Sept. 21, 1937. E. C. HORTON 2,093,981

FUEL FEEDING SYSTEM

Filed Aug. 30, 1935

Fig. 1.

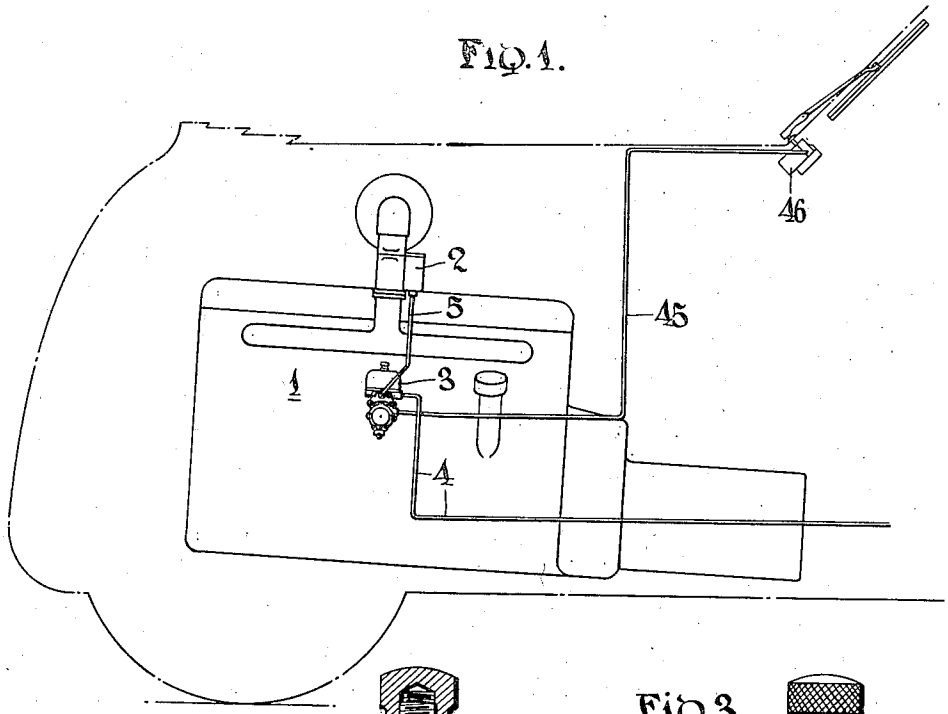


Fig. 2.

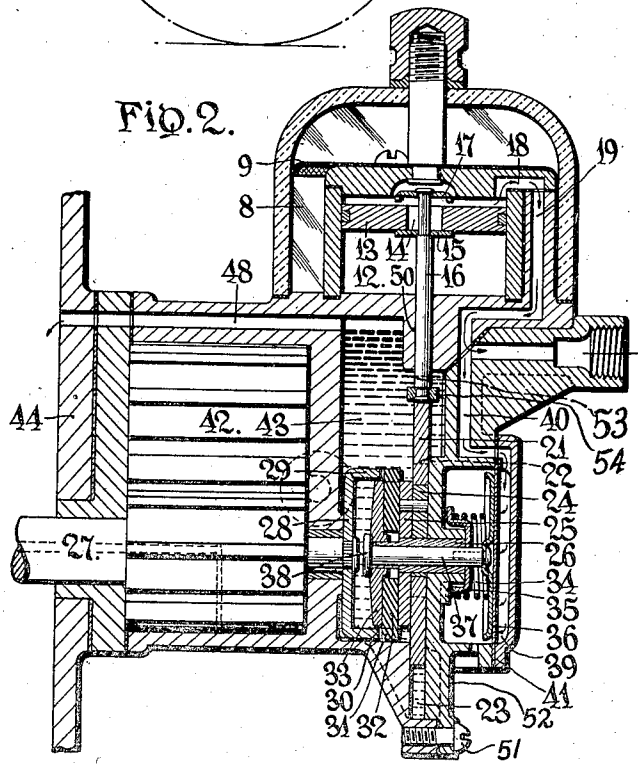
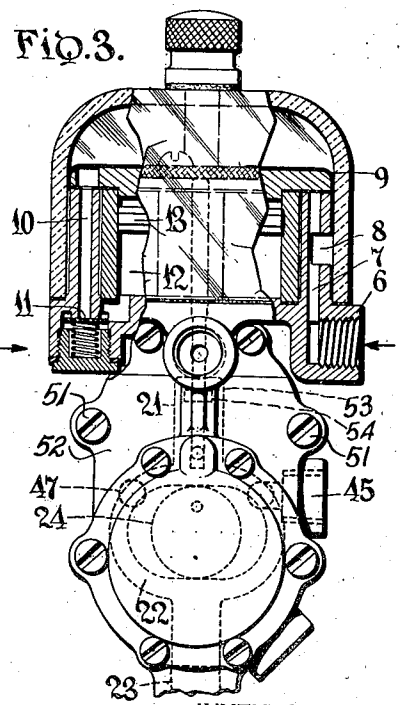


Fig. 3.



