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FUEL PUMPING DEVICE

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2 Sheets-Sheet 1

Fig. 1.

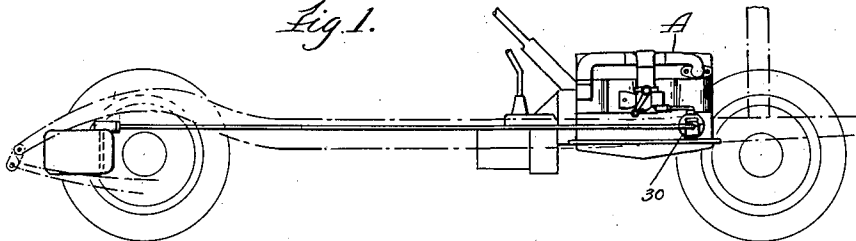


Fig. 2.

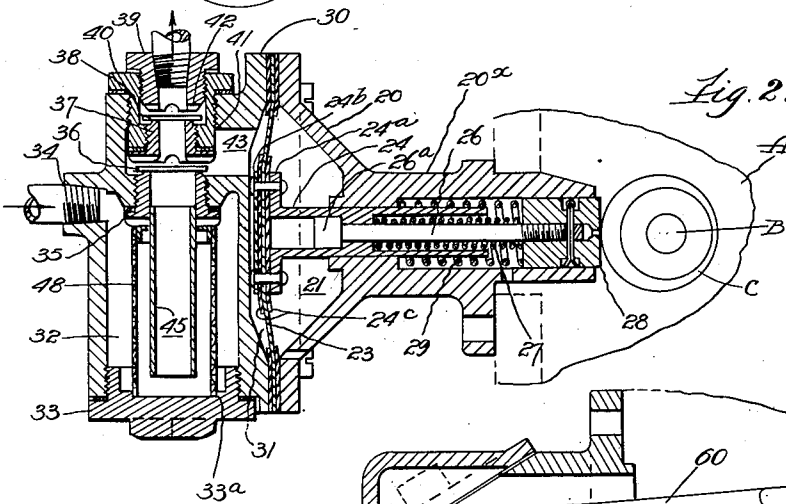
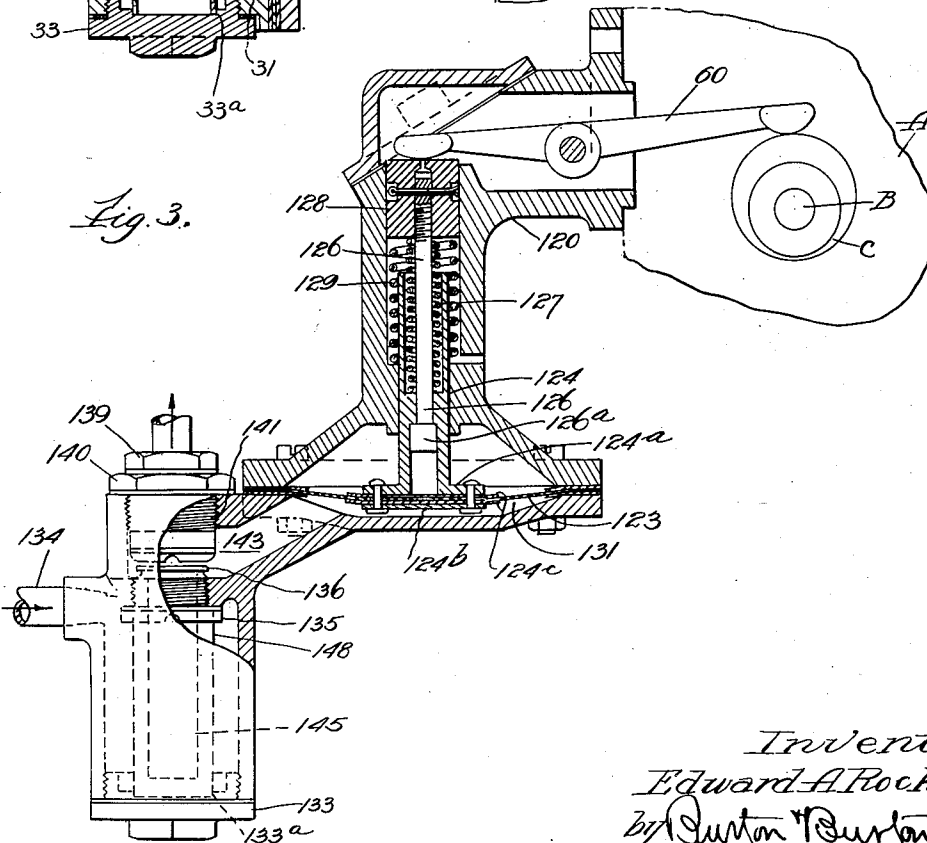


Fig. 3.



