

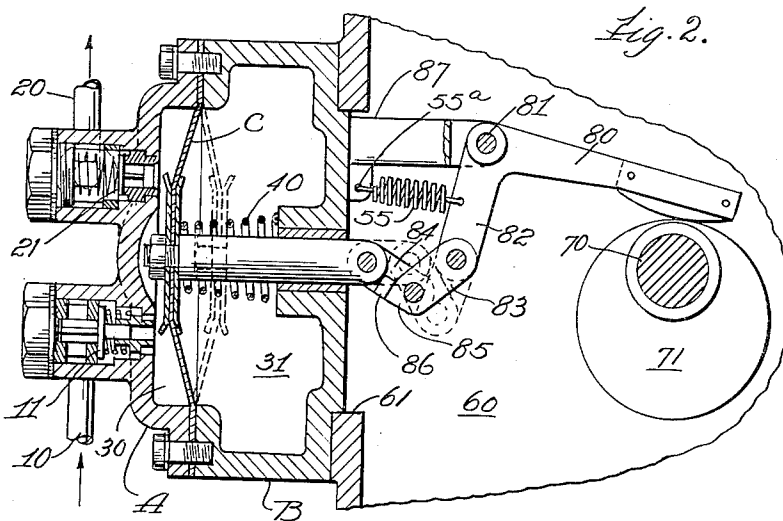
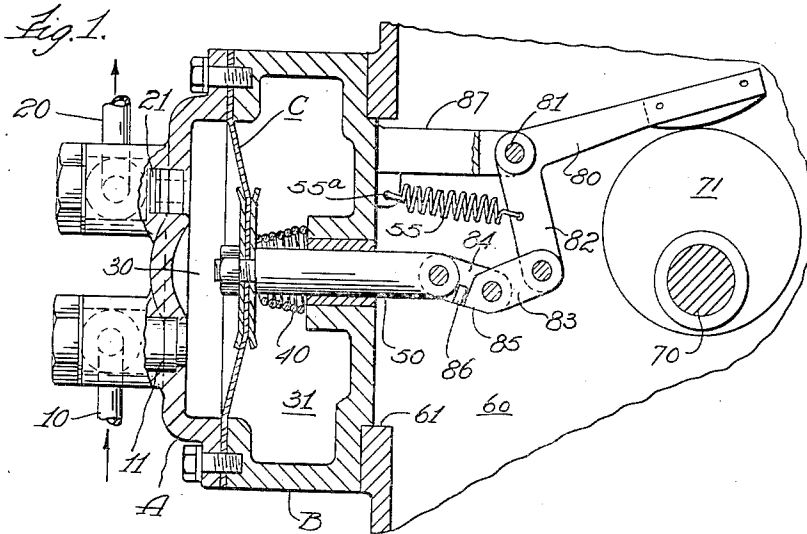
May 19, 1931.

W. H. SCHULZE

1,806,268

FUEL PUMP

Filed March 8, 1929



Witness  
H. C. McHugh

Inventor  
William H. Schulze.  
By *Burton & Burton*  
his Attorneys

## UNITED STATES PATENT OFFICE

WILLIAM H. SCHULZE, OF CHICAGO, ILLINOIS, ASSIGNOR TO STEWART-WARNER CORPORATION, OF CHICAGO, ILLINOIS, A CORPORATION OF VIRGINIA

## FUEL PUMP

Application filed March 8, 1929. Serial No. 345,396.

The purpose of this invention is to provide a pumping device adapted to be mounted on the crank case of an engine to be served by it for supplying fuel to the engine carbureter from a fuel source at a lower level than the carbureter or the pumping device.

The specific purpose with respect to which the device is designed in detail, is to make the device in its entirety compact in form and without exposing moving parts, and having said movable parts suitable for deriving pumping movement from an engine cam with which the structure co-operates in such a manner that the cam cycle has an active and an idle phase, and the pumping member of the pumping device derives its intake stroke positively from the cam in the active phase of the cam cycle, and derives its feeding stroke in the idle phase of the cam cycle from the reaction of a spring which is conditioned for such reaction by the cam in its active phase simultaneously with the communication of the intake stroke.

And in this mode of operation it is a further specific purpose of the invention to arrange for the part which is actuated by the cam in the active phase of the cam cycle to follow the cam in the idle phase so as to avoid the annoying and harmful impact of the cam on the actuated part by the recurrence of the intake phase, and to make this possible by provision for lost motion between the positively actuated part and the pumping member in the movement of the former for following the cam in the idle phase of the cam cycle. The invention consists in the elements and features of construction shown and described as indicated in the claims.

In the drawings:

Figure 1 is a vertical section of a structure embodying one form of the invention showing the moving parts at the position occupied at the end of the fuel intake stroke of the pumping member.

Figure 2 is a similar view showing said parts at the position occupied at the end of a full feeding stroke.

