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COOLED INJECTION NOZZLE
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Fig. 1

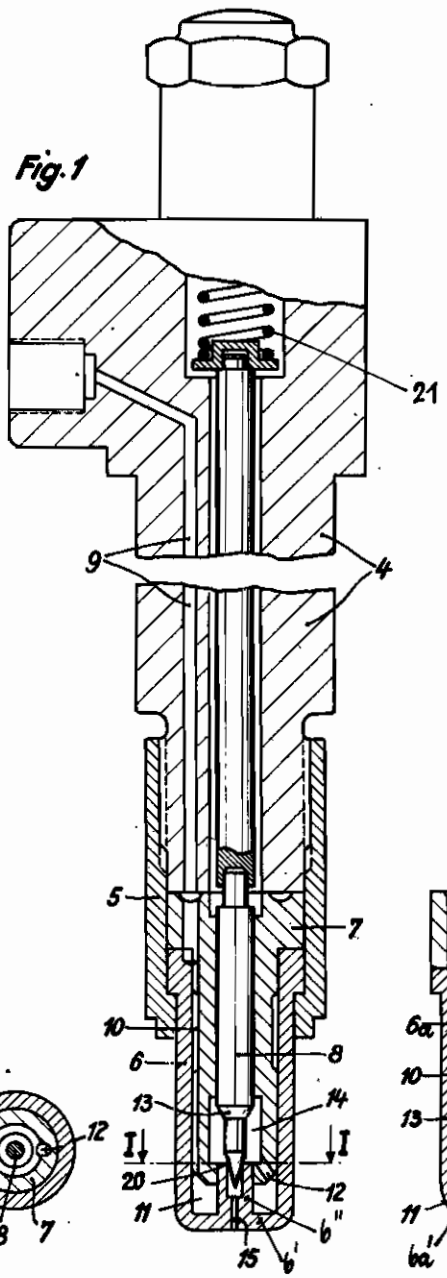
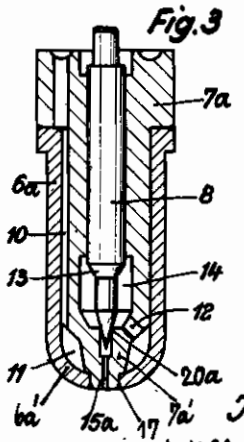


Fig. 2

Fig. 3



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ALIEN PROPERTY CUSTODIAN

COOLED INJECTION NOZZLE

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The present invention relates to cooled, fluid-controlled injection nozzles for internal combustion engines, of the type in which the nozzle body comprises a cooling chamber surrounding the seat for the nozzle needle and the wall of the nozzle jet and being passed by the fuel before injection thereof.

This arrangement offers the advantage over injection nozzles in which the cooling liquid is passed through chambers separate from the chambers passed by the fuel to be injected that no additional feed and discharge pipes are required which would occupy much space. However, in the known nozzles of this type the cooling chamber has been arranged in the nozzle plate in the form of a helical channel which is very difficult to be made.

A better arrangement is obtained according to the present invention in making up the nozzle body of two sleeve-shaped parts pinned together and defining an annular space surrounding the zone of the seat for the nozzle needle and of the nozzle jet of which sleeves at least one is longitudinally grooved in the fitting surface for feeding the fuel oil to the annular space while a conduit, as far as possible from the foregoing groove, is leading to a second annular space surrounding the shoulder of the nozzle needle at which the fluid pressure exerts its lifting action.

It is an object of the present invention to provide an injection nozzle of the kind referred to, which is easy to make and very efficient in operation.

With this and further objects in view, as may become apparent from the within disclosures, the invention consists not only in the structures herein pointed out and illustrated by the drawings, but includes further structures coming within the scope of what hereinafter may be claimed.

The character of the invention, however, may be best understood by reference to certain of its structural forms, as illustrated by the accompanying drawings in which—

Fig. 1 is a longitudinal section,

Fig. 2 a cross section on line I—I of Fig. 1 and

Fig. 3 a longitudinal section of a modification, showing the nozzle body only.

Similar reference numerals denote similar parts in the different views.

Referring now to the drawings in greater detail, and first to Figs. 1 and 2, it will be seen that the two sleeve-shaped parts **6** and **7** of the nozzle body are held against the front face of a nozzle holder **4**, by means of suitable shoulders on the parts as shown and by a cap nut **5** screwed tight by an exterior thread on the holder **4**. A nozzle needle **8** slides in a central bore in the inner sleeve **7**.

The fuel is fed through a bore **9** in the holder **4** and a communicating channel **10** provided between the sleeves or formed by a groove in one of the sleeves, to an annular cooling chamber **11** defined between the sleeve **7**, the outer wall of the sleeve **6**, the end wall **6'** of sleeve **6** and a central inward projection **6''** of the same. From this cooling chamber the fuel passes through a bore **12** into an annular control chamber **14** surrounding a conical shoulder **13** of the nozzle needle **8**. The needle valve **8** is controlled by action of the fuel upon its shoulder **13** and lifted from its seat **20**, against the action of a spring **21**, if the force of the fluid pressure acting upon the shoulder **13** overcomes the spring force, whereby the fuel is injected into the cylinder (not shown) through an injection channel or jet **15**. A tight fit is provided between projection **6''** of sleeve **6** and the engaging bore of sleeve **7**, permitting communication between the two chambers through the bore **12** only.

Referring now to the embodiment shown in Fig. 3, it will be noted that the valve seat **20***a* for the nozzle needle **8** and the injection channel **15***a* are in this case formed by the inner sleeve **7***a* while the same were formed by the outer sleeve **6** in the embodiment shown in Figs. 1 and 2. The inner sleeve **7***a* is formed with a projection **7'***a* extending through a bore in the hemispherical end wall **6***a'* of the outer sleeve **6***a*. The joint between the projection **7***a'* and the bore is made tight by soldering or welding at **17**. By way of alternative, a screw joint may be provided for this purpose which is well known in the art and, therefore, has not been illustrated.

It will thus be understood that my invention suggests the construction of the nozzle body of two sleeves **6**, **7**, or **6***a*, **7***a* pinned together which in the zone of the seat **20** or **20***a* of the nozzle needle **8** and of the jet **15** or **15***a* of the nozzle form an annular space. At least one of the two sleeves is recessed at its surface engaging the other sleeve for forming a fuel feeding channel **10** to the cooling chamber **11** of the nozzle, while a bore **12** which, as best seen from Fig. 2, is spaced away as far as possible from the point where the groove **10** communicates with the cooling chamber **11**, leads to a chamber **14** which directly surrounds the needle **8** at its shoulder **13** acted upon by the fuel pressure to open the valve.

WILLY VOIT.