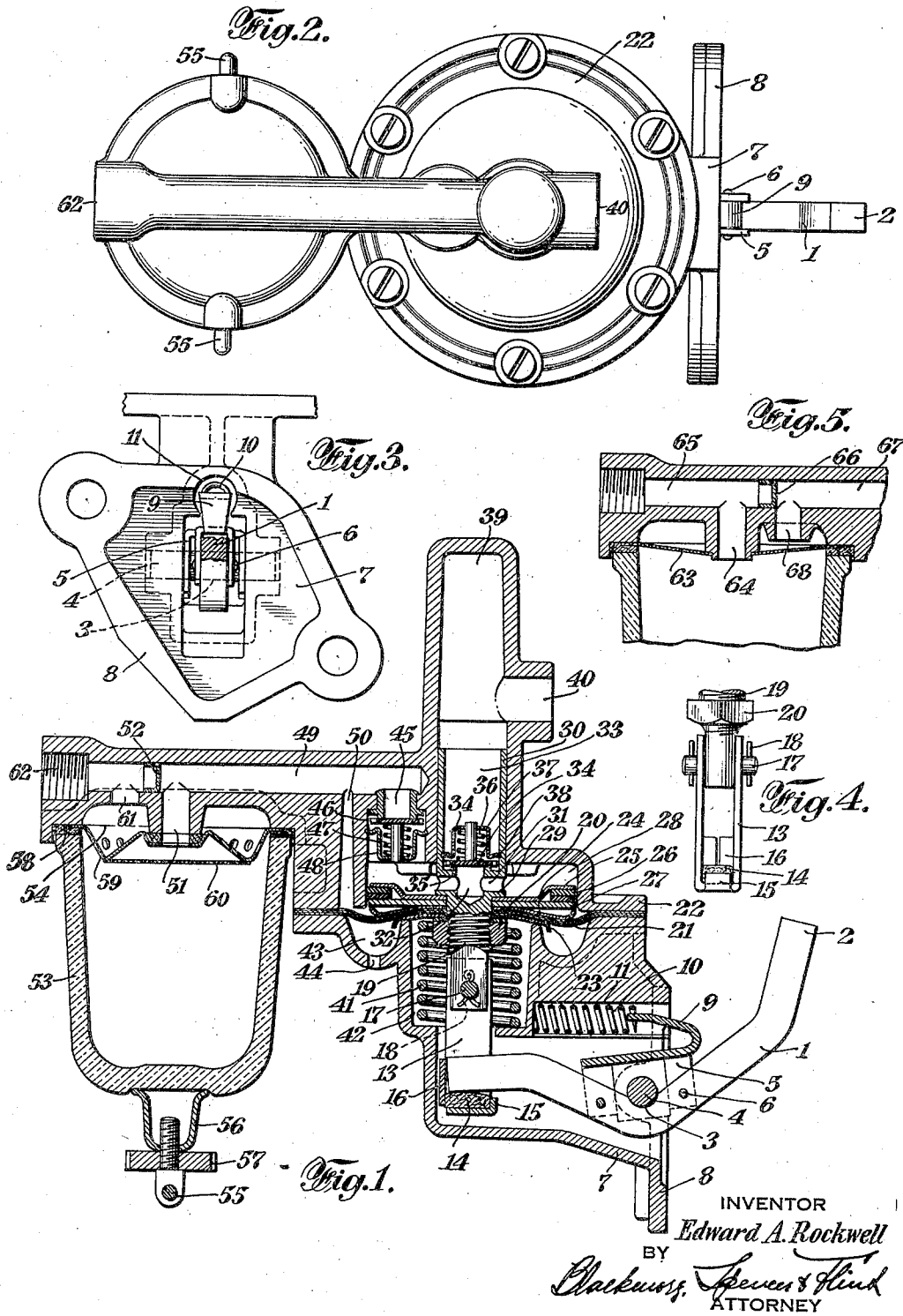


May 11, 1937.

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FUEL PUMPING APPARATUS

2,080,392

Filed June 8, 1935



UNITED STATES PATENT OFFICE

2,080,392

FUEL PUMPING APPARATUS

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Application June 8, 1935, Serial No. 25,573

2 Claims. (Cl. 103—154)

My invention relates particularly to a fuel pumping apparatus designed for use in connection with internal combustion engines and which is applicable to automotive vehicles of all kinds.

