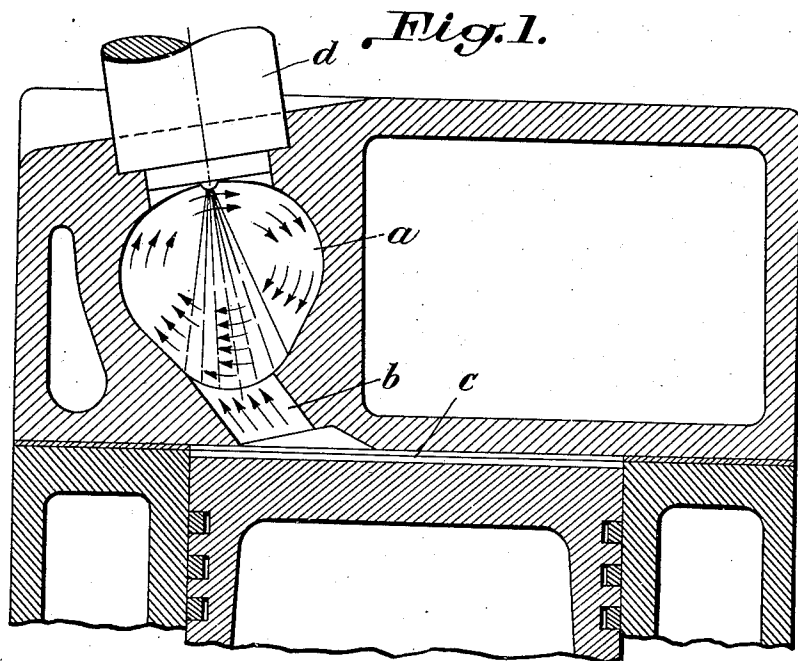
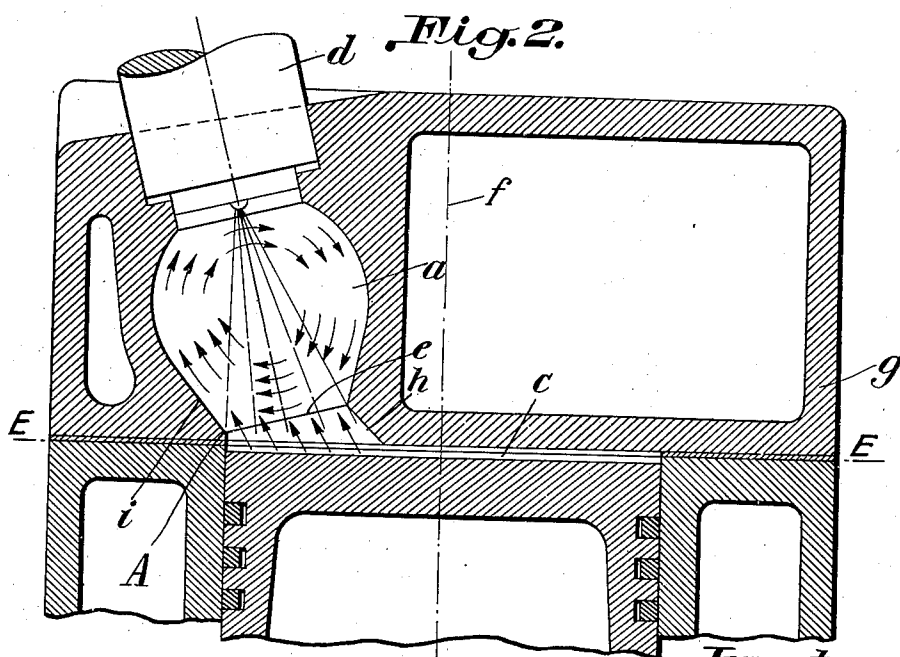


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INTERNAL COMBUSTION ENGINE

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INTERNAL COMBUSTION ENGINE

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1 Claim. (Cl. 123—33)

The invention relates to injection type internal combustion engines having a whirl chamber arranged in the cylinder head, with an inclined connecting duct opening into the whirl chamber at the side opposite the injection valve.

