April 30, 1946. A. L. PARKER 2,399,245

FLUID DISPENSING DEVICE

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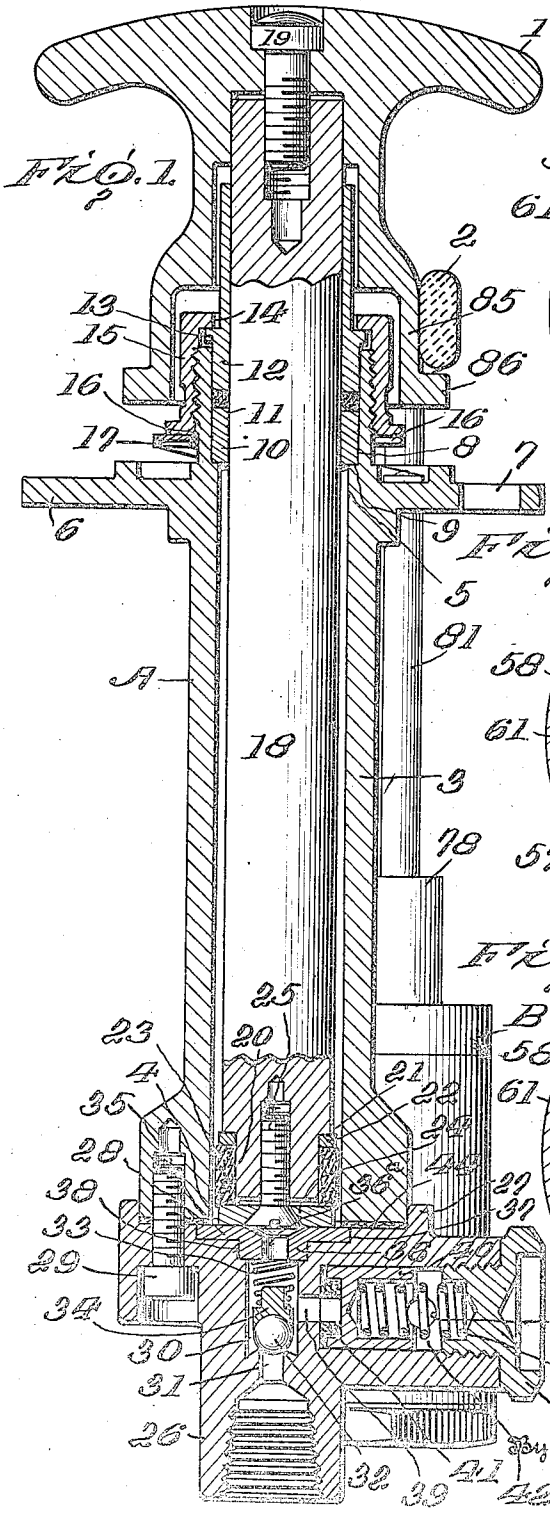


Fig. 1.

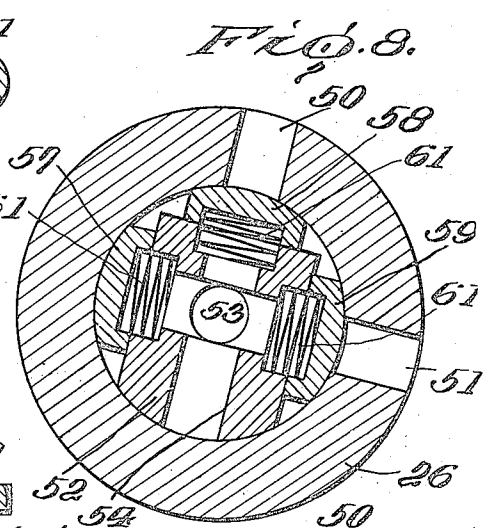


Fig. 8.

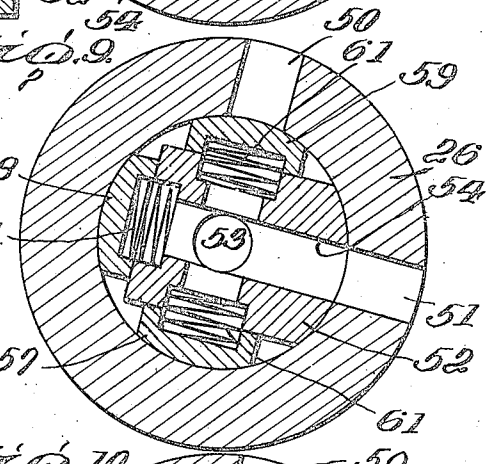


Fig. 9.

