

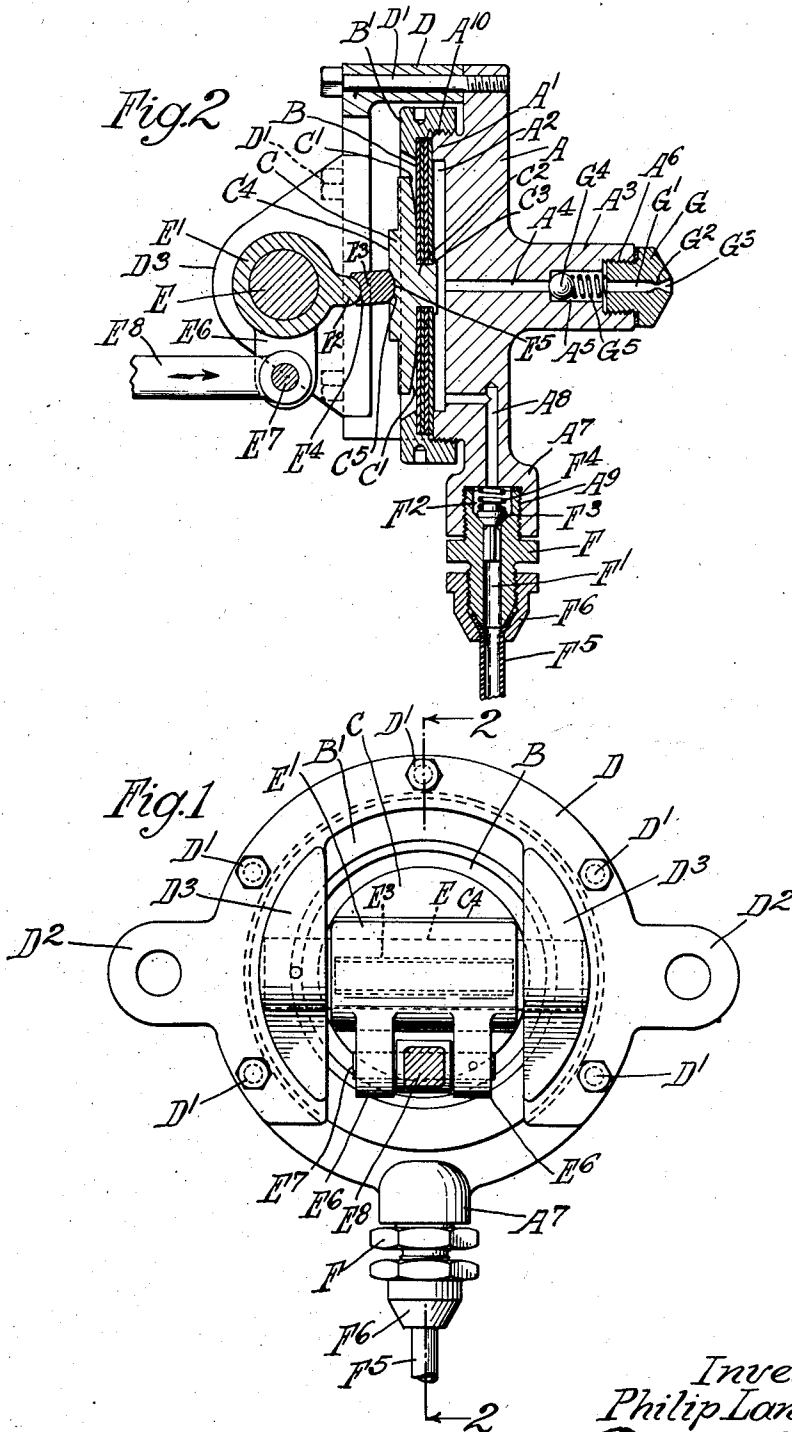
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INJECTOR

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UNITED STATES PATENT OFFICE

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INJECTOR

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1 Claim. (Cl. 103—150)

This invention relates to an injector. It has for one object to provide an injection or liquid supplying system in which a compression chamber is embodied in a housing and in which the usual outlet or discharge valve is replaced by an injection valve.

Another object is to combine in such an injection outfit a laminated diaphragm as the moving or yielding member.

Other objects will appear from time to time in the specification and claim.

The invention is illustrated more or less diagrammatically in the accompanying drawing, wherein—

Figure 1 is an elevational view with parts in section;

Figure 2 is a transverse cross section taken at line 2—2 of Figure 1.

Like parts are designated by like characters throughout the specification and drawings.

A is a housing member formed on one face with an annular raised portion A¹ and a depression or cavity A². Projecting from the opposite face is a reduced extension A³. A perforation or passage A⁴ extends from the depression A² to and through the extension A³. It is provided with one enlargement A⁵ and a second enlargement A⁶, which may be interiorly threaded as shown. A second extension A⁷ projects preferably from one edge of the member A. A passage A⁸ runs from the depression A² to and through the extension A⁷. It is enlarged and preferably interiorly threaded as at A⁹. The annular portion A¹ may be threaded on its outer edge as at A¹⁰.

