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(54) MOUNTING FUEL INJECTION VALVES AND NOZZLES ON INTERNAL COMBUSTION ENGINES

(71) We, ROBERT BOSCH GMBH, a German Company of Postfach 50, 7 Stuttgart 1, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The invention concerns the mounting of a fuel injection valve or nozzle on an internal combustion engine.

An injection valve is known from German Offenlegunschrift 2,149,817 in which the valve housing is fitted in a rubber ring and the latter is in turn fitted in a sleeve which is made from thermally insulating material and which has only a small surface area in contact with the surrounding part of the internal combustion engine. However, even the small contact surface constitutes a bridge for the transfer of heat.

The fuel injection valves, which are fitted in the suction pipe or channel of the engine or in the engine block, are heated to a considerable extent by either indirect or direct transfer of the heat propagated by the hot engine block and the exhaust pipes, particularly after the engine has been stopped.

According to the present invention there is provided an internal combustion engine having a fuel injection valve or nozzle which injection valve or nozzle is inserted into the aperture of a projection on a wall of a suction passage of the engine and has a housing which is supported in said aperture without contacting the inner wall of the projection, the space between the injection valve or nozzle housing and the inner wall of the projection being covered by a bellows which is secured at one end to the housing and at the other end to the outer wall of the projection.

The arrangement in accordance with the invention, has the advantage that the valve or nozzle is very satisfactorily thermally insulated by the space between the housing of the injection valve or nozzle and the projection aperture.

Furthermore, it is advantageous that the valve or nozzle housing has a considerable amount of unobstructed movability within the projection aperture. Thus, manufacturing tolerances and differing coefficients of thermal expansion are no longer of any importance.

The invention is further described by way of example with reference to the accompanying drawing of an injection valve.

An injection valve has a valve housing 1 which is provided with a lateral connection 2 for electrical leads 3 leading to a solenoid (not illustrated) arranged in the interior of the valve housing 1.

The valve housing 1 has a clamping nut 4 by means of which the valve housing is rigidly screwed to a screw extension 6 arranged in the wall of a fuel distributor 5 (not further illustrated). The fuel distributor 5 is connected to the vehicle engine (not illustrated) by means of a holder 7. The fuel distributor 5 is surrounded by a soundproofing layer 8 through which the screw extension 6 extends.

An injection end 9 of the valve housing 1 is inserted into an aperture 10 in a projection 11 provided on the wall 12 of a suction passage 13. The injection valve housing 1 is arranged in the aperture 10 in so as to be free from contact with the wall of the same and the end 9 of the housing is freely suspended in the suction passage 13. An annular space 14 between the injection valve housing 1 and an inner wall 15 of the projection 11 is covered by means of a bellows 16 which is secured at one end to the injection valve housing 1 and at the other end to an outer wall 17 of the projection 11. The bellows 16 prevents air from entering the suction passage 13, without exerting any

transverse forces on the injection valve.

It may also be mentioned that, alternatively, the suction passage 13 may be formed in the cylinder head of the engine, and that the injection valve may be actuated mechanically instead of by means of a solenoid. It is also conceivable to use an injection nozzle instead of an injection valve.

Satisfactory thermal insulation is obtained by virtue of the freely suspended arrangement of the injection valve in the suction passage. The free movability compensates for the detrimental effect of manufacturing tolerances and differing coefficients of thermal expansion of the parts.

WHAT WE CLAIM IS:-

1. An internal combustion engine having a fuel injection valve or nozzle which injection valve or nozzle is inserted into the aperture of a projection on a wall of a suction passage of the engine and has a housing which is supported in said aperture without contacting the inner wall of the projection, the space between the injection valve or nozzle housing and the inner wall of the projection being covered by a bellows which is secured at one end to the housing and at the other end to the outer wall of the projection.

2. An internal combustion engine as claimed in claim 1, in which the valve or nozzle housing is rigidly screwed by means of a clamping nut to a fuel distributor which is connected to the engine by means of a holder.

3. An internal combustion engine as claimed in claim 2 in which the fuel distributor has a screw extension for the clamping nut, which screw extension passes through a sound-proofing layer surrounding the fuel distributor (5).

4. An internal combustion engine as claimed in claim 1; arranged substantially as herein particularly described with reference to and as illustrated in the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*