July 29, 1930. A. ABRAMSON 1,771,907

VARIABLE STROKE PUMP OPERATING MECHANISM

Filed Nov. 9, 1928

Fig. 3.

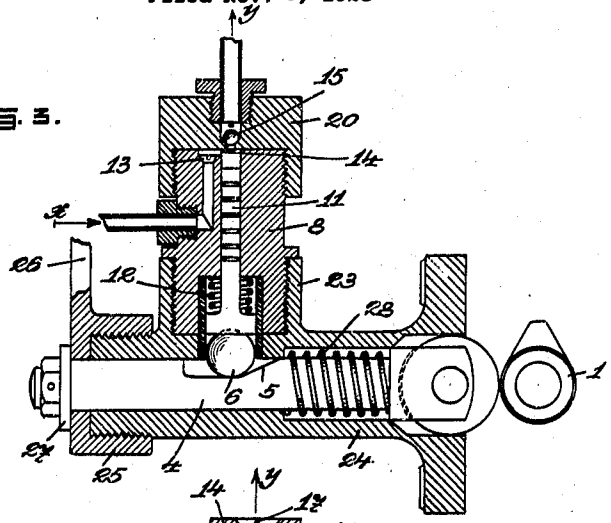


Fig. 1.

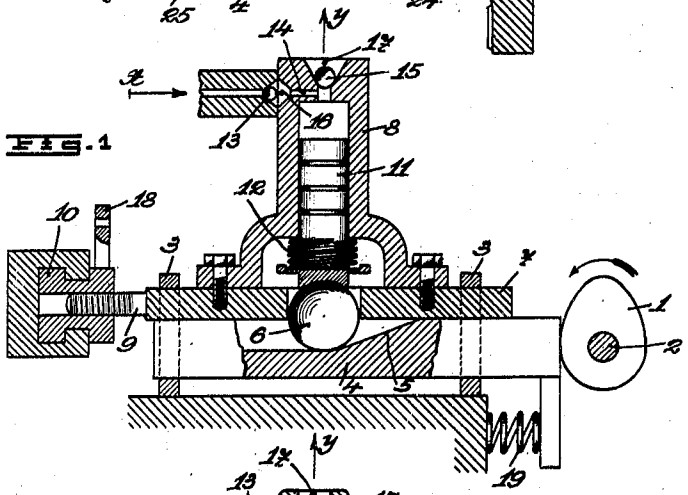
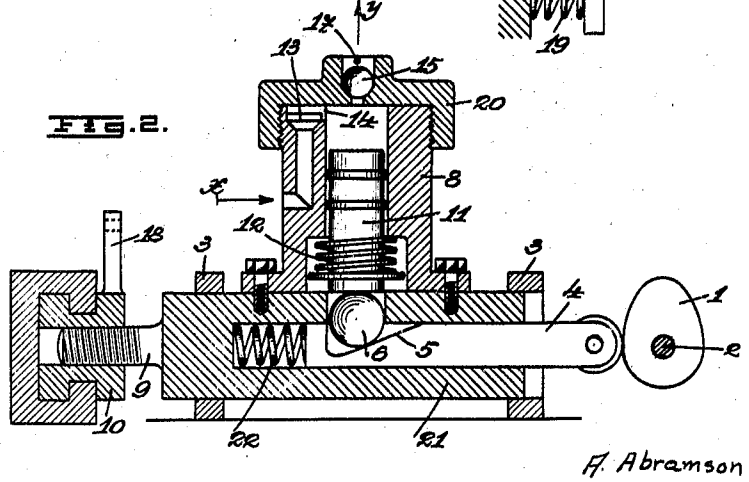


Fig. 2.



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VARIABLE-STROKE PUMP-OPERATING MECHANISM

Application filed November 9, 1928, Serial No. 318,187, and in Czechoslovakia November 22, 1927.

This invention relates to a device for converting in a regulable manner rotary motion into reciprocating motion, more particularly for operating fuel pumps for internal combustion engines and consists substantially in this, that from the rotary member there is derived uninterruptedly or at intervals of time a reciprocating motion of a wedge-shaped member which is yieldingly held and guided against it and with respect to the inclined surface of which the member performing the desired main motion can be set under pressure and regulably. Applied to the operation of fuel pumps for internal combustion engines the device is constructed in such a manner that the pump piston presses a ball which is guided axially with respect to its axis against a reciprocated inclined surface, the arrangement being such that by altering the position of the ball relative to the inclined surface the time and duration of the action of the inclined surface on the ball and consequently on the pump piston can be varied. This also causes an alteration in the stroke of the piston and the operative space in the pump cylinder.

In the accompanying drawing Figs. 1, 2 and 3 show three constructional examples of the device in section, as applied to the operation of a fuel pump for internal combustion engines.

In the example shown in Fig. 1 against the cam 1 of the continuous rotating shaft 2 a sliding member 4 which is guided in the frame 3 is held by the pressure of the spring 19, the sliding member having an inclined surface 5. Against this inclined surface a ball 6 can be set, which is guided in the direction of the desired main motion, that is to say in the direction of the stroke of the pump piston 11, in the plate 7. The plate 7 which is connected to the pump cylinder 8 or is made integral with it is guided in the frame 3 and is provided with a screw stud 9 which screws in a nut 10 which is secured against axial displacement and can be turned by means of a lever 18. The piston 11 is held by a spring 12 against the ball 6.

