

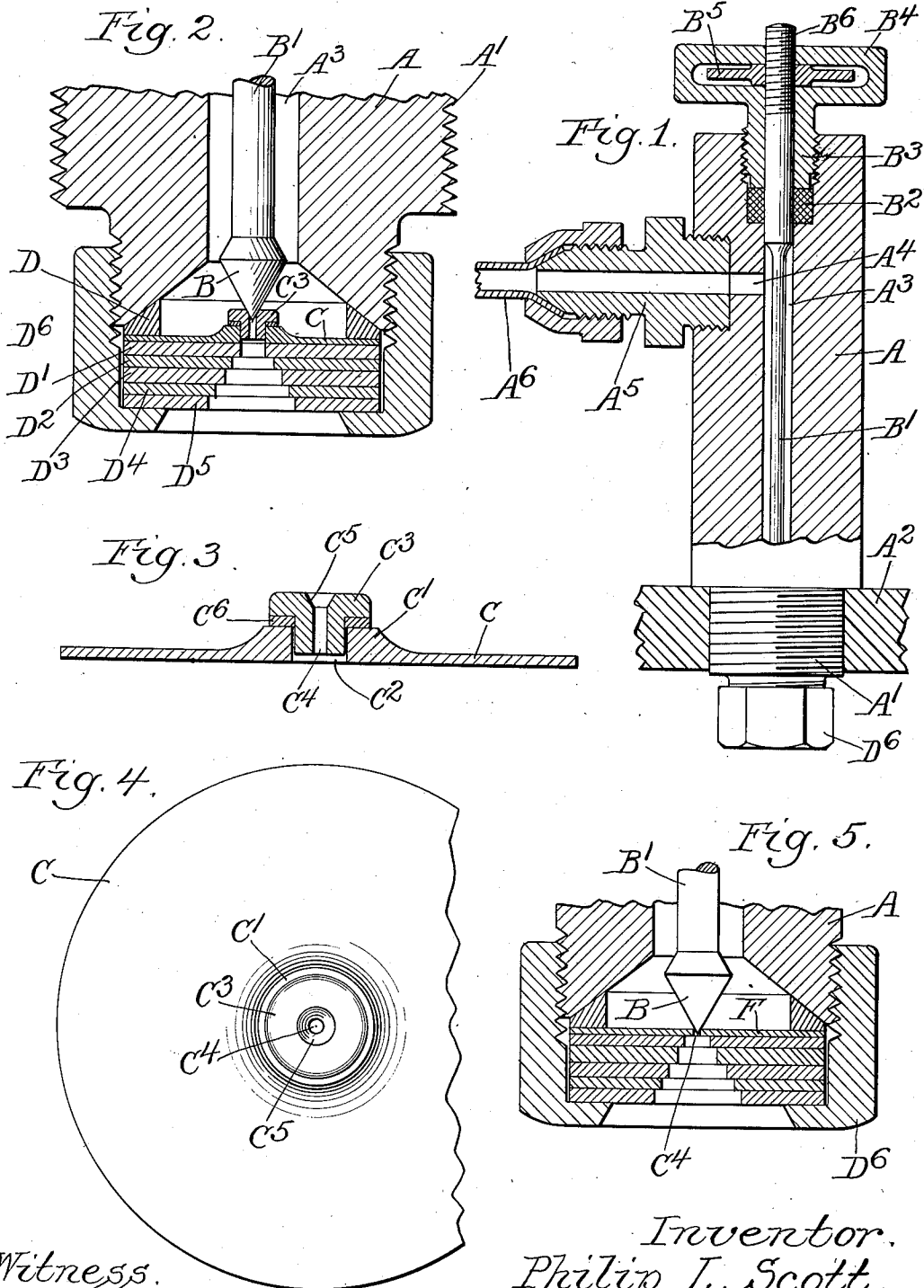
June 15, 1926.

1,589,241

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ATOMIZER

Original Filed May 6, 1921



Witness.

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ATOMIZER.

Application filed May 6, 1921, Serial No. 467,247. Renewed January 6, 1926.

My invention relates to improvements in atomizers and is illustrated for the purpose of convenience as applied to an atomizing valve which may be used in connection with the injection and atomization of fuel for internal combustion engines.

My invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a section in part elevation of the atomizing valve assembly;

Figure 2 is a detail section on a large scale through the spray nozzle itself;

Figure 3 is a detail section on a large scale of a part of the spray nozzle;

Figure 4 is a plan view of the part shown in Figure 33;

Figure 5 is a modified form in which the separable plug is dispensed with;

A is the body of the valve housing. It is screw threaded at A' and adapted to be screw threaded into the wall of the engine cylinder A² though obviously it might be held in position by other means and it will be understood that the cylinder wall A² serves as a support for the nozzle. The valve body A has an inner cylinder liquid passage A³ axially disposed and communicating with the radial passage A⁴ which in turn communicates with the nozzle A⁵ adapted to be screw-threaded into a pipe A⁶ through which the liquid or fuel to be atomized is forced into the interior of the valve.