Witness my hand.

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UNITED STATES PATENT OFFICE

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FUEL PUMPING DEVICE

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3 Claims. (Cl. 103—38)

The purpose of this invention is to provide an improved construction of a pumping device for supplying fuel to the carburetor of an internal combustion engine from a fuel source located at a lower level than the carburetor. It consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:

10 Figure 1 is a diagrammatic view designed for showing the location of the pumping device relatively to the engine and fuel source.

15 Figure 2 is a sectional view of one form of pumping device, section being at the plane axial with respect to the pumping device and its connection with the engine.

Figure 3 is a view similar to Figure 2 showing a modified form of the pumping device.

20 Figure 4 is a view similar to Figure 2 showing a further modification.

Figure 5 is a section at the line 5—5 on Figure 4.

25 In the construction shown in the drawings, the engine is indicated at A, a shaft thereof by which the pumping device is operated is indicated at B, having the pump operating cam, C.

In the form shown in Figure 2, the pumping device comprises a casing consisting of two members, 20 and 30, which have mated recessed faces at which they are clamped together, clamping between them a flexible diaphragm, 23, which partitions from each other the recesses, 21 and 31, respectively, of the two casing members, said diaphragm constituting a movable wall member of the pumping chamber formed by the recess, 31, in the casing member, 30. In the casing member, 20, there are mounted the means for flexing the diaphragm, 23, alternately in opposite directions for alternately enlarging and reducing the pumping chamber, said means comprising a two-membered diaphragm stem, the member, 24, being positively attached to the diaphragm at the center thereof by means of the flange, 24^a, of said stem member, and a washer, 24^b, at the opposite side of the diaphragm between which flange and washer there are clamped onto the diaphragm at opposite sides thereof thin disks, 24^c, 24^c, which, occupying the central area of the diaphragm, limit its flexure to the annular area between the circumference of said disks and the annular margin of the mated faces of the casing members between which a peripheral margin of the diaphragm is clamped. The other stem member,

26, is telescoped in the stem member, 24, the latter being axially bored for accommodating the member, 26, and counterbored at the end toward the diaphragm for accommodating the head, 26^a, of said member, 26, and forming a shoulder for stopping said head to limit the extension of the two-membered stem.

The stem, 24, is counterbored from the opposite end to accommodate a coil spring, 27, coiled around the stem, 26, in said counterbore; and said stem, 26, is furnished at its outer end with a head and wear piece, 28, to accommodate which the stem, 20^x, of the casing member, 20, is counterbored to a diameter sufficiently in excess of the diameter of the stem, 24, to accommodate outside the latter stem and within said counterbore a second coil spring, 29, which reacts at one end against the shoulder formed by the counterbore, and at the other end against the head and wear piece, 28, of the stem member, 26, which is fitted in said counterbore of the casing stem, 26^x. Said head and wear piece, 28, is bored and threaded for screwing it onto the stem, 26, which is threaded to receive it, and the wear piece is thus adjustable to suit the springs and the range of lost motion desired. For safety against unscrewing the wear piece, it is counterbored to receive a cotter pin, 28^m, and to provide for varied adjustment of the wear piece on the stem, it is slotted from the end, as seen at 26^m, a sufficient distance to cover the range of adjustment. It will be understood that the cross bore and slot may be registered for admitting the cotter pin at each half turn of the wear piece in adjusting the latter. The head and wear piece, 28, protrudes from the casing stem, 20^x, for co-operation with the cam, C, on the engine shaft, B, which it will be understood operates for positively actuating the stem, 26, inwardly with respect to the casing member, 20, the spring, 29, reacting for thrusting said stem member in the opposite direction and causing the wear piece to follow the eccentric cam throughout the rotation of the latter. There is a vent 20' which is at the bottom of the part 20 protruding into the crank case, so as to form a breather for the reciprocating parts, and also to allow any oil which accumulates in the spring housing to return to the crank case. And it may be understood that this positive actuation of the stem member, 26, causes the head, 26^a, of said stem member to withdraw from the shoulder on the stem member, 24, thus releasing the latter so that it may yield to the reaction of the spring, 27, when and to the extent that the

engine consumption of fuel permits the diaphragm to have its feeding movement for maintaining the supply in the fuel line to the carbureter. And it will be seen that the reaction of the diaphragm for yieldingly actuating the diaphragm in the direction of its chamber-reducing movement for feeding the spring, 29, for thrusting the head, 28, of the stem member, 26, outwardly, constitutes the force for retracting the diaphragm in the direction of its chamber-enlarging movement for drawing in the fuel from the low level source.

