

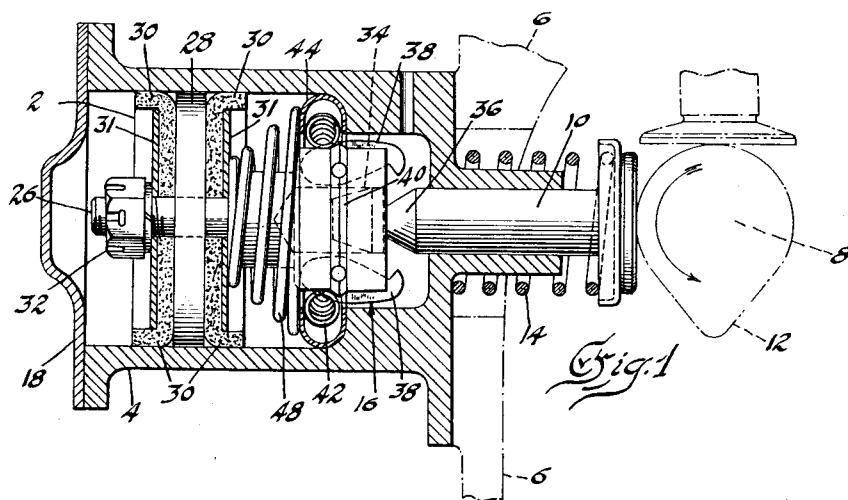
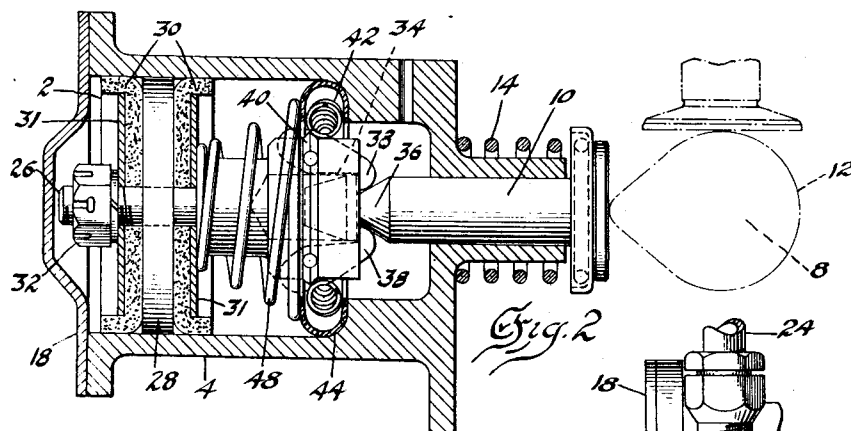
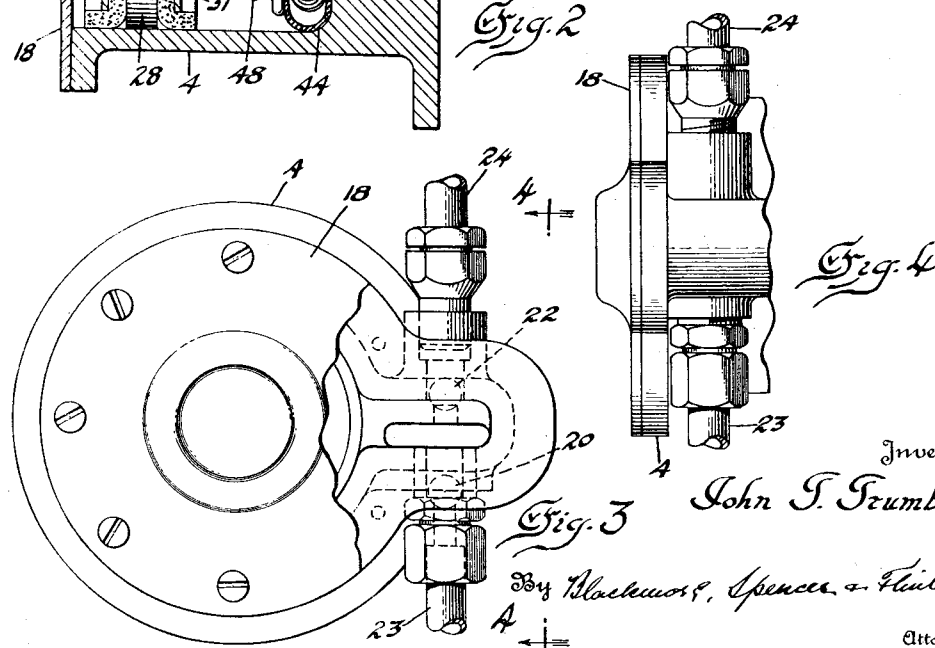
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FUEL PUMP

