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O. W. SCHEY
INJECTION VALVE
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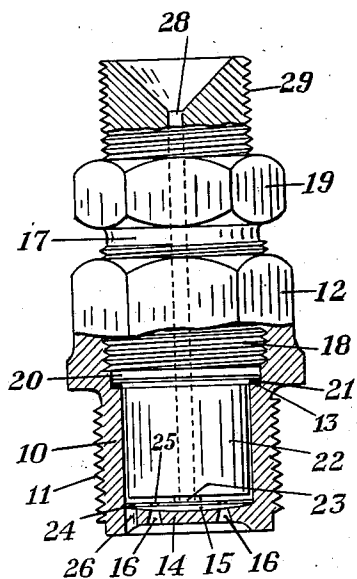


Fig. 1

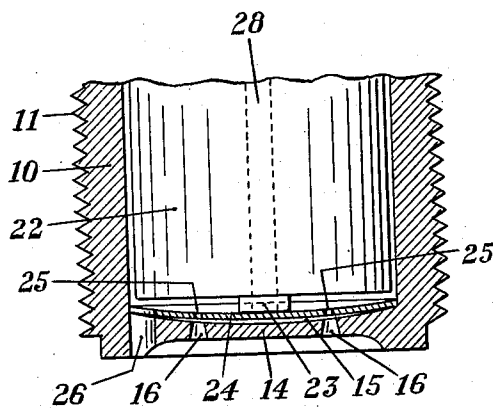


Fig. 5

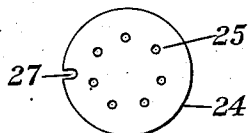


Fig. 3

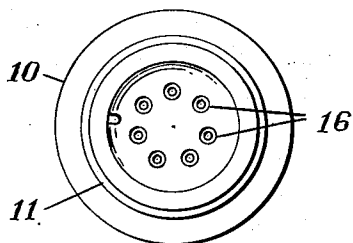


Fig. 4

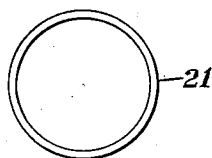


Fig. 2

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INJECTION VALVE

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Application October 25, 1935, Serial No. 46,707

1 Claim. (Cl. 299—107.3)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to injection valves, and it has a particular relation to injection valves for supplying a fuel charge to the cylinder or combustion chamber of an engine of the Diesel or spark ignition types.

One of the objects of the present invention is the provision of an injection valve of simple and compact construction for delivering the fuel in properly atomized condition to the combustion chamber, where it may be ignited by the heat of compression or by an electric spark.

Another object of the invention is the provision of an injection valve of the character described, embodying a flexible diaphragm for controlling the flow of fuel to the combustion chamber and which may be deflected in controllable amounts to regulate the pressure required to open the same.

With these and other objects in view, as well as other advantages which may be incident to the use of the improvements, the invention consists of the parts and combinations thereof hereinafter set forth and claimed, with the understanding that the several necessary elements constituting the same may be varied in proportion and arrangement without departing from the nature and scope of the invention, as defined in the appended claim.

In order to make the invention more clearly understood, there are shown in the accompanying drawing means for carrying the invention into practical effect, without limiting the improvements in their useful application to the particular construction, which, for purposes of explanation, have been made the subject of illustration.

In the accompanying drawing:

Fig. 1 is a view, partly in side elevation and partly in longitudinal section, of an injection valve embodying the present invention;

Fig. 2 is a plan view of the shim or spacing washer;

Fig. 3 is a plan view of the diaphragm;

Fig. 4 is a bottom plan view of the structure shown in Fig. 1, and,

Fig. 5 is an enlarged, fragmentary, longitudinal, sectional view of the lower portion of the valve.

Referring to the drawing, an injection valve constructed in accordance with the present invention is shown as comprising a hollow outer member 10 provided with screw threads 11 for engagement with a threaded opening in the combustion chamber or manifold of a Diesel or spark ignition engine, and with a hexagonal portion 12 for engagement by a wrench. The member 10 is also formed with an internal annular shoulder

13 and with an end wall 14 having a concave inner face 15 provided with a plurality of outlet apertures 16. An inner member 17 having threads 18 is threaded into the correspondingly threaded upper portion of the member 10, and is also formed with a hexagonal portion 19 for engagement by a wrench. The inner member 17 is also provided with an annular shoulder 20 for engagement with a shim or spacing washer 21, which is seated upon the shoulder 13, and also with a cylindrical lower portion 22 provided with an axial protuberance 23 for engagement with a metal diaphragm 24. This diaphragm is supported adjacent to the end wall 14 in bridging relation to the concavity 15 therein, and is provided with a plurality of ports 25 in registering with the outlet apertures 16. The diaphragm 24 is prevented from rotating and disturbing the alignment of the ports 25 with the apertures 16 by means of a key 26 engageable with a notch 27 formed in the periphery of the diaphragm.

The inner member 17 is provided with an axially disposed fuel inlet passage 28 which extends throughout the length of the member 10 and opens through the protuberance 23 and also with an upper screw threaded portion 29 for attachment to a suitable fuel line.

The shim 21 is of such thickness that when the inner member 17 is threaded into the outer member 10 the protuberance 23 will deflect the diaphragm 24 into the concavity 15 of the wall 14 a slight distance, as shown in Fig. 5, and normally close the inner end of the fuel inlet passage 28. The pressure of the fuel, however, will flex the diaphragm 24 outwardly so as to permit fuel to pass from the inlet passageway 28 into the space above the diaphragm and thence through the ports 25 therein to the space between the diaphragm and the end wall 14, from where it escapes through the outlet apertures 16. The pressure at which the fuel is delivered may be regulated by varying the thickness of the shim 21, which controls the initial deflection of the diaphragm 24.

From the foregoing it will be apparent that a very simple and efficient injection valve is provided in which the only surface requiring lapping is the lower surface of the protuberance 23.

In the event that excess pressure should develop in the inlet passage 28 the diaphragm 24 will be flexed to a position in which it is supported throughout its area by the end wall 14 which prevents any further movement thereof. This eliminates any possibility of the diaphragm becoming ruptured by undue flexing. During the

explosion of the charge in the cylinder the diaphragm 24 seats firmly against the protuberance 23 and effectually seals the inlet passage 28 against the escape of gas into the fuel line.

- 5 It will be understood that communication past the diaphragm 24 may be obtained by providing suitable ports in the side wall of the member 10 instead of in the diaphragm itself, and also that the protuberance 23 may be provided on the diaphragm 24 instead of on the cylindrical member 22. Also, it will be apparent that the shim 21 may be seated between the member 22 and the outer circumference of the diaphragm 24, if so desired.

- 15 Other modifications in the proportions and arrangement of the parts may be made by those skilled in the art without departing from the nature and scope of the invention, as set forth in the appended claim.

- 20 The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

An injection valve comprising a hollow element adapted to be inserted in the spark-plug opening of an internal combustion engine, and having an annular shoulder and an inner reentrant end wall 5 provided with a fuel outlet; an inner member threaded into said hollow element in seating engagement with said shoulder and formed with a centrally disposed protuberance provided with a fuel inlet; a perforated diaphragm mounted in 10 said hollow element and seated at the periphery of said end wall for engagement with said protuberance and adapted to close said inlet when the pressure of the fuel therein decreases to a predetermined value and to be flexed away from 15 said protuberance to open said inlet for the passage of fuel therethrough when the pressure of the fuel inlet increases to a predetermined value, said protuberance maintaining said diaphragm under an initial deflection; and spacing means 20 interposed between said shoulder and said inner member for varying such initial deflection.

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