 reacting upon the diaphragm through the disk 42.

The construction thus far described is all old construction and in the old forms the motion of the lever 37 is generally transmitted to the pump stem 43 by a lost motion connection and the lever is maintained in thrust engagement with the cam by some suitable follower spring. The novel features of the present invention relate to the connection of the lever 37 to the pump stem 43 and the arrangement of the follower spring. The lever 37 has an upwardly extending arm 47 from the fulcrum pivot 38 which engages a follower

spring 48 mounted in a socket 49 of the lower casing part 11 above the cavity 39, so that the spring 48 is at right angles with respect to the axis of the pump stem 43. The lever arm 47 may have a stud 50 for positioning the spring 48. It will, therefore, be understood that the cam 36 during the active phase thereof produces a positive movement of the lever 37 about the pivot 38 and compresses the spring 48 and during the inactive phase of the cam, the lever is returned by the force of the compressed spring 48. Therefore the lever 37 will be maintained in contact with the cam at all times.

The lever 37 also includes a lower flat face 51 to which is attached a stiff leaf member 52 which extends to an end 53 closely adjacent the lower end of pump stem 43. A resilient leaf spring 54 is arranged to lie against the bottom of the metal plate 52 and is also secured to the lever 51 through the rivets 55 and a securing plate 56. The ends of the stiff leaf member 52 and the leaf spring 54, which are secured to the lever 37, may be curved as indicated at 56 to be positioned in a recess of the flat face 51 of the lever 37. The end of leaf spring 54, which connects to the pump stem 43, has a slot 57 engaging a reduced portion 58 of the pump stem between upper and lower rounded portions of the pump stem. It will be understood that the slot 57 is provided so that the arcuate motion of the leaf spring 54 will be accommodated relative to the straight line movement of the pump stem 43.

During the positive stroke of the lever in a suction direction, the end 53 of the stiff leaf member 52 acts as a fulcrum about which the leaf spring 54 may bend so that the connection between the lever 37 and the pump stem is sufficiently stiff to produce a suction stroke of the pump against the resistance of the compression spring 46. However, when the lever 37 moves in an opposite direction, the leaf spring 54 may bend about the first securing rivet 55 and therefore a discharge impulse will not be transmitted to the pump stem. Therefore the leaf spring will flex in one direction more than in the other and it can absorb lost motion, due to a variable discharge stroke of the pumping diaphragm. The leaf spring tends to absorb shocks in transmitting a suction stroke to the pump stem and therefore gives a quiet operation.

It should also be understood that, if so desired, the compression spring for producing the discharge stroke may be eliminated if the strength of the leaf spring is so regulated that it will produce the desired impulse in transmitting discharge strokes to the pump diaphragm. This form is shown in Fig. 3.

The composite lever arm which connects to the pump stem may be constructed in any desired manner so long as the force transmitted in one direction is greater than the other.

I claim:

A variable stroke fuel pump comprising a pump casing having a pumping chamber therein, a reciprocable pumping member cooperating with said pumping chamber, a reciprocable pump stem connected to said pumping member and guided for movement by said pump casing, said casing including a lower cavity into which said pump stem extends, a constant stroke pivoted bell crank lever carried by said pump casing, said lever including a rigid cam-actuated arm extending outward from said lower cavity and a composite lever arm consisting of a plurality of resilient leaf spring members in overlapped relation, the lowermost and longest of said leaf spring members being connected to said pump stem whereby movement of the lever in one direction about its pivot transmits a positive suction stroke to said pumping member and movement in the opposite direction transmits a resiliently limited discharge stroke to said pumping member.

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