

March 23, 1937.

A. A. SNYDER

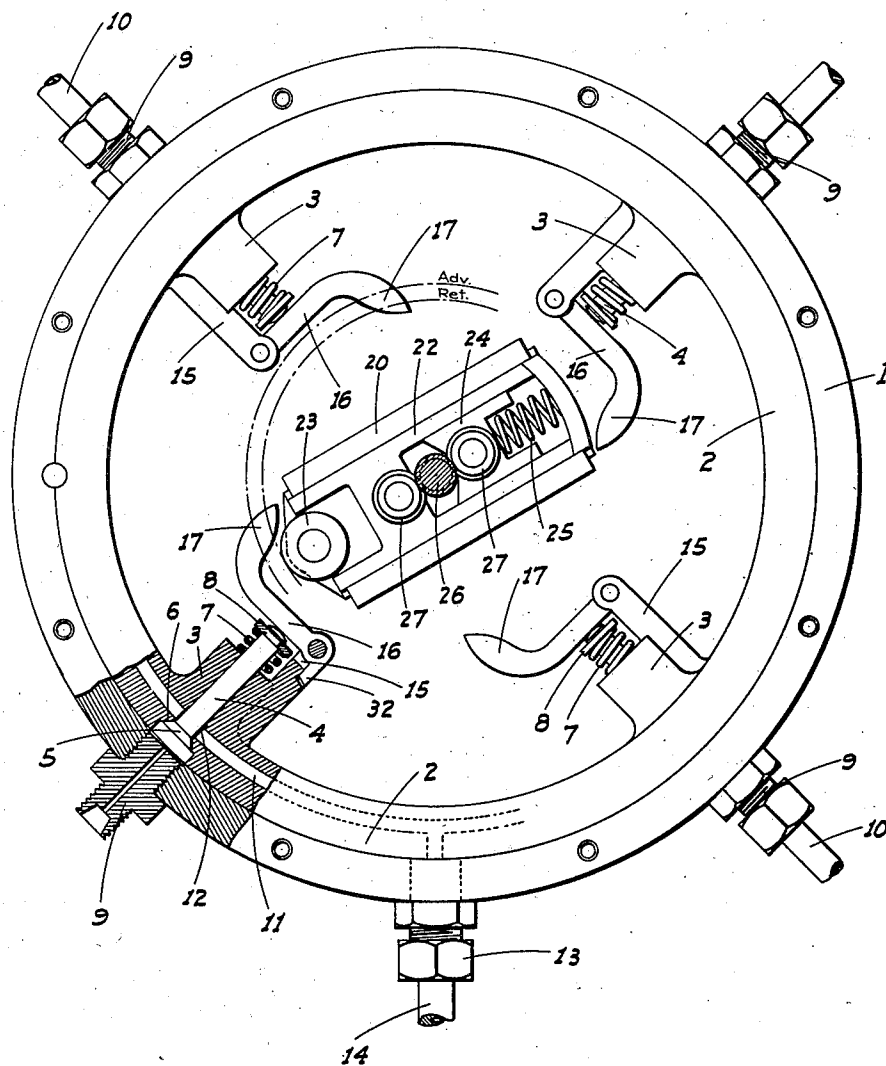
2,074,437

FUEL DISTRIBUTOR FOR DIESEL ENGINES

Filed Feb. 25, 1936

2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

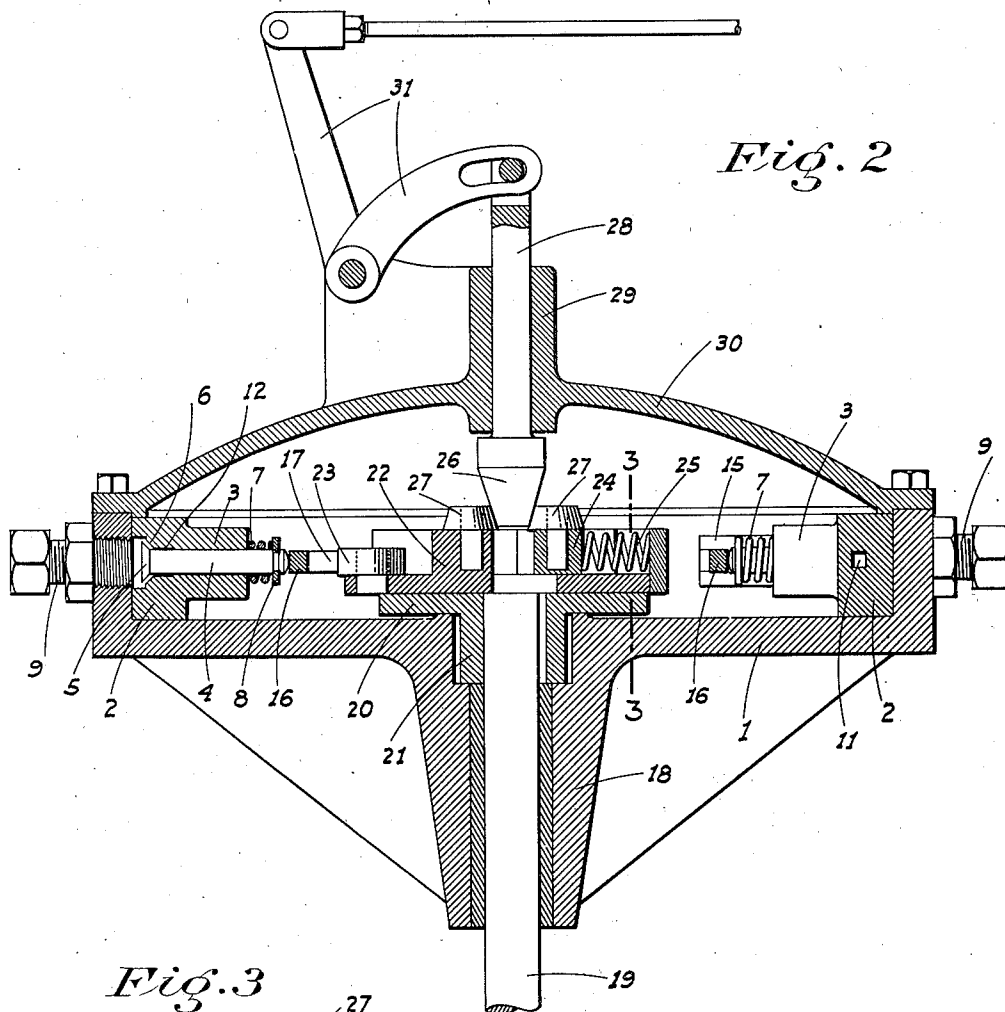
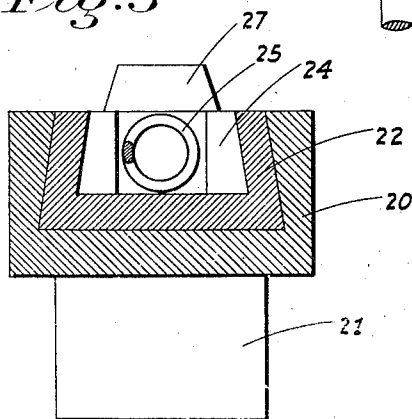


Fig. 3



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FUEL DISTRIBUTOR FOR DIESEL ENGINES

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15 Claims. (Cl. 137—145)

This invention relates to Diesel engines and particularly to a distributor for the fuel thereof.

The principal object of my invention is to provide a fuel distributing device for engines of this type constructed so that the time of feeding of the fuel to the injection valves of the engine relative to the position of the pistons at the end of the compression stroke may be varied at the will of the operator, so as to relatively advance or retard the time of firing and give the same results as regards the operation of the engine as is obtained by advancing or retarding the spark in a gasoline engine.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a top plan view of my distributor with the cover removed and partly in section.

Fig. 2 is a fuel elevation of the distributor, showing one of the fuel valves opened by the rotary arm.

Fig. 3 is an enlarged cross section of the arm taken on the line 3—3 of Figure 2.

Referring now more particularly to the characters of reference on the drawings, the distributor comprises a shell which in the form of a relatively shallow circular cup in which is pressed a ring 2 of a special alloy which avoids the need of packing glands and any parts slidably fitted therein.

The ring is provided with inwardly projecting, evenly spaced, radial bosses 3 which form guides and supports for valve stems 4; there being as many bosses and stems as there are cylinders in the engine. The outer ends of the stems just inwardly of the outer periphery of the ring are formed with valve heads 5 normally engaging seats 6. The valves are held to their seats against outward radial movement by heavy compression springs 7 about the stems between the inner end of the bosses and collars 8 on the stems. Fittings 9, connected to distributing conduits 10 are secured in the side of the shell which is in alignment with the valves so that when any valve is opened the fuel may flow into the corresponding fitting and conduit and thence to the

particular injection valve to which said conduit leads.

A circumferential passage 11 is formed in the ring, and intersects the stem bores just behind the valve seats, said bores being enlarged slightly at that point shown at 12. The passage is connected at any desired point with an intake fitting 13 mounted in the shell and connected to a feed conduit 14 in which fuel is maintained under heavy pressure by any suitable means as usual.

