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S. F. LEMANSKI

2,247,759

CYLINDER HEAD FOR INTERNAL COMBUSTION ENGINES

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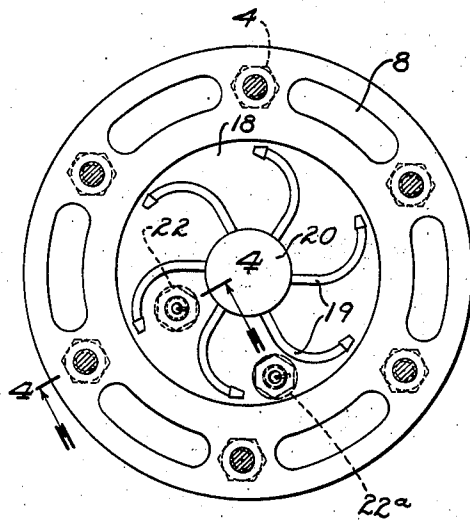


FIG. 3.

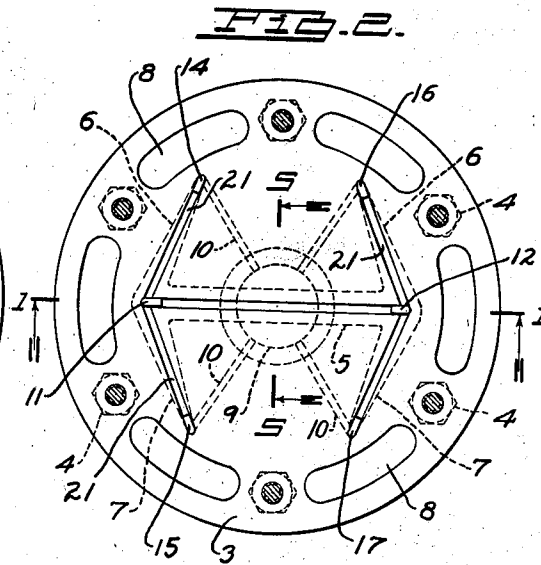


FIG. 2.

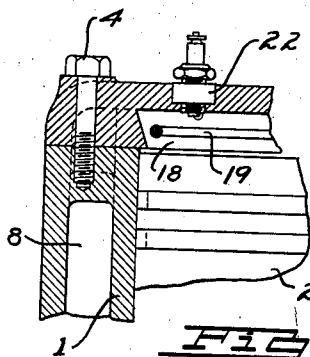


FIG. 4.

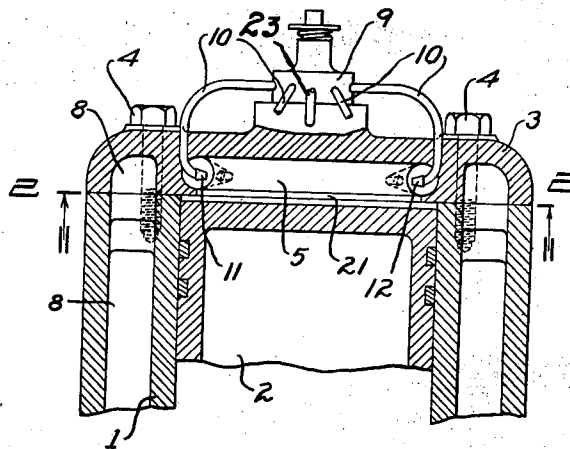


FIG. 1.

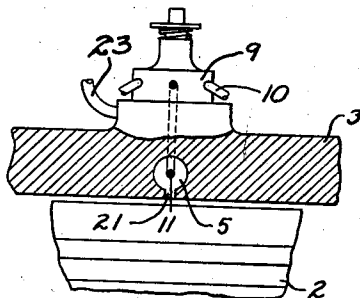


FIG. 5.

INVENTOR.
Savarian F. Lemanski
BY *Emile B. Wiesner*
ATTORNEY.