The object of my invention is to provide a fuel pumping means having many advantages over previous fuel pumping devices. The object is particularly to provide an apparatus which may be readily constructed and with a minimum of cost and labor and which will more effectively perform the pumping of the fuel to the internal combustion engine, as, for instance, an internal combustion engine provided with any desired type of carbureter. A further object is to provide a pumping mechanism of the type involving a diaphragm as a pumping element, having a piston associated therewith in an advantageous manner. Another object is to provide an efficient guide for the diaphragm, or piston, or both, in which guide the outlet valve can be mounted in order to reduce the clearances and make a more compact construction possible. A further object is to locate the guide in a cushioning dome on the outlet side of the pump. Again, a further object is to mount the operating springs for the pumping element in such a manner as to make the construction more compact and better adapted for large scale production. Still a further object is to provide the inlet with an auxiliary passageway to the pump such as to supplement the action of the pumping stroke spring and at the same time return to the inlet passageway any excess of fuel which might seep by the piston. Another object is to provide a secondary chamber in connection with the inlet passageway, so arranged as to facilitate the flow of the incoming fuel while permitting the above mentioned action of the fluid through said auxiliary passageway. Further objects of my invention will appear from the detailed description hereinafter.

While my invention is capable of being carried out in many different ways, for the purpose of illustration I have shown certain embodiments of my invention in the accompanying drawing, in which—

Fig. 1 is a vertical section of a fuel pumping apparatus made in accordance with my invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a side elevation showing the lever mechanism for operating the pump;

Fig. 4 is an elevational detail of the means

for connecting the said lever to the diaphragm; and

Fig. 5 is a vertical detailed section showing a modified form of filter.

In the drawing I have shown an upwardly bent lever 1 having an outer end 2 adapted to ride on an operating cam of any desired character, driven by an internal combustion engine, as, for example, the engine driving an automobile. This lever 1 has a recess 3 in the elbow of the bent portion thereof to receive a transverse pivot 4 which passes through the two sides of a U-shaped bracket 5 secured to the lever 1 on opposite sides thereof by rivets 6, said pivot 4 being journaled in a lower pump casing 7 having a flange 8 for attachment to the side of the casing of said engine. Said bracket 5, furthermore, has an upwardly and backwardly turned tongue 9 to co-act with the end of a horizontal spring 10 which is carried in a cylindrical spring-pocket 11 formed in the lower pump casing 7. The spring 10 is provided for keeping the end of the lever 2 in contact with the cam. The other end 12 of said lever is carried in a U-shaped strap or stirrup 13 provided at its lower portion with a leather buffer 14 which is held in place at one side by an ear 15 and at the other side by a transversely bent member 16 on the stirrup 13 which also serves to protect the end 12 of the lever from contacting with the lower pump casing 7. The two upper ends of the strap 13 are connected by a pin 17 and a cotterpin 18 to a stem 19 having a nut 20 for holding in place a laminated diaphragm 21, the periphery of which is clamped between the lower pump casing 7 and an upper pump casing 22. Between the said nut 20 and the diaphragm 21 there is also a flanged lower supporting disk 23 for the diaphragm 21. Also above said diaphragm 21 there is an upper convex supporting disk 24. Above the disk 24 there is furthermore carried by the stem 19 a piston disk 27 which supports at its periphery a plurality of self-centering bakelite piston rings 26 loosely confined in place by a recessed clamping disk 25 in such a manner that the piston rings 26 loosely fit within a piston chamber 28 in the upper pump casing 22. The recessed clamping disk 25 fits against a shoulder 29 on the stem 19, forming a hollow guide member 30 having a transverse inlet passageway 31 and a vertical outlet passageway 32 communicating with a chamber 33 in the guide member in which there is seated an outlet check valve 34 against an upturned lip 35 and which is held in place by a spring 36 supported by a strap 37 with

