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(54) A fuel injection nozzle for diesel engines

(57) A plate 15 adjacent the nozzle outlet 30 or the nozzle body (35), Fig. 2 (not shown), forms one electrode and the nozzle body (19) and/or the engine body 10 the other electrode for producing an electrostatic field which prevents the deposition of carbon in the nozzle fuel metering region. The field is dependent on engine load and speed and may act throughout engine operation or in pulses.

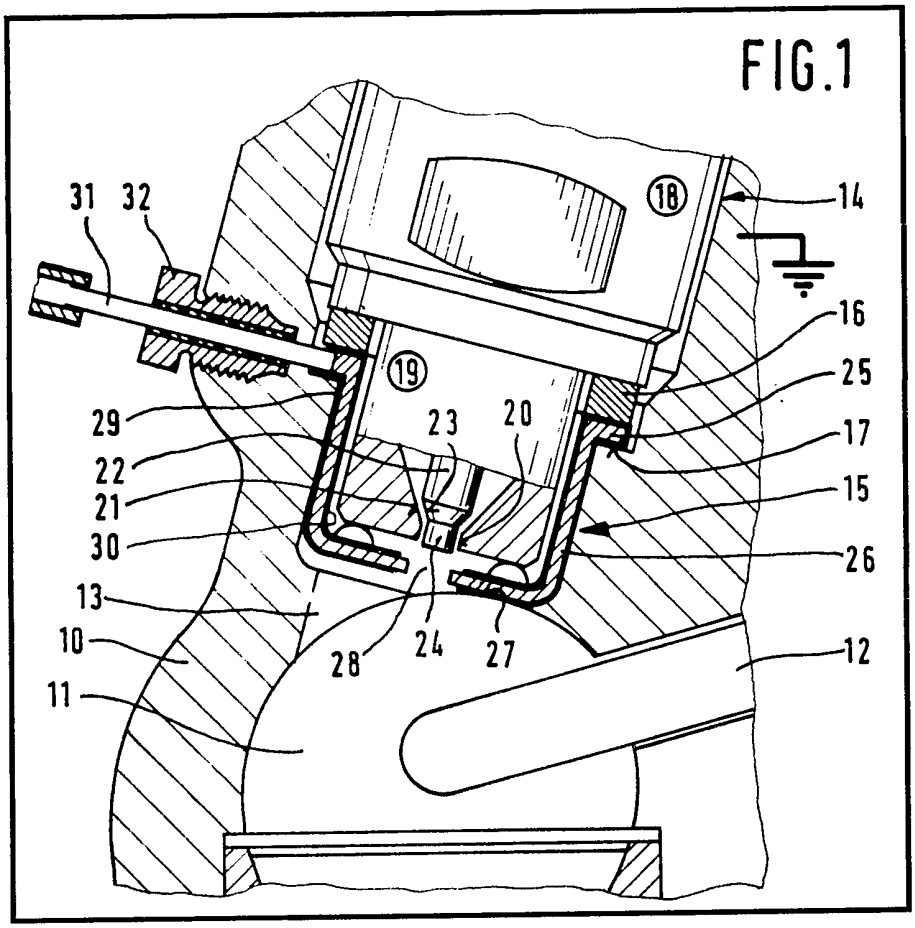


FIG.1

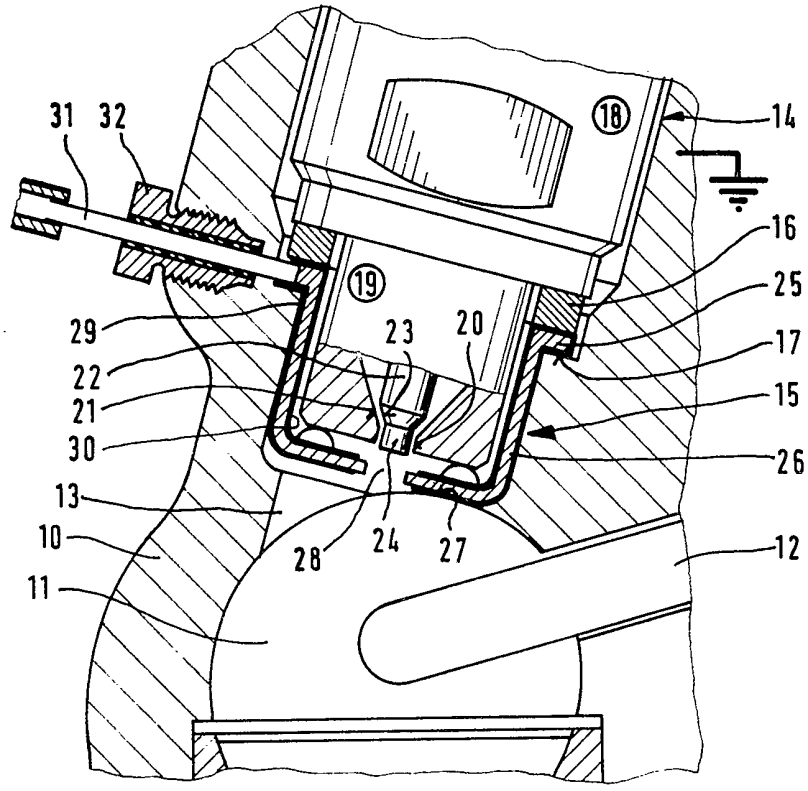
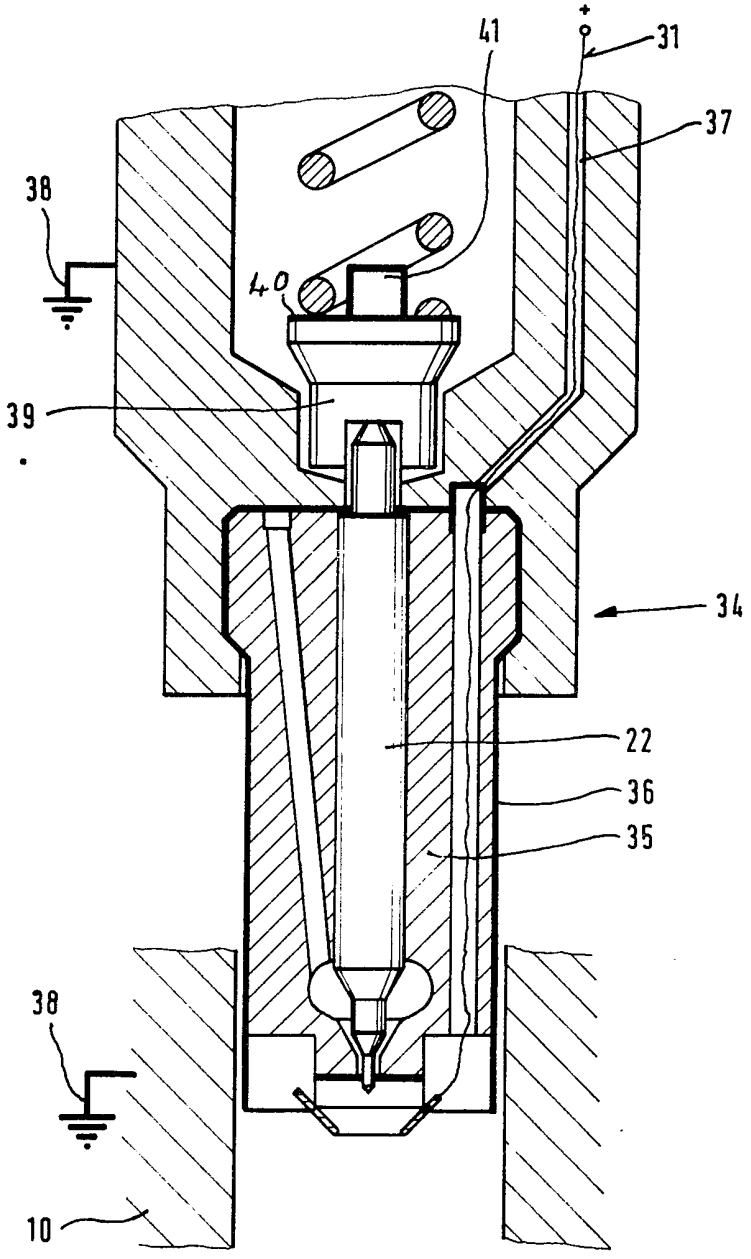


FIG. 2



SPECIFICATION

A fuel injection nozzle for diesel engines

The coking of the fuel metering location, that is to say the metering cross-section and the jet forming region, is due to the frequent functional defects of injection nozzles. The coking forms caked agglomerates which build up from primary soot particles and from oily fuel components of the order of magnitude of 10 to 50 Angströms. Thus, the coking of the fuel metering location formed by the nozzle needle and the nozzle body is so severe that with present day nozzle geometry a cleaning effect by the fuel flow no longer takes place but is even reduced. This leads to considerable combustion noise when idling and on partial load, to increased hydrocarbon emission when idling and also to blue smoke.

