Aug. 7, 1956 H. LANG 2,757,967

FUEL INJECTION NOZZLE FOR DIESEL ENGINES

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FIG. 2

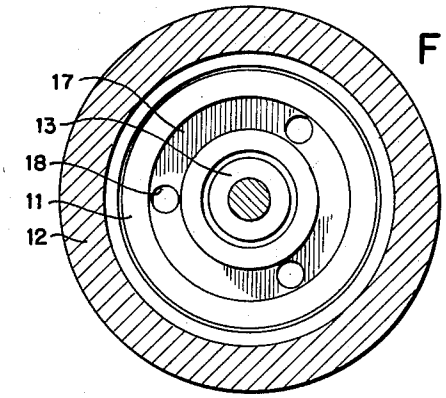
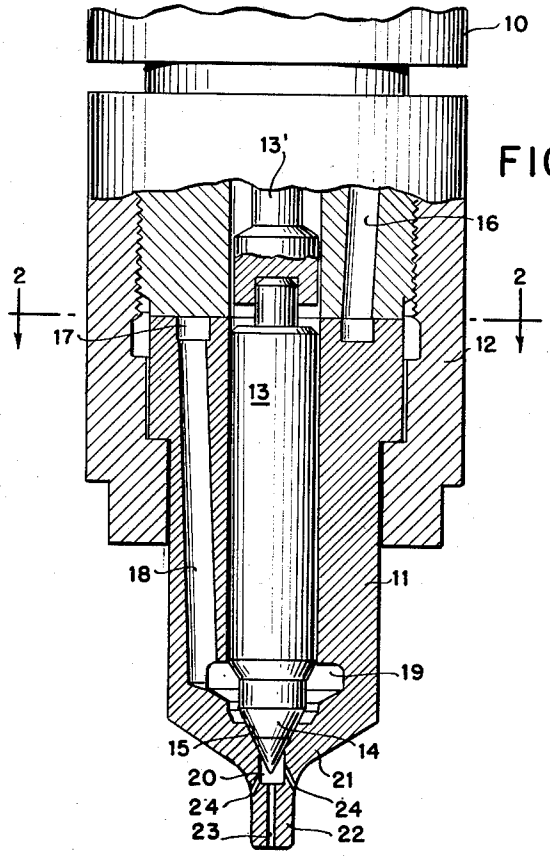


FIG. 1



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FUEL INJECTION NOZZLE FOR DIESEL ENGINES

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2 Claims. (Cl. 299—107.6)

My invention relates to fuel-injection nozzles for Diesel engines and more particularly to nozzles including a differential needle valve and a plurality of spray ducts emanating from a collecting or distribution chamber arranged in the tip of the nozzle body behind the valve seat in the direction of the flow of the fuel.

It has already been suggested to arrange in nozzles of the said type one central spray duct extending in the axial direction of the nozzle and at least one inclined spray duct extending substantially in radial direction of the nozzle. In such nozzles all the said ducts were substantially of the same length which equaled to the thickness of the wall in the usually conical tip of the nozzle body. The spray effect from all said ducts was the same and in view of the relatively short length of said ducts the jet of fuel after passing therethrough disintegrated into a fine mist almost immediately behind the ducts and did not reach more distant portions of the combustion space.

It is the principal object of my invention to avoid the said disadvantage and to provide a nozzle which will not only produce a widely defused spray of fuel in the combustion chamber but which will also deliver fuel to more distant portions of the combustion space. To this effect according to my invention I provide the tip of the nozzle body with an axial extension or pintle through which a primary central axial duct extends. This elongated primary duct will guide the fuel jet pressed therethrough with the result that the jet will be kept in shape and will not immediately disintegrate after having left said duct, and will safely reach any distant portion of the combustion space against which it has been directed. The lateral fuel duct or ducts also originating in said collecting or distribution chamber pass through the wall of the substantially conical tip of the nozzle at or near the base of said axial extension or pintle and are shorter and preferably also narrower than the said primary fuel duct so that the fuel jet leaving the same will quite immediately or at least very soon thereafter disintegrate and will widely and evenly distribute fuel in the portion of the combustion chamber surrounding the tip of the nozzle.

