Dec. 25, 1956 W. O. BISCHOFF ET AL 2,775,233

FUEL INJECTION PUMP

Filed June 24, 1954 3 Sheets-Sheet 1

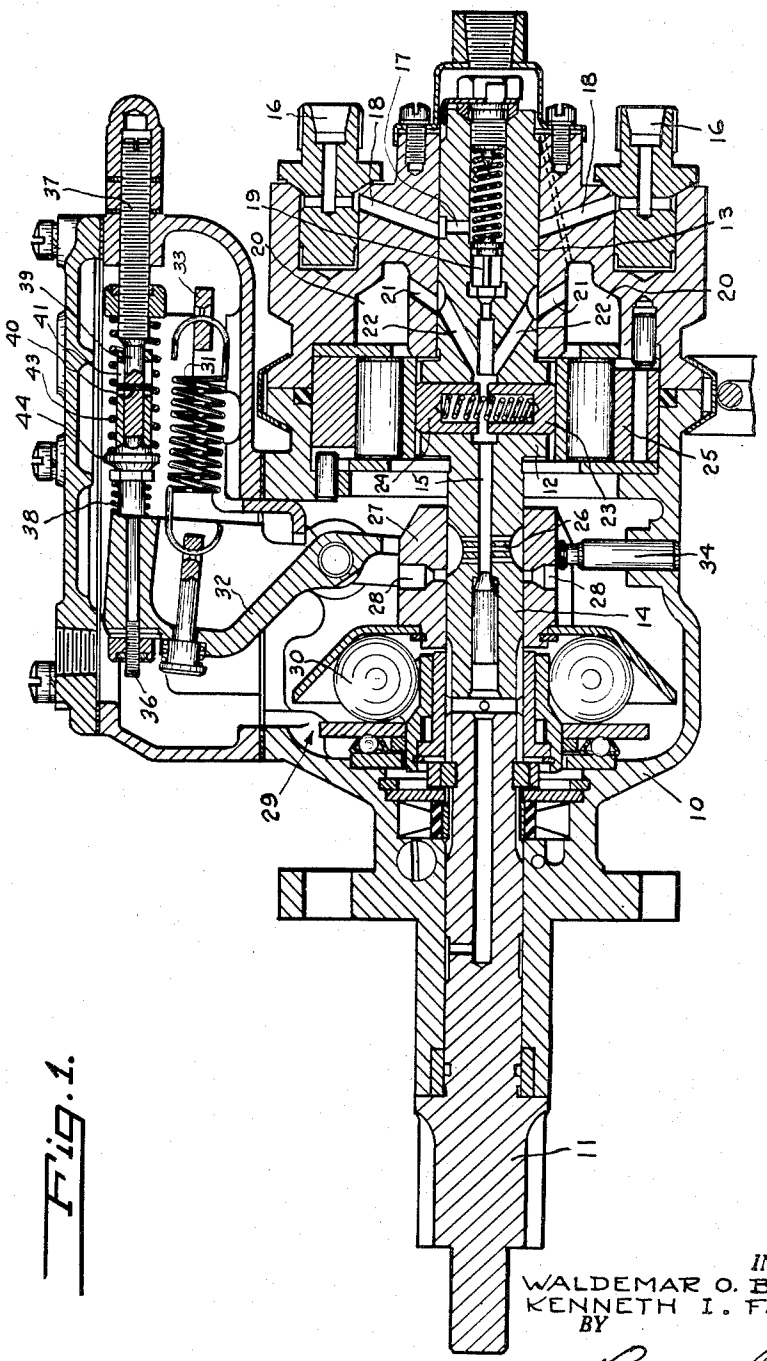


Fig. 1.

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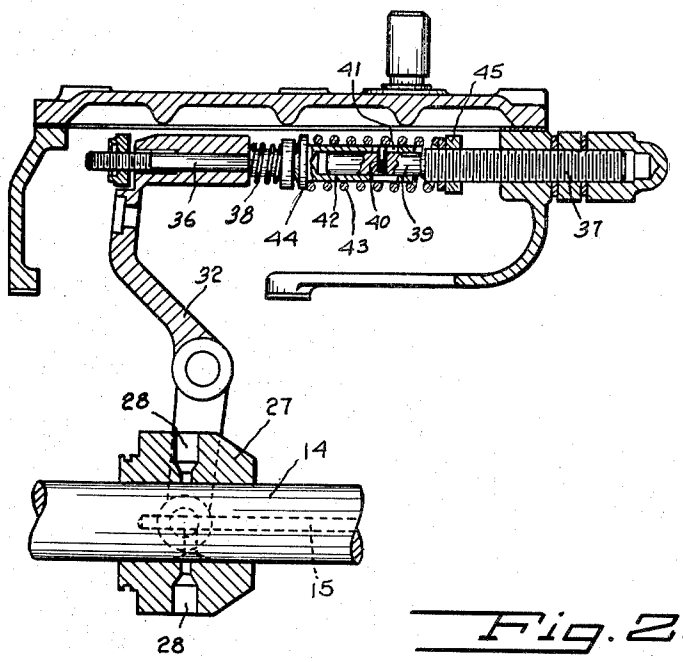


Fig. 2.

