# PATENT SPECIFICATION

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COMPLETE SPECIFICATION

## Improvements in Valve Gear for Multi-Cylinder Internal Combustion Engines

We, LANCIA & C. FABBRICA AUTOMOBILI TORINO S.A., an Italian Company, of 99, Via Monginevro, Turin, Italy, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to multi-cylinder internal combustion engines with a domed combustion chamber and two inclined valves in each cylinder head. The object of the invention is to provide an arrangement of the valve gear members which permits the space occupied by the engine to be reduced and leaves the members of the head entirely accessible.

According to the invention, in an engine in which each cylinder head comprises two valves with divergent stems, whereof the axes lie in a plane inclined relatively to the axis of the cam shaft situated at the side of said head, this condition is secured by the fact that the plane containing the axes of the valve stems has an inclination relatively to the axis of the cam shaft such that the adjacent ends of the valve stems of two successive cylinders are side by side.

The planes containing the axes of the valve stems may, in this way, be brought sufficiently close to the longitudinal direction of the engine to leave completely free the lateral side of the head where the sparking plug may thus be mounted in a readily accessible manner, and at the same time the projection formed by the valve members relatively to the cylinder profile does not form an obstacle to arranging the aligned cylinders of the engine close together.

One constructional embodiment of the invention is shown, by way of example, in the accompanying drawing, wherein

Figure 1 is a diagram in plan of a cylinder head,

Figure 2 is a section in the plane of the valve stems, and

Figure 3 is a plan of a portion of the head of an engine with two rows of cylinders brought close together.

In Figures 1 and 2, 1 indicates the cylinder head in which is provided the dome-shaped combustion chamber 2, and 3 indicates the cam shaft which is mounted parallel to the axis of the engine on one side of the cylinder head.

The seats of the valves through which the chamber 2 communicates with the induction and exhaust conduits are disposed with their centres in a meridian plane inclined relatively to the axis of the cam shaft 3.

The stems of the two valves 4, 4′ which control the said seats, and consequently also the axes of the respective guides 5, 5′ and the axes of the sleeves 6, 6′ enclosing the return springs form two lines which are inclined and divergent relatively to the axis of the cylinder and which lie in a plane inclined relatively to the axis of the cam shaft.

For actuating the valves, there are two two-armed levers 7, 7′ pivoted in the support 8 in parallel bearings, the axes of which are both at right angles to the stems of the valves.

The levers 7, 7′ abut with one arm on the end of the stem of the corresponding valve 4, 4′ and with their other arm on the end of an axially guided rod 9, 9′ bearing on the corresponding cam 10, 10′ of the cam shaft 3.

A hole for the sparking plug 11 is provided in the head in the region of the wall of the chamber 2 between the two valves and on the side opposed to that where the cam shaft is mounted.

As will be seen in Figures 1 and 2, the sparking plug 11 in this way occupies a central position in the cylinder head and in a lateral region of the engine, while remaining completely clear of the other members, and readily accessible from the outside.

Therefore, in multi-cylinder engines with aligned cylinders, the sparking plugs are all in a readily accessible position on one side only of the engine.

The arrangement is particularly suitable for engines having two rows of cylinders close together, in which case, as shown in Figure 3, the cams 10 are carried by a cam shaft 3 mounted between

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the two rows of cylinders and each of them acts on one arm of a lever 7 controlling a valve 4.

In this case, the planes *c-d* in which lie the axes of the stems of the two valves of each cylinder are all inclined relatively to the axis *a-b* of the cam shaft 3, and this inclination is such that the ends of the valve stems of two successive cylinders are side by side.

As will be seen in this Figure, the cylinders of each row are closer together than would be possible if the valves lay ln a meridian plane parallel to the axis of the cam shaft. Furthermore, the valves are not situated below any tranmission member of the valve gear and the sparking plugs all occupv a position central of the combustion chamber and conveniently accessible on both sides of the engine.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A valve gear for multi-cylinder internal combustion engines with a domed combustion chamber and two inclined valves in each cylinder head, the axes of which valves lie in a plane inclined relatively to the axis of the cam shaft mounted on one side of the head, characterised in that the inclination of the planes containing the axes of the stems relatively to the axis of the cam shaft is such that the adjacent ends of the valve stems of two successive cylinders are side by side.