UNITED STATES PATENT OFFICE

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CYLINDER HEAD FOR INTERNAL COMBUSTION ENGINES

Savarian F. Lemanski, Detroit, Mich.

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3 Claims. (Cl. 123—32)

This invention relates to cylinder heads for internal combustion engines and the object of the invention is to provide a cylinder head into which a series of jets discharge a fuel and air mixture in a manner to produce maximum turbulence at the time of combustion of the fuel in order to completely consume the fuel on each explosion.

A further object of the invention is to provide a cylinder head for internal combustion engines shaped to provide a fuel chamber into which a fuel and air mixture is discharged through opposed jets to produce turbulence within the chamber and to thoroughly mix the fuel particles with the air for firing.

Another object of the invention is to provide a cylinder head formed with fuel pockets in which the fuel and air mixture is mixed with the air of the combustion chamber, the pockets being open to the interior of the cylinder to allow the mixture to expand into the cylinder upon combustion.

A further object of the invention is to provide a cylinder head formed with two side chambers connected by a transverse chamber, jets being provided at each end of each side chamber and at each end of the transverse chamber so that when the fuel mixture is discharged through the jets maximum turbulence and mixing is produced within the chambers.

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawing in which—

Fig. 1 is a longitudinal section through a cylinder and head embodying my invention.

Fig. 2 is a face view of the cylinder head taken on line 2—2 of Fig. 1.

Fig. 3 is a view similar to Fig. 2 showing an alternative form of construction.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is a section taken on line 5—5 of Fig. 2 showing the cross section of the diametrical chamber.

An internal combustion engine cylinder 1 is shown in Fig. 1 in which a piston 2 is reciprocally mounted. This cylinder is provided with the usual engine water jackets and a head 3 is fitted over the upper end of the cylinder and is secured thereto by the cylinder head bolts 4. The cylinder head itself is shown more particularly in Fig. 2 and is provided with a diametrical chamber 5 which is circular in cross section

as shown in Fig. 5, and this chamber 5 communicates at each end with angular chambers 6 and 7. These angular chambers 6 and 7 at each end of the chamber 5 are also circular in cross section as shown in Fig. 1 and are slightly tapered or conical so that each chamber is widest at the point where it opens into the diametrical chamber 5 and narrowest at the end furthest away from the diametrical chamber 5. The chambers 6 and 7 at each end in combination with the transverse chamber 5 are arranged substantially in the form of an H as will be understood from Fig. 2. The chambers 6 and 7 at each end of the transverse chamber 5 shown in dotted lines in Fig. 2 are each inwardly inclined at an angle less than a right angle to the transverse channel. Mounted on the top of the cylinder head 3 as shown in Fig. 1 is an injector 9 for injecting a fuel and air mixture under pressure into the various chambers in the cylinder head. This injector 9 is provided with an inlet 23 and with a series of six discharge tubes 10 opening therefrom and these tubes 10 discharge into the ends of the substantially H shaped chamber formed in the head. The tubes at the ends are shaped to provide discharge jets and the jets 11 and 12 are arranged to discharge toward each other from opposite ends of the diametrical chamber 5 shown in Fig. 2.

These two jets or streams of fuel and air mixture impinge against each other in the chamber 5 producing a turbulence and mixing of the fuel with the air which is under compression in the head at this time to produce a thoroughly explosive and burnable mixture. At the same time, the fuel mixture from the jets 14 and 15 at the opposite ends of the left hand side of the H chamber also impinge in the portions 6 and 7 of the left hand chamber and the fuel mixture from the jets 16 and 17 are directed toward each other in the right hand side of the H-shaped chamber. This produces a thorough mixture of fuel and air at the top of the piston which nearly contacts the cylinder head at the top of its stroke as shown in Fig. 1 and the burning gases pass out through the slots 21 provided in the bottom of the several chambers and communicating with the cylinder. When the piston is at the top of its stroke and the several jets are opened, the fuel and air mixture is confined to the chambers in the cylinder head and is mixed in these chambers. The fuel and air mixture is discharged through the tubes into the compression chamber of the cylinder under pressure produced in the injector 9 and during operation of the engine

as a Diesel type the compression of the gases in the compression head produces the explosion. If desired for starting, a spark plug may be utilized in order to initially fire the mixture until the engine is operating effectively.

