

[54] **INTERNAL COMBUSTION ENGINES**

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[22] Filed: **Apr. 23, 1971**

[21] Appl. No.: **136,872**

[52] U.S. Cl. **123/90.27, 123/55 R**

[51] Int. Cl. **F02I 1/00**

[58] Field of Search **123/65 VD, 57 B, 123/55 R, 55 A, 44 C, 90.27, 44 E, 75 B, DIG. 1, DIG. 6, 55, 75 B**

[56] **References Cited**

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[57]

ABSTRACT

In a twin V-cylinder motorcycle engine the two cylinders and their overhead subassemblies are duplicates of each other and shifted 180° with respect to each other. Their overhead camshafts are driven off opposite ends of the crankshaft by speed reduction drive means disposed along opposite sides of the engine.

1 Claim, 3 Drawing Figures

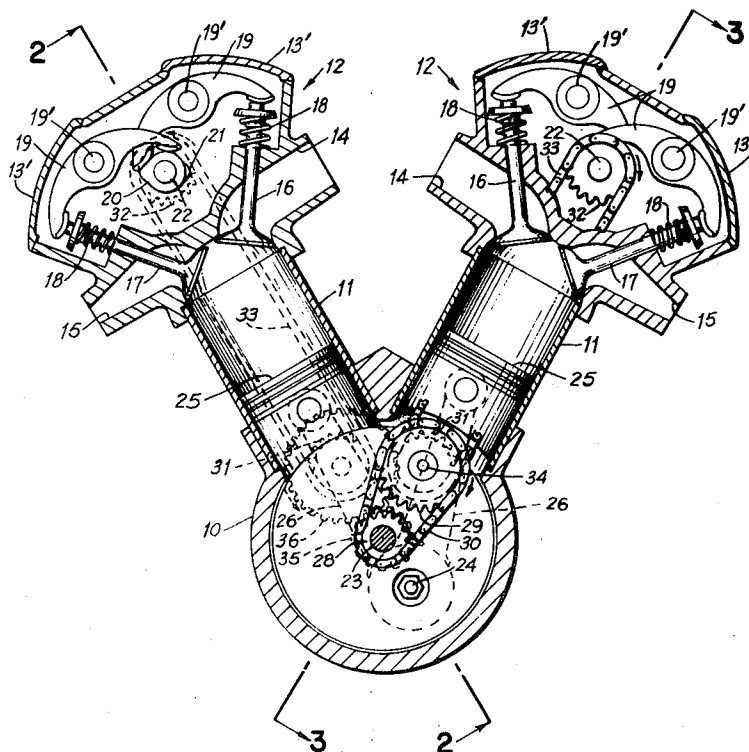
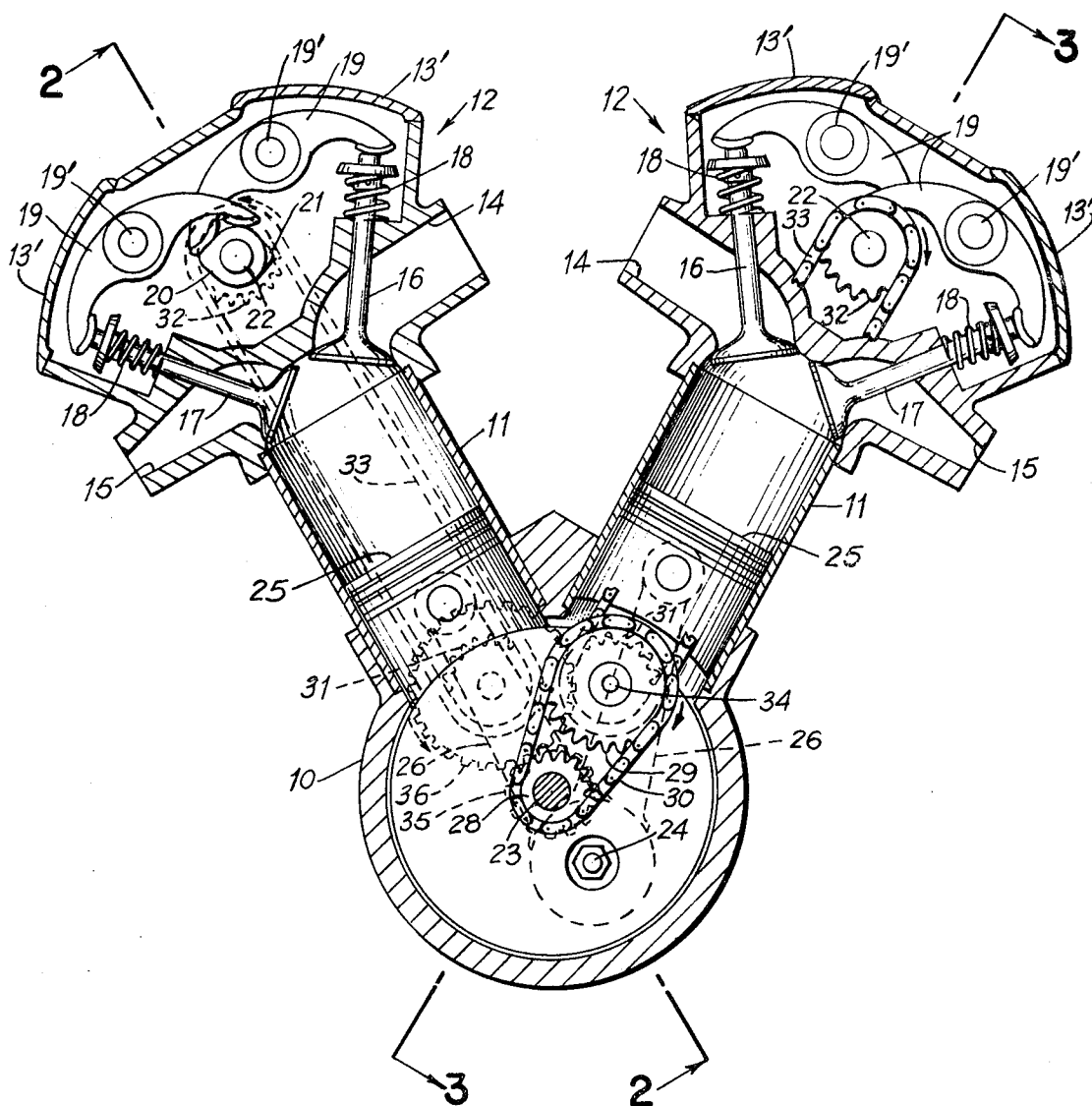