Referring to the drawings the structure shown comprises two casing members, A and B having clamped between them a flexible diaphragm, C, partitioning recesses, 30 and 31, in the mated faces of said members, respectively, of which the recess, 30, thus becomes the pumping chamber with the diaphragm constituting a wall member movable for enlarging and reducing the chamber for its pumping action. The casing member, A, has fuel inflow connection, indicated at 10, controlled by a valve 11, and fuel discharge connection indicated at 20, controlled by a valve, 21. The casing member, B, at the end opposite that at which the diaphragm is clamped, is flat for mounting at and closing an aperture, 61, in the engine casing indicated at 60, the diaphragm operating stem, 50, being extended through and obtaining guide bearing in the flat portion of the wall of the casing member, B, which is registered with and closes the aperture, 61. Said registered portion of the wall of said casing member, B, carries a bracket, 87, which projects into the cavity of the engine casing and supports, as seen at 81, the fulcrum of a bell crank lever, 80, one arm of which is extended for actuation by the engine cam, 71, while the other arm, 82, is connected by a pair of toggle links, 83 and 84, with the diaphragm stem, 50, said links being provided with co-operating stops, 85 and 86, limiting their approach to alignment in the movement communicated by the bell crank lever upon its movement in the active phase of the cam, so that in said active phase the diaphragm is retracted against the reaction of the spring, 40, for the intake stroke of the diaphragm.

For causing the cam-actuated lever to follow the cam in the idle phase of the cam cycle, there is provided a stretched spring, 55, connected at one end to the arm, 82, of the bell crank lever, and at the other end to the casing member, B, as indicated at 55<sup>a</sup>. And it will be seen that the movement of the lever in thus following the cam in the idle phase is accommodated by the toggle links which in this movement of the lever are folded together, withdrawing their stops from each

other and thus avoiding communicating movement to the diaphragm from the movement of the lever in thus following the cam.

Upon consideration of the structure it will be recognized that the provision which permits the lever to follow the cam in its idle phase constitutes a lost motion connection between the diaphragm and the cam-actuated lever which allows the diaphragm to receive from the spring, 40, feeding movement greater or less, according to the engine requirements, which are thus supplied under substantially uniform pressure exerted by the reaction of the spring, 40.

It may also be noted that the form of the pump casing member, B, terminating with the flat wall closes the aperture in the engine casing, and which carries on the outer side in position for being entered into the engine casing all the operating connections by which the pumping member derives actuation from the engine cam, so that no space is required for these connections or for their movements within the pump casing, and thus permits the pump casing to be limited in size to the dimension necessary to accommodate the diaphragm and its movement and the spring for giving it its feeding stroke.

I claim:

1. A pumping device adapted for mounting on an engine casing for protruding thereinto an operating element to be actuated by an engine cam, said pumping device comprising a casing having a pumping chamber and a pumping member therein with an operating stem protruding from the casing at the side thereof arranged for mounting on the engine casing at an aperture in the latter; operating connections for said stem carried by the pump casing on the outer side of said casing within the area registered with the engine casing aperture, said connections comprising a lever fulcrumed on the pump casing and having operating connections with the pumping member stem, said connections consisting of a pair of toggle links pivotally connected respectively to said stem and said lever and pivoted together and having co-operating stops arranged for encounter to stop the relative pivotal movement of the links in the direction for aligning all their pivots, with the pivot-in-common out of such alignment, said links being free for relative pivotal movement in the direction for folding them together.

2. A pumping device arranged to be mounted on an engine casing for protruding thereinto an operating element to be actuated by an engine element, comprising a pump casing containing a pumping chamber and a pumping member therein having a reciprocating stem journaled in and protruding from the casing at a side thereof ar-

anged for mounting on the engine casing at an aperture in the latter, the casing wall at the side thus mounted and in which said stem is journaled being substantially closed over the entire area thereof which is registered with the engine casing aperture for mounting flat against the engine casing, connections for operating the pumping member stem carried by said flat wall of the pump casing at said registered area, said connections being wholly within the engine casing and comprising a lever arranged for co-operation with an engine cam for positive actuation in one phase of the cam cycle and free from such actuation in another phase of the cam cycle.

3. A pumping apparatus comprising a pump casing, a reciprocating pumping member therein having an operating stem protruding from the casing, actuating means for said stem comprising a lever and operating connections with the stem, said lever being mounted on the casing exteriorly thereof, said pump casing being arranged for mounting on an engine casing at an aperture in the latter, the stem actuating means being arranged for protruding into the engine casing through the aperture thereof for co-operation of said actuating means with an engine cam; the operating connections comprising a pair of toggle links pivoted together having co-operating stops arranged for connection to stop their relative movement in the direction for aligning them, with their pivot-in-common out of alignment with their end pivots, said links being free for relative pivotal movement in the direction for folding them together.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 4 day of March, 1929.

WILLIAM H. SCHULZE.