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R. E. OLIN

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FUEL INJECTION PUMP

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Fig. 1.

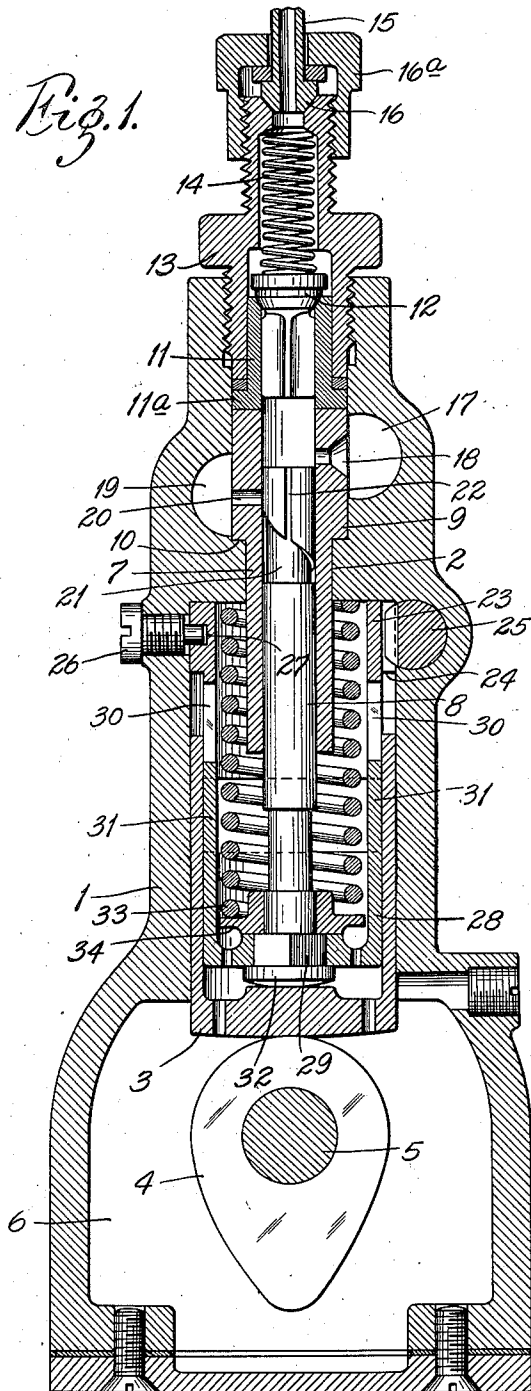
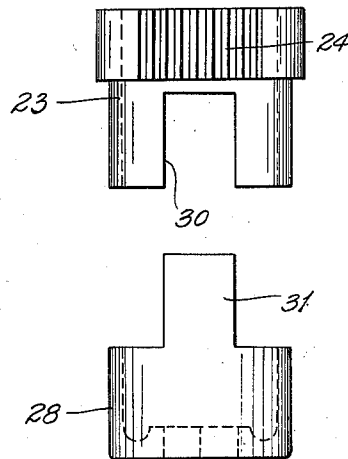


Fig. 2.



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UNITED STATES PATENT OFFICE

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FUEL INJECTION PUMP

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Application January 31, 1935, Serial No. 4,215

4 Claims. (Cl. 103—41)

My invention relates to fuel injection pumps of the kind wherein the quantity of fuel delivered by the pump is controlled by rotary adjustment of the reciprocating pump plunger or piston. The invention has for its principal object to provide a simple, efficient, compact and economical arrangement for rotatably adjusting the pump plunger. The invention consists in the fuel injection pump and in the parts and combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawing, which forms part of this specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a central vertical section through a fuel injection pump embodying my invention, the pump plunger being shown at the end of its suction stroke; and

Fig. 2 is a side elevational view of a regulating sleeve and the plunger cup.

Referring to the accompanying drawing, my invention is shown in connection with a fuel injection pump comprising a housing 1 provided with a vertical bore 2 having an enlarged lower end portion, within which is slidably mounted a tappet cup 3 which is forced upwardly in the bore by means of a cam or tappet 4 mounted on a cam shaft 5 located in an enlarged bottom chamber 6 communicating with the lower end of said enlarged bore. A pump cylinder 7, which contains a plunger or piston 8, has an enlarged collar portion 9 seated on an annular shoulder 10 provided therefor in the upper or smaller portion of the vertical bore 2.

Mounted in the vertical bore 2 above the cylinder 7 is a tubular member 11 provided at its lower end with a base flange 11a, which seats against the upper end of said cylinder and at its upper end with a seat for a fuel discharge valve 12. Threaded into the upper end of the bore 2 is a tubular fitting or shell 13, which holds the valve seat 11 against the pump cylinder 7 and is provided at its upper end with a space for a coil spring 14 that normally holds the fuel discharge valve 12 against said seat. A fuel discharge pipe 15 has a conical end portion 16 seated in a bevel seat provided therefor in the upper end of the tubular fitting 13 and held in position by means of a cap 16a threaded on the upper end of said tubular fitting.

The housing 1 is provided with a passageway 17, which receives liquid fuel from a feed pump (not shown) and communicates with an inlet port 18 in the wall of the cylinder 7. The housing is provided on the opposite side of the cyl-

inder with an overflow passageway 19 that communicates with an overflow port 20 located in said cylinder opposite the inlet port 18 therein. The inlet port 18 and the overflow port 20 are preferably disposed at different levels. The pump plunger or piston 8 is of the general type provided with a recessed portion 21 having an inclined wall and communicating through a peripheral recess 22 with the compression chamber of the cylinder, whereby the effective feed stroke of the plunger may be regulated by varying the angular position thereof.

