

April 8, 1941.

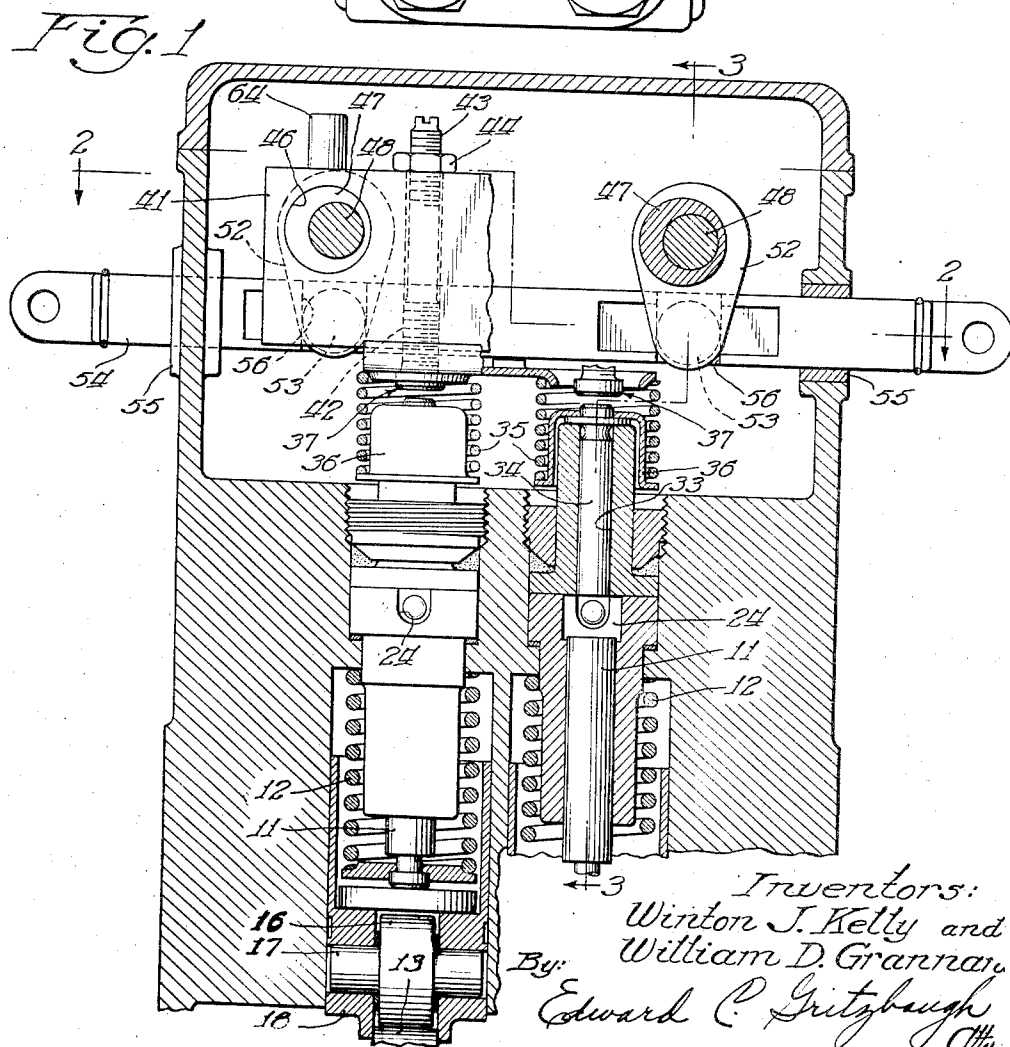
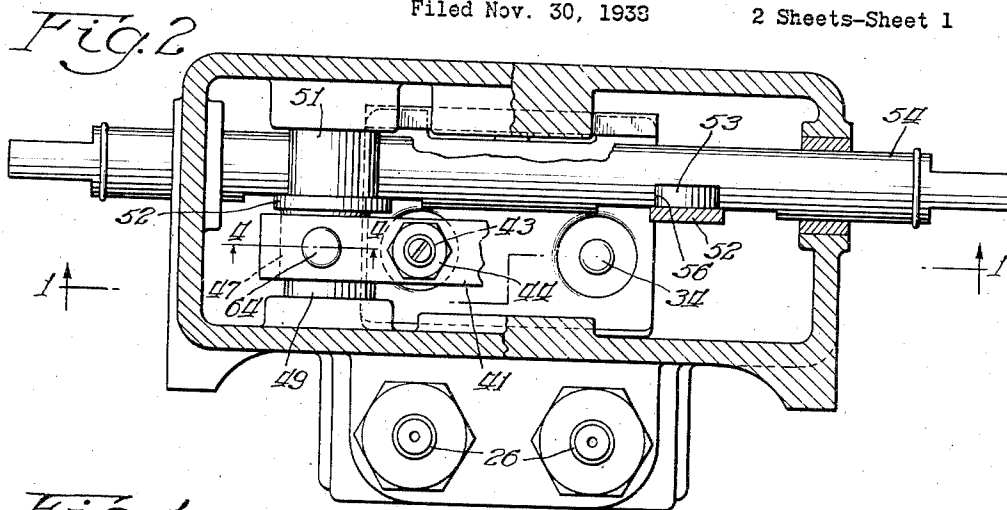
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2,237,347