The invention has for its object to reduce the fuel consumption in this type of engine.

The invention will be described in detail by reference to two illustrative embodiments shown in the drawing.

Fig. 1 is an axial section of one end of a cylinder, showing the improved whirl chamber in its head; and

Fig. 2 is a similar sectional view of a modified form of the invention.

In Fig. 1 is shown a cylinder 1 including a head 2 and piston 3 operating in the piston chamber *c* of the cylinder. In the cylinder head is a whirl chamber *a* connected by a duct *b* to the piston chamber *c*. Opposite the duct *b* an injection valve *d* is directed into the whirl chamber. In accordance with the invention the whirl chamber is made pear-shaped and tapers in the direction of the jet issuing from the nozzle *d* toward the duct *b*. In order to ensure positive starting of the engine, the inclination and length of the communicating duct *b* are preferably so chosen, that a part of the fuel is injected through the duct *b* into the piston chamber *c*. During the combustion stroke the air compressed into the whirl chamber is constrained to set up a whirl, as indicated by the arrows. By the tapering of the whirl chamber, the current of air is broadened in the direction of the axis of the fuel jet, near the extremity of the fuel jet, so that a very large part of the finely dispersed fuel jet is caught up by the circulating air current. Thereby a very good mixture of the air with the fuel is achieved.

In previously known engines of this type the whirl chamber has been spherical. Tests show that with a pear-shaped whirl chamber as described herein, the rate of consumption of the fuel is substantially lower than with the known spherically shaped whirl chamber. The saving in fuel is primarily due to the fact that the fuel jet in the tapered end of the chamber is more fully presented to the air entering there, and particularly to the circulating air, than in a spherically shaped chamber. By the tapering there is at the very extremity of the fuel jet, where it is dispersed in fine droplets, a spreading out of the circulating air current, in the direction of the axis

of the fuel jet, whereby the finely dispersed fuel jet is picked up by the air over a considerable length.

The same advantages can also be achieved with a disk-shaped whirl chamber, the cross section of which in the whirling plane is pear-shaped.

In the illustrated form shown in Fig. 2 the whirl chamber *a'* tapers conically in the direction of the fuel jet, down to its narrowest cross section *e*, and from there flares toward the piston chamber *c* of the engine, preferably at the same cone angle. The whirl chamber is accordingly a true solid of revolution, the axis of revolution of which is the fuel jet axis. In order to achieve a smooth tangential entrance of the air into the whirl chamber, the chamber is inclined to the cylinder axis *f*, so that its conically flared extension is cut off diagonally by the inner face *E—E* of the cylinder head *g*, substantially to the narrowest cross section *e*. The air forced out of the piston chamber *c* during the last part of the stroke of the piston is guided into the whirl chamber *a* by the right half *h* of the conically shaped extension and the left half *i* of the conically shaped taper.

The most favorable relations for the entrance of the air into the whirl chamber exist when the point of intersection, *A*, of the narrowest cross section *e* and the plane *E—E* falls upon the periphery of the cylinder bore. In this case the entire air compressed by the piston enters the whirl chamber without deflection.

The construction of the whirl chamber as a solid of rotation has the important advantage that the inside of it can be exactly machined. The machined smooth inner walls cause only slight friction loss in the whirling mixture.

We claim:

In an injection type internal combustion engine, a cylinder including a cylinder head covering the end of a piston chamber, said cylinder head having a whirl chamber therein connected to the piston chamber by a duct inclined to the axis of the cylinder, and an injection valve having its nozzle in said whirl chamber opposite said duct and adapted to direct a jet of fuel toward said duct, said whirl chamber being pear-shaped and tapering in the direction of the jet from said nozzle, toward said duct.

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