FIG. 1

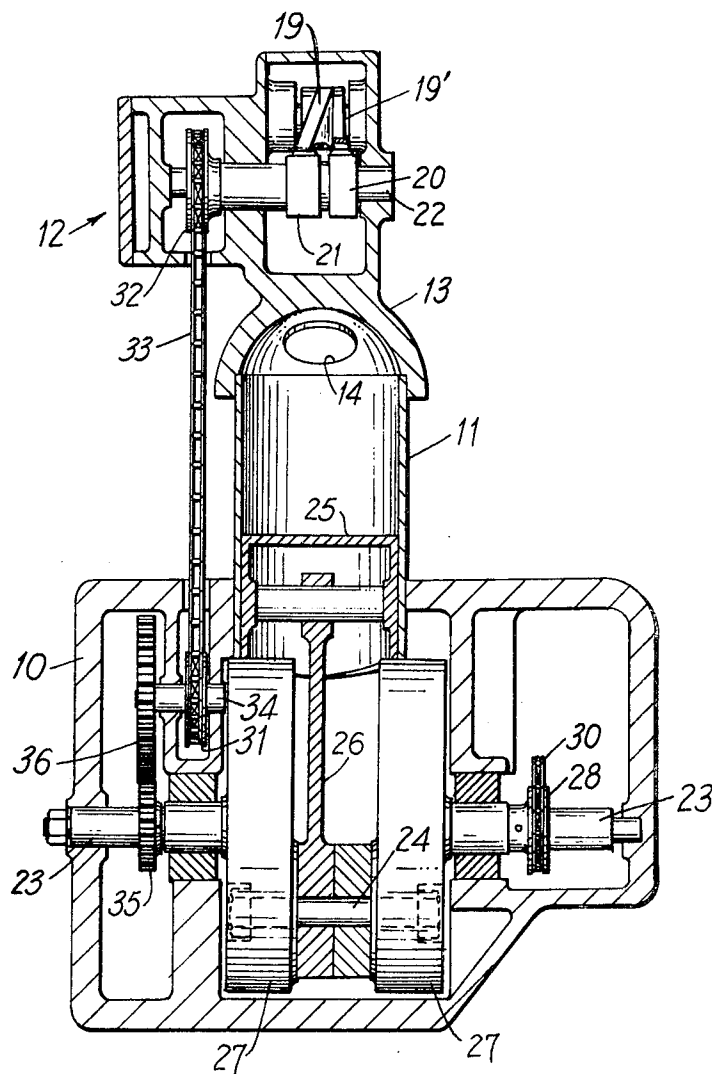


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FIG. 2



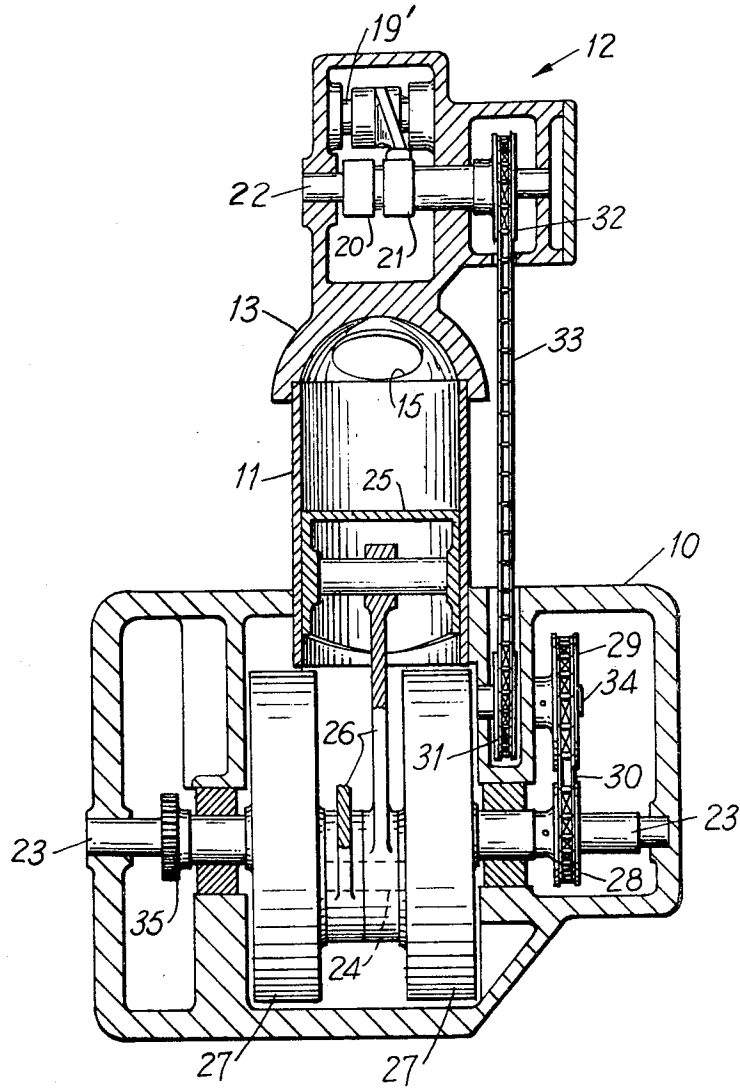
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FIG. 3



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INTERNAL COMBUSTION ENGINES

This invention relates to an improvement in internal combustion engines, and more particularly, to an improvement in twin V-cylinder engines.

In the prior art, as exemplified by prior William S. Harley, U.S. Pat. No. 2,111,242 (1938), it has been common practice in a twin V-cylinder motorcycle engine to provide distinct front and rear cylinders and to operate the valves off one end of the crankshaft by a set of four pusher rods located on one side of the engine. Although this engine is very satisfactory, it requires many parts and is relatively high cost.

It is an object of this invention to provide an improved low cost twin V-cylinder engine by simplifying the above described prior art motorcycle engine.

Briefly, in the invention the cylinders and their overhead subassemblies are duplicates of each other. By using overhead valve camshafts and rotating the cylinders and their overhead subassemblies 180° with respect to each other and driving the camshafts off opposite ends of the crankshaft the cylinders and their overhead subassemblies can be interchangeable one for the other. Thus, in the invention only one cylinder and overhead subassembly design is needed for the twin cylinders.

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a broken away side elevation view of a twin V-cylinder motorcycle engine incorporating the invention;

FIG. 2 is a sectional view taken along the section line 2—2 of FIG. 1; and

FIG. 3 is a sectional view taken along the section line 3—3 of FIG. 1.

In the description only those parts are described which are necessary to understand the invention, and duplicate parts are assigned the same reference numerals.