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FUEL PUMP

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This invention consists of a fuel pump particularly designed for use in supplying gasoline from the main tank of an automobile to the auxiliary reservoir constituted by the float bowl of the conventional carburetor. As is well known when the gasoline in the bowl reaches a certain level a float controlled valve is operated to cut off the fuel supply. When this takes place it is essential that the system shall not be subjected to excessive pump pressure in order to prevent injury to the pipe connections or flooding of the carburetor by the forcing of the float controlled valve.

Many attempts have been made to prevent the building up of excessive pump pressures. Thus pressure operated by-passes have been provided to carry excess fuel back to the intake side of the pump. Resilient devices have been interposed between the pump and the fuel so that when the carburetor has been fully supplied with fuel subsequent strokes of the pump effect only idle compression and expansion of the resilient devices. Again it has been proposed to provide a pump which is positively actuated on the suction stroke and spring actuated on the discharge stroke, the power stored in the spring when fully compressed being the maximum pressure which can be exerted upon the fluid and the spring being so selected that this maximum is within safe limits. My pump belongs to this latter class. While it is especially designed for use in fuel supply systems of internal combustion engines it is obvious that it is of utility in many other pumping systems and for the handling of various fluids. My pump is distinguished by the fact that I have provided means controlled by the pressure of the fluid in the system, that is, the gasoline in the float bowl and connecting piping, to control the connection of an actuating member with the pump member on the suction stroke. The specific means which I have used consists of clutch devices carried by the pump member and automatically caused to clutch or unclutch the actuating member in accordance with the position of the pump member, which, in turn, depends upon the pressure on the discharge side of the pump. Thus from another point of view my invention consists

broadly in a pump member, an actuating member, and a connection between them which is dependent upon the position of one of the members.

Specifically, my invention consists of a piston operating in a cylinder and carrying clutch devices for engagement with a constantly reciprocated plunger preferably actuated by one of the cams on the usual cam shaft. A spring is provided for effecting the discharge stroke of the piston and the construction is such that at the end of the discharge stroke the clutch devices may be caused to engage the plunger, which then effects the suction stroke of the piston, at the end of which the clutch devices are automatically disengaged and the spring exerts pressure on the piston to effect the discharge of fluid. In case the carburetor float is in position to shut off the entrance of fuel the actuating spring merely remains under tension ready to effect pumping action when the fuel level becomes lowered.

In this manner fuel is supplied as needed and when the requirements of the carburetor have been temporarily supplied the device consumes no energy other than that absorbed by the idle movement of the plunger.

In the drawings:

Figure 1 is a sectional view through my improved fuel pump.

Figure 2 is a view corresponding to Figure 1 showing the parts in another position.

Figure 3 is an end elevation of the pump.

Figure 4 is a view taken on line 4—4 of Figure 3.

My illustrated pump consists essentially of a reciprocable pumping member in the form of a piston 2 operating in a cylinder 4 which, for convenience, may be secured to the crankcase indicated at 6 in proximity to the usual cam shaft 8; an actuating member consisting of a plunger 10 yieldingly forced out against a cam 12 on the cam shaft by means of a spring 14 having a fixed abutment; and a clutch device indicated at 16 for connecting the piston and the plunger in the manner to be described.

The outer end of the cylinder 4 is closed by means of a plate 18 and this end of the

cylinder constitutes a pump chamber and is shown provided with conventional intake and discharge valves indicated at 20 and 22, respectively. In the application of my pump to automobile fuel feeding systems, the intake pipe 23 is connected to the usual gasoline tank, customarily mounted at the rear of the vehicle, and the discharge pipe 24 is connected to the usual carburetor float bowl (not shown) in which a float operates a valve to prevent the admission of fuel to the chamber when the liquid level reaches a certain height.