Thus the main motion of the piston 11 is derived from the reciprocating auxiliary motion of the inclined surface 5. This main motion is regulable, as, by turning the nut 10 in one direction or the other, the ball 6 is caused to approach or recede from the inclined surface 5 or is adjusted on the inclined surface itself, whereby, owing to the motion of the sliding member 4 remaining constant, the time and duration of the action of the inclined surface on the ball 6 can be varied. With the displacement of the ball with respect to or on the inclined surface 5 the operative space in the pump cylinder, the quantity delivered by the pump and the stroke of the piston are determined.

The pump is fed at x through the suction valve 13 which allows the liquid to enter through a narrow passage 14 in the wall of the pump cylinder into the pump cylinder and below the delivery valve 15. The motion of the valves 13 and 15 is limited by the pins 16 and 17.

In the constructional form shown in Fig. 2 the cover 20 of the piston pump, in which is the delivery valve 15, also acts as the means for limiting the stroke of the valve 13, thereby reducing the clearance of the pump to a minimum.

In other respects this constructional form differs from that shown in Fig. 1 only in this, that the sliding member 4 is slidable in a guide 21 between the operating cam 1 and a spring 22 which finds an abutment against the bottom of the hole in the guide. The guide 21 is connected to the pump cylinder 8, guided in the frame 3 and provided with the screw stud 9.

In the constructional example shown in Fig. 3 the arrangement is such that the ball and the pump cylinder do not alter their lateral position with respect to the motion of the sliding member 4, but that the sliding member can be adjusted relatively to the axis of the pump and the operating cam. The pump cylinder 8 is screwed into the socket-shaped extension 23 of a hollow body 24 in which the sliding member 4 with its inclined surface 5 is capable of sliding. The end of the hollow body 24 remote from the operating cam 1 is provided with an external thread on which the hub 25 of an adjusting

lever 26 is screwed. The sliding member 4 extends through the adjusting lever 26 and the latter has at its outer end a collar 27. A spring 28 interposed between a shoulder in the hollow body 24 and the head of the sliding member 4 seeks to keep the collar 27 pressed against the adjusting lever 26. Hence, on the hub 25 being adjusted laterally in one direction or the other on the hollow body by the adjusting lever 26 being turned, the position of the inclined surface 5 with respect to the ball 6 is altered and consequently, through the action of the cam 1 on the sliding member 4 being caused to take place later or sooner, the time and duration of the action of the pump is advanced or retarded. Thus the action of the pump is retarded with the reduction in the quantity delivered by the fuel pump or vice versa.

What I claim is:

1. A device for converting in a regulable manner a rotary motion into a reciprocating motion, more particularly for operating fuel pumps for internal combustion engines, comprising in combination a main member capable of reciprocating sliding motion, an auxiliary member capable of reciprocating sliding motion, an inclined surface on the said auxiliary member, a member capable of continuous rotary motion and of coacting with the said auxiliary member for imparting the reciprocating motion to it continuously or at intervals of time, means for yieldingly pressing the main reciprocating member against the auxiliary reciprocating member and means for adjusting the position of the main reciprocating member with respect to the said inclined surface, as and for the purpose set forth.

2. A device for converting in a regulable manner a rotary motion into a reciprocating motion, for operating fuel pumps for internal combustion engines, comprising in combination a pump cylinder, a piston capable of sliding in the said cylinder, an auxiliary member capable of a reciprocating sliding motion transversely to the axis of the pump piston, an inclined surface on the said auxiliary member, a member capable of continuous rotary motion and of coacting with the said auxiliary member for imparting the reciprocating motion to it, a ball located between the piston and the said inclined surface, means for yieldingly pressing the piston against the ball and the ball against the inclined surface, a plate connected to the pump cylinder, a hole in the said plate for acting as a guide for the ball in the direction of the piston axis and means for adjusting the said plate and for fixing it in position, whereby the operative space of the cylinder, the quantity delivered by the pump or the stroke of the piston and the time and duration of the action of the pump can be varied, as and for the purpose set forth.

3. A device for converting in a regulable manner a rotary motion into a reciprocating motion, for operating fuel pumps for internal combustion engines, comprising in combination a pump cylinder, a suction valve for the said cylinder, a cylinder cover capable of acting as an abutment for the suction valve, a piston capable of sliding in the said cylinder, an auxiliary member capable of a reciprocating sliding motion transversely to the axis of the pump piston, an inclined surface on the said auxiliary member, a member capable of continuous rotary motion and of coacting with the said auxiliary member for imparting the reciprocating motion to it, a ball located between the piston and the said inclined surface, means for yieldingly pressing the piston against the ball and the ball against the inclined surface, a plate connected to the pump cylinder, a hole in the said plate for acting as a guide for the ball in the direction of the piston axis and means for adjusting the said plate and for fixing it in position, whereby the operative space of the cylinder, the quantity delivered by the pump or the stroke of the piston and the time and duration of the action of the pump can be varied, as and for the purpose set forth.

In testimony whereof, I have signed my name to this specification.

ALEXANDER ABRAMSON.