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FUEL FEEDING SYSTEM

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6 Claims. (Cl. 103—23)

This invention relates to a motor vehicle power plant and primarily to the fuel feeding system thereof.

Fuel pumps now in use are quite generally driven from the cam shaft of the engine, the piston being urged toward the driving cam by a spring which tends to keep the piston disposed within the path of the cam to be more or less driven constantly by the latter with a resultant tapping noise when the piston stroke is shortened due to the pump output exceeding the engine requirements.

The present invention has for its object to provide a fuel feeding system which is efficient and quiet in operation. More specifically, the invention embodies means for providing more or less slippage in the pump drive as the pressure on the fuel at the outlet side of the pump exceeds or approaches a substantially predetermined degree, such as that which is requisite to meet the demands of the engine.

In the drawing

Fig. 1 is a diagrammatic showing of a portion of a motor vehicle power plant embodying the present invention;

Fig. 2 is a sectional view through the fuel pump; and

Fig. 3 is another view of the pump, partly in section, and depicting the same as viewed at right angles to the plane of the section of Fig. 2.

Referring more particularly to the drawing, the numeral 1 designates the motor vehicle engine having a carburetor 2, a fuel pump 3 which intakes fuel from a supply tank (not shown) through a pipe 4 and delivers it to the carburetor through pipe 5. The inlet pipe 4 is connected to the pump by a nipple 6 which latter opens through the inlet port 7 into the sediment chamber 8, a strainer 9 serving to remove foreign particles from the fuel. From the sediment chamber the fuel passes through a duct 10 past the inlet valve 11 into the chamber 12 at the inlet side of the pump plunger 13. According to the illustrated embodiment, the pump outlet is at the opposite side of the plunger and the fuel is transferred about the latter as through a by-pass opening 14. A valve 15 closes the by-pass 14 on the upward stroke of the plunger and opens it on the downward stroke. The valve may be mounted on the plunger rod 16 on which latter the plunger is slidable between a stop member 17 and the valve. Because of this play mounting of the plunger, it will be apparent that as the pump rod 16 is moved downwardly the valve 15 will uncover the by-pass 14 to permit the fuel transfer from the lower side of the plunger to the upper side thereof, and on the reverse stroke, the valve 15 will initially close the by-pass 14 and then follow with the plunger as the latter expels the fuel through the outlet port 18. The outlet port is connected by the pipe 5 to the carburetor 2 and a one way check valve (not shown) may be provided therein, if desired.

For operating the pump the plunger rod may be connected to the vertically sliding cross head 21 having a transverse bearing 22 and being guided at the lower end in a well 23. In the transverse bearing is disposed a cam 24 which is fixed to a driven disk 25 on the driven shaft 26, the driven disk being one of the clutching elements of a frictional clutch utilized to connect the driven shaft 26 to the driving shaft 27. The driving shaft may be one of the shafts of the engine, or it may be geared thereto in a suitable manner. Fixed on the driving shaft is a yoke 28 which has outturned arms 29 notched, as at 30, to receive lugs 31 formed on the periphery of the driving disk 32 and thereby provide a play connection permitting proper operation of the clutch. The driving disk has facial contact with the driven disk 25 against which it is urged by a cooperating driven disk 33 disposed at the opposite side of the driving disk. The cooperating disk is slidable on the reduced extension of the driven shaft 26, and a spring 34 urges such disk against the driving disk 32 so as to hold the clutch operative for connecting the pump to the driving shaft. The spring may be seated on a plate 35 and exert outward pressure against a plate 36 to which the cooperating disk 33 is connected by a stem 37 that is slidable through a bore in the shaft 26. A flanged head at 38 on the stem 37 overhangs the cooperating disk 33 so as to have pressing contact therewith without necessarily revolving therewith.

Means are provided for automatically unclutching the pump from the drive shaft 27 when the pump output tends to exceed the requirements of the carburetor. For this purpose there is provided a pressure chamber 39 which has communication with the outlet passage 19 of the pump by means of a branch passage 40. The pressure chamber is provided with a movable wall in the form of a diaphragm 41 which is connected to or bears upon the plate 36 and when the pressure on the fuel at the outlet side of the pump reaches a predetermined degree it will be transmitted to the wall 41 for moving the same against the action of spring 34, which is of predetermined strength, and thereby tending to remove the clutching pressure of the cooperating disk 33 from the driving disk 32. Consequently the driving shaft will slip with respect to the driving disk 32 and will reduce the propelling influence on the pump plunger.

As the carburetor requires more fuel, the fluid pressure on the wall 41 will obviously lower so that the spring 34 may again function to clutch the pump to its drive.

