

Dec. 3, 1929.

R. GAUPP

1,737,653

INJECTING NOZZLE FOR VISCOUS FUELS IN DIESEL ENGINES

Filed Nov. 5, 1926

Abb. 1

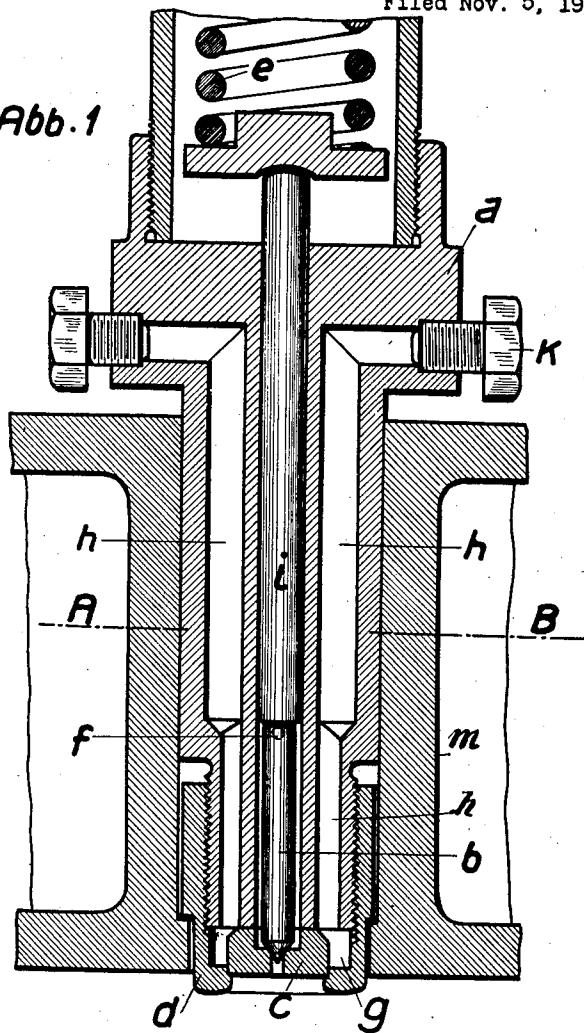


Abb. 2

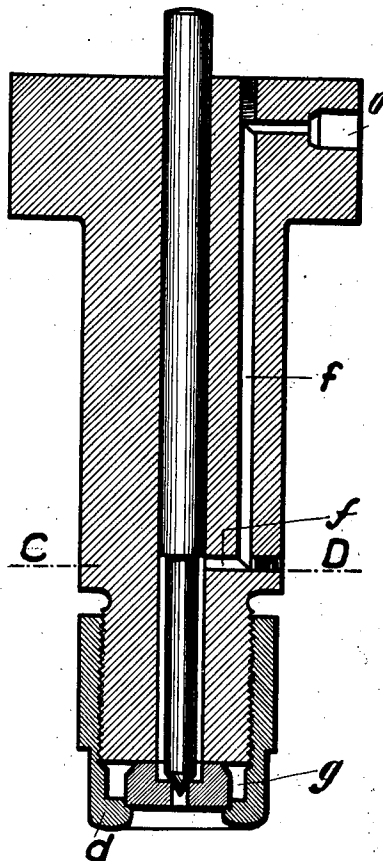


Abb. 3

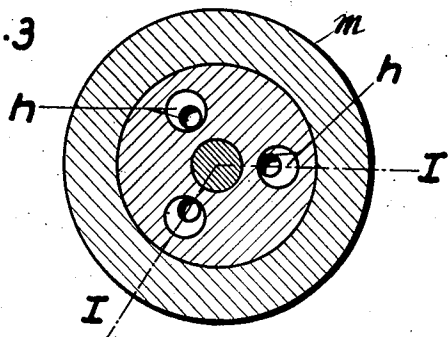
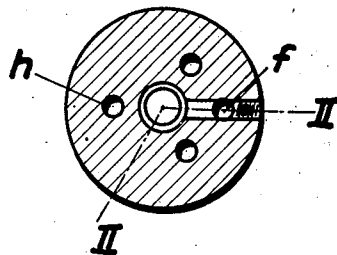


Abb. 4



R. Gaupp
inventor

By: Marko & Clerk
Attys.

UNITED STATES PATENT OFFICE

RUDOLF GAUPP, OF COLOGNE-ON-THE-RHINE, GERMANY, ASSIGNOR TO MOTOREN-FABRIK DEUTZ AKTIENGESellschaft, OF COLOGNE-DEUTZ, GERMANY

INJECTING NOZZLE FOR VISCOUS FUELS IN DIESEL ENGINES

Application filed November 5, 1926, Serial No. 146,468, and in Germany November 26, 1925.

In the treatment of viscous fuels in closed nozzles for Diesel engines with airless injection the disadvantage arises, particularly when the nozzle body is of rather large dimensions, that the latter becomes so cool in the upper part that the oil leaking past between the valve spindle and its guide, owing to its excessive viscosity, exerts a retarding action. It has indeed already been proposed to pre-heat the viscous fuel oil in order to enable it to be forced with sufficient mobility through the narrow passages of the nozzle. This pre-heating, however, fails as regards leakage oil, which works through slowly between the valve spindle and its guide and has been cooled down for a very long time when it reaches this position.