Pivoted at one end on lugs 15 projecting inwardly from the bosses adjacent one side of the same are levers 16, which overhang and extend beyond the stems in a substantially circumferential direction parallel to the base of the shell. At their free ends, the levers are formed with projections 17 which extend at an angle toward the center of the shell.

The shell is formed with a depending central hub or boss 18 in which is turnably mounted a shaft 19. This shaft is driven from the engine in a suitable manner at one-half, or crank shaft speed, depending on whether the engine is of the two or four cycle type. The shaft projects inside the shell and has a distributor arm unit of special adjustable form secured therein for rotation therewith.

This arm unit comprises a substantially rectangular support 20, having a depending centrally disposed hub 21 secured on the shaft. The support is of channel-shaped form in cross section, open at both ends; the inner surfaces of the side walls diverging downwardly as shown in Figure 3. Slidably mounted in the support is a member 22 forming the adjustable arm itself, and having a roller 23 mounted thereon at one end. This roller projects beyond the arm for successive engagement with the lever projections 17 as the arm rotates, said projections extending into the path of rotation of the roller as indicated in Figure 1.

Slidably within the member 22 is a block 24, with a compression spring 25 between the block and the end of the member 22 opposite the roller. A space is left between the block and the member 22 in vertical alignment with the shaft, into which space a depending cone-shaped spreader 26 projects. The spreader is axially aligned with the shaft and engages rollers 27 or the like fixed on the arm 22 and the block 24 in diametrically opposed relation to each other; the axes of these rollers being parallel to the axis of the spreader so that a minimum of friction is had as the distributor arm unit rotates about the spreader.

The spreader is mounted on a stem 28 which is slidable in a supporting boss 29, formed in a cover 30 secured on the shell 1; the stem being adjusted vertically by any suitable manually operable means such as indicated at 31.

In operation it will be seen that as the distributor arm rotates, the roller 23 successively engages the projections 17 at a fixed distance from the center of rotation as long as the spreader is held stationary. Owing to the block 24 and the spring 25, a pressure on the member 22 is exerted which counteracts the tendency of said member to move out by centrifugal force. As the roller 23 engages projection 17, it depresses the corresponding arm 16, which in turn depresses and opens the adjacent valve, allowing fuel to flow from the passage 11 into the corresponding conduit 10.

If the roller 23 is at its inmost position relative to its center of rotation, it will engage the projections 17 adjacent their inner end and the opening of the valves will take place in relatively retarded relation to the compression cycle of the engine as will be emphasized. If the spreader is depressed, the rollers 27 will spread or separate which moves the arm member 22 outwardly. The roller 23 then engages the projections 17, which extend angularly in the direction of rotation of the arm, sooner than was previously the case. This causes the valves to be opened sooner and provides for an advanced injection of the fuel into the engine with the accompanying difference in efficiency in the operation of the engine.

To limit the inward turning of the arms 16 on their pivots either when released by the roller 23 or in the event of backfire, I provide a suitable stop as indicated at 32 in Figure 1.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A fuel distributor comprising a supporting shell, a rotary distributor arm in the shell, a fuel feed passage in the shell, a plurality of fuel outlets from the shell, normally closed valves interposed between the fuel feed passage and the different outlets, stems projecting from the valves radially of and toward the arm, the valves opening with outward radial movement of the stems, stem actuating levers extending across and engaging the inner ends of the stems, means pivoting the levers at one end, the opposite end of the levers extending inwardly toward the arm at a forward angle relative to the direction of rotation of the arm, and an element on the arm to successively engage the levers adjacent said opposite end thereof and turn the levers about their pivots to cause them to depress the valve stems and open the valves.

2. A structure as in claim 1, with means to selectively move said arm element radially relative to the axis of rotation of the arm.

3. A fuel distributor comprising a supporting shell, a rotary distributor arm in the shell, a fuel feed passage in the shell, a plurality of fuel

outlets from the shell, normally closed valves interposed between the fuel feed passage and the different outlets, stems projecting from the valves radially of and toward the arm, the valves opening with outward radial movement of the stems, a radially adjustable element on the arm, and means mounted in connection with the stems and positioned for engagement by said element to cause the stems to be depressed and the valves opened in differently timed relation depending on the adjusted position of the element.

4. A fuel distributor comprising a supporting shell, a driven shaft projecting into the shell through the bottom thereof, a fuel feed passage in the shell, a plurality of fuel outlets from the shell, normally closed valves interposed between the fuel feed passage and the different outlets, stems projecting from the valves radially of and toward the shaft, the valves opening with outward radial movement of the stems, levers extending across and engaging the inner ends of the stems, means pivoting the levers at one end, the opposite end of the levers extending inwardly toward the shaft at a forward angle relative to the direction of rotation of the shaft, and an arm unit on the shaft, said unit including a radially adjustable element positioned to engage and depress said opposite end portions of the levers with the rotation of the arm.