PUMP CONTROL

Filed Nov. 30, 1933

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

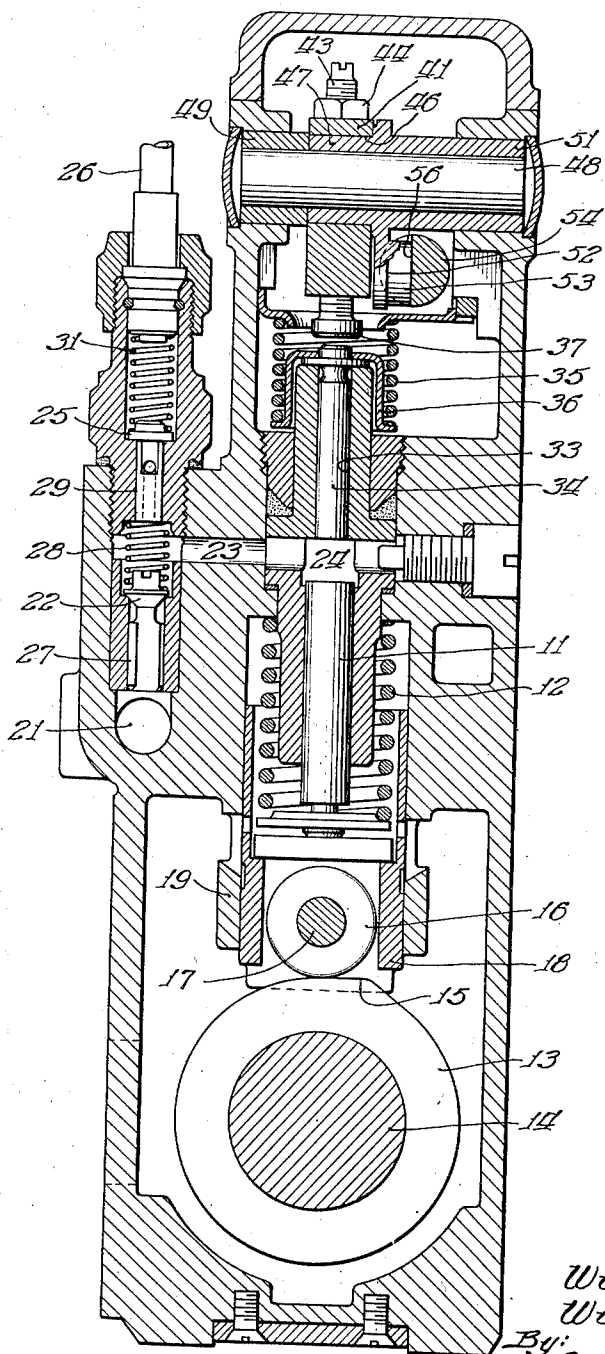
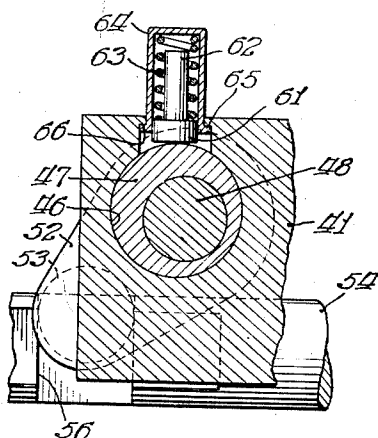