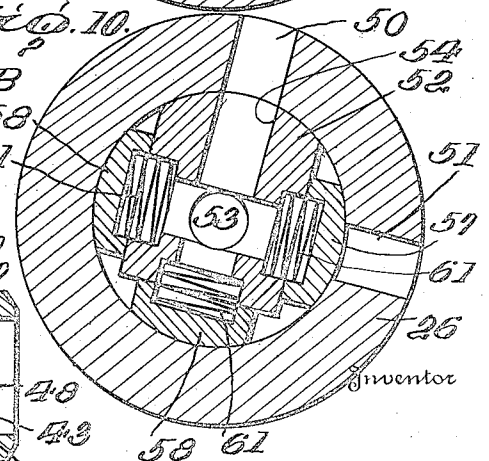


Fig. 10.

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FIG. 2.

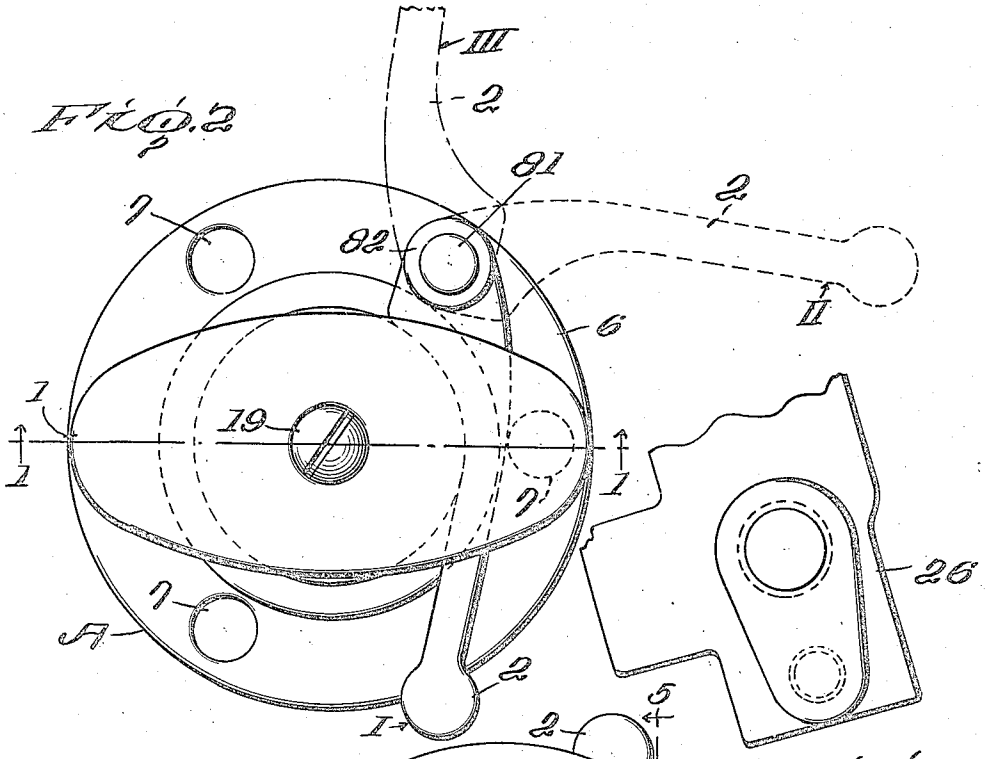
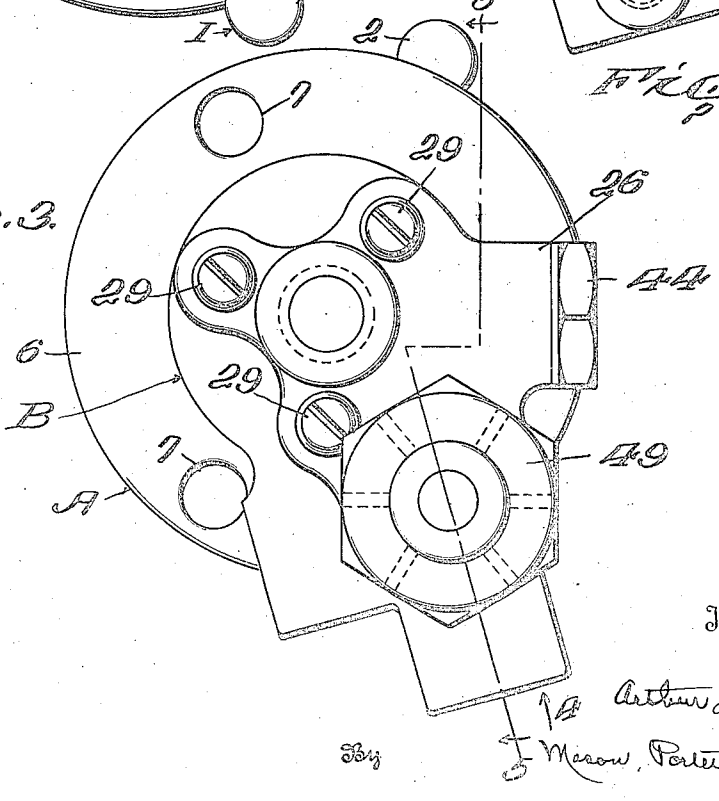