The said and other objects of my invention will be more fully understood from the following specification when read with the accompanying drawing in which one embodiment of my invention is illustrated in Fig. 1 in a sectional elevational view and in Fig. 2 in a cross sectional view on line 2—2 of Fig. 1.

As shown in the drawing the nozzle body **11** is secured to the nozzle holder **10** by the cap nut **12**. The differential needle **13** is centrally and slidably seated in said body **11** and is in any customary manner attached to a spring loaded stem or spindle **13'** displaceably mounted in said holder **10**. The needle **13** is provided with a

conical valve tip **14** which rests upon and cooperates with the conical seat **15** arranged in the nozzle body **11**. The oil to be injected under pressure into the combustion chamber of the engine cylinder (which is not shown) passes through one or more ducts **16** of the holder **10** into a circular groove **17** of the body **11** and from there through one or more longitudinal ducts **18** into a pressure chamber **19** arranged above the valve seat **15**. When the needle **13** is raised by the oil pressure and the valve tip **14** lifted from its seat **15** the fuel flows under pressure through the valve opening into the distribution chamber **20** arranged in the conically shaped tip **21** of the nozzle body **11**. From there the oil passes into the combustion chamber of the cylinder through a primary axial duct **23**, and through at least one lateral secondary spray duct **24** extending radially and under an angle against the nozzle axis through the tip **21** of the nozzle body **11**. According to my invention the said conical tip **21** containing the said distribution chamber **20** is provided with an axial extension or pintle **22** through which said duct **23** extends from said chamber **20**. The thus elongated duct **23** guides the oil jet passing therethrough with the result that the jet is kept in shape, and does not immediately disintegrate after leaving the said duct, thus preserving its original impact. The outer orifices of the lateral spray ducts **24** are situated substantially in the transition between the conical body tip **21** and the pintle **22**. These lateral ducts **24** penetrating just the wall of the tip **21** are shorter, and preferably also narrower than the axial duct **23**.

It will be well understood that the compressed oil after the needle **13** has been raised and the valve **14** opened will flow more readily and quicker through the axial jet opening **23** than through the shorter lateral spray ducts **24** and this will result in an advanced fuel injection which is often desired. To improve this effect the lateral ducts **24** may be narrower than the axial duct **23**. The oil quickly and readily passing through the duct **23** will well cool the exposed pintle **22** and also the neighboring portion of the tip **21** in which the lateral spray ducts **24** are situated.

The fuel jet or jets leaving the shorter and preferably also narrower lateral ducts **24** will quite immediately or at least very soon thereafter disintegrate thus widely and evenly distributing fuel in the space of the combustion chamber surrounding the tip **21** of the nozzle.

Having shown and described one embodiment of my invention to illustrate the application of the principles thereof I wish to have it understood that my invention may be otherwise embodied without departing from such principles and without avoiding the scope of the appended claims.

What I claim as my invention is:

1. A fuel spray nozzle for Diesel engines comprising in combination a nozzle body having a substantially conically shaped tip, a valve in said body including a differential needle and a valve seat, a fuel collecting or distribution chamber substantially within said tip, a pintle extending behind said chamber from said tip in axial direction of said nozzle body; a primary fuel duct axially passing through said pintle from said collecting chamber; and at least one secondary fuel duct laterally extending from said collecting chamber through said tip of the nozzle body substantially in a direction forwardly inclined to the longitudinal axis thereof, said secondary fuel duct or ducts being shorter than the said primary fuel duct.

2. A fuel spray nozzle for Diesel engines comprising

in combination a nozzle body having a substantially conically shaped tip, a valve in said body including a differential needle and a valve seat, a fuel collecting or distribution chamber substantially within said tip, a pintle extending behind said chamber from said tip in axial direction of said nozzle body; a primary fuel duct axially passing through said pintle from said collecting chamber; and at least one secondary fuel duct laterally extending from said collecting chamber through said tip of the nozzle body substantially in a direction forwardly inclined to the longitudinal axis thereof, said secondary fuel duct or ducts being shorter than the said primary fuel duct and having a narrower cross section than the said primary axial fuel duct.

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