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FUEL PUMP AND GOVERNOR MECHANISM FOR OIL ENGINES

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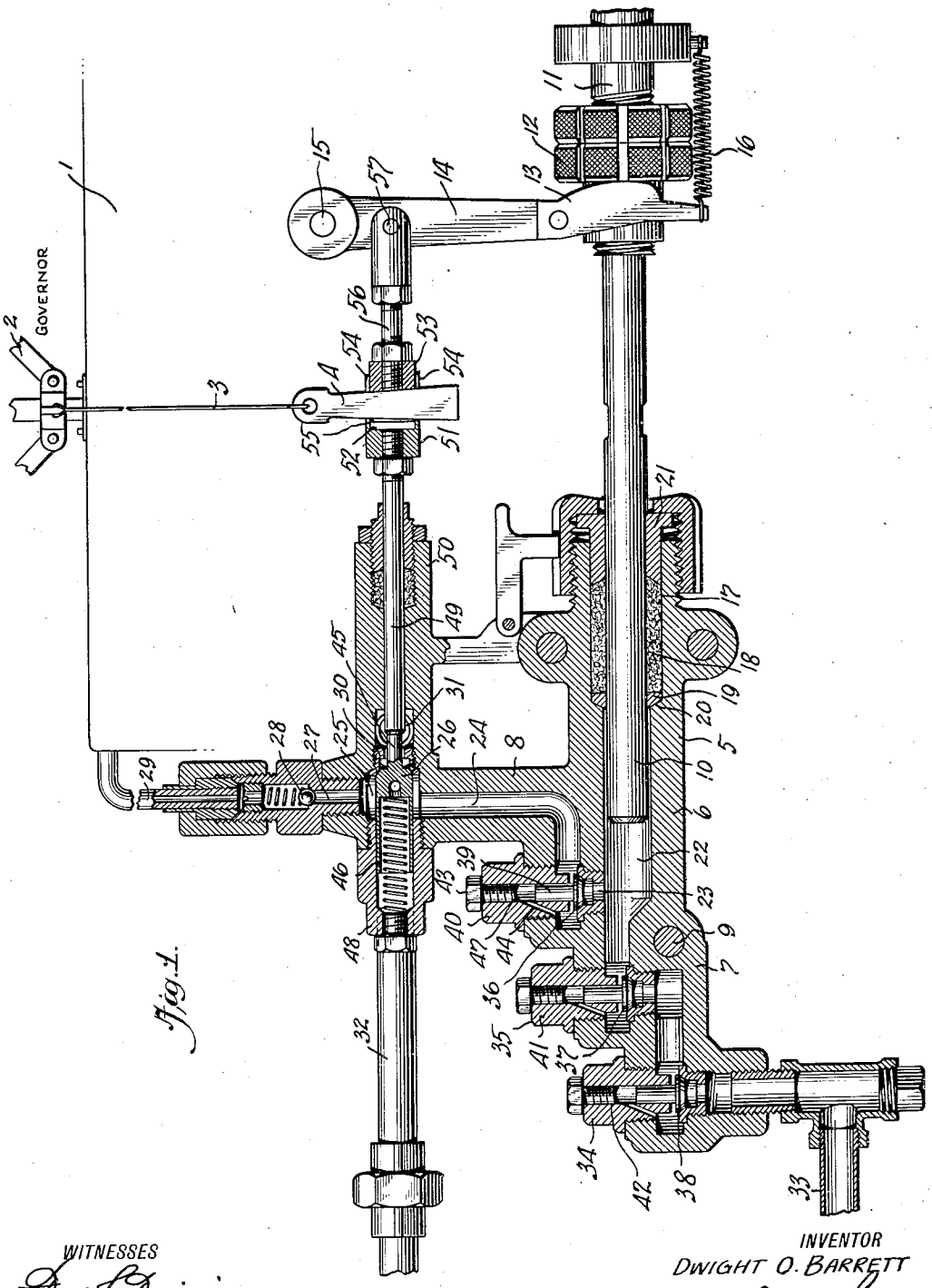


Fig. 1.

WITNESSES

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Fig. 2.