An alternative form of construction is shown in Figs. 3 and 4 in which the cylinder head is provided with a circular recess 18 and with a series of jet tubes 19 discharging tangentially around the wall of the recess 18. These jet tubes 19 are connected to a central member 20 from the injector so that the liquid fuel and air mixture may be injected from the injector through the tubes 19 into the compression chamber.

As these tubes are arranged to discharge the mixture at a tangent, thorough turbulence is produced to mix the fuel particles with the air within the compression chamber. It is also possible to inject fuel and air through the jets successively so as to produce an even expansion of gases under combustion. However, the injection must be fairly rapid due to the rapid stroke of the piston in the cylinder. A spark plug 22 is shown in Figs. 3 and 4 for firing the mixture in the head for operating the engine with a spark plug.

The spark plugs shown in Figs. 3 and 4 may be utilized for firing fuels of lighter specific gravity but where fuels of heavy specific gravity are used it is preferable to place the spark plug so that the spray from the jets passes the spark plug points to more readily ignite the fuel. In this case, the spark plug will be preferably placed directly in front of one of the jets as indicated at 22a in Fig. 3. It is also possible to utilize the spark plug for starting even when the engine is operated as a Diesel type. However, to properly fire the engine with a spark plug operating under Diesel engine compression ratios, it will be necessary to provide some sort of a valve for partially relieving the compression until the engine is warmed up, at which time, the valve could be shut and the spark plug disconnected.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, will provide an arrangement for mixing the fuel particles with the air in the combustion chamber and provides a device which accomplishes the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In an internal combustion engine, a cylinder,

a cylinder head having a diametric chamber of circular cross section, the cylinder head being provided with a pair of chambers at each end of the diametric chamber and on opposite sides thereof, said end chambers being circular in cross section and being largest at the juncture with the diametric chamber and being smallest at the end furthest away from the diametric chamber, a jet for injecting a fuel and air mixture into each end of the diametric chamber, a jet in the small end of each end chamber for injecting a fuel and air mixture longitudinally of each end chamber, the cylinder head being provided with a small longitudinal opening in the bottom of each chamber communicating with the interior of the cylinder and a piston movable into close proximity with the bottom face of the cylinder head.

2. In an internal combustion engine, a cylinder, a cylinder head having a diametric chamber open to the interior of the cylinder, the cylinder head having a pair of chambers at each end of the diametric chamber opening into the diametric chamber, a jet at each end of the diametric chamber adapted to inject fuel longitudinally of the diametric chamber and a jet in the end of each end chamber arranged to inject fuel under pressure toward the diametric chamber, the chambers being all open to the interior of the cylinder and a piston movable to close proximity with the cylinder head to confine the injected fuel mainly to said chambers prior to downward movement of the piston.

3. In an internal combustion engine, a cylinder head having a diametric chamber open to the interior of the cylinder, the cylinder head being provided with a pair of chambers at each end of the diametric chamber and on opposite sides thereof, the end chambers being largest at the juncture with the diametric chamber and being smallest at the end furthest away from the diametric chamber, each pair of chambers at the opposite ends of the diametric chamber being inclined relative to the diametric chamber at an angle less than a right angle, a jet for injecting a fuel and air mixture into each end of the diametric chamber, a jet in the small end of each end chamber adapted to inject fuel and air mixture longitudinally of each end chamber, the cylinder head being provided with an opening in the bottom of the several chambers communicating with the interior of the cylinder and a piston movable into close proximity with the bottom of the cylinder head.

SAVARIAN F. LEMANSKI.