B is a needle valve mounted on a valve stem B' located within the liquid passage A³. This valve stem is enlarged at its upper end substantially to fit the bore of the liquid passage. B² is a compression packing surrounding the stem and held in place by a gland B³ screw threaded into the valve housing. This gland carries a yoke B⁴ in which is mounted the hand wheel B⁵ which wheel is screw threaded on the upper end of the valve stem B³ so that the operator may rotate the hand wheel, displace the valve stem longitudinally.

C is a supporting plate having a central boss C' apertured as at C². C³ is an insert plug having downwardly extending skirt located within the aperture C². It is perforated as at C⁴ and the needle valve B is adapted to rest upon the valve seat C⁵. C⁶ is a packing washer of any suitable metal or any other packing material adapted to

be compressed between the flange of the insert plug and the boss C'.

D is a packing ring interposed between the plate C and the conical end of the valve housing A. D', D², D³, D⁴, and D⁵ are apertured spring discs supporting the plate C and all of them held in position and tightened up against the end of the valve housing by the nut D⁶, screw threaded on the end of the valve housing. These discs may be of various thicknesses and of different kinds of material depending on the conditions to be met and the kind of work to be done. The apertures in them are progressively enlarged so that the spray jet passing out through the plug C³ will not come in contact with the walls of the conical passage thus formed. These discs all of them, operate together as an exceedingly stiff leaf or laminated spring and each disc is adapted to carry a part of the initial compression load imposed upon the spring assembly by the downward pressure of the needle valve upon the plug.

In operation, the hand wheel is tightened up so as to exert pressure between the needle valve and its seat and tends to set up an initial load upon these spring disc members, and close the valve spring pressure.

The needle valve and the plug are both of exceedingly hard and durable material. The supporting discs serve as springs to support this plug and the single supporting disc which contains the plug is much thinner than any of these discs and tends to act more as a packing or supporting element for the plug than as a spring element itself though under some conditions it might be desirable for the disc to have a spring action.

These discs might all be of the same thickness or might be of various thicknesses, or of various materials, the idea being that it may under some conditions, be desirable to have spring discs whose characteristics are different so that under varying conditions, the ultimate or total effect is substantially the same.

The idea is that for a given deflection the thinner the disc, the lower the stress and although the valve operates on exceedingly minute deflections still the pressures are likely to be so high and the temperatures are likely to be so high and the reversals in pressures are of such high frequency, that it is desirable to use a plurality of discs in which

the stresses are exceedingly low in proportion to the elastic limit in order to obtain long life.

In operation, liquid and in this case, fuel, is forced into the valve housing by a pump or any other suitable means at pressures high enough to overcome the initial tension of the laminated spring disc, and unseat the valve sufficiently to permit the liquid to be forced out between the needle valve and the seat on the plug and be sprayed out of the nozzle.

My invention includes the use of any suitable pump or any reciprocating or continuously acting means for forcing a pulsating or a continuous stream of liquid into and through the nozzle. When a pulsating stream is discharged, the pressure is first built up to unseat the valve and cause a jet of atomized liquid to rush out and then drop down to allow the valve to close and then build up again, the process being a continuous one made up of a series of intermittent impulses extending over a long period of time.

In the modified form shown in Figure 5, the upper plate F is substituted for the plate C and plug C³. In this case, I have shown a flat plate without any boss or anything else. The needle valve in this case would seat on the plate itself and the atomized jet or spray of material would be discharged through the aperture in this plate. Under other conditions, it might be desirable perhaps to use the removable plug without the boss on the supporting plate or it might be desirable to use a supporting plate with a boss but no plug. Under various conditions, various combinations could be used.

One reason for using the boss with the exceedingly brittle and hard plug, is that it is necessary to have a firm foundation for the flange on the plug to rest on, as otherwise the hard brittle plug if not properly supported might break and when the plug is used without the boss, it frequently happens that the supporting disc will bend and result is that the plug will rest on it only at its outer periphery and break off or cause the gasket to leak. The stiffening action of the boss tends to limit the bending of the supporting disc to points removed from the plug and results in a satisfactory support for the plug enabling the plug to last and the gasket to carry its load too without undue difficulty.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made in size, shape, and arrangement of parts without departing materially from the spirit of my invention and I wish therefore, that my drawings be regarded as in a sense diagrammatic.

It will be clear that while I have illustrated an atomizing device particularly adapted to be used with an internal combustion engine, it may nevertheless be used for other purposes, and with other devices such as, for example, for the injection of fuel into boilers or heating devices or for drying purposes.

I claim:

1. An atomizing valve comprising a body, a laminated perforated spring disc, a seat carried thereby and a needle valve adapted to be seated in said seat.

2. An atomizing valve comprising a body, a laminated perforated spring disc, a seat carried thereby and a needle valve adapted to be seated in said seat, and means for forcibly holding the needle valve against the seat to exert an initial tension on the spring disc.

