Aug. 11, 1964 L. PÉRAS 3,144,013

INTERNAL COMBUSTION ENGINES

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Fig. 1

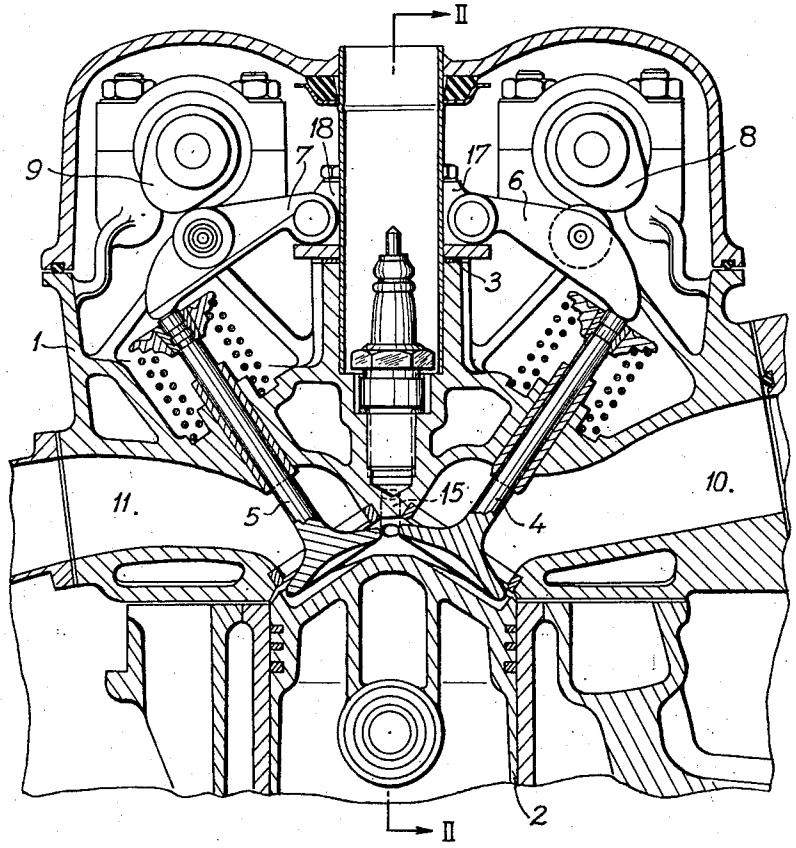
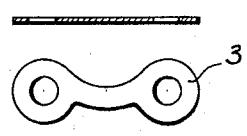


Fig. 4



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Fig. 2

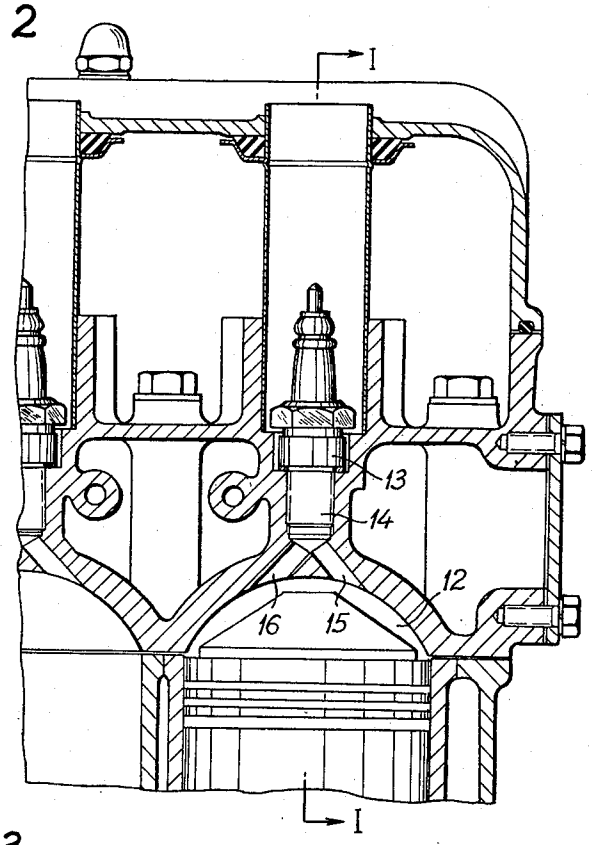
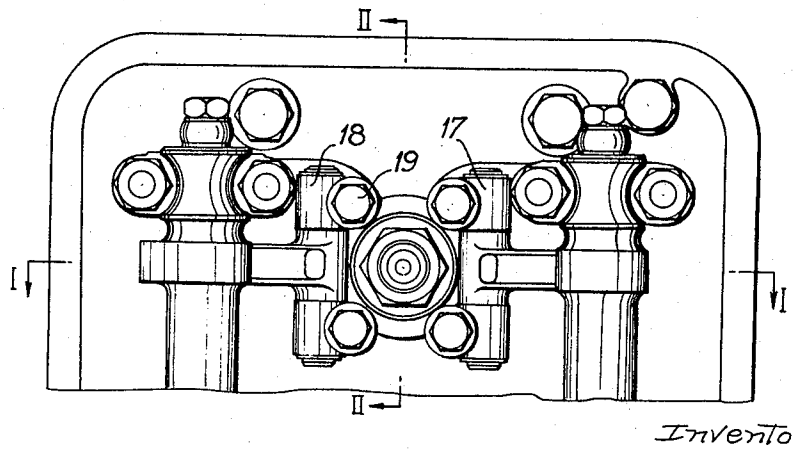


Fig. 3



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INTERNAL COMBUSTION ENGINES

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1 Claim. (Cl. 123—191)

This invention relates to internal combustion engines and has specific reference to the design of the cylinder head and to the valve operation with a view to improve the engine performance.