FIG. 4.

FIG. 3.



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FLUID DISPENSING DEVICE

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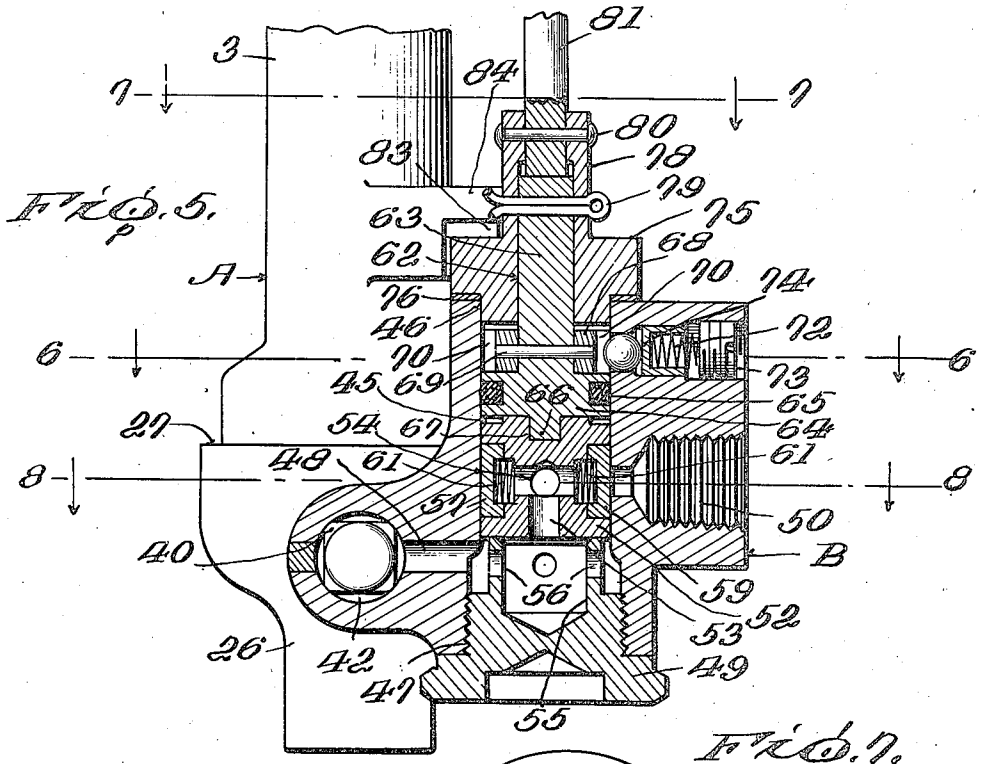


FIG. 5.

FIG. 7.