5. A fuel distributor comprising a supporting shell, a driven shaft projecting into the shell through the bottom thereof, a fuel feed passage in the shell, a plurality of fuel outlets from the shell, normally closed valves interposed between the fuel feed passage and the different outlets, stems projecting from the valves radially of and toward the shaft, the valves opening with outward radial movement of the stems, levers extending across and engaging the inner ends of the stems, means pivoting the levers at one end, the opposite end of the levers extending inwardly toward the shaft at a forward angle relative to the direction of rotation of the shaft, and an arm unit on the shaft, said arm unit comprising a support fixed on the shaft, an arm slidable in the support radially of the shaft, a roller on the outer end of the arm to engage and depress the opposite end portions of the levers with the rotation of the arm, and means to slide said arm radially including an axially movable manually operable stem disposed in axial alinement with the shaft.

6. A fuel distributor comprising a supporting shell, a driven shaft projecting into the shell through the bottom thereof, a fuel feed passage in the shell, a plurality of fuel outlets from the shell, normally closed valves interposed between the fuel feed passage and the different outlets, stems projecting from the valves radially of and toward the shaft, the valves opening with outward radial movement of the stems, levers extending across and engaging the inner ends of the stems, means pivoting the levers at one end, the opposite end of the levers extending inwardly toward the shaft at a forward angle relative to the direction of rotation of the shaft, and an arm unit on the shaft, said arm unit comprising a support fixed on the shaft, an arm slidable in the support radially of the shaft, a roller on the outer end of the arm to engage and depress the opposite end portions of the levers with the rotation of the arm, another roller on the arm disposed with its axis parallel to the shaft and to one side of the axis thereof, and in a radial line with the first named roller, a cone-shaped mem-

ber disposed in axial alinement with the shaft and bearing against said last named roller and manual means to shift said cone-shaped member axially.

7. A structure as in claim 6, with means functioning to hold said last named roller against the cone member and counteracting centrifugal action tending to move said arm outwardly.

8. A structure as in claim 6, with another roller engaging the cone member on the opposite side, a block on which said other roller is mounted slidable in the arm, and spring means between the arm and block acting to resist outward movement of the arm.

9. A structure as in claim 6, with another roller engaging the cone member on the opposite side, a block on which said other roller is mounted slidable in the arm, and a compression spring between the end of the block opposite the roller thereon and the adjacent end of the arm.

10. A structure as in claim 6, in which said manual means comprises a stem on and projecting from the cone-shaped member in a direction opposite to the shaft, a member secured on the shell in which the stem is supported, and manually controlled means between the member and stem to move the latter axially.

11. A fuel distributor comprising a body member provided with a fuel feed passage and a plurality of fuel outlets leading therefrom, normally closed valves for said outlets arranged about a circle, depressible stems projecting from the valves, a rotary distributor arm mounted axially of said valve circle, and means to successively depress the stems with the rotation of the arm and including an element on the arm adjustable axially of the stems.

12. A fuel distributor comprising a body member provided with a fuel feed passage and a plurality of fuel outlets leading therefrom, normally closed valves for said outlets arranged about a

circle, depressible stems projecting from the valves, a rotary distributor arm mounted axially of said valve circle, and means to successively depress the stems with the rotation of the arm and including an element on the arm and manually controlled means to adjust said element axially of the stems without affecting the position and movement of the arms.

13. A fuel distributor comprising a body member provided with a fuel feed passage and a plurality of fuel outlets leading therefrom, normally closed valves for said outlets arranged about a circle, depressible stems projecting from the valves, a rotary distributor arm mounted axially of said valve circle beyond the stems, stem actuating levers extending across and engaging the ends of the stems, means pivoting the levers at one end, the opposite ends of the levers extending toward the arm at a forward angle relative to the direction of rotation of the arm, and an element on the arm to successively engage the levers adjacent said opposite end thereof to turn said levers about their pivots to cause them to depress the valve stems and open the valves.

14. A structure as in claim 13, with manually controlled means to adjust said element in a direction axially of the stems.

15. A fuel distributor comprising a body member provided with a fuel feed passage and a plurality of fuel outlets leading therefrom, normally closed valves for said outlets arranged about a circle, depressible stems projecting from the valves, a rotary distributor arm mounted axially of said valve circle, an element on the arm adjustable axially of the stems, and means mounted in connection with the stems and positioned for engagement by said element to cause the stems to be depressed and the valves opened in differently timed relation depending on the adjusted position of the element.

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