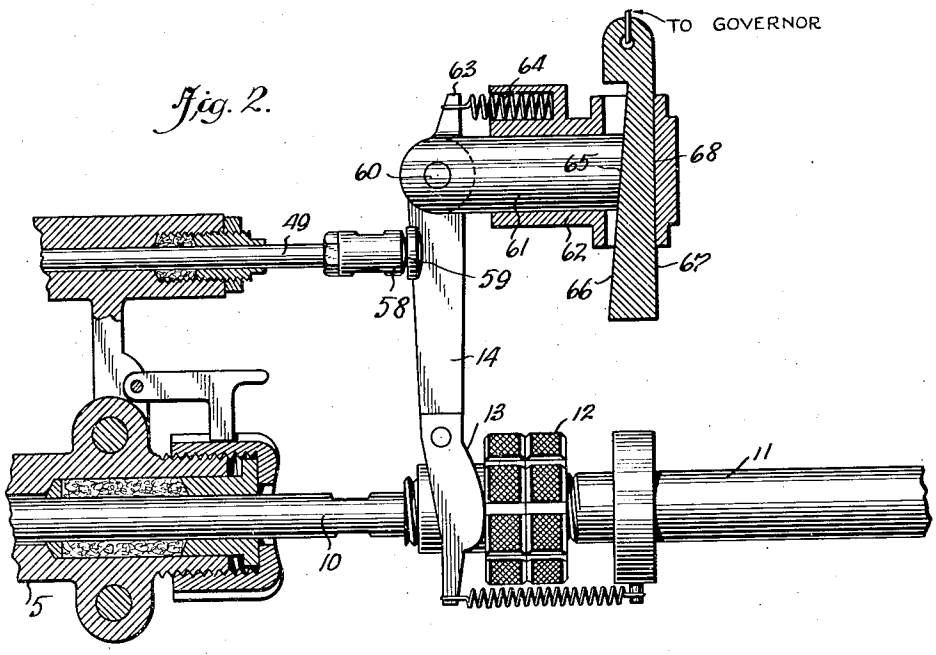
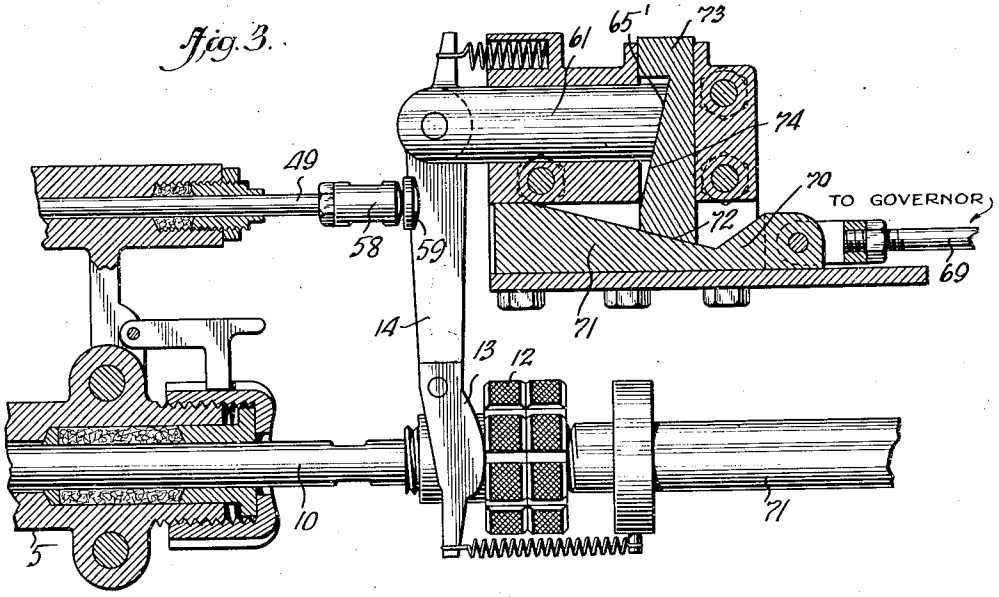


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FUEL PUMP AND GOVERNOR MECHANISM FOR OIL ENGINES.

Application filed March 5, 1924. Serial No. 697,113.

This invention relates to internal combustion engines and attachments therefor and has for an object to provide an improved construction for supplying and governing oil fed to the engine during the operation thereof.

Another object of the invention is to provide an improved injecting apparatus and timed automatic means for controlling or varying the amount of fuel injected by the injecting apparatus.

A further object of the invention is to provide an injecting device for engines of the "Diesel type" wherein the various valves are arranged to present a full opening whenever necessary.

An additional object of the invention is to provide an injecting apparatus for oil engines in which the valves and other parts are readily renewable and all moving parts are mounted in renewable supports.

A still further object is to provide an injecting pump and regulating by-pass valve with suitable associated devices whereby the amount of oil injected may be varied by a governor automatically or may be varied manually while the pump operates at a continuous even speed.

In the accompanying drawings—

Figure 1 is a sectional view through a device embodying the invention, the same being shown in connection with part of an engine and part of a governor.

