CONTROL FOR LIQUID FUEL PUMPS FOR COMPRESSION IGNITION ENGINES

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

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CONTROL FOR LIQUID FUEL PUMPS FOR COMPRESSION IGNITION ENGINES

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This invention relates to liquid fuel pumps for compression ignition engines, and of the kind incorporating an axially movable regulating rod for determining the quantity of fuel supplied to the engine, and a stop for limiting movement of the rod in one direction so as to determine the maximum quantity of fuel which can be supplied to the engine.

In such pumps it is usual for the stop to be adjustable. However, in certain countries where the normal fuel oil may not be readily available it may be necessary at times for the engine with which the pump is associated, to run on petrol or paraffin. A change from one type of fuel to another will necessitate a change in the position of the stop determining the maximum quantity of fuel which can be fed to the engine, and the object of the present invention is to provide convenient means whereby adjustment of the stop can be readily effected to suit such changes of fuel without disturbing the initial adjustment of the stop.

According to the invention a stop for a liquid fuel pump of the kind specified comprises in combination a housing, a plurality of spring-loaded push pieces mounted in the housing with their outer end portions extending through one side thereof, a shoulder on the portion of each push piece within the housing which is presented to the other end of the housing, and the shoulders on the plurality of push pieces being disposed at different distances from their inner ends respectively, and a catch member within the housing for co-operation with the shoulders of the push pieces in such a manner that upon depression of any one push piece the catch member will be moved automatically to a different position within the housing whilst releasing a previously depressed push piece.

In the accompanying drawings FIGURES 1 and 2 respectively are part-sectional side and end views taken respectively on the lines 1—1 of FIGURE 2 and 2—2 of FIGURE 1, and illustrating one example of the invention, FIGURES 3 and 4 are similar views taken respectively on the lines 3—3 of FIGURE 4 and 4—4 of FIGURE 3, and illustrating a modification.

Referring to FIGURES 1 and 2 of the drawings the fuel pump may be of any convenient kind incorporating a longitudinally movable regulating rod 1 for determining the quantity of fuel supplied to the engine cylinder or cylinders at each reciprocation of the pump plunger or plungers. For limiting movement of the regulating rod in one direction and thereby determining the maximum quantity of fuel which can be fed to the engine, there is provided a stop 2.

The stop comprises an externally screw-threaded spigot 3 secured to the injection pump housing or some other relatively fixed part 4, and having a central bore through which extends a cylindrical abutment member 5 against one end of which the regulating rod 1 is adapted to bear in the position to retain it in the depressed position of the spigot 3 is an internally screw-threaded portion extending from one side of a housing 6, a lock-nut 6a being provided on the spigot 3 whereby the housing 6 can be located at a desired setting on the spigot.

Mounted within the housing 6 in parallel and side-by-side relationship are a pair of axially movable push pieces 7, 8. The outer end portion 7a of the push piece 7 and the outer end portion 8a of the push piece 8 extend through the side of the housing 6 remote from the spigot 3, and the inner end portions 7b and 8b of the push pieces within the housing are enlarged to define annular and inclined shoulders 9, 10 respectively between the inner and outer end portions. Moreover, the shoulders 9, 10 are at different distances from the inner ends of the push pieces 7, 8 respectively, and the inner ends are positioned to act alternatively as abutments for the member 5 as will be described. Also, the inner ends of the push pieces 7, 8 are recessed to accommodate the ends of a pair of coiled compression springs 11, 12 acting between the housing and the push pieces in a direction to move the latter outwardly.

Within the housing 6 and between the push pieces 7, 8 is a catch member, which may take the form of a roller 13 constrained for movement laterally relative to the direction of movement provided to the push piece 7, 8. Moreover, the diameter of the roller 13 is such that it can only be accommodated between the wider inner portion of one push piece and the narrower outer portion of the other, but cannot be accommodated between the wider inner portions of both push pieces. Thus in the position illustrated the roller 13 sits to retain the push piece 8 depressed against the action of its spring 12, due to its contact with the shoulder 10 and the side of the housing 6 through which the outer end portions 7a, 8a of the push pieces extend. Furthermore, when the push piece 7 is depressed the action of the spring 12 will cause the shoulder 10 to urge the roller 13 laterally into a position over the shoulder 9, and thereby release the push piece 8.