Fig. 4



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UNITED STATES PATENT OFFICE

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PUMP CONTROL

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9 Claims. (Cl. 103—37)

This invention relates to Diesel pumps and more particularly to an improved mechanism for regulating the position of the stops which determine the length of travel of the control plungers.

Prior to our invention, the mechanism available was both expensive to fabricate and relatively less satisfactory in its operation.

It is an object of this invention to provide a novel and simplified control mechanism for regulating the adjusted position of the control plunger stops that is relatively inexpensive to manufacture and which is efficient in its operation.

It is a more specific object to provide the above simplified arrangement wherein each stop member is readily adjustable independently of the remaining stop members.

It is a further object to provide a novel brake and anti-vibrating device in connection with the relatively moving parts whereby to still further improve the operation of our novel control mechanism.

Other and more particular objects, uses and advantages of our invention will be made apparent from a reading of the following specification in conjunction with the attached drawings which form a part thereof and wherein:

Fig. 1 is a side elevation in section taken substantially on the line 1—1 of Fig. 2 showing a Diesel pump incorporating a preferred embodiment of our invention;

Fig. 2 is an elevation in section taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is an end elevation in section taken substantially on the line 3—3 of Fig. 1; and

Fig. 4 is an enlarged section view of a portion of the control mechanism showing to advantage the eccentric including the operating means therefor; the stop mounting block, the mounting of the stops therein; together with the brake and anti-vibrating arrangement.

Referring in greater detail to the figures of the drawings, our invention is disclosed as applied to a well known form of Diesel pump, which for the sake of understanding the mode of coaction of our novel control mechanism therewith, comprises a plurality of reciprocable pump plungers 11 urged in one direction by springs 12 and operated in the opposite direction by suitable cams 13 mounted on cam shaft 14 and driven in timed relation with the Diesel engine (not shown) to which fuel is being supplied. We have shown a pump having two pump plungers, however, any number desired may be employed.

Rise 15 on cam 13 actuates roller 16 mounted on shaft 17 carried by cage 18 arranged to re-

ciprocate within a guide-defining boss 19, which cage in turn contacts the lower end of plunger 11 for raising the same against the opposition of spring 12.

Liquid fuel under a predetermined pressure is introduced through inlet passage 21, one-way valve 22, transverse passage 23, and into pump chamber 24. This introduction of fuel takes place on the downward or intake stroke of plunger 11, the upward or pumping stroke of plunger 11 being effective to drive the liquid fuel from pump chamber 24 in a reverse direction through transverse passage 23, out past one-way valve 25 and through conduit 26 to that cylinder (not shown) to which the particular pump plunger 11 is arranged to supply fuel. One-way valve 22 is of course provided with the necessary guide arrangement indicated generally at 27 and with a closing spring 28 for urging the same to the closing direction against the opening effect of the incoming fuel under pressure. One-way outlet valve 25 is likewise provided with the necessary guide arrangement indicated generally at 29 together with closing spring 31 effective to urge valve 25 in the closing direction with a predetermined pressure, as will appear.

A control arrangement is provided for regulating the volume output of the respective plungers 11 which comprises an auxiliary cylinder 33 in communication with pump chamber 24 and provided with a control or regulating plunger 34 reciprocable therein. Spring 35 acting through bonnet or hood 36 urges control or regulating plunger 34 in the direction of one limit of its travel while the pressure of the liquid within chamber 24 created in response to the upward or pumping stroke of plunger 11 is effective to move plunger 34 in the opposite direction against the urging effect of spring 35.