B is a diaphragm or movable member positioned at its edges upon the raised portion A¹ and while it may be formed of a single member it is preferably formed of a plurality of laminations. A generally annular retaining member B¹ engages the threads A¹⁰ of the raised portion A¹ and holds the diaphragm in sealing contact with the raised portion A¹. The diaphragm thus co-operates with the housing A and the raised portion A¹ to define what is in effect a pumping chamber.

C is a compression plate. It may be generally rounded in outline and preferably has its edges tapered as at C¹. It may be provided with a central projecting portion C² which is positioned in a corresponding perforation in the diaphragm. The portion C² may be riveted or otherwise shaped to engage the diaphragm as at C³. Thus the compression member C is attached to the diaphragm so that the two move together. Obviously any other suitable means of attachment might be provided. The compression member C

may have a relatively raised portion C⁴ on one face. In this raised portion C⁴ a depression or groove C⁵ is preferably formed.

D is a housing part, being formed generally in the shape of an incomplete annulus and fastened to the housing A by screws D¹ or by any other suitable means. It is preferably provided with laterally extending oppositely placed ears D² by means of which the injector unit as a whole may be fastened to any suitable mounting. Projecting upwardly from and preferably formed integrally with the member D is a pair of supporting members D³, in which a shaft E is positioned. Movably mounted on the shaft is a sleeve-like member E¹. Projecting from the member E¹ is a raised and preferably elongated member E² which is in axial alignment with the member E¹ and with the shaft E. It is rounded at its outer edge as shown. E³ is a toggle member provided with a groove E⁴ in one face, and being rounded as at E⁵ on its other face. The rounded face E⁵ of the member E³ is normally positioned in the groove or depression C⁵ and the groove or hollow E⁴ of the member E³ engages the member E². Laterally extending from the sleeve E¹ is a pair of ears E⁶. Positioned between them is a shaft E⁷ upon which is journaled a connecting rod or link E⁸.

Removably positioned in the portion A⁹ of the extension A⁷ is a valve housing F. It is provided with a passage F¹ which is enlarged at its inner end as at F². A valve F³ is seated within it and is normally held seated by a spring F⁴. A supply or intake conduit F⁵ is fastened to the housing F by a cap or engaging member F⁶.

An injection nozzle G, which is provided with a passage G¹, a restriction G² and a discharge opening G³, is positioned within the enlarged passage A⁶ which is in communication with the passage A⁴. A ball valve G⁴ is mounted within the passage A⁶ and is adapted to be seated to close the passage A⁴. It is normally held in seated position by a spring G⁵.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of my invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

The use and operation of this invention are as follows:

The device in the particular form illustrated is adapted particularly, although not solely, for use as an injector to furnish fuel to an internal-combustion engine. When so used it is positioned

so that the injection nozzle can supply fuel, that is to say, can inject fuel, into the cylinder of an engine. The nozzle in the particular form shown is of the so-called fixed opening type, that is to say, the actual injection orifice is not closed and is not variable in shape and size. The supply of fuel to the nozzle is intermittent and is controlled by the pressure in the injection unit and to some degree by the ball check valve shown. In the operation of the device it is assumed that it is mounted on an engine and that the injection orifice is positioned to discharge into the cylinder. Its source of fuel supply is connected to the injector and the parts are put into operation. With the parts in the position shown, it is assumed that the injector is filled with fuel. The link member E⁸ is moved in the direction of the arrow and the sleeve E¹ with the projection E² upon it is carried in a counter-clockwise direction. The toggle member E³ is thus pressed against the compression plate C and the diaphragm is forced inwardly. The amount of movement of the diaphragm will ordinarily be minute; as the diaphragm is moved in the volume of the chamber enclosed by it and the housing A is, of course, reduced. The valve F³ is held seated by the pressure within the chamber and when the pressure has mounted sufficiently to overcome the resistance of the spring G⁵ the valve G⁴ is unseated and discharge of fuel through the fixed injection orifice takes place. The movement of the link E³ is reversed at a suitable point in the engine cycle. The timing and the amount of movement of the diaphragm actuating parts are adjustable and may be controlled at the will of the operator to produce the desired injection action. When the movement of the member E⁸ is reversed the sleeve

E¹ moves in a clockwise direction, pressure on the toggle and the compression plate is reduced and the diaphragm moves outward again, thus increasing the volume of the chamber and reducing the pressure. When the pressure has been reduced sufficiently, the valve G⁴ is seated and the discharge of fuel stops. Further movement of the diaphragm creates suction within the chamber, the valve F³ is unseated and fuel is drawn into the chamber. Thus the cycle of the injection device is completed.

I claim:

In combination in an injector, a housing defining a portion of a pressure chamber, and a laminated flexible diaphragm, attached to said housing with a sealing contact and defining a portion of a pressure chamber, an inlet valve communicating with said chamber and a member defining an atomizing orifice, said member in communication with said chamber and forming its sole outlet, a check valve controlling said atomizing orifice, a compression plate permanently secured to said diaphragm and means for acting upon said diaphragm through said compression plate to move the diaphragm to create pressure within the pressure chamber, said means including a rotatably mounted member and a toggle, between said compression plate and said rotatably mounted member, means for moving the rotatably mounted member to force the toggle against the compression plate, whereby the compression plate and diaphragm are moved to alter the volume of the pressure chamber, the diaphragm being capable of itself of returning to its original position when free to do so.

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