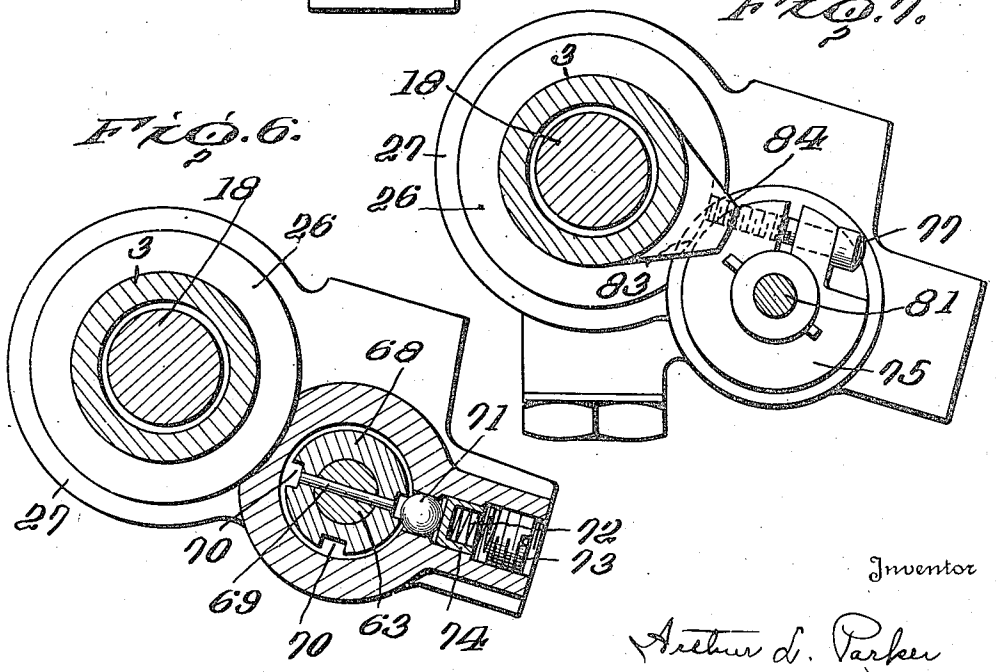


FIG. 6.

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Patented Apr. 30, 1946 2,399,245

UNITED STATES PATENT OFFICE

2,399,245

FLUID DISPENSING DEVICE

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Application February 10, 1944, Serial No. 521,864

11 Claims. (Cl. 103—2)

This invention relates to fluid dispensing devices and more particularly to dispensing devices for controlling the delivery of fluid from a pressure source, for example a pump, to one or more selected points for use. Devices embodying the invention are particularly adapted for operation as primers for internal combustion engines.

United States patents to Arthur L. Parker Numbers 1,934,878 and 1,942,255 granted November 14, 1933, and January 2, 1934, respectively, disclose prior dispensing devices of the class to which the present invention relates. In these patented constructions a pump piston is provided with means whereby at the end of its compression stroke the piston may be connected to a distributing valve arranged to turn about the axis of the piston so as to direct the pump discharge to selected points for use. In accordance with one feature of the present invention, a distributor valve mechanism may be arranged alongside a pump cylinder, and the setting of the valve or valves to permit or prevent flow of fluid may be effected by operation of a handle or the like preferably arranged to operate near the pump piston. The construction disclosed herein has some features which, in a very broad sense, are similar to features of construction disclosed and claimed in the co-pending application of Arthur L. Parker, Robert H. Davies, and Joseph F. Melichar, Ser. No. 467,196, filed November 22, 1942.

An object of the present invention is to provide a fluid dispensing device, e. g. an engine primer, embodying new and improved features of construction making it certain and efficient in operation and suiting it for exacting duties, for example the priming of aircraft engines to insure quick starting.

Another object of the invention is to provide a device of the character referred to including an improved means for locking the pump against operation.

Another object of the invention is to provide a device of the character described including a pump cylinder and distributor valve body detachably assembled in a novel way, the valve body being adapted to be fitted to or removed from the pump cylinder by relative movement of the valve body longitudinally or axially with respect to the cylinder.

Another object of the invention is to provide a device of the character referred to in which a distributor valve element, for example a rotor, is so mounted in the valve body and so connected to a valve operating handle as to facilitate removal of the valve assembly as a unit from the pump cylinder and piston assembly.

Another object of the invention is to provide a device of the character described in which the movable distributor valve element is readily accessible and easily removable for repairs or adjustments.

Another object of the invention is to provide a novel and improved distributor valve construction.