Advantages of the invention

The disadvantages explained with regard to the state of the art are substantially overcome with the injection nozzle according to the invention. The invention is based on the consideration of preventing the coking of the metering location by influencing the paths of the primary particles without needing to vary the so-called flow geometry of the nozzle.

Advantageous further developments of the invention are described in the sub-claims. With the arrangement of the injection nozzle according to claim 2, only an electrical voltage is required but no current; in this way, insulation defects or breakdowns which occur are detected in an electrical circuit in a simple manner and are likewise indicated.

Drawing

Two embodiments of the invention are illustrated in the drawing and are described in detail in the following specification. Fig. 1 is the first example with a first electrode formed as a protective sleeve and Fig. 2 is the second example with a nozzle body formed as the first electrode, both shown in axial section and true to scale.

Description of the embodiments

The diesel engine 10 shown only in section has a combustion chamber 11, into which projects a glow plug 12, and a multiple stepped bore 13. An injection nozzle 14 urges an insulated shielding plate 15 formed as a protective sleeve against a shoulder 17 in the bore 13 through a ring 16. The injection nozzle 14 has an injection body 19 secured by means of a nozzle retaining nut 18 and having cylindrical injection hole 20 and a frusto conical valve seat 21. A nozzle needle 22 has a sealing cone 23 cooperating with the valve seat 21 and a pin 24 which has a so-called overlapping clearance with respect to injection hole 20 of the nozzle body 19. The above-described cooperating sections of the nozzle needle 22 and of the needle body 19 designated as a metering location of the injection nozzle 14.

The shielding plate 15 forms the first electrode of an electrostatic field which prevents coking of the metering location at least during the working cycle of the engine. The plate 15 is cap-shaped with an outer flange 25 clamped between the ring 16 and the shoulder 17, a sleeve 26 extending therefrom and a base 27 which is provided with an aperture 28. The aperture plate 15 consists of electrically conducting material, an outer insulating layer 29 and an inner insulating layer 30. A supply conductor 31 is fixed in the diesel engine by means of an insulating portion 32 and connects the apertured plate 15 to the positive pole of an electrical generator (not shown) the negative pole of which is connected to the diesel engine 10. In this way, the region of the injection nozzle 14 and of the diesel engine 10 adjacent the plate 15, forms a second electrode for the electrostatic field generated by the generator. The electrostatic field can be applied during the entire engine operation or only in a pulsating manner during a working cycle; it is dependent on the speed and the load on the engine.

If, at least during the working cycle of the diesel engine, a voltage is applied to the two electrodes, then, in the region of the aperture 28 and of the metering location of the injection nozzle 14, there exists an electrostatic field which prevents coking of the said metering location.

The second embodiment in Fig. 2 shows the nozzle body 35 cooperating with the nozzle needle 22 and which is fixed in the injection nozzle 34 shown only in section, by means of an insulating layer 36. The nozzle body 35 acting as a first electrode is connected to the positive pole of an electrical generator (not shown) by the supply conductor 31 passing through a duct 37; the injection nozzle 34 is connected to the diesel engine (not shown) in a conducting manner at 38. The nozzle needle 22 and pressure plate 39 cooperating therewith are likewise insulated in their critical region 40 and 41.

If the positive voltage is now applied to the nozzle body 35 acting as the first electrode and the negative voltage is applied to the diesel engine 10 acting as the second electrode, then the electrostatic field of force prevents coking at the sections of the injection nozzle 34 described as the metering location.

CLAIMS

1. A fuel injection nozzle for diesel engines having the following features:
   a) a nozzle needle provided with a sealing cone,
   b) a nozzle body provided with a valve seat which cooperates with the sealing cone

as a kind of valve,

c) an electrical field prevents the coking at the metering location of the injection nozzle at least during the working cycle of the engine.

2. A nozzle according to claim 1 with the following feature:

d) the electrical field is an electrostatic field.

3. A nozzle according to claim or claim 2 with the following feature:

e) the nozzle body is arranged in the injection nozzle by means of an insulating layer and forms the first electrode.

4. Nozzles according to claim 1 or 2 with the following feature:

f) a protective sleeve has an outer and inner insulating layer and forms the first electrode.

5. A fuel injection nozzle for diesel engines, substantially as herein described with reference to Fig. 1 or Fig. 2 of the accompanying drawings.

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