Figure 2 is an enlarged sectional view showing a slight modified arrangement of governing mechanism to that shown in Figure 1.

Figure 3 is a second modified form of a governing mechanism to that shown in Figure 1.

Referring to the accompanying drawings by numeral, 1 indicates an oil engine of any kind, as for instance. a low compression or high compression Diesel engine. This engine is provided with a governor 2 of any desired type which acts to operate a rod or ligament 3 for moving the wedge 4 as hereinafter fully described.

In Figure 1, the pump 5 is shown as operating in a horizontal position but it is evident that the parts could be arranged to operate in a vertical position without departing from the spirit of the invention and that a number of re-arrangements may be used and the same results secured. Preferably, the parts are arranged so that the wedge 4 will be in a vertical position in order that it may be moved down by gravity or may be pulled upwardly by the governor 2. If desired, a spring could be connected with the wedge causing it to move downwardly though this is ordinarily not necessary as the weight of wedge is sufficient and a spring might affect the action of the governor.

The pump 5 is provided with a casing 6, which casing is formed with suitable extensions 7 and 8 in which the various valves and control mechanism are mounted. The casing 6 is secured by suitable bolts 9 to the engine or to any suitable support. The plunger 10 of the pump 5 moves horizontally and is operated by a suitable rod 11 actuated by the engine through any suitable mechanism. A nut 12 threaded on the shaft 10 acts as an adjustable bumper for the cam face 13 of the arm or fork 14, said fork being pivotally mounted at 15 on any suitable stationary support while the cam face 13 is held against the nut 12 by a suitable spring 16. It will be noted that the casing 6 is provided with an enlarged bore 17 in which suitable packing 18 is arranged and also a washer 19, said washer snugly fitting the plunger 10 though loosely mounted in bore 17. This washer presses against the shoulder 20 when the packing 18 is compressed by the packing nut 21. As the plunger 10 reciprocates it draws in oil into the chamber 22 and then expels the same through the outlet valve 23 from which it passes through the passage-way 24 of the extension 8 to the chamber 25. If the valve 26 is closed, the oil will pass inwardly through the passage-way 27 and raise the ball valve 28 so that it will flow through the pipe 29 to the engine 1. If the valve 26 is open, the oil or most of the same will pass through the valve sleeve 30 which carries a seat co-acting with the valve member 26. After passing through this sleeve the oil will pass out the opening 31 into the return or by-pass pipe 32 back to the source of supply. The pipe 33 is connected to the source of supply and the oil flows through said pipe when the plunger 10 is in its intake or suction stroke. The oil flowing into the chamber 22 of the pump 5 will first pass the inlet valve 34 and then a second inlet valve 35 before it discharges into the chamber 22. On the return or compression stroke of the plunger 10, both of the valves 34 and 35 will automatically close and the

outward valve 40 will open so that the oil must pass upwardly through passageway 24 into chamber 25. It will be noted that both of the inlet valves and the outlet valves are provided with sleeves similar to sleeve 30 which do not present guides for the various valve members 36, 37 and 38 arranged in the valves 34, 35 and 40. Each of these valve members, however, is provided with a comparatively long stem 39 fitting into respective plugs 40, 41 and 42 whereby the respective valve members are guided in their reciprocatory movement. A suitable closing threaded plug 43 is provided for each of the plugs and also a by-pass 44 is provided for each of the plugs so that an even pressure will be on both sides of the respective valve members whereby they will quickly open and also quickly close.

In connection with the valve member 26, it will be seen that this valve member is a by-pass valve member and is provided with a short stem 45 as well as with a hollowed out or chambered section 46 in which the spring 47 operates. This spring presses against the valve member 26 and against the removable plug 48 so as to normally hold the valve member on its seat. An operating stem 49 is provided for operating the by-pass valve 26, said stem being separate from the stem 45 so that an exact alignment is not necessary. The stem 49 is slidingly mounted in a suitable extension 50 projecting from extension 8 and is supplied with a suitable packing box to prevent loss of pressure. At the outer end the stem 49 is provided with a member 51 having a socket 52 in which the plug 53 is slidingly positioned. Slots 54 are also provided in member 51 so as to accommodate the wedge 4 while the plug 53 is provided with a suitable slot 55 for accommodating the wedge 4. The block 53 is connected with a rod 56 which is pivotally mounted on fork 14 by the pivotal pin 57. By sliding the wedge 4 vertically, the stem 49 may be caused to operate sooner or later and thereby cause a longer or shorter injection of oil into engine 1. When the wedge 4 is in its lowermost position, the narrowest point thereof will be engaging members 51 and 53 but the fork 14 will be swinging back and forth the usual distance and the stem 49 will not be moved sufficiently far to unseat the valve member 26 and, consequently, all of the oil pumped will be forced or injected into the engine.