By providing suitable stops for limiting the movement of control or regulating plungers 34 in opposition to springs 35, it will thus be readily seen that means is provided for regulating the volume output of plungers 11. More specifically plungers 11, upon being moved in the upward or pumping direction, raise the pressure of the fluid within chambers 24 to a point where control plunger 34 is moved outwardly in its cylinder 33 against the opposition of spring 35 to a point where it contacts an adjustable stop 37 whereupon further movement of plunger 11 raises the pressure of the fluid to a further point where one-way valve 25 is opened and fluid is transmitted through conduit 26 to suitable injector nozzles (not shown) located for delivery of fuel to

the particular cylinder. It will be noted that spring 35 is necessarily less resistant to the movement of plunger 34 than is spring 31 to the movement of one-way valve 25.

Regulating plunger stop control mechanism

Our invention is particularly directed to the mechanism for regulating the adjusted position of the stop 37 which will now be described in detail.

The stops 37 are each adjustably supported in a mounting member or block 41 arranged to be adjusted in a generally coaxial direction relative to the plunger 34. These stop members 37 are formed with a body or stem portion comprising a first threaded portion 42 received by complementary threads formed in the lower portion of block 41 and a second threaded portion 43 of a smaller diameter than portion 42 extending through the block 41 and receiving a lock nut 44 thereabout. The outer end of the stem portion of stop 37 is further formed for cooperation with a suitable tool such as a screw driver for adjusting the stop member 37 relative to the block 41 independent of the remaining stop members. Block 41 is formed with journals 46 for the reception of eccentrics 47, mounted on supporting shaft 48. Shaft 48 is provided with suitable spacing sleeves 49 and 51 for maintaining block 41 and eccentrics 47 in their proper position and is in turn supported adjacent its ends in the side walls of the casing, for supplying a fixed axis about which eccentric 47 is made to turn for raising and lowering block 41 to regulate the position of stops 37 relative to the ends of control plungers 34.

For effecting the turning of eccentric 47 about shaft 48 there is provided crank arms 52 carrying adjacent the ends thereof protuberant pin portions 53. These pin portions are operated upon to turn cranks 52 by means of a reciprocable control bar 54 mounted in guides 55, positioned in the walls of the pump housing. This control bar 54 is formed with slots 56 engaging pins 53. The control bar 54 may be connected by suitable linkage to either a manual control or to any of the well known automatic controls for effecting its adjustment to regulate the position of the stops 37 by turning the eccentrics 47.

Brake and anti-vibrating means for the eccentric 47 and block 41 is provided in the form of a shoe 61 which rides on the outer periphery of eccentric 47 and has a vertical pin portion 62 extending up through block 41. A spring 63 surrounds pin portion 62 engaging the upper surface of the shoe 61 at one end and engaging at the other end the inner periphery of a thimble 64 maintained in position by the engagement of an annular flange 65 with a shoulder 66 formed in the block 41.

It will thus appear that we have provided a very simple yet efficient and practicable arrangement of means for effecting the adjustment of the stops 37.

It is further important to note that the eccentric is in effect two bell cranks or a double bell crank. Geometrically, these two bell cranks each compensate respectively for the angularity of the other. The radius of the eccentric is positioned at right angles to the radius of the crank bar and vertical movement caused by the eccentric is therefore in constant proportion to the horizontal movement of the control rod acting on the crank arm.

While we have disclosed our invention in connection with a specific embodiment thereof, it is to be understood that this is by way of illustration and not by way of limitation and that our invention is to be defined more particularly by the appended claims, which should be given a scope as broad as the prior art will permit.

We claim:

1. In a Diesel pump of the type wherein there is provided a reciprocable pump plunger and a reciprocable control plunger for controlling the volume output of said pump plunger and means for determining the limit of movement of said control plunger in response to fluid pressure produced by said pump plunger, said last named means comprising a stop for said control plunger adjustable axially of said control plunger, an eccentric for effecting axial adjustment of said stop, means providing a fixed axis about which said eccentric is made to turn and means for turning said eccentric about said axis.