2. A valve gear as claimed in claim 1, characterised in that in the case of an engine having two rows of cylinders close together, the planes containing the axes of the stems of the valves of the two rows of cylinders are inclined relatively to the axis of the cam shaft mounted between the two rows of cylinders.

3. A valve gear for multi-cylinder internal combustion engines substantially as shown in Figures 1 and 2 or in Figure 3 of the accompanying drawing.

Dated this 28th day of September, 1938.

Lancia & C. Fabbrica Automobili Torino S.A.,
Per BOULT, WADE & TENNANT,
111/112, Hatton Garden,
London, E.C.1,
Chartered Patent Agents.

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FIG. 1

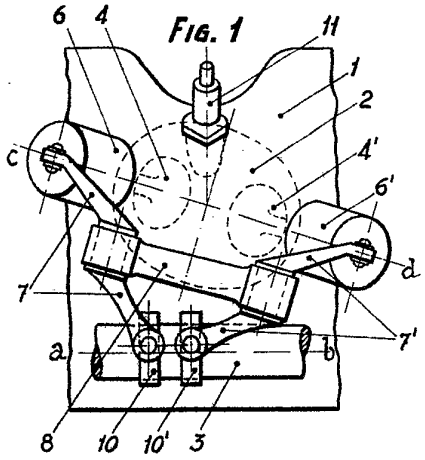



FIG. 2

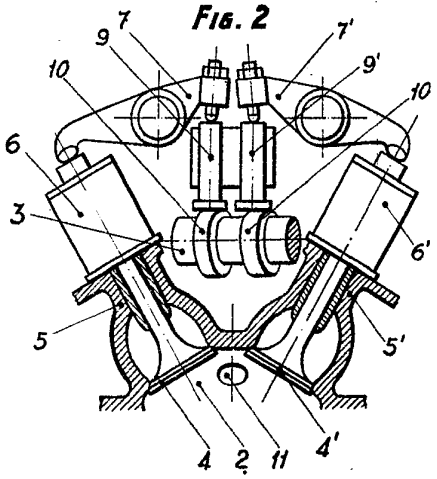
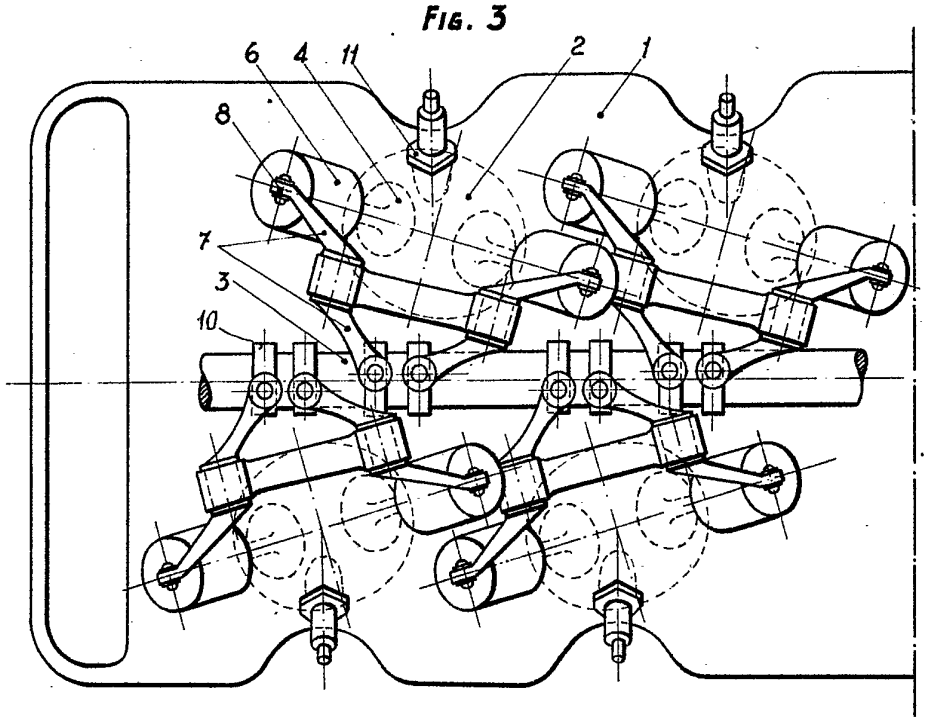



FIG. 3

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