When it is desired to inject a less amount, the parts may be manually actuated or the governor 2 may be set to raise the wedge 4 and, consequently, separate the blocks 51 and 53 so that as the fork 14 begins to swing its usual distance, the valve 26 at each stroke of the plunger 10 will be opened more and more. It will be noted, however, that the pump 10 will begin to force the oil through chamber 25 and into the engine 1 before the valve 26 opens unless the wedge 4 has been moved upwardly to its full upper position whereupon the valve opening 26 will take place at such an early period as to cause all of the oil being pumped to pass through the by-pass pipe 32 and, consequently, deprive the engine 1 of the entire supply of oil.

In Figure 2, a modified construction of regulating means is provided which may be substituted for that shown at the right in Figure 1. In this form of the invention, the stem 49 is provided with a bumper 58 adapted to act against the surface 59 mounted on the fork 14. This fork is pivotally mounted at 60 on a reciprocating support 61 carried by a stationary fitting 62. A projection 63 is arranged on the support 61 and a spring 64 acts thereon to force out the support 61 thus keeping the fork in contact with bumper 58 allowing freedom of movement to vertical wedge. The support 61 is provided with an inclined or cam surface 65 acting against the inclined surface 66 of wedge 67 which wedge also acts against the surface 68 of the stationary fitting 62 whereby whenever said wedge is moved the action of the stem 49 will be varied. This wedge may be actuated manually or by a governor as shown in Figure 1.

In Figure 3 a further modified form of regulating device is shown wherein the rod 69 operated by the governor extends horizontally and operates a horizontally sliding cam 70, which cam is provided with a comparatively steep cam surface 71 engaging the cam surface 72 of a cam 73. The cam 73 is also provided with a comparatively steep cam surface 74 engaging the inclined surface 68′ of the support 61. By this construction and arrangement of cams, comparatively steep cam surfaces may be used without effecting the action of the governor when the fork 14 moves. If an eccentric or some other form of mechanism was used, the back pressure oftentimes retards or otherwise effects the action of the governor as there is a continuous back pressure. In the present instance, the governor or other sifting means acts once and then the cams are stationary without any back pressure. It will be noted that the wedges are entirely free from the pump or other operating mechanism and may be operated manually or by a governor.

In certain types of engine, as for instance, marine engines, one or more pumps may be operated from one wedge provided with separate wedge surfaces for each pump and connected to a single operating mechanism. In forming the various valves, the threads for the supporting plugs are preferably cut at the same time and by the same tap as the threads for the sleeves, said tap being of the usual offset tap structure. In

this way an absolutely perfect alignment is secured with a minimum effort.

What I claim is:—

1. In a device of the character described, a valve, a valve actuating means including a pivoted arm, a reciprocating member connected to said arm, cam means for controlling the effective action of said reciprocating member on said arm to vary the effective movement of said arm so as to vary the action of the valve, and means for swinging said arm.

2. In a device of the type described, a valve, a pivoted arm for moving said valve, means for moving the pivot point of said arm, means for swinging the free end of said arm, the means for moving the pivot point of said arm comprising a pair of coacting cams, one of said cams being longitudinally movable in operation, whereby to relieve all pressure from said arm on said last named cam.

3. In a fuel feed for engines provided with a governor, a valve for controlling the feed of oil to the engine, a spring for moving said valve in one direction, a pivoted arm for moving the valve in the opposite direction, a reciprocating member for moving the pivot point of said arm, a sliding cam for moving said member in one direction, said cam being actuated by the governor of the engine, and means for swinging the free end of said arm.

4. In a fuel feed for oil engines provided with a governor, a valve for controlling the feed of oil to the engine, means for moving said valve in one direction, a pivoted arm for moving said valve in the opposite direction, a reciprocating member pivotally connected with one end of said arm, means for shifting said reciprocating member for moving the pivot point of said arm, said means including a longitudinally movable cam engaging one end of said reciprocating member, and means for swinging the free end of said arm.

5. In a fuel feed for oil engines provided with a governor, a valve for controlling the feed of oil to the engine, means for moving said valve in one direction, a pivoted arm for moving the valve in the opposite direction, a reciprocating member pivotally connected with one end of said arm, said reciprocating member having a cam face at the end opposite that connected with the arm, a longitudinally movable cam engaging said cam face acting to shift the reciprocating member longitudinally when the cam is moved in one direction, means actuated by the governor of the engine for moving said cam, and means for swinging the free end of said arm.

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