April 6, 1926. 1,579,351

K. ELTZE

INTERNAL COMBUSTION ENGINE

Filed Jan. 17, 1925

Fig. 1

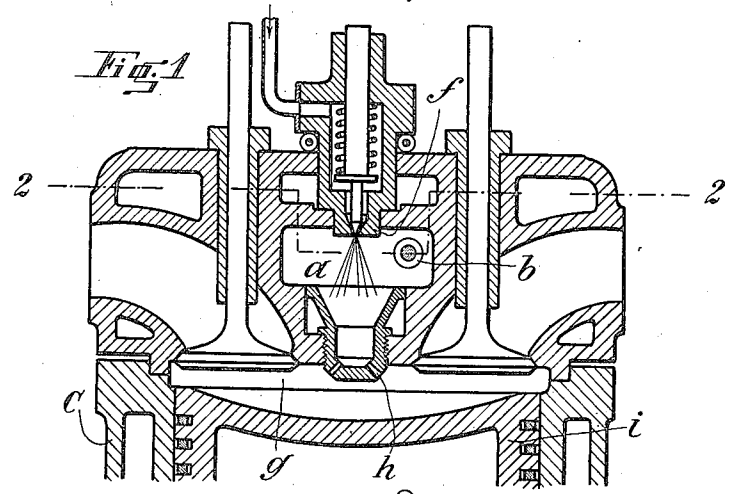
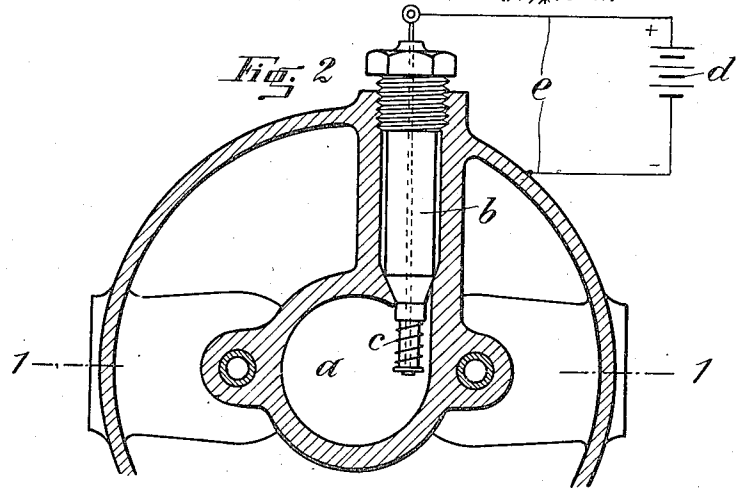


Fig. 2



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UNITED STATES PATENT OFFICE.

KURT ELTZE, OF MANNHEIM-KAFERTAL, GERMANY, ASSIGNOR TO BENZ & CIE., RHEINISCHE AUTOMOBIL-U. MOTOREN-FABRIK AKTIENGESELLSCHAFT, OF MANNHEIM, GERMANY, A CORPORATION OF GERMANY.

INTERNAL-COMBUSTION ENGINE.

Application filed January 17, 1925. Serial No. 3,071.

To all whom it may concern:

Be it known that I, KURT ELTZE, a citizen of Germany, and a resident of Mannheim-Kafertal, Germany, have invented certain new and useful Improvements in Internal-Combustion Engines (for which I have filed application in Germany, Dec. 21, 1922), of which the following is a specification.

My invention relates to improvements in internal combustion engines and more particularly in the arrangement of the electric igniters which are used for starting raw oil engines by being made incandescent by electric current. In constructions now in use the said igniters are arranged radially with respect to the axis of the engine and in position for being impinged by the spray of fuel delivered from the nozzle. Therefore, the igniter may be cooled so far that ignition fails. Further, after the engine has been started and the electric current switched off, the igniter is in the way of the spray thus preventing uniform distribution of the fuel within the ignition chamber. Further in such constructions the efficiency of the igniter is impaired if the incandescent wire is helically wound around the end of the cylindrical or conical body of the igniter. For convenience in mounting the igniter its length is ordinarily larger than the diameter of the end face. Therefore, the major part of the igniting faces is located on the cylindrical portion of the plug and on the incandescent wire helically wound thereon, while the end face is covered by a cap or nut providing the electrical connection, which cap is not sufficiently heated for igniting the spray of fuel.

The object of my invention is to provide a construction in which cooling of the igniter is prevented, and in which the igniter presents a large heating surface to particles of fuel separated from the said spray and impinging thereon. With this object in view my invention consists in mounting the igniter at a part of the ignition chamber, which is not directly traversed by the jet of fuel, but is traversed only by particles separated from the said jet by the compressed air forced into the ignition chamber by the compression within the combustion chamber of the cylinder. In the preferred construction the igniter is disposed tangentially of the periphery of the ignition chamber, so that it presents a large incandescent surface to the said particles of fuel.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1, is a sectional elevation taken on the line 1—1 of Fig. 2,

Fig. 2, is a section taken on the line 2—2 of Fig. 1.

Referring more particularly to the drawing, the cylinder C of the internal combustion engine is provided at its top with an ignition chamber *a*, a fuel nozzle *f* disposed coaxially of the ignition chamber, and an igniter comprising a plug *b* of refractory material and an incandescent wire *c* coiled thereon and adapted to be heated by electric current supplied for example from a battery *d* through leads *e*. The ignition chamber communicates with the combustion chamber *g* through apertures *h*. As appears from Fig. 1 the igniter *b*, *c* is disposed within the ignition chamber at a part which is not traversed by the spray of fuel delivered from the nozzle *f* and, as viewed from the combustion chamber *g* and the apertures *h*, it is located behind the said spray. In the example shown in the figures the axis of the igniter *b*, *c* is perpendicular to a plane passing through the axis of the ignition chamber and lateral of the axis of the nozzle *f*.

In the starting operation of the engine a current of air is forced by the compression stroke of the piston *i* into the ignition chamber, and the said current separates minute particles from the jet of fuel injected in opposition thereto, which particles are in part thrown towards the igniter *b*, *c*. While the engine is cool the said particles strike against the igniter so as to start ignition. After the engine has become hot the particles are ignited while moving towards the igniter. By disposing the igniter at the rear of the spray of fuel delivered from the nozzle it is not impinged upon and cooled by the mass of fuel, but it is struck only by particles of fuel separated from the spray by the current of air forced into the ignition chamber though the apertures *h*. Therefore the igniter is always sufficiently hot to insure ignition of the fuel. Further, the ig-

niter presents a large igniting surface to the particles of fuel.

After the engine has started by the combustion of fuel in the ignition chamber in the manner just described, the electric current to the igniter coil is cut off. The injected fuel is thereafter ignited and burned in the highly compressed air in the combustion chamber, which attains a temperature above the ignition point of the fuel. The subsequent normal operation of the engine is, therefore, entirely automatic, and requires no external means to ignite the fuel supply.

Certain features of the invention disclosed herein are also found in my earlier application Serial No. 756,211 filed in the United States Patent Office on December 16, 1924.

I claim:

In an internal combustion motor, a combustion chamber, a cylindrical ignition chamber adjacent said combustion chamber, a restricted passage connection the said chambers, a nozzle projecting into said ignition chamber for injecting a spray of fuel therein, and an igniter plug having a cylindrical portion extending into said ignition chamber tangentially to the periphery thereof and positioned out of the path of said spray.

In testimony whereof I hereunto affix my signature.

KURT ELTZE.