More particularly, this invention is concerned with the following points:

A cylinder head arrangement wherein the combustion chambers have a hemispherical configuration with inlet and exhaust valves of relatively great dimensions with respect to the cylinder diameter, these valves being inclined to fit in the cylinder head, and a central spark plug overlying the combustion chamber and having its electrodes in communication with the combustion chamber through a pair of oblique ducts.

A valve disposal wherein twin camshafts operate the valves through very short levers or rockers of the pawl type having their pivot pins mounted for each of them near the centre of the combustion chamber by means of a detachable and separate bearing adjustable vertically by means of a shim formed with two holes through which extend the screws for securing the relevant bearing.

A typical form of embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is a vertical cross section of the engine, showing the upper portion of the cylinder and piston assembly, the combustion chamber, the valves, the rockers and the twin camshafts, the section being taken along the line I—I of FIGS. 2 and 3;

FIGURE 2 is a longitudinal section showing the hemispherical combustion chamber and the spark plug, the section being taken along the line II—II of FIGS. 1 and 3;

FIGURE 3 is a plane view showing the rocker bearing and its fixation by means of two screws, and

FIGURE 4 illustrates the shim for adjusting the rocker bearings.

As shown in FIG. 1, the reference numeral **1** designates the cylinder head of the internal combustion engine comprising a piston **2**, inlet and exhaust valves **4**, **5**, valve-actuating rockers **6**, **7**, twin overhead camshafts **8**, **9** and inlet and exhaust ports **10**, **11**.

Referring now to FIG. 2, it will be seen that this engine comprises a hemispherical combustion chamber **12** and a spark plug **13** screwed in a central recess **14** overlying the combustion chamber **12** and communicating therewith through a pair of oblique ducts **15**, **16** having an inclination of about 80° relative to the wall of this chamber.

FIGURE 3 shows two rocker bearings **17**, **18** with their fastening screws **19**.

The main purpose of the essential improvements described hereinabove is to improve the engine efficiency for a given, relatively low cubic capacity or displacement, due to a rational combustion chamber configuration and a high engine speed.

The rational combusition chamber configuration and a satisfactory filling thereof with the air-fuel mixture are

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permitted by the provision of two large-diameter poppet valves inclined about 70° to the horizontal. The valve heads are very close to each other and to the cylinder axis, so that a gap of only a few millimeters (⅛" to ¼") is left between the valve heads. Similarly, the exterior of each valve head is separated by only a few millimeters from the cylinder bore. It will be seen that with this valve disposal the spark plug electrodes cannot be placed in close vicinity of the part-spherical vault of the combustion chamber. According to another feature characterizing this invention and considering this impossibility, the spark plug has been somewhat raised and instead of communicating with the chamber through a central hole or shaft it communicates through a pair of ducts **15**, **16** forming an angle of about 80° with the surface of this chamber, as already explained hereinabove.

These two ducts open into the central portion of the combustion chamber at right angles to the plane containing the valves. In this portion of the chamber the combustion mixture is concentrated mainly in the central region of the top dead centre at the end of the compression stroke, due to the combination of the hemispherical shape of the combustion chamber with the frustoconical configuration of the piston crown.

As a result, the spark produced by the spark plug is transmitted through the ducts **15**, **16** to two zones in the cylinder head whereby two flame fronts are built up at the best possible location, so that the flame propagation is faster than in any other known cylinder head configurations. Morever, the inlet and exhaust ports are designed with a view to ensure an efficient filling of the combustion chamber, the substantially horizontal carburettor leading to the induction pipe slightly inclined to the horizontal. On the other hand, the exhaust duct is slightly curved to permit the mounting of an exhaust manifold of which the branch pipes constitute the extensions of the curve formed initially in this duct, so that the evacuation of the exhaust gas is facilitated.

To permit high velocities of rotation to be attained by the engine the inlet and exhaust valves are lightened by dispensing with the conventional overhead-valve cam tappets, and the valves themselves are the same as those used in push-rod and valve-rocker disposals, so that they are considerably lighter, and relatively short rockers **6**, **7** are disposed between the valve shanks and the overhead cams, as already explained.

Each bearing is detachable and secured by means of a pair of screws **19**. Between the cylinder head boss and the bearing seat an adjustment shim **3** (see FIG. 4) is interposed, according to the desired valve shank clearance. These shims can be fitted rapidly and easily without removing any part except the bearing concerned with the desired adjustment, this removal being facilitated by the ratio of the lever arms which requires a shim thickness about three times greater than the clearance or play to be corrected.

Moreover, the relative spacing of the valves and the overhead position of the spark plug afford a more convenient design of the water jacket passages around each spark plug, so that the spark plug temperature may be reduced to a certain extent.

Although the present invention has been described in conjunction with a preferred embodiment, it is to be understood that modifications and variations may be re-

sorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and appended claim.

I claim:

An internal combustion engine having a cylinder with a hemispherically shaped combustion chamber adjacent one end, a pair of valve opening means in said shaped chamber disposed at an inclined angle with each other forming valve seats, the upper edges of said seats being spaced closely adjacent each other, a pair of oblique diverging ducts disposed in the space between said upper edges of said seats and communicating with said chamber between said valves, a spark plug disposed in said engine above said ducts and in communication with the upper ends of said ducts, said spark plug being disposed vertically in alignment with said ducts and in the space between said upper edges of said valve seats.

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