3. An atomizing valve comprising a body, a laminated, perforated spring disc, including a holding disc, a seat in said disc, and a needle valve adapted to be seated in said seat.

4. An atomizing valve comprising a body, a laminated perforated spring disc, including a holding disc, a seat carried by said holding disc, and a needle valve adapted to be seated in said seat, and means for forcibly holding the needle valve against the seat to exert an initial tension on the spring disc.

5. An atomizing valve comprising a laminated perforated spring disc, a removable perforated plug in said perforation having a valve seat thereon, a needle valve adapted to be seated in said seat in the plug.

6. An atomizing valve comprising a laminated perforated spring disc, including a perforated holding disc, a removable perforated plug carried by said holding disc, a valve seat in the plug and a needle valve adapted to be seated in said seat.

7. An atomizing valve comprising a laminated perforated spring disc, including a perforated holding disc, a removable perforated plug carried by said holding disc, a valve seat in the plug and a needle valve adapted to be seated in said seat, and means for forcibly holding the needle valve against the seat to exert an initial tension on the spring disc.

8. An atomizing valve comprising a laminated perforated spring disc, a removable perforated plug in said perforation having a valve seat thereon, a needle valve adapted to be seated in said seat, the plug having a shank projecting into the perforation and a flange resting upon the disc to hold the plug in place.

9. In an atomizing valve an apertured supporting plate separate from the valve housing, an apertured plug in the aperture in the plate, a needle valve in engagement with

the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate.

10. In an atomizing valve an apertured supporting plate separate from the valve housing, an apertured plug in the aperture in the plate, a needle valve in engagement with the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate, the plug being flanged, the flange engaging the surface of the plate.

11. In an atomizing valve an apertured supporting plate separate from the valve housing, an apertured plug in the aperture in the plate, a needle valve in engagement with the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate, the plug being flanged, the flange engaging the surface of the plate, the plate having a boss surrounding the aperture and in engagement with the flange.

12. In an atomizing valve an apertured supporting plate separate from the valve housing, an apertured plug in the aperture in the plate, a needle valve in engagement with the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate, the plug being flanged, the flange engaging the surface of the plate with a packing ring interposed between the flange and the plate.

13. In an atomizing valve an apertured supporting plate separate from the valve housing, an apertured plug in the aperture in the plate, a needle valve in engagement with the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate, the plug being flanged, the flange engaging the surface of the plate, the plate having a boss surrounding the aperture and in engagement with the flange, with a packing ring interposed between the flange and the plate.

14. A laminated spring for atomizing nozzles comprising a plurality of flat perforated spring plates arranged side by side, the perforations in the plates increasing progressively in the direction of discharge of the atomized material.

15. A laminated spring for atomizing nozzles comprising a plurality of flat perforated spring plates arranged side by side, the perforations in the plates increasing progressively in the direction of discharge of the atomized material, said plates being of different thicknesses.

16. A laminated spring for atomizing nozzles comprising a plurality of flat perforated

ed spring plates arranged side by side, the perforations in the plates increasing progressively in the direction of discharge of the atomized material, said plates being made up of different materials.

17. In an atomizing nozzle a laminated spring nozzle plate, the laminations being of such thickness as to provide extremely minute stresses under varying deflections of the spring plate.

18. In an atomizing valve an apertured supporting plate, an apertured plug in the aperture in the plate, a needle valve in engagement with the plug to close the aperture, the pressure of the valve on the plug being adapted to hold it seated upon the plate, the apertures in the plates forming a conical passage large enough to clear the spray of atomized material.

19. In an injection valve, a perforated valve disc, a needle point adapted to penetrate the perforations and normally close it and a reinforcing disc adapted to support said perforated disc.

20. In a spray nozzle, a perforated disc, means for normally closing it, means for supplying liquid under pressure to one side of it to deflect it away from the closing means, and reinforcing means engaging the disc adjacent the perforation, to yieldingly resist and limit the deflection thereof.

21. In an injection valve a perforated valve disc, a needle point adapted to penetrate in and normally close the perforation, a reinforcing member adapted to support said perforate disc, the valve disc and supporting member being adapted to respond to hydraulic pressure brought to bear upon it so as to open the perforation.

22. In an injection valve, a perforated valve disc, a needle point adapted to penetrate the perforation and normally close it and a reinforcing member adapted to support said perforated disc.

23. In an atomizing nozzle, the combination of a laminated valve seat and a head co-operating therewith to normally seal the passage through said nozzle, said laminated seat adapted to yield under fluid pressure within the nozzle, to form an atomizing orifice for the discharge of said fluid.

24. An atomizing nozzle according to claim 23, characterized by the fact that the atomizing orifice formed by the fluid pressure is of substantially microscopic dimension in one direction.

Signed at Chicago, county of Cook and State of Illinois, this 3rd day of May, 1921.

PHILIP LANE SCOTT.