Referring now particularly to the drawings, shown therein is a crankshaft casing 10 having a pair of cylinders 11 mounted thereon. The upper ends of cylinders 11 are closed by subassemblies 12. Subassemblies 12 comprise castings 13. Castings provide inlets and exhausts 14 and 15 which are opened and closed respectively by valves 16 and 17. The valves are biased to closed position by springs 18 and are moved to open position by rocker arms 19. The rocker arms 19 are carried on shafts 19' mounted in castings 13 and castings 13 are closed by covers 13'.

The rocker arms 19 for each cylinder are operated by cams 20 and 21 which are mounted on an overhead camshaft 22. Camshafts 22 are mounted in the castings 13. The camshafts 22 are operated off opposite shaft ends 23 of the engine crank 24 in a manner to be described shortly.

The cylinders 11 have pistons 25 which are connected to crank 24 by connecting rods 26. The parts 27 are flywheels such as disclosed in the mentioned Harley U.S. Pat. No. 2,111,242. They served as arms for connecting the crank 24 with the crank shaft ends 23. That is to say, the parts 23, 27, 24, 27, 23 in effect comprise

the engine crankshaft which is mounted for rotation in the casing 10.

The left hand camshaft 22 of FIG. 1, see also FIG. 2, has its driven end positioned on the far side of the engine to be driven off the far end 23 of the crankshaft. In the case of the right hand cylinder of FIG. 1, see also FIG. 3, it and its overhead subassembly is an exact duplicate of the one on the left. However, it is shifted or rotated 180° so as to position the driven end of its camshaft 22 on the near side of the engine so it can be driven off the near end 23 of the crankshaft. In other words, the two cylinders together with their overhead subassemblies are shifted or rotated 180° with respect to each other relative the lengthwise axes of the cylinders.

The near side crankshaft to camshaft drive comprises a first pair of sprocket wheels 28, 29 and chain 30 set and an interconnected second pair of sprocket wheels 31, 32 and chain 33 set. The sprocket 28 is mounted on the crankshaft end 23 and the sprocket 32 on the camshaft 22, see FIG. 3. The sprockets 29 and 31 are on a shaft 34 mounted in the case 10. The sprocket 28 is smaller than the sprocket 29 and with the chain 30 provides a speed reduction on the near side of the engine for the right hand camshaft 22.

On the far side of the engine a shaft 34 and a pair of sprocket wheels 31, 32 and chain 33 set are provided as on the near side of the engine. However, the speed reduction means comprises a pair of gears 35 and 36 on the shafts 23 and 34 instead of the first sprocket wheel chain set 28, 29, 30. This is to achieve a change in rotation between the two camshafts 22 when viewing FIG. 1, since they have been shifted 180° with respect to each other for drive off opposite ends of the crankshaft. The directions of rotation of the two crankshaft to camshaft speed reduction and drive means are shown by appropriate arrows in FIG. 1.

It will now be seen that aside from the difference in the two speed reduction means 28, 29 and 35, 36 each half of the engine is an interchangeable duplicate of the other. This simplification and parts reduction makes for a substantial reduction in the cost of the engine.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and therefore, it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In an internal combustion engine having a crankshaft casing and a pair of piston cylinders mounted thereon in V-shaped spatial arrangement with respect to each other, the upper ends of said cylinders having cylinder heads mounted thereon, said heads containing valves, rocker arms for operating said valves, and a camshaft for operating said arms, said casing having a crankshaft mounted therein and pistons in said cylinders connected to said crankshaft by connecting rods, said cylinders and their named parts being duplicates of each other and being positioned one behind the other but in 180° rotated relationship with respect to each other relative the lengthwise axes of the cylinders whereby the corresponding ends of said camshafts are driven off opposite ends of said crankshaft, one of said camshafts being driven off one end of said crankshaft

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by a sprocket wheel mounted on said crankshaft one end and a chain extending therefrom to another sprocket wheel mounted on a reduced speed shaft and another sprocket wheel mounted on said reduced speed shaft connected by another chain to another sprocket wheel mounted on said one camshaft along one side of said engine, and the other of said camshafts being driven off the other end of said crankshaft by a gear mounted on said crankshaft other end and another gear which is engaged therewith and mounted on an-

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other reduced speed shaft and a sprocket wheel on said another reduced speed shaft connected by a chain to a sprocket wheel mounted on said other camshaft along the opposite side of said engine, whereby the crankshaft to camshaft speed reduction and drive means for one of said cylinders is positioned along one side of said engine and the crankshaft to camshaft speed reduction and drive means for the other of said cylinders is positioned along the opposite side of said engine.

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