2. In a Diesel pump of the type wherein there is provided a reciprocable pump plunger and a reciprocable control plunger for controlling the volume output of said pump plunger and means for determining the limit of movement of said control plunger, said last named means comprising means defining a stop for controlling the limit of movement of said control plunger, said stop being axially adjustable relative to said control plunger, eccentric crank means connected with said stop means for effecting adjustment thereof, means defining a fixed axis of rotation for said eccentric crank means, and means for adjusting said crank about said axis.

3. In a Diesel pump of the type wherein there is provided a reciprocable pump plunger and a reciprocable control plunger for controlling the volume output of said pump plunger and means for limiting the movement of said control plunger, said last named means comprising a mounting block coaxially adjustable relative to said control plunger, a stop member for controlling the limit of travel of said control plunger threadably received in said block for adjustment relative thereto, means for effecting the coaxial adjustment of said block and stop member relative to said control plunger comprising a crank having an eccentric thereon, a journal in said block for co-operatively receiving said eccentric, means defining a fixed axis of rotation for said crank and means for turning said crank about said axis for effecting the adjustment of said stop member relative to said control plunger.

4. In a Diesel pump of the type wherein there is provided a plurality of reciprocable pump plungers for delivering liquid fuel to the respective cylinders of a Diesel engine, a plurality of corresponding reciprocable control plungers for controlling the volume of fuel delivered by said pump plungers and means for limiting the extent of movement of said control plungers, said last named means comprising a coaxially located stop member for each of said control plungers, a mounting block for supporting said stop members in adjustable relation thereto, said mounting block in turn being reciprocable in a coaxial direction relative to said control plungers, means for effecting the adjustment of said mounting block comprising an eccentric, a bearing in said block receiving said eccentric, a crank for turning said eccentric, means defining a fixed axis of rotation for said crank and means effective to turn said crank to move said block and stops coaxially relative to said control plungers.

5. In a Diesel pump of the type wherein there is provided a plurality of reciprocable pump plungers for delivering liquid fuel to the respective cylinders of a Diesel engine, a plurality of corresponding reciprocable control plungers for controlling the volume of fuel delivered by said pump plungers and means for limiting the extent of movement of said control plungers, said last named means comprising a coaxially located stop member for each of said control plungers, a mounting block for supporting said stop members in adjustable relation thereto, said mounting block in turn being reciprocable in a coaxial direction relative to said control plungers, means for effecting the adjustment of said mounting block comprising a plurality of eccentric means, a plurality of corresponding spaced bearings in said block receiving said eccentrics, a crank for each of said eccentrics for turning the same, and means for turning said cranks to produce an equal adjustment of each of said stops.

6. The structure as defined in claim 4 wherein there is provided a pair of spaced eccentric means for effecting identical adjustment of each of said stops.

7. The structure as defined in claim 4 wherein said means for operating said crank comprises a reciprocable bar and wherein said crank is formed with an operating pin thereon and said bar is slotted for cooperation with said pin, together with means defining a guide for said bar.

8. In a Diesel pump of the type wherein there is provided a reciprocable pump plunger and a

reciprocable control plunger for controlling the volume output of said pump plunger and means for determining the limit of movement of said control plunger, said last named means comprising a stop member positioned in the path of movement of said pump plunger, a supporting member for said stop member provided with a bearing, an oscillatable member journaled in said bearing, means defining a fixed supporting axis of oscillation for said last named member, said axis being eccentric to the center axis of said member, whereby the arcuate movement of said member is effective to vary the position of said stop member and means for effecting the arcuate movement of said rotatable member.

9. In a Diesel pump of the type including a reciprocable pump plunger, an auxiliary reciprocable plunger for controlling the volume output of said pump plunger, a stop member in the path of said control plunger for determining the extent of movement thereof and means for changing the position of said stop member to vary the limit of movement of said control plunger, said means comprising means defining a bearing associated with said stop member, a member having a circular portion complementary in size to and received in said bearing, means defining a fixed eccentrically disposed supporting axis for said member and means for imparting arcuate movement to said last named member about said axis to change the position of said stop member.

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