A further object of the invention is to provide a distributor valve including a rotor equipped with outwardly pressed, circumferentially spaced sealing members adapted to control the flow of fluid selectively through a plurality of discharge ports.

Other objects will become apparent from a reading of the following detailed description, the appended claims, and the accompanying drawings.

In the drawings:

Figure 1 is an axial longitudinal sectional view of a device embodying the invention, the section being taken on the line 1—1 of Figure 2.

Figure 2 is a top plan view.

Figure 3 is a bottom plan view.

Figure 4 is a fragmentary elevation looking in the direction of the arrow 4 in Figure 3.

Figure 5 is a section on the irregular line 5—5 of Figure 3.

Figure 6 is a cross section on the line 6—6 of Figure 5.

Figure 7 is a cross section on the line 7—7 of Figure 5.

Figures 8, 9, and 10 are detail cross sectional views on the line 8—8 of Figure 5 and respectively showing a valve rotor in different positions.

A preferred embodiment of the invention shown in the accompanying drawings comprises a fluid dispensing device adapted to direct fluid under pressure selectively to two points for use or to cut off the supply of fluid entirely. The device includes a pump generally designated A and a distributor device generally designated B detachably mounted on the pump. The pump is adapted to be operated manually by a handle 1 and the distributor device is controlled by a handle 2 positioned close to the pump handle 1 so that the pump and distributor may easily be operated co-relatively.

The pump A includes a barrel or cylinder 3 open at its inner and outer ends 4 and 5 respectively. A flange 6 integral with the cylinder 3 adjacent its outer end 5 is provided with openings 7 for mounting the dispensing device on an

instrument panel or like support. The outer end 5 of the cylinder is counterbored as at 8 to form a resultant shoulder 9. A bushing 10 in the counterbore 8 abuts the shoulder 9 and has a flat edge engaged by a packing 11 held in place by a bushing 12. The bushing 12 is flanged at 13 to be drawn up by a flange 14 on a nut 15 which has threaded engagement with the cylinder barrel 3. The nut 15 is formed with serrations 16 engageable with a spring finger detent 17 for holding the nut against accidental turning.

The pump also includes a movable plunger element 18 which extends outwardly beyond the cylinder end 5 for receiving the handle 1 held in place by a screw 19. The inner end of the plunger is reduced as at 20 to provide a shoulder 21. A washer 22 surrounding the reduced plunger portion 20 abuts against the shoulder 21 and is of slightly greater diameter than the plunger proper but is of considerably less diameter than the wall of the cylinder 3. A bearing member 23 which preferably is of non-metallic material, such as laminated linen base phenolic resin, is mounted on the plunger reduced portion 20 and is clamped between the washer 22 and another washer 24 drawn toward the inner end of the plunger by a screw 25. The washer 24 is of about the same diameter as the washer 22 but the bearing member 23 is of considerably larger diameter so as to be engageable with the wall of the cylinder 3 for guiding the inner end of the plunger. However, the bearing member 23 is rather loosely fitted within the cylinder, there being sufficient working clearance to prevent trapping of liquid or air in the annular chamber surrounding the plunger.

The distributor device B includes a casing or valve body 26 formed with a flange 27 adapted to be fitted over the inner end of the cylinder by relative axial movement of the body 26 with respect to the cylinder 3. A washer 28 is interposed between the inner end face of the cylinder and the valve body 26 so as to seal the joint between the cylinder and valve body when the latter is drawn toward the cylinder by three screws 29.

The valve body 26 is formed with a chamber 30 adapted to receive fluid through an intake port 31 connected to any suitable source of supply (not shown). The port 31 is controlled by a ball valve 32 urged on its seat by a spring 33 interposed between a spring follower 34 and a spring abutment member or plate 35 clamped between the cylinder barrel 3 and valve body 26. The abutment plate 35 is formed with a boss 36 having a passage aperture 36a leading from the cylinder to the valve chamber 30. The plate 35 fits in a depression 37 in the valve body 26 and the boss 36 extends into a valve body counterbore 38.