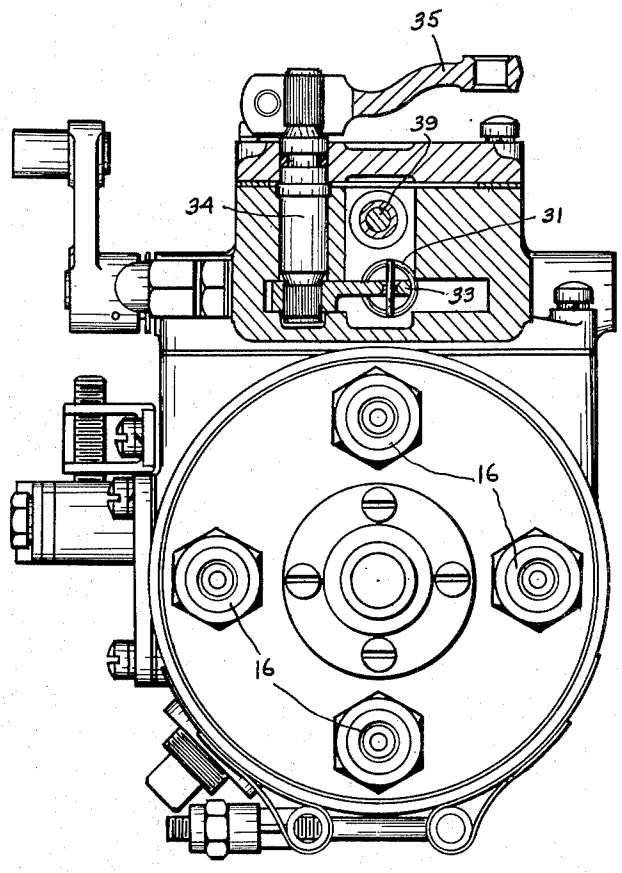
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Fig. 3.



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FUEL INJECTION PUMP

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3 Claims. (Cl. 123—140)

This invention relates to fuel injection pumps and has particular reference to a new and improved arrangement which is combined with the pump and governor for permitting a temporary increase of the quantity of fuel injected beyond the full load fuel quantity as determined by the full load stop provided in the governor for facilitating starting of the engine.

An object of the invention is to provide new and improved means in a fuel injection pump for allowing a temporary increase or additional fuel for facilitating the starting of the engine which arrangement is relatively simple and inexpensive and is fool proof in that it only operates when the engine is stopped and thereby prevents the driver utilizing said means except for the purpose intended, namely, for facilitating starting of the engine.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings. It will be understood that changes may be made in the details of construction and arrangement of parts without departing from the spirit of the invention as set forth in the accompanying claims, as the preferred form has been given by way of illustration only.

Referring to the drawings:

Fig. 1 is a longitudinal sectional view of the fuel injection pump embodying the invention;

Fig. 2 is a fragmentary view, similar to Fig. 1, but on an enlarged scale; and

Fig. 3 is a top view of the apparatus shown in Fig. 1, partially in section.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout, the pump shown embodying the invention comprises a housing **10** in which is journaled a rotor having a driving portion **11**, injection pump portion **12**, distributing portion **13** and metering portion **14**.

The rotor is provided with a duct or passage **15** whereby the metering portion **14** communicates with the injection pump portion **12** and the distributing portion **13** also communicates with injection pump portion **12**.

Surrounding the metering portion **14** are provided the outlets **16**, each of which is adapted to communicate with a combustion chamber of an internal combustion engine, or the like, and each of which is adapted to communicate with the metering portion **14** through duct or passage **17** in metering portion **14** and the radial passages **18**, one of which is provided for each of the outlets **16** and which are adapted to communicate with passage **17** successively upon rotation of rotor **11**.

The delivery valve **19** is provided in the passage or duct **15** between the injection pump portion **12** and the distributing portion **13**.

