Aug. 20, 1935. F. STEPHAN 2,012,146

ATOMIZER

Filed May 7, 1932

Fig. 2

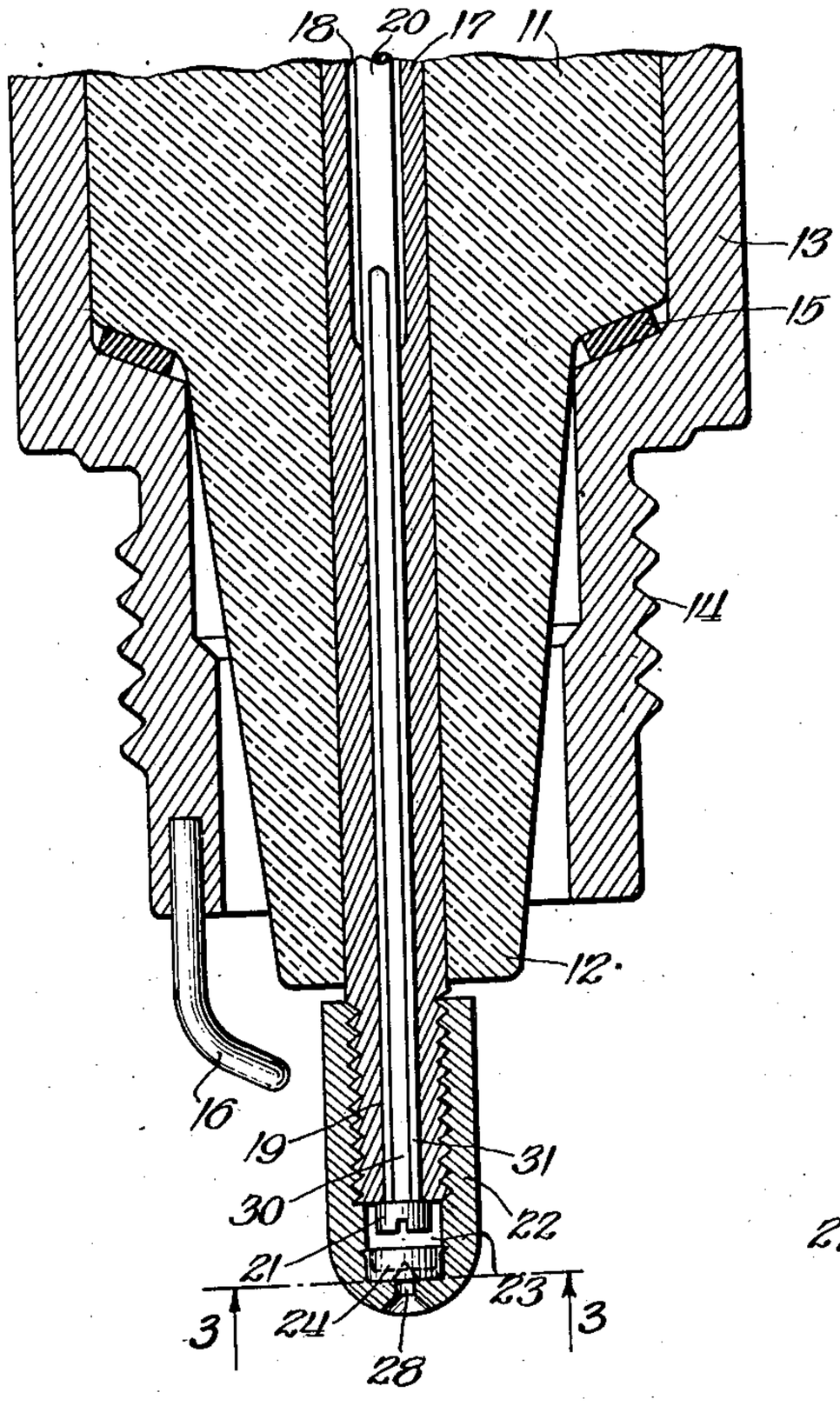


Fig. 1

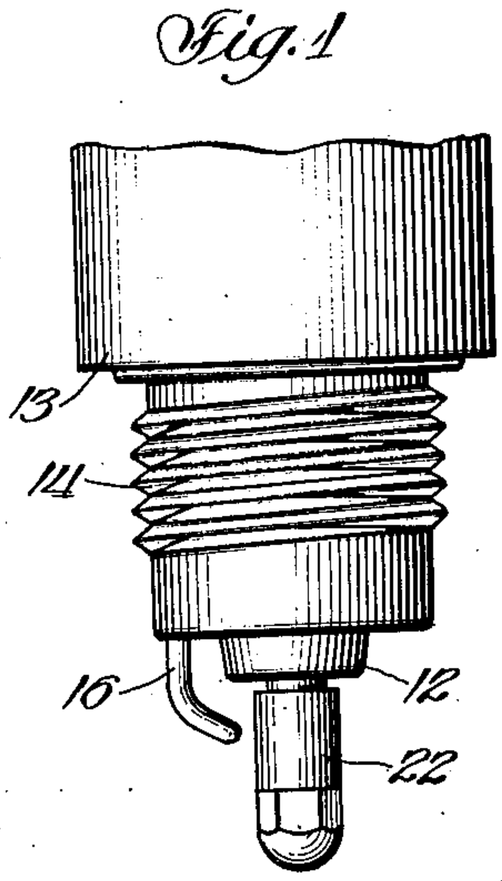
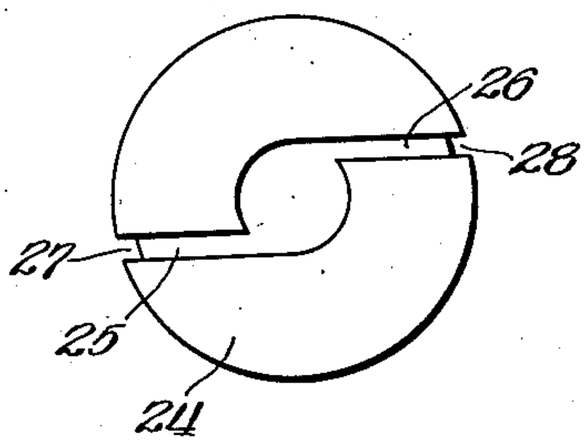


Fig. 3



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UNITED STATES PATENT OFFICE

2,012,146

ATOMIZER

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Application May 7, 1932, Serial No. 609,811

4 Claims. (Cl. 299—107.1)

This invention relates to an atomizing means and more particularly to an atomizing nozzle. This nozzle may be employed, generally speaking, in all such devices and appliances where a liquid or fluid is to be atomized. I have shown the atomizing nozzle cooperating with a device for feeding fuel to a cylinder of an internal combustion engine. The device is fully disclosed in my copending application Serial Number 605,938, filed April 18, 1932. Details of construction of the device may be had from this application. I shall limit the following description particularly to the atomizing nozzle as such.

The invention is particularly illustrated in the accompanying single sheet of drawing in which

Fig. 1 is a partial side view of the device also disclosed in the above mentioned copending application;

Fig. 2 is an enlarged longitudinal cross-section of the device shown in Fig. 1; and

Fig. 3 is a view of member **24** disposed within the atomizing nozzle. The view is taken along line **3—3** in Fig. 2, looking in the direction of the arrows.

An insulating member **11** having a tapering end **12** is disposed within a metallic shell **13** provided with a thread **14** for attachment to the cylinder of an internal combustion engine. Gaskets such as **15** provide a tight seat of the insulating body **11** within the metal shell **13**. An electrode **16** is secured at the inner end of the metal shell **13**. Within the insulating member **11** is disposed a valve housing or valve body **17** protruding from the inner end thereof as shown. This valve body has a bore such as **18** which narrows down into a bore **19** near the inner end of the valve body. Disposed within this bore is a valve stem **20** carrying a valve plug **21**. The valve stem is flattened on both sides at the end extending through the smaller bore **19** of the valve body, as indicated at **30** and **31**, in order to permit liquid passing from the bore **18** to the bore **19** to pass around the portion of the valve stem disposed in the bore **19**. Secured to the inner end of the valve body **17** by means of a thread or the like is the atomizing nozzle **22**. Liquid fuel in measured and metered quantities is fed through the device during the operation thereof so that these metered quantities are also under the control of the valve **20** and are ejected from the bore **19** into the chamber **23** formed by the nozzle. The plug **21** can freely move within this chamber **23**. These measured and metered quantites of fuel are forced through the device under pressure. There are also provisions in the device for eliminating impurities from the liquid fuel and also for eliminating air bubbles contained in the fuel. These are described in detail in the previously cited copending application.

The structure of the nozzle is as follows:—

An atomizing member **24** having turbine grooves **25** and **26** disposed on the face thereof, and corresponding grooves or notches **27** and **28** on the side, is disposed within the nozzle **22** as is particularly shown in Fig. 2.

This atomizing member consists of a metal plate which is dropped into the nozzle so that the plane carrying the turbine grooves faces the single central nozzle opening **28**. It is then permanently affixed within the nozzle shell by a wedging tool which forces the edges of the member **24** into the nozzle material as may also be seen from the section shown in Fig. 2.