Extending laterally from the chamber 30 is an outlet port 39 controlled by a piston valve element 40 equipped with a rubber facing washer 41. The valve element 40 is reciprocable in a valve chamber 42 and is urged against its seat by a spring 43 interposed between a spring seat plug 44 and the valve element. As shown in Figure 5 the valve element 40 is generally square in cross section but has rounded corners or edges in sliding engagement with the walls of the chamber 42. Thus, when the element 40 is lifted from its seat fluid can pass out through the port 39 and thence through the spaces between the flat sides of the valve element and the walls of the chamber 42.

In operation, when the pump piston 18 is moved outwardly the intake valve ball 32 will be moved off its seat by suction in the cylinder and fluid will be drawn into the cylinder through the intake port 31, the chamber 30 and the passage 36a. At this time the valve element 40 will be held on its seat by the spring 43. When the plunger is moved inwardly the ball valve 32 will become seated and the fluid under pressure will open the spring-held outlet valve 40 so as to permit fluid to be forced out through the port 39 and past the valve element 40.

As shown in Figure 5, a bore 45 extends completely through the valve body 26 alongside of and parallel to the axis of the pump cylinder and is open at both of its ends 46 and 47. A cross passage 48 extends from the chamber 42 to the interior of the bore 45. The adjacent end of the bore 45 is closed by a cap 49.

Discharge ports extending through the valve body 26 open laterally into the bore 45 at circumferentially spaced points. In the form shown there are two such ports 50 and 51 (see Figures 5, 8, 9 and 10) spaced ninety degrees apart and opening laterally into the bore 45. For controlling the delivery of pressure fluid through the discharge ports, a rotor element 52 is mounted to turn in the bore 45 in the zone of the passages 50 and 51. The rotor is formed with a longitudinally extending passage 53 communicating at its inner end with a passage 54 extending laterally to the outside of the valve element 52. The closure cap 49 acts as an abutment for holding the rotor 52 against axial movement toward the adjacent end of the body 26 and is formed with an axial bore 55 and with radial openings 56 which enable fluid discharged through the cross passage 48 to flow into the longitudinal passage 53 in the rotor.

The position of the rotor 52 in the bore 45 determines whether fluid discharged by the pump is to be delivered through the discharge port 50, or the discharge port 51, or is prevented from being delivered through either discharge port. For obtaining such a selective control the rotor 52 is provided with three cup-shaped pressure members 57, 58, 59, preferably formed of graphitic material and each being restrained from longitudinal and rotary movement with respect to the rotor. The pressure members have curved outer faces conforming to the wall of the bore 45 and are urged outwardly into sealing engagement with the bore wall by springs 61. In the illustrated embodiment three pressure members are shown as being spaced circumferentially at intervals of ninety degrees. By referring to Figures 8, 9 and 10 it can readily be seen that the rotor 52, when moved to three selective positions, will condition the distributor device for delivery of pumped fluid through either of the discharge ports or will prevent delivery of fluid entirely. Thus, with the rotor position as shown in Figure 8 the ports 50 and 51 are covered respectively by the pressure members 58 and 59 so that no fluid can be delivered at all. With the rotor 52 positioned as shown in Figure 9, the lateral passage 54 registers with the discharge port 51 so that fluid can be delivered through the latter. At this time the other discharge port 50 is covered by the pressure member 59. When the rotor is positioned as shown in Figure 10 fluid can be delivered through the lateral passage 54 and the discharge port 50, the port 51 being sealed off by the pressure member 57 which covers it.

Means readily accessible to the operator are provided for moving the valve rotor 52 to its several positions. A coupling member 62 formed with a shank 63 has a ring portion 64 rotatable in the bore 45, the ring portion preferably being

provided with packing 65 in sealing engagement with the bore wall. A tongue 66 on the shank 63 extends into a groove 67 in the valve rotor for providing detachable end-to-end connection between the coupling member 62 and the rotor 52. An indexing ring 68 pinned to the shank 63 as at 69 is formed with three depressions or recesses 70 adapted selectively to receive a detent ball 71 urged inwardly by a spring 72 interposed between an abutment plug 73 and a spring follower 74 engaging the ball 71. The recesses 70 are so located with respect to the lateral passage 54 in the valve rotor and the pressure members 57, 58 and 59 that the ball 71 will be received in one of the recesses 70 when the valve rotor is in each of the positions shown in Figures 8, 9 and 10. Thus the spring pressed ball 71 and indexing ring 68 releasably hold the valve rotor against angular displacement from any of its selected set positions.