downwardly bent lateral portions to act as a stop for the valve 34 so as to be sprung into recesses 38 in the chamber 33. Said guide 30 is arranged to reciprocate in the lower portion of an air cushioning dome 39 formed in the upper pump casing 22. An outlet 40 conveys the pumped fuel to a carburetor of any desired character of the internal combustion engine. Around the stem 13 there is furthermore provided a pumping-stroke spring 41 in a recess 42 in the lower pump casing 7 and adjacent to the recess 42 there is an annular chamber 43 connected to the outer air by a vent 44. At one side of the guide member 30 there is situated an inlet port member 45 forming a seat for an inlet check valve 46 which is held in place by a spring 47 supported by a strap 48 similar in construction to the strap 37. The inlet port member 45 communicates with a horizontal inlet passageway 49 which leads to an auxiliary inlet passageway 50 forming a by-pass around the inlet valve 46 so as to not only return fuel which leaks past the piston rings 26 back to the passageway 49, but also serves to supplement the action of the pumping spring 41 in the pumping stroke due to the decreased pressure that has been produced in the inlet passageway 49. The inlet passageway 49 leads to a vertical passageway 51 through which the fuel enters due to a plug 52 which closes this end of the passageway 49. Said vertical passageway 51 projects downwardly into a removable dirt trap or gascolator 53 in such a manner as to form an inlet suction space 54. The gascolator 53 is preferably of glass, and is held in place by a pivoted yoke member 55 having a flared button 56, bearing on the lower face of the gascolator 53 and adapted to be pressed against the same by a thumb-screw 57. The gascolator 53 is thus clamped to the upper pump casing 52 by the yoke 55 against a gasket 58 and a perforated filter-supporting member 59, having a gauze filter 60, which fits against the lower end of the vertical passageway 51. Above the strainer 59 there is a vertical inlet 61 leading to a horizontal inlet 62 which is connected in any desired manner to the low-level gasoline supply tank on the automobile.

The modification of the invention shown in Fig. 5 is constructed the same as the form of the invention already described except that in this instance there is an annular gauze filter 63 fitting around the lower end of an inlet passageway 64 connected to a horizontal inlet 65 the same as the inlet 62. In this instance a plug 66 closes off the passageway 65 at the right of the vertical passageway 64, thus leaving an outlet passageway 67 communicating with a vertical passageway 68 above the gauze filter 63.

In the operation of my invention, referring first to Figs. 1 to 4, the end of the pump-operating lever 2 will be moved to the left, in Fig 1, by the engine cam to retract the diaphragm piston pump. This results in drawing into the pump chamber 28 fuel from the lower gasoline supply tank through the passageways 62 and 61,

perforated filter-support 59 and thence into the gascolator 53, after which the fuel will pass through the filter 60 and the passageways 51, 49 and 45 to the inlet valve 46 and thence into the pump chamber 28. There will thus be a decreased pressure produced in the passageway 49 and the auxiliary passageway 50 causing the return of any fuel which seeps past the piston rings 26 back to the passageway 49 and this action will at the same time supplement the force of the pump-spring 41 on the pump stroke which now takes place due to said spring 41, the end 2 of the lever being returned to its initial position by the follower spring 10. The fuel will thus be discharged through the outlet valve 34 into the vapor pressure dome 39 and thence by the outlet 40 to the engine carburetor.

It will be noted that in the pumping operations of the diaphragm 21 and the piston 25 the rings 26, which are loosely carried in the cylinder 28 between the clamping plate 27 and the piston 25, will accommodate themselves to the interior of the cylinder 28 without interfering with the guiding of the piston within said cylinder, the guiding being accomplished by the hollow guide member 30. This operation is facilitated by the fact that the stirrup 13 is capable of pivotal lateral movement with regard to the stem 19 during the actuation of the stem 19 by the lever 1.

While I have described my invention above in detail I wish it to be understood that many changes may be made therein without departing from the spirit of the same.

I claim:

1. A fuel pump having relatively movable parts forming a pump chamber, a first tubular member carried by and movable with one of said relatively movable members, a second tubular member surrounding and guiding said first tubular member and having unrestricted communication with the discharge opening from said pump, said pump having an outlet valve located in said first tubular member.

2. A pump comprising a housing formed with a pump chamber, a piston reciprocable in said chamber, a tubular member secured to and reciprocable with said piston, a tubular guide therefor, said guide freely communicating with the discharge opening from said pump, means to reciprocate said piston, a diaphragm centrally clamped to said piston and peripherally secured to said housing, inlet and outlet valves communicating with said chamber, said outlet valve being within said reciprocable tubular member, said housing having an inlet passage leading to the inlet valve, a compensating passage extending at right angles to said inlet passage and leading from said inlet passage to a space adjacent the periphery of said diaphragm whereby leakage around the piston is restored to the inlet passage and the force of the piston reciprocating means is augmented.

EDWARD A. ROCKWELL.