The mechanism for rotatably adjusting the pump plunger 8 comprises a sleeve 23 mounted in the upper end of the enlarged lower portion of the vertical bore 1 and provided along a portion of its periphery with teeth 24 adapted to cooperate with the teeth of a rack 25 mounted in a longitudinal recess in said housing. The driving sleeve 23 is held in place by means of a screw 26 that is threaded through the wall of the housing 1 and has a reduced inner end portion that extends within a peripheral recess 27 in said driving sleeve. Mounted in the tappet cup 3 is a plunger cup 28 that has a driving engagement with the lower portion of the plunger comprising a squared or flatsided portion 29 on the plunger that fits a similarly shaped opening through the bottom of said plunger cup. The plunger cup 28 also has a driving engagement with the driving sleeve 23, as by means of notches 30 in said sleeve that straddle upwardly extending tongues 31 on said plunger cup. The plunger cup 28 rests upon an enlarged head portion 32 formed on the lower end of the plunger and provided with a spherical end face that is held in engagement with the bottom of the tappet cup 3 by means of a coil spring 33 mounted within the adjusting sleeve 23 and plunger cup 28 with its upper end bearing against the top of the enlarged lower portion of the bore 1 and with its lower end bearing against an annular spring seat 34 sleeved on the plunger inside said plunger cup.

The above described construction is very simple and provides an effective means for rotatably adjusting the pump plunger. The tappet cup has no direct connection with the pump plunger or with the mechanism for oscillating said plunger and is thus adapted to be removed and replaced without disturbing these parts. The drive sleeve and plunger cup enclose the spring and are in turn mounted in the tappet cup, thus providing a very simple and compact arrangement of parts. The retaining screw holds the drive

sleeve upwardly in the housing, while the engagement between the upper end of the tappet cup and the lower end of the drive sleeve serves to maintain the drive sleeve concentric with the bore in which it is mounted.

Obviously, the hereinbefore described arrangement admits of considerable modification without departing from the invention. Therefore, I do not wish to be limited to the precise arrangement shown and described.

What I claim is:

1. A fuel injection pump comprising a housing, a cylinder therein, a plunger reciprocable in said cylinder and projecting therebelow, a tappet cup slidably mounted in said housing concentric with said plunger and cooperating with the lower end thereof, a tappet for actuating said tappet cup, a sleeve rotatably mounted in said housing concentric with said plunger with its lower end extending into said tappet cup, means for oscillating said sleeve, a plunger cup mounted in said tappet cup, said sleeve and said plunger cup having cooperating portions permitting relative axial movement but preventing relative rotary movement, said plunger cup and said plunger having cooperating portions preventing relative rotary movement thereof, and a spring mounted in said sleeve and said plunger cup for retracting said plunger, said tappet cup and said plunger cup.
2. A fuel injection pump comprising a housing, a cylinder therein, a plunger reciprocable in said cylinder and projecting therebelow, a tappet cup slidably mounted in said housing concentric with said plunger and cooperating with the lower end thereof, a tappet for actuating said tappet cup, a sleeve rotatably mounted in said housing concentric with said plunger with its lower end extending into said tappet cup, means for oscillating said sleeve, a screw threaded through said housing with its inner end engaging said sleeve to hold the same upwardly in said housing, a plunger cup mounted in said tappet cup, said sleeve and said plunger cup having cooperating tongue and notch portions permitting relative axial movement but preventing relative rotary movement, said plunger cup and said plunger having cooperating portions preventing relative rotary movement thereof, and a spring mounted in said sleeve and said plunger cup for retracting

said plunger, said tappet cup and said plunger cup.

3. A fuel injection pump comprising a housing, a cylinder therein, a plunger reciprocable in said cylinder and projecting therebelow, a tappet cup slidably mounted in said housing concentric with said plunger and cooperating with the lower end thereof, a tappet for actuating said tappet cup, a sleeve rotatably mounted in said housing concentric with said plunger with its lower end extending into said tappet cup, means for oscillating said sleeve, removable means for holding said sleeve upwardly in said housing, a plunger cup mounted in said tappet cup, said sleeve and said plunger cup having cooperating portions permitting relative axial movement but preventing relative rotary movement, said plunger cup and said plunger having cooperating portions shaped to prevent relative rotary movement thereof, a spring seat sleeved on said plunger inside of said plunger cup, and a spring mounted in said sleeve and said plunger cup with its upper end in engagement with said housing and with its lower end in engagement with said spring seat.

4. A fuel injection pump comprising a housing, a cylinder therein, a plunger reciprocable in said cylinder and projecting therebelow, a sleeve rotatably mounted in said housing concentric with said cylinder and provided with a plurality of downwardly opening circumferentially spaced elongated notches, a cup member secured at its bottom to the projecting lower end of said plunger with its side wall extending upwardly around said plunger in endwise alinement with the lower end of said sleeve, said side wall of said cup member being notched to form a plurality of circumferentially spaced tongues that extend upwardly into the downwardly opening notches in said sleeve and form an axially slidable but nonrotatable connection between said sleeve and said cup member, and a tappet cup reciprocable in said housing with its bottom in abutting relation to the lower end of said plunger and with its side wall extending upwardly around said cup member in contact with the notched side wall thereof and with the notched portion of said sleeve.

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