A split collar 75 mounted on the shank 63 of the coupling member 62 abuts against a washer 76 which in turn abuts the adjacent end face of the valve body 26. The collar 75 is drawn tight on the shank 63 by a clamping screw 77. The collar has a sleeve extension 78 pinned as at 79 to the shank 63 and riveted as at 80 to a valve operating stem 81 which extends through a bearing 82 in the pump barrel flange 6. The valve handle 2, which preferably is of molded plastic, is mounted on the outer end of the stem 81 on the side of the flange 6 opposite the distributor device B. The flange 6 provides a bearing for supporting the stem 81 against lateral movement while permitting free turning of the stem to effect adjustments of the valve rotor 52.

Counterclockwise rotation of the stem 81 and valve rotor 52 is limited by engagement of the end of the clamping screw 77 with a stop lug 83 on the pump barrel 3. A wing 84 on the pump barrel overlaps the collar 75 so as to prevent the collar and operating members 62 from being withdrawn inadvertently from coupled engagement with the valve rotor 52.

If it is desired to service the distributor device the clamping screw 77 is loosened and the pin 79 is removed to uncouple the operating member 62 from the collar 75 and stem 81. The screws 29 are then taken out and the valve body 26 is moved endwise away from the cylinder 3. Because of the pressure exerted by the detent ball 71 the coupling member 62 will remain in the valve body 26 but can easily be withdrawn therefrom merely by overcoming the yielding holding pressure of the ball 71. By removing the closure cap 49 the valve rotor 52 will be made easily accessible. Thus, the distributor device can be detached for adjustment or repair without disturbing the mounting of the pump and the valve operating stem 81 on the instrument panel or other support.

Figure 2 indicates the three positions to which the valve operating handle 2 may be moved to set the valve rotor 52 either to cut off delivery entirely, or to deliver fluid through the port 50, or to deliver fluid through the port 51. When the handle 2 is in the full line position designated I, the valve rotor 52 will be set as shown in Figure 8 so that there can be no delivery of fluid through either discharge port 50 or 51. The handle position indicated at II corresponds to the position of the rotor 52 shown in Figure 9 wherein pumped fluid will be delivered through the discharge port 51, and the handle position designated III corresponds to the position of the valve rotor shown in Figure 10 in which the parts are co-related to enable fluid to be delivered through the port 50.

The pump handle 1 is formed with a skirt 85 adapted to extend over the outer end 5 of the cylinder and the gland nut 15 when the plunger 18 is in its innermost position. In order that the pump plunger will be locked against operation when the distributor valve rotor 52 is in the cut-off position shown in Figure 8, the laterally projecting valve adjusting handle 2 is arranged to extend over or to overlap a flange 86 on the skirt 85 as shown in Figure 1. Withdrawal of the pump plunger 18 is prevented by engagement of the skirt flange 86 and valve adjusting handle 2.

The dispensing device disclosed herein embodies the invention in a preferred form but it will be understood that changes may be made without departing from the invention as defined in the claims.

I claim:

1. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end; a flange on said valve body circumferentially engaging said cylinder at the open end thereof and being adapted to be fitted to and detached from said cylinder by relative movement of said valve body axially of said cylinder; means for detachably fastening said valve body to said cylinder; valve mechanism carried by said valve body; and an apertured abutment member clamped between said open end of said cylinder and said valve body for retaining said valve mechanism in operative position in said valve body.

2. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a distributor valve element movable in said valve body; an operating stem extending substantially parallel to and alongside said cylinder; and means detachably connecting said operating stem to said valve element, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve element can be moved endwise away from said cylinder and said operating stem.

3. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a distributor valve element movable in said valve body; an operating stem extending substantially parallel to and alongside said cylinder; bearing means fixed with respect to said cylinder and mounting said operating stem for valve adjusting movements; and means detachably connecting said operating stem to said valve element, the arrangement being such that when said fastening means and said connect-

ing means are released said valve body and valve element can be moved endwise away from said cylinder and said operating stem while said operating stem is still mounted by said bearing means.

4. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a distributor valve element rotatable in said valve body; an operating stem extending substantially parallel to and alongside said cylinder; a flange on said cylinder formed with a bearing for mounting said operating stem to turn; and means detachably connecting said operating stem to said valve element, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve element can be moved endwise away from said cylinder and said operating stem while said operating stem is still mounted in said bearing.

5. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a bore in said valve body communicating with said chamber; a discharge port opening through said body laterally into said bore; a valve rotor rotatable in said bore in the zone of said discharge port; a longitudinal passage in said rotor communicating with said bore; a lateral passage in said rotor extending from said longitudinal passage to the outside of said rotor and being adapted, in one position of said rotor, to communicate with said port; a pressure member interposed between said rotor and the wall of said bore; a spring interposed between said rotor and said pressure member for urging said pressure member into contact with said wall; an operating stem extending substantially parallel to and alongside said cylinder; and means detachably connecting said operating stem to said valve rotor, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve rotor can be moved endwise away from said cylinder and said operating stem.

6. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a bore in said valve body communicating with said chamber; a discharge port opening through said body laterally into said bore; a valve rotor rotatable in said bore in the zone of said discharge port; a longitudinal passage in said rotor communicating with said bore; a lateral passage in said rotor extending from said longitudinal passage to the outside of said rotor and being adapted, in one position of said rotor, to communicate with said port; a pressure member interposed between said rotor and the wall of said bore and being adapted, in a different position of said rotor, to cover said port; and an opening in said rotor extending between said longitudinal passage and the radially inner face of said pressure member whereby said pressure member will be forced against the bore wall by fluid pressure; an operating stem extending substantially parallel to and alongside said cylinder; and means detachably connecting said operating stem to said valve rotor, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve rotor can be moved endwise away from said cylinder and said operating stem.

7. Combination as set forth in claim 6 which includes, for holding the valve rotor against axial movement in one direction, a plug mounted in one end of the valve bore and abutting an end of the valve rotor, said plug having an axial bore communicating with the longitudinal passage in the rotor, and a radial opening providing communication between said axial bore and said chamber.

8. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a distributor valve element movable in said valve body; an operating stem extending substantially parallel to and alongside said cylinder; a lug projecting laterally from said cylinder and spaced axially from an end of said valve body; a collar on said stem extending between said lug and said end of the valve body for limiting endwise movement of said stem; and means detachably connecting said operating stem to said valve element, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve element can be moved endwise away from said cylinder and said operating stem.

9. In a fluid dispensing device, a pump cylinder open at one of its ends; plunger means extending through the opposite end of said cylinder; a valve body mounted against said open end of said cylinder and having a chamber communicating with said cylinder open end, said valve body being removable from said cylinder by relative movement axially with respect to the cylinder; means for detachably fastening said valve body to said cylinder; a valve bore in said valve body parallel to the cylinder axis; a valved passage extending transversely from said chamber to said valve bore; a distributor valve element rotatable in said valve bore; an operating stem extending substantially parallel to and alongside said cylinder; and means detachably connecting said operating stem to said valve element, the arrangement being such that when said fastening means and said connecting means are released said valve body and valve element can be moved endwise away from said cylinder and said operating stem.

10. In a fluid dispensing device, a pump including a cylinder and a plunger reciprocable therein; a valve body on said cylinder formed with a bore extending parallel to the cylinder axis and spaced

laterally from the cylinder; means providing valved communication between said cylinder and said bore; a discharge port opening laterally through said body into said bore; a rotor in said bore for controlling flow of fluid out through said port; a rotatable valve operating member extending into said bore at one end thereof; an end-to-end detachable connection between said member and said rotor; a split collar on said member cooperable with said valve body for limiting movement of said member axially into said bore; a clamping screw for drawing said collar tight on said member; and a stop on the outside of said cylinder engageable by an end of said screw for limiting rotation of said member and said rotor in one direction.

11. In a fluid distributing device, a cylinder; a plunger reciprocable therein; an operating handle on an end of said plunger extended beyond one end of said cylinder; a skirt on said handle adapted to move over said end of said cylinder when the plunger is in its innermost position in said cylinder; a peripheral flange on said skirt; a distributor valve including a bore extending alongside said cylinder and a valve rotor rotatable in said bore; a rotatable valve operating stem extending alongside said cylinder; and means projecting laterally from said stem and being adapted to overlie said flange when said plunger is in its innermost position and said valve rotor is in a predetermined position to thereby hold said plunger against operation.

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