The casing member, 30, contains a fuel receiving chamber, 32, which is cylindrical in form and having its lower end provided with a screwed-in closure member, 33, of full diameter of the chamber. At the upper part the fuel chamber, 30, is provided, as seen at 34, with connection for receiving fuel from the low level source, which, entering said fuel chamber at the upper part, descends to the bottom and fills up the chamber gradually at the bottom. From the upper end of the fuel chamber the casing member, 30, has an opening through the upper end wall of the chamber, 32, into an upper chamber, 41; and into said opening there is screwed from the lower side, that is, at the upper end of the fuel chamber, a fitting, 35, which affords at its upper end in the chamber, 41, a seat for a check valve, 36, opening upwardly, and stopped in its opening movement by the lower end of a fitting, 37, which at its upper end affords seat for an upwardly opening check valve, 38, which in turn is checked as to its upwardly opening movement by a bushing, 39, which is screwed into a bushing, 40, which in turn is screwed through the upper end wall of the chamber, 41, which thus intervenes between the upper end of the fuel receiving chamber to the top of the casing member, 30. This fitting, 40, it will be noticed serves for carrying at its lower end of the valve seat member, 37, and at its upper end the valve stopping bushing, 39. It will be understood that the lower ends of the valve seat member, 37, and bushing, 39, are radially notched as seen at 42 to prevent their lower ends becoming seats for the check valves, respectively, said check valves being thin disks diametered enough less than the cavities around the valve seat fittings in which they are lodged, to permit free flow of fuel around their peripheries for reaching the notches, 42, in the valve stopping ends of said valves, respectively. The casing member, 30, has a passage, 43, leading from the pumping chamber, 31, into the passage 41 at a point intermediate the check valves, 36 and 38. For conducting the fuel from the lower part of the fuel receiving chamber to the passage, 41, for passing the check valve, 36, on the way to the pumping chamber, there is provided a fuel duct member, 45, which is mounted in the lower end of the valve seat fitting, 35, and extends down within the fuel chamber, being open at its lower end in the lower part of the latter. Encompassing this fuel duct and partitioning it from the outer portion of the cavity of the fuel receiving chamber into which the fuel enters from the connection, 34, there is provided a cylindrical filtering screen, 48, which is diametered intermediately between the diameter of the fuel duct member, 45, and the interior of the fuel receiving chamber, and is adapted to be introduced through the lower end of the fuel receiving chamber before the closure member, 33, is applied, and is of such

length as to be stopped at its upper end against the top wall of the fuel chamber, or more specifically stated, against the lower end of a boss which protrudes slightly downwardly from the top wall of the closure member for mounting the valve fitting, 35, and at its lower end is stopped upon the closure member, 33, when the latter is screwed into place, said closure member having a central recess, 33^a, for receiving and centering the lower end of the filtering screen.

Upon considering this construction it may be understood that the chamber-enlarging stroke of the diaphragm, 23, operates for producing partial vacuum in the chambers and passages of the casing member, 30, and causing fuel to be lifted from the fuel source and discharged into the fuel receiving chamber, eventually filling that chamber and passing the check valve, 36, and the passage, 43, entering the pumping chamber, from which, on the chamber reducing stroke of the diaphragm, it is forced back through the passage, 43, and out through the valve seat fitting, 37, and past the check valve, 38, for supplying the carbureter. And it will be observed that in this movement the fuel drawn into the fuel receiving chamber must pass through the filtering screen, 48, before it can reach the check valve, 36, and the pumping chamber, and thereby the valves are protected against liability to be held imperfectly seated by solid matter which might be carried in the fuel stream, but for the interpositioning of the filtering member.

In the construction shown in Figure 3, corresponding parts are indicated by the same numerals as in Figure 2, with the prefix of the numeral "1". But in this form the casing members are adapted for positioning the pumping diaphragm horizontally instead of vertically as in the form of Figure 2, and the diaphragm stem derives its positive actuation not directly from the cam, C, but through a lever, 60, which is fulcrumed in the horizontally extending arm of the casing member, 120, having its outer extremity provided with a terminal, for co-operating with the cam, C.