The operation of the device is as follows:

When the measured and metered quantity of liquid fuel is delivered through the device in a manner which is described in detail in the previously mentioned copending application, the pressure of the fuel will cause an actuation of the valve plug **21**, and this plug is lifted from its seat, permitting the in-rush of fuel into the chamber **23**. The fuel passes then along the notches or grooves **27** and **28** on the sides of the member **24** and is deflected at an angle along the turbine grooves **25** and **26** toward the center, that is, in the direction of the central flaring nozzle opening **28**. A high angular velocity is imparted to the fuel as it passes along the turbine grooves, and the fuel is thus rotated at high speed in streams, in opposite directions, and is ejected in the form of a rotating cone. It is thus finely divided and atomized, and ejected through the nozzle opening **28** into the combustion chamber of the cylinder.

Whenever I have used the term—inner—in connection with the valve body **17** or other parts, it is to be understood that I mean that end of the device which is attached to the engine cylinder. It will be seen from the drawing and from the above description that the inner end of the valve body **17** projects into the cylinder of the engine. It will also be seen that the delivery of the fuel takes place within the engine cylinder into the atomizing chamber **23**, and that the angular acceleration for the purpose of atomization is imparted to the fuel at the point of ejection thereof, that is, directly at the nozzle opening **28**.

When the fuel is ejected in atomized condition, in the form of a rotating mist or spray, it will provide the proper fuel mixture with air, and this

mixture will be ignited by a spark occurring between the electrode 16 and the nozzle 22.

Numerous changes may be devised without departing from the spirit of the invention. The nozzle may be employed in connection with internal combustion engines as well as machines and engines or appliances of widely different nature. It is also possible to employ the invention for the atomization of gases. I intend to exploit the invention in all such modifications or uses that may fall within the scope of the appended claims.

What I claim is:

1. A spray nozzle for injecting liquid fuel charges directly into the cylinder of an internal combustion engine, comprising a casing having an internally threaded bore extending from its upper end downwardly and having a discharge orifice at its bottom end communicating with said bore, a deflecting member disposed within said casing and registering with the bottom thereof, grooves at the bottom of said deflecting member and grooves at the periphery thereof communicating with said bottom grooves, the material of said member being wedged into the material of said casing to secure said member permanently and rigidly in position within said casing, said communicating grooves forming ducts in said member for deflecting liquid delivered thru said bore to the discharge orifice of said casing.

2. A spray nozzle for injecting liquid fuel charges directly into the cylinder of an internal combustion engine, comprising a casing having an internally threaded bore extending from its upper end downwardly and having a discharge orifice at its bottom end communicating with said bore, deflecting member disposed within said casing and registering with the bottom thereof, the material of said member being wedged into the material of said casing to secure said member permanently and rigidly in position within and at the bottom of said casing, a plurality of peripheral ducts on said member for guiding liquid delivered thru said bore in separate streams toward the bottom of said casing along the walls thereof, lateral ducts on the face of said member registering with said peripheral ducts for deflecting said liquid angularly along the bottom of said casing, and a central recess on the face of said member registering with said discharge orifice, said lateral ducts terminating in said recess to discharge said liquid thru said orifice into said cylinder.

3. In combination with a device for feeding fuel charges into the cylinder of an internal combustion engine to maintain continuous operation thereof, a fuel feeding member projecting freely into said cylinder, a central duct in said member and valve means at the free end thereof for controlling the feeding of fuel thru said duct, and a spray nozzle removably secured to the free end of said member and freely projecting into said cylinder, said nozzle comprising, a single casing member for attachment to said feeding member, a discharge orifice at the free end of said casing, a single atomizing disc member permanently wedged within said casing member at the bottom thereof and adjacent said discharge orifice, peripheral grooves on the wall of said disc member and grooves on the face thereof, said grooves forming ducts in said nozzle for conducting said fuel to said discharge orifice.

4. In combination with a device for feeding fuel charges into the cylinder of an internal combustion engine to maintain continuous operation thereof, a fuel feeding member projecting freely into said cylinder, a central duct in said member and valve means at the free end thereof for controlling the feeding of fuel thru said duct, and a spray nozzle removably secured to the free end of said member and freely projecting into said cylinder, said nozzle comprising, a single casing member for attachment to said feeding member, a discharge orifice at the free end of said casing and a single atomizing disc member permanently wedged within said casing member at the bottom thereof and adjacent said discharge orifice, said atomizing disc member carrying turbine grooves facing said discharge orifice and arranged to impart accelerated angular velocity to said fuel ejected therethru, and grooves on said atomizing member arranged to conduct said fuel charges to said turbine grooves.

FRITZ STEPHAN.