If desired, a vacuum pump 42 of the gear type may be interposed between the clutch chamber 43 and the crank case 44, the inlet side of such suction pump being connected by a conduit 45 to any suitable suction operated accessory 46. The gears of the pump are preferably sealed in their contact with each other by a film of oil entering along the shaft 27, or otherwise, and being delivered with the air through the outlet 47 into the clutch chamber 43 from which the oil may return to the crank case through passage 48. It is preferable to have this return passage 48 high enough to retain a quantity of oil in the clutch chamber sufficient to submerge the lower end of the bearing 50 through which the plunger rod 16 slides. This not only maintains the clutch immersed in the lubricant but also avoids the necessity of a stuffing box thereabout, since any tendency of the fuel to pass through the bearing 50 will be resisted by the oil in chamber 43.

In operation the pump will normally be driven by the drive shaft to supply the requirements of the carburetor and engine, and as soon as these requirements are met and there is a tendency to exceed such requirements, the pressure built up in the outlet passage will be transmitted to the wall 41 and act thereon to permit slippage between the plunger rod and the driving shaft. When the fuel supply in the carburetor is to be replenished the driving connection will be reestablished in accordance with the pressure responsive control provided.

Under excessive and momentary pressure the drive may become completely unclutched from the pump and the latter may remain at rest, but usually under normal pressure the clutch is partially operative and the driven disks will drag and slip on the driving disk to drive the plunger with a slower stroke and entirely free of any tapping noise.

The construction of the assembly is such that the parts are made readily accessible for repair and replacement. For instance, the pressure chamber 39 together with the wall 41, its connected stem 37 and the mounting for the latter are removable as a unit by loosening the several screws 51 and lifting out the housing section 52. Removal of this section 52 opens the guideway or well 23 and uncouples the driving disc lugs 31 from the notches 30 of the yoke 28. Likewise the yoke-like upper end 53 of the vertically sliding cross head 21 disengages itself laterally from the disc or shoulder 54 on the lower end of the pump rod 16. This construction provides for ready detachment of the transmission unit from its drive 28 and its driven part 16 so that the unit may readily be inspected or replaced as occasion may arise.

While the foregoing construction has been given in detail for clearness, it will be understood that the disclosure is merely illustrative of the inventive concept involved, which may be applied to changes in construction and arrangement necessary to meet practical requirements without departing from the scope and spirit of the invention claimed.

What is claimed is:

1. A fluid pump having inlet and outlet passages, means for driving the pump, a clutch between the pump and its driving means, comprising contacting drive and driven members, a clutch chamber in which the clutch is disposed, means for maintaining a quantity of oil in the chamber sufficient to lubricate the clutch, a pressure chamber connected to the outlet passage and having a movable wall responsive to changes in pressure on the fuel in the outlet passage, and means connecting the movable wall to the clutch for permitting relative movement of said drive and driven members when the pressure on the fuel in the outlet passage tends to exceed a predetermined degree, such pump embodying a plunger, and a plunger rod extending through a bearing into the clutch chamber for being driven by the clutch, such bearing extending below the oil level in such chamber.

2. A fuel pump having a plunger and plunger rod, a drive therefor, a clutch connecting the drive to the pump, a clutch chamber in which the clutch is disposed, and means for maintaining a quantity of oil in the chamber at a level sufficient to maintain the clutch in a bath of oil, and the plunger rod extending through a bearing in the clutch chamber at a point submerged in the oil bath.

3. A pump having a chamber and a fluid displacing member movable therein, a rod slidable in a bearing formed in the wall of said chamber for operating said fluid displacing member, a drive for the rod, a clutch connecting the drive to the rod, a clutch chamber enclosing the clutch and into which the bearing from the pump opens in a downward direction, and means for maintaining a quantity of oil in the clutch chamber at a level above the lower end of the bearing whereby such bearing will be submerged in the bath of oil.

4. A pump having a chamber and a fluid displacing member movable therein, a rod slidable in a bearing formed in the wall of said chamber for operating said fluid displacing member, a drive for the rod, a clutch connecting the drive to the rod, a clutch chamber enclosing the clutch and into which the bearing from the pump opens in a downward direction, said clutch including parts having frictional engagement with each other for transmitting power, and means for circulating oil through the clutch chamber and maintaining an oil level therein above the lower end of the bearing whereby the exposed portion of the rod, together with the clutch, will be submerged in the bath of oil.

5. A pump provided with a movable actuating part, a driving part for the pump, and a transmission unit removably interposed between said parts and detachably interlocked therewith to permit ready removal of said unit from said parts, said unit including a clutch operable to detachably connect said parts.

6. A pump provided with a movable actuating part, a driving part for the pump, a transmission unit removably interposed between said parts and detachably interlocked therewith to permit ready removal of said unit from said parts, said unit including a clutch operable to detachably connect said parts, and means responsive to the pressure output of the pump for controlling the functioning of the clutch, said means being removable with and forming a part of said transmission unit.

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