In the modification shown in Figure 4, corresponding parts are indicated by the same numerals employed in Figure 2 with the prefix of the numeral "2". In this form the casing members, 220 and 230 are adapted for positioning the operating diaphragm 223 vertically, as in the form shown in Figure 2, and this form is differentiated from that of Figure 2 chiefly by the circumstance that the fuel receiving chamber is not formed integrally with the casing member, 230, but is formed by a cup member, 232, upwardly open and applied to the lower side of the overhanging portion of the casing member, 230, which is formed for seating the upper end of the cup thereon and for clamping between the two members the margin of a filtering bag, 248, within which the fuel duct member, 245, extends downwardly from its connection at its upper end with the overhanging arm of the casing member, 230, the clamping and securing of the margin of the filtering bag being by means of disks, 250, 251, respectively below and above said bag marginal area, and secured together by hollow rivets, 252, set through both the disks and the intervening margin of the filtering bag. In this form the connection for fuel flow to the receiving chamber is made at the upper side of the overhanging portion of the casing member, 230, as seen at 234, the passage from said con-

nection leading down into a portion of the fuel receiving chamber formed by an annular recess, 255, in the under side of the overhanging portion of the casing member, 230, from which chamber formed by said annular recess the fuel passes through the hollow rivets, 250, 251, into the lower portion of the fuel receiving chamber formed by the sediment cup, where it arrives outside the filtering bag through which it must pass to obtain passage through the lower end of the fuel duct, 245, from the upper end of which it passes by a horizontal passage, 257, in the casing member, 230, to the lower end of the passage, 241, in which there are provided valve seat fittings for the check valves, 236 and 238, corresponding to the valves, 36 and 38, of the form shown in Figure 2. The detail differences in the provisions for mounting these check valve fittings and valve stop members in the form shown in Figure 4 from the form shown in Figure 2 will be fully understood from the drawings without further description, being merely such as dictated to the mechanic by the slight differences in the arrangement of the parts.

I claim:

1. An impulse liquid feeding device comprising an impulser arranged for a variable stroke, a housing in which the impulser is mounted, a two-membered stem for the impulser, said two members being telescopically associated for movement relative to each other affording lost motion between them in the actuation of the impulser for variable stroke, and having co-operating stops for limiting said lost-motion, the outer telescoped stem member being apertured from end to end for admitting the inner-telescoped member in the direction for encounter of said stops with each other, the inner telescoped member being dimensioned for extending through and protruding from the outer-telescoped member, and housing being formed for affording slide and guide bearing for said outer-telescoped member, and being counterbored from the end remote from the impulser forming a stop shoulder around said outer-telescoped member, a stop detachably secured on the protruding end of the inner-telescoped member dimensioned for slide fit in said counterbore, a spring lodged in the counterbore reacting between said stop shoulder and said end stop, and a second spring reacting to hold said outer telescoped member in stopped relation with said inner telescoped member, the outer-telescoped stem member being counterbored from the end remote from the impulser forming a stop shoulder facing the stop carried by the end of the inner-telescoped member, and said second spring being coiled around

said inner-telescoped member and reacting between said shoulder and said stop.

2. In a fuel pump, a casing having a pumping chamber therein, a flexible diaphragm forming a movable wall of said pumping chamber, a member attached to the central portion of said diaphragm, said casing forming a guide bearing for reciprocable movement of said member, a second member telescoped within said first member and protruding outwardly therefrom, said members having cooperating stop faces for limiting relative extension, said second member including a thrust receiving outer end portion, said casing forming a guide bearing for said end portion, a compression spring received within said casing encompassing said second member and reacting between said casing and said end portion in a direction for producing a suction stroke of said diaphragm through movement of both of said members, means adapted to engage said outer portion of said second member to thrust said second member inward and compress said spring, and a second compression spring tending to maintain said first member in stopped engagement with said second member for resiliently producing a variable discharge stroke of said diaphragm during the inward stroke of said second member.

3. In a fuel pump, a casing having a pumping chamber therein, a flexible diaphragm forming a movable wall of said pumping chamber, said casing having a guide bearing portion concentric with said diaphragm, a sleeve member attached to the central portion of said diaphragm and guided for reciprocable movement by said guide bearing portion of said casing, a stem member telescoped within said sleeve member and protruding outwardly therefrom, said members having cooperating stop faces for limiting relative extension, said stem member having an enlarged outer end thrust receiving portion guided for reciprocable movement by said guide bearing portion of said casing, a compression spring received within said guide bearing portion of said casing and reacting between said casing and said enlarged outer end portion of said second member for producing a suction stroke of said diaphragm through movement of both of said members, means for inwardly thrusting said second member to compress said spring, and a second compression spring reacting between said sleeve member and said stem member tending to hold said members in stopped engagement for resiliently producing a variable discharge stroke of said diaphragm during the inward stroke of said second member.

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