The illustrated piston of my pump consists of a stem 26 carrying a head 28 on either side of which are arranged washers 30 and disks 31 clamped to the stem by any suitable means such as a nut 32. The opposite end of the stem of the yieldable and reciprocable piston is of enlarged diameter and is shown as bored as at 34 to receive the inner end of the plunger 10. Conditionally to effect a tension-transmitting connection between said piston and said plunger, the mentioned inner end of the plunger is formed with an annular groove 36 providing shoulder portions for engagement by dogs 38 pivoted to the enlarged portion of the stem 26 of the piston. To give the dogs 38, a snap action, this portion of the piston is also provided with an annular cam 40 for cooperation with an annular coil spring 42 arranged within housing 44 secured in the pump cylinder. A spring 48 is provided to effect the discharge movement of the pump, one end of the spring abutting against the housing 44 and the other end abutting against the head of the piston.

The operation of the device is apparent from the examination of Figures 1 and 2. With the piston and plunger each at the outer end of its stroke as shown in Figure 2, and only the outward limit of movement of the latter being invariable, cam 40 is at the left of spring 42 and consequently the spring acts to depress the dogs 38 into engagement with the groove 36 in the plunger 10 thereby so connecting the piston and the plunger as to provide a tension-transmitting connection therebetween. Upon further movement of the cam shaft the spring 14 operates to move the plunger 10 and the piston 2 to the right as viewed in Figure 2. This intake movement continues until piston 2 has moved to such an extent that the spring 42 passes over the high point of the annular cam,—40 whereupon said spring operates with a snap action to withdraw the dogs completely from engagement with the plunger. Should the cam 12 again depress the plunger 10 prior to the completion of the described movement of the pump member the inclined wall of the notch 36 will cam the dogs 38 out of engagement with the notch and they will ride along the surface of the

plunger until the succeeding stroke of the plunger whereupon they will again engage in the notches until some intake stroke of the piston is completed.

It is apparent that with this construction a variable delivery stroke of the pump is effected by the spring 48 which is of insufficient pressure to force the float valve of the carburetor and cause flooding. When the level of fuel in the float bowl becomes low the spring 48, this being a resilient means entirely distinct from plunger 10, continues its delivery action, and whenever the piston reaches substantially the end of its stroke the clutch device 16 comes into play to again place the spring 48 under tension to effect a continuation of the pumping action. The tendency of spring 14 may be partially offset by low pressure in the pump chamber; but this pump requires no expenditure of energy other than that required for the idle movement of the plunger except when there is an actual demand for fuel. The suction stroke of the pump is conditionally effected by resilient means in the form of the spring 14 entirely distinct from the pump member and consequently the movement is not as abrupt as it would be were the plunger positively moved on its effective stroke. It is also to be noted that the snap-acting clutch device is unaffected by rotation of piston or plunger about their axes.

It is obvious that if desired a diaphragm may be substituted for the piston, the operation in such event being in nowise altered. The pump is also characterized by few parts, and simplicity of design, and is readily applicable to automobile motors as now constructed. In all of the illustrated embodiments of this invention, it will be seen that expulsion strokes are conditionally effected by resilient means, the length of stroke depending upon the extent to which the pumping element may be depressed by pressure within the pump chamber, that intake strokes are effected by resilient means and through thrust-refusing means which are provided with snap-acting clutch means making the transmission of tension there-through dependent upon pressure conditions in a delivery line, conditionally to compel substantial equality of reciprocation.

I claim:

1. In a fluid pumping system, the combination of: a reciprocable and yieldable pumping member; a reciprocatory actuating member; and means therebetween, controlled by the pressure of the pumped fluid, for clutching one of said members to the other for continued and equal intake movement.

2. In a fuel pumping system, the combination of: a reciprocable and yieldable pumping member; a reciprocatory actuating member; and means therebetween, controlled by

the pressure of the pumped fluid, for clutching one of said members to the other for movement therewith,—said clutching means including means, controlled by the position to which said pumping member may be depressed, for effecting either a disconnection or a tension-transmitting connection with the actuating member.

3. In a fluid pumping system, the combination of: a reciprocable and yieldable pumping member; a reciprocatory actuating member; means for clutching one of said members to the other; and means, controlled by the depression of said first named member, for disconnecting said members.

4. In a fluid pumping system, the combination of: a reciprocable and yieldable pumping member; a reciprocatory actuating member; and thrust-refusing clutch means, controlled by the position to which the pumping member may be depressed by pressure, for so connecting said members as to keep them together,—imparting equal strokes from said actuating member so long as said members remain connected.

