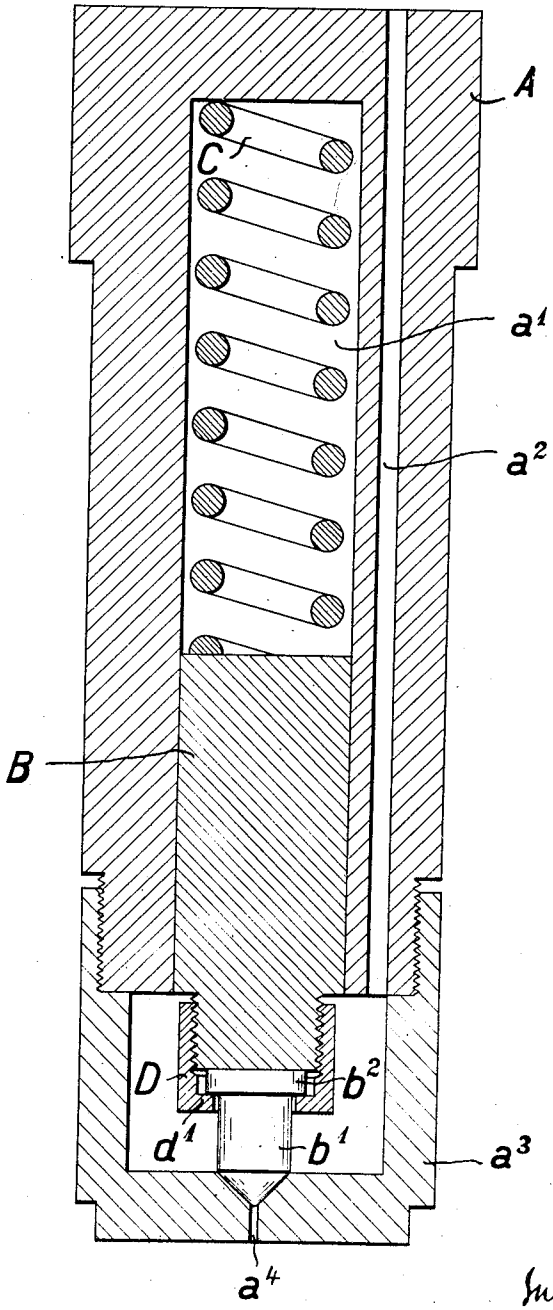
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K. HIMMELSBACH

FUEL INJECTION DEVICE FOR INTERNAL COMBUSTION ENGINES

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Inventor
Karl Himmelsbach
By Kniffler Bros
Attys

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KARL HIMMELSBACH, OF ESSEN, GERMANY, ASSIGNOR TO FRIED. KRUPP AKTIEN-GESELLSCHAFT, OF ESSEN-ON-THE-RUHR, GERMANY.

FUEL-INJECTION DEVICE FOR INTERNAL-COMBUSTION ENGINES.

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This invention relates to internal combustion engines and has particular reference to engines of the type in which the fuel is injected into the cylinder directly by the fuel pump without the use of compressed air, the opening of the fuel valve being effected automatically by the pressure of the liquid fuel during the pressure stroke of the fuel pump.

In well-known engines of this kind the upper portion of the valve needle is formed as a steering piston which is ground in the valve casing. Owing to this arrangement which renders a yielding of the guided portion impossible, it is difficult to attain an accurate centering of the lower needle portion constituting the valve proper with relation to the conical valve seat, especially so if the seat is disposed in a part which is separate from the casing and which while in screw-threaded connection with the casing does not at the same time serve as a guide for the valve needle.

The invention has for its object to obviate the said drawback and to provide a device by which a good centering of the valve needle on the valve seat is always secured, the object being essentially attained by forming the lower portion of the valve needle as a special piece which is connected with the upper needle portion in such a manner that it is non-shiftable in axial direction while it is movable radially in all directions so that it is adapted to always adjust itself centrically with relation to its hollow cone-shaped seat under the action of the valve spring.

An embodiment of the subject-matter of the invention is illustrated in the accompanying drawing which shows a longitudinal section through a fuel injection device constructed in accordance with the invention.

The casing A is provided with a cylindrical bore a^1 in which is mounted for reciprocatory motion the upper part B of the valve needle which forms a steering piston. The piston is tightly ground in and placed under the action of the valve spring C arranged above it. The admission of the fuel takes place through a channel a^2 arranged in the casing A. The casing has screwed on its lower end a pot-shaped member a^3 the bottom of which contains the hollow conical seat and the nozzle bore a^4 opening into the seat. According to the invention the needle valve b^1 proper is a special piece separated from the piston B. It possesses at its upper end a collar b^2 and is connected with the piston B by a cap nut D which by its inner flange d^1 grips with lateral play behind the collar b^2. The nut D is tightened so much that the two parts B and b^1 bear against each other in axial direction without any play, while the part b^1 is allowed to move with relation to the part B radially in all directions. Thereby it is attained that the needle valve b^1 is always pressed exactly concentrically on the valve seat under the action of the valve spring C.

There may be used instead of the cap nut D a correspondingly shaped sleeve pressed on or connected in any other suitable manner with the part B.

Claims:

1. A fuel injection device for internal combustion engines of the kind referred to, consisting of a fuel valve comprising a casing, a valve needle and a conical seat for the needle, the valve needle being made up of two superimposed separate parts, the upper part constituting a spring-pressed steering piston mounted for reciprocation in the casing and the lower part forming the valve proper, and means connecting the two needle parts in such a manner as to hold them against tilting movement with relation to each other, but to allow the lower part to move radially with relation to the upper part in all directions so that the valve will always adjust itself centrically to its seat under the action of the valve spring.

2. A fuel injection valve for internal combustion engines comprising a casing, a valve needle and a conical seat for the needle, the valve needle being made up of two superimposed separate parts with abutting surfaces, at least one of which is flat, the upper part constituting a spring-pressed steering piston mounted for reciprocation in the casing and the lower part consisting of a stem and a collar forming the valve proper, and a perforated cap nut screwed on the lower end of

the upper part and receiving within it the collar of the lower part, the stem extending out through the perforation, the perforation being of greater diameter than the stem to permit lateral motion thereof, and the cap-nut being adapted to hold the abutting surfaces of the upper and lower parts in contact with each other to prevent tilting of the lower part with respect to the upper part.

The foregoing specification signed at Essen, Germany, this 21st day of January, 1925.

KARL HIMMELSBACH.