Fuel is supplied to the pump from sump **20** through ports **21** and passages **22** in rotor **11**.

The inlet passages **22** and the distributing passage **17** are so related as to provide a rotor valve action whereby the filling through ports **22** will occur in the period between the aligning of port **17** with each of the radial ports **18**.

In injection pump portion **12**, comprises a pair of opposed plungers **23** with the spring **24** therebetween for urging said plungers apart during the suction stroke and the pumping stroke is effected by the internal cam **25** having opposed lobe portions which through the rollers and tappets, urge the plungers toward each other on the pumping stroke.

The metering portion **14** is provided with the radial passages **26** for bypassing fuel from passage **15** and thereby controlling the quantity of fuel injected by the pump.

Overlying passages **26** is the control sleeve **27** which has the ports **28** through which fuel is bypassed and the relation of sleeve **27** and ports **28** to ports **26** controls the quantity of fuel bypassed.

The centrifugal governor **29** has a portion connected to the sleeve **27** and the ball weights **30** for actuating the sleeve in one direction against the force of governor spring **31** which urges the sleeve in the opposite direction through governor lever **32**.

The governor spring **31** is connected to governor lever **32** and to lever **33** on shaft **34** which shaft is adapted to be rotated by operating lever **35** which is connected to the engine throttle or accelerator pedal of the vehicle whereby the setting of the governor spring **31** may be controlled.

Also connected to governor lever **32** is the torque control member **36** which is adapted to engage the adjustable full load stop **37** which controls the maximum quantity of fuel to be delivered by the pump.

On torque control screw **36** is torque control spring **38** which allows the injecting of a slight additional fuel quantity when the speed of the pump decreases under full load conditions and thereby providing additional fuel for torque or lugging power.

On full load stop member **37** is provided the reduced extension **39** having the pin **40** in a slot **41** in member **42** in which member **39** telescopes and starting spring **43** is positioned between the enlarged head **44** on member **42** and adjustable threaded member **45**.

The starting spring **43** is slightly weaker than governor spring **31**.

When starting the engine, the governor spring is moved or wound to full load position and if this spring is stronger than starting spring **43**, it causes starting spring **43** to collapse and allows the adjustment of sleeve **27** to go into starting position, that is, the position of ports **28** are out of register with port **26** whereby all of the fuel pumped is injected and the full delivery is obtained from the pump.

After the engine starts, and the governor weights **30** begin to function, the governor takes over and functions in its normal manner and the starting apparatus does not again function until the engine is next started.

In starting, the throttle is pulled all the way out or the accelerator pedal is pushed way down which causes governor spring **31** to effect collapse of starting spring **43** and to remain in this position until the engine starts and which the governor takes over for automatic control.

Through the described arrangement and construction, absolute assurance is, therefore, given that the arrangement for providing an injection quantity exceeding the full load quantity can function only for the starting of the engine with such mechanism totally inactive during normal operation of the engine.

From the foregoing it will be seen that I have provided new and improved means for obtaining all of the objects and advantages of the invention.

We claim:

1. In a device of the character described, a governor for a fuel injection pump, said governor having an operating lever operatively connected to the control for the injection pump and a governor spring for positioning said lever, a full load stop adapted to be engaged by said lever for controlling the normal maximum fuel quantity to be delivered by the pump, said full load stop having a movable portion for allowing the positioning of said lever at a position to provide additional fuel for starting, and spring means for urging said movable portion into said position to allow additional fuel for starting, said spring being slightly weaker than said governor spring and adapted to be totally inactive except during starting of the engine.

2. In a device of the character described, a governor for a fuel injection pump, said governor having an operating lever operatively connected to the control for the injection pump and a governor spring for positioning said lever, a full load stop adapted to be engaged by said lever for controlling the normal maximum fuel quantity to be delivered by the pump, said full load stop having a collapsible portion for allowing the positioning of said lever at a position to provide additional fuel for starting, and spring means for urging said collapsible portion into said position to allow additional fuel for starting, said spring being slightly weaker than said governor spring and adapted to be totally inactive except during starting of the engine.

3. In a device of the character described, a governor for a fuel injection pump, said governor having an operating lever operatively connected to the control for the injection pump and a governor spring for positioning said lever, a full load stop adapted to be engaged by said lever for controlling the normal maximum fuel quantity to be delivered by the pump, said full load stop having a telescoping portion for allowing the positioning of said lever at a position to provide additional fuel for starting, and spring means for urging said telescoping portion into said position to allow additional fuel for starting, said spring being slightly weaker than said governor spring and adapted to be totally inactive except during starting of the engine.

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