5. In a fluid pumping system, the combination of: a pumping member; a reciprocatory member adapted conditionally to reciprocate the pumping member; means for clutching one of said member to the other; and means, controlled by the position of the pumping member, for completely disconnecting the pumping member from the actuating member, said clutching means being capable of transmitting tension but substantially incapable of transmitting thrust between said actuating member and said pumping member.

6. In a fluid pumping system, the combination of: a pumping member; a reciprocatory actuating member, and snap means, controlled by the position to which the pumping member may yield under pressure, for so clutching one of said members to the other as conditionally to compel equality of reciprocation.

7. In a fluid circulating system, the combination of: a reciprocatory pumping member; means for moving the pumping member in one direction; and means for conditionally moving the pumping member in the opposite direction, said last named means including a clutch device controlled in accordance with the pressure of the fluid being pumped, and provided with snap means for alternatively effecting a tension-transmitting connection and a complete disconnection.

8. In a fluid circulating system, the combination of: a reciprocatory pumping member; a reciprocating actuating member; and snap-acting means controlled by the pressure of the fluid in the system for clutching one of said members to the other for combined movement of reciprocation.

9. A combination as defined in claim 8, in

which said snap-acting means is controlled by the position to which the pumping member may yield under pressure.

10. A pump comprising: a pump chamber having inlet and outlet ports, a pumping member in the chamber; resilient means for urging the pumping member in one direction; a constantly reciprocated actuating member; and snap means, controlled by the pressure on the discharge side of said pump, for conditionally transmitting reciprocating motion from one of said members to the other.

11. A combination as defined in claim 10, said last-named means being carried by said pumping member and actuated to operatively engage, and alternatively to completely disengage, said reciprocated actuating member.

12. The combination of: a pumping member; an actuating member; snap-acting clutch means carried by one of said members and adapted completely to disengage and alternatively to engage the other member; and means for actuating the said clutch means, the operation of said last-named means being dependent upon the position of the pumping member.

13. In a fluid pumping system, the combination of: a pump chamber having intake and discharge ports; a pumping member in the chamber, means for yieldingly urging the pumping member in one direction; a plunger; means for yieldingly urging the plunger in one direction; means for positively urging the plunger in the opposite direction; and means, controlled by the pressure of the fluid of the system, for connecting the pumping member and plunger for longitudinal movement in the direction in which the said plunger is yieldingly urged.

14. A pump comprising: a pump cylinder member having an inlet and an outlet; a pumping member in the cylinder; means for resiliently urging the pumping member in one direction; a plunger, the cylinder member being bored to receive and guide the plunger; means for reciprocating the plunger; and conditionally operative thrust-refusing means for connecting the plunger and the pumping member to effect, by a transmission of tension therebetween, movement of the pumping member in a direction opposite to that in which it is resiliently urged.

15. The combination as defined in claim 14, said conditionally operative means comprising dogs carried by the pumping member, and spring devices adapted to actuate said dogs to cause them to grip and to release the plunger in accordance with the position of the pumping member, said plunger being provided with an annular groove for engagement by said dogs.

16. The combination as defined in claim 14, said clutch means comprising dogs car-

ried by the pumping member, and spring devices adapted to actuate said dogs to cause them to grip and to release the plunger in accordance with the position of the pumping member.

17. In a pumping system, the combination of: a pumping member; yielding means, distinct from said pumping member, for effecting the discharge stroke of the pumping member; and thrust-refusing means, also distinct from said pumping member, intermittently operable at the same predetermined position of the pumping member to effect a complete intake stroke thereof.

18. The combination as defined in claim 17, each of said means including a spring, the spring associated with said intermittently operable member being stronger than the spring associated with the pumping member and being arranged to overcome the effect of the latter during the intake stroke.

19. In a pumping system, the combination of: a pumping member; means distinct from said pumping member, for yieldingly effecting the intake stroke of the pumping member; and means also distinct from said pumping member and coaxial therewith, for yieldingly effecting the discharge stroke of the pumping member, each of said means including a compression spring which has a fixed abutment relative to said pumping member.

20. In a fuel pump: a pumping element reciprocable in a pump chamber; resilient means, distinct therefrom, to effect expulsion strokes of said pumping element; an actuating element having a substantially invariable limit of thrust; and means including a compression spring which has a fixed abutment relative to said pumping element, for conditionally imparting intake strokes from said actuating element to said pumping element.

In testimony whereof I affix my signature.

JOHN T. TRUMBLE.