Since the shoulders 9, 10 on the two push pieces are at different distances respectively from their inner ends, when the one piece is held depressed the abutment member 5 can move further into the housing 6 than when the other piece is held depressed. By this means it is possible to provide two alternative limit positions for the abutment member without changing the setting of the housing 6 on the spigot 3.

In the modification illustrated in FIGURES 3 and 4 three parallel push pieces 7, 8, 14 may be arranged in triangular relationship within the housing, and the catch member may be in the form of a ball 13a constrained for lateral movement between the push pieces, and arranged to hold only one piece depressed at any one time. As in the previously described example, the outer end portions 7a, 8a of the push pieces 7, 8 extend through the side of the housing 6 remote from the spigot 3, and the inner end portions 7b, 8b of these push pieces are enlarged to define annular and inclined shoulders 9, 10 between the inner and outer end portions. Moreover, the outer end portion (not shown) of the push piece 14 also extends through the last mentioned side of the housing 6, and the inner end portion 14a of this push piece 14 is also enlarged to define an annular and inclined shoulder (not shown) similar to those of the other push pieces 7, 8. By arranging the shoulders of the three pieces at different distances from their inner ends respectively three alternative limit positions for the abutment member are provided according to which of the pieces is held in the depressed position. This modification may be employed where the engine is required to run on oil as alternative fuel, but alternatively the additional push piece 14 may provide a limit position in which a greater quantity of fuel than that permitted by either of the push pieces 7, 8 is fed to the engine to facilitate starting.

Conveniently each push piece will bear indicia indicating the kind of fuel for which the pump is adjusted when the piece is held depressed, and it is thus a simple matter...
to adapt the engine for the kind of fuel most readily available.

In a modification of the invention the abutment member may be omitted, and one end of the regulating rod may be arranged to slide within the spigot so as to bear directly against the appropriate push piece when it is moved to its maximum fuel supply position.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A stop for the fuel regulating rod of a liquid fuel pump of the kind specified, comprising in combination a housing, at least two spaced and parallel push pieces having outer end portions extending through one side of said housing, enlarged inner end portions slideably mounted within said housing, and inclined shoulders disposed between said inner and outer end portions at different distances respectively from the inner ends of the corresponding push pieces, compression springs situated within said housing and acting on said push pieces to oppose depression thereof, and a catch member of circular cross section situated within said housing between and in peripheral contact with the outer end portion of one of the push pieces which occupies a depressed position, and the inner end portion of the other push piece which occupies its outermost position, said catch member being also in peripheral contact with the side of said housing through which the outer end portions of said push pieces extend, and with the shoulder on the depressed push piece, to prevent the latter from moving outwardly until the other push piece is subsequently depressed sufficiently to permit lateral movement of said catch member, whereupon the previously depressed push piece is moved to its outermost position by the spring acting thereon, and during such movement said catch member is moved laterally by the shoulder on the last mentioned push piece into contact with the outer end portion and the shoulder of the other push piece, and thereby serves to retain the latter in the depressed position until the outermost push piece is again depressed, whereupon said catch member is caused to re-assume its initial position under the action of the shoulder on the said other push piece during the return of the latter to its outermost position by the spring acting thereon.

2. A stop for the fuel regulating rod of a liquid fuel pump of the kind specified, comprising in combination a housing, three spaced and parallel push pieces having outer end portions extending through one side of said housing, enlarged inner end portions slideably mounted within said housing, and inclined shoulders disposed between said inner and outer end portions at different distances respectively from the inner ends of the corresponding push pieces, compression springs situated within said housing and acting on said push pieces to oppose depression thereof, and a catch member in the form of a ball situated within said housing between and in contact with the outer end portion of one of the push pieces which occupies a depressed position, and the inner end portions of the other push pieces which occupy their outermost positions, said catch member being also in contact with the side of said housing through which the outer end portions of said push pieces extend, and with the shoulder on the depressed push piece, to prevent the latter from moving outwardly until either of the other push pieces is subsequently depressed sufficiently to permit lateral movement of said catch member, whereupon the previously depressed push piece is moved to its outermost position by the spring acting thereon, and during such movement said catch member is moved laterally by the shoulder on the last mentioned push piece into contact with the outer end portion and shoulder of the subsequently depressed push piece, and thereby serves to retain the latter in its depressed position until either of the other push pieces is depressed, whereupon the previously depressed push piece is moved to its outermost position by the spring acting thereon, and during such movement said catch member is moved laterally by the shoulder on the last mentioned push piece into contact with the outer end portion and shoulder of the depressed push piece to retain the latter in its depressed position.

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