The present invention obviates this disadvantage by initiating an artificial heating of the spindle guide from the hottest part of the nozzle by circulation of heat. For this purpose, between the nozzle plate and the cap which holds it fast, an annular cap has been formed, and the latter is provided with ducts which extend right to the upper part of the spindle guide and are open at the top or closed to the outside. These spaces are filled with a liquid which is adapted to execute a thermal circulation and thus to give off heat at the lower part of the nozzle guide owing to this circulation. For this purpose the liquid must not have too high a viscosity at the working temperature, must have sufficient power to take up heat at metal surfaces, and must not have too low a boiling point, in order to guard against the formation of vapour as far as possible. It has been found that lubricating oil possesses the properties required for this purpose.

One constructional form of the invention is illustrated in the accompanying drawings, wherein

Figs. 1 and 2 show two sectional elevations through the nozzle body taken on the lines I—I in Fig. 3 and II—II in Fig. 4 respectively.

Figs. 3 and 4 are sections taken on the lines A—B in Fig. 1, and C—D in Fig. 2 respectively.

In the nozzle body *a* is inserted the nozzle

valve *b* with the spindle *i*. The nozzle valve is closed by the nozzle plate *c*, which is held fast by a screw cap *d*. The valve is pressed on to its seat in a known manner by a compression spring *e*, which is held above the spindle *i* by means of a spring plate, and is only raised when motor oil is forced at a high pressure through the angular duct *f* in the nozzle body *a* from a fuel pump, not shown, connected to the nozzle body at *o*. Since the nozzle body has to be inserted into a water-cooled sleeve *m* in the cylinder head, the spindle *i* must inevitably be clamped or at least checked in its movability in its upper part, past which the leakage oil under high pressure is forced between the spindle and its guide.

In order to obviate this, the following arrangement is provided: Between the nozzle cap *c* and the cap *d* an annular clearance space *g* is left, which communicates by ducts *h*, *h* with the upper part of the nozzle body. The ducts *h*, *h* are filled with lubricating oil, and at the top are either open or are closed by plugs *k*.

The action is as follows: When the engine is working, both the cap *d* and the nozzle plate *c* are highly heated by the combustion, and therefore give up heat to the liquid filling the annular space. Convection currents now start in the upper parts of the ducts *h*, *h*, which are preferably of greater cross-sectional area than the lower parts, and there exert a heating influence through the guide of the spindle *i*, to such an extent that the leakage oil that is forced through remains sufficiently thin or mobile not to retard the movement of the valve.

Instead of separate bores *h*, *h*, a single annular cavity may be provided, which acts as a heating means.

What I claim is:—

1. An injecting nozzle for viscous fuels, for use in Diesel engines, consisting of a nozzle body secured in the cylinder of the engine and enclosing the movable valve members that effect the injection of the fuel into the cylinder, said valve members being surrounded by cavities which serve for the reception of liquid and extend from the lower part to

the upper part of the nozzle body to give up there to the nozzle body the heat which the filling liquid takes up from the lower part of the nozzle body, which becomes hot when the engine is in operation, said cavities forming an annular chamber connected with ducts traversing the nozzle body, and said annular chamber surrounding the valve plate secured to the movable spindle enclosed by the nozzle body, and the adjustable seat for said valve plate.

2. An injecting nozzle for viscous fuels, for use in Diesel engines, consisting of a nozzle body secured in the cylinder of the engine and enclosing the movable valve members that effect the injection of the fuel into the cylinder, said valve members being surrounded by cavities which serve for the reception of liquid and extend from the lower part to the upper part of the nozzle body to give up there to the nozzle body the heat which the filling liquid takes up from the lower part of the nozzle body, which becomes hot when the engine is in operation, said cavities forming an annular chamber connected with ducts traversing the nozzle body, and said annular chamber surrounding the valve plate secured to the movable spindle enclosed by the nozzle body, and the adjustable seat for said valve plate, the ducts traversing the valve body having bores of larger diameter at the upper part remote from the cylinder than at the lower part adjacent to the cylinder, and being closed by closure members at the places where they open to the atmosphere.

3. An injection nozzle for viscous fuels, for use in Diesel engines with airless injection, consisting of a nozzle body, secured in the cylinder of the engine and enclosing the movable valve members that effect the injection of the fuel into the cylinder, the said valve members being surrounded by cavities in the nozzle body which do not communicate with the interior of the engine cylinder but serve for the reception of a small quantity of liquid, which absorbs heat from the lower parts of the valve members adjacent to the cylinder space and gives it up to the outer portions of the nozzle body, owing to convection current arising in the liquid within the said cavities, thereby warming the lubricating oil between the nozzle body and the valve spindle.

In testimony whereof I have signed my name to this specification.

RUDOLF GAUPP.