Nov. 8, 1955 P. R. MORISSETTE 2,722,923

INTERNAL COMBUSTION ENGINE

Filed June 29, 1953 2 Sheets-Sheet 1

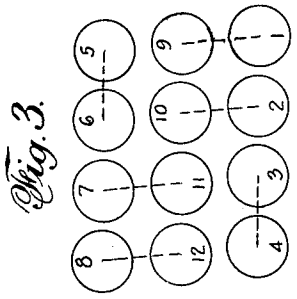


Fig. 3.

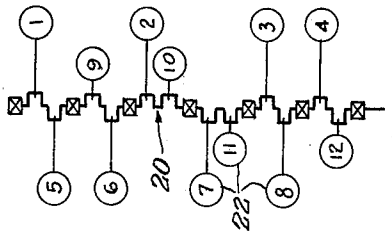


Fig. 4.

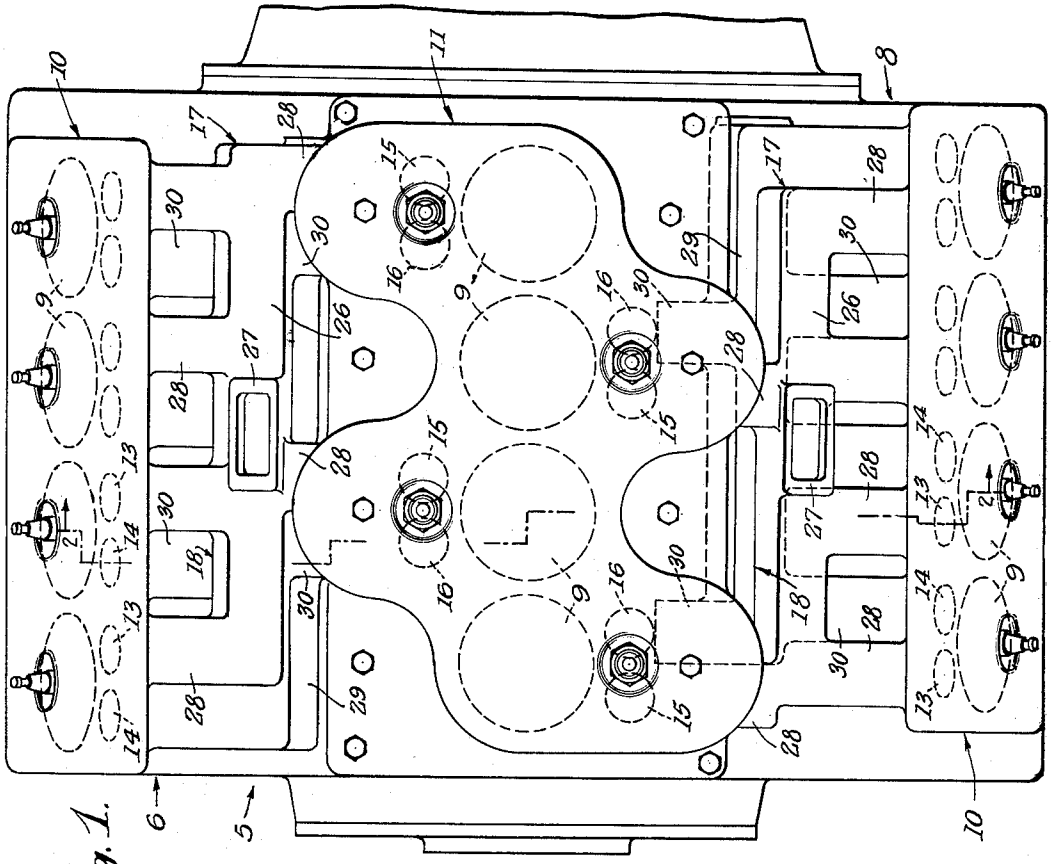


Fig. 1.

Inventor

PAUL R. MORISSETTE

By C. G. Stratton

Attorney

Nov. 8, 1955 P. R. MORISSETTE 2,722,923

INTERNAL COMBUSTION ENGINE

Filed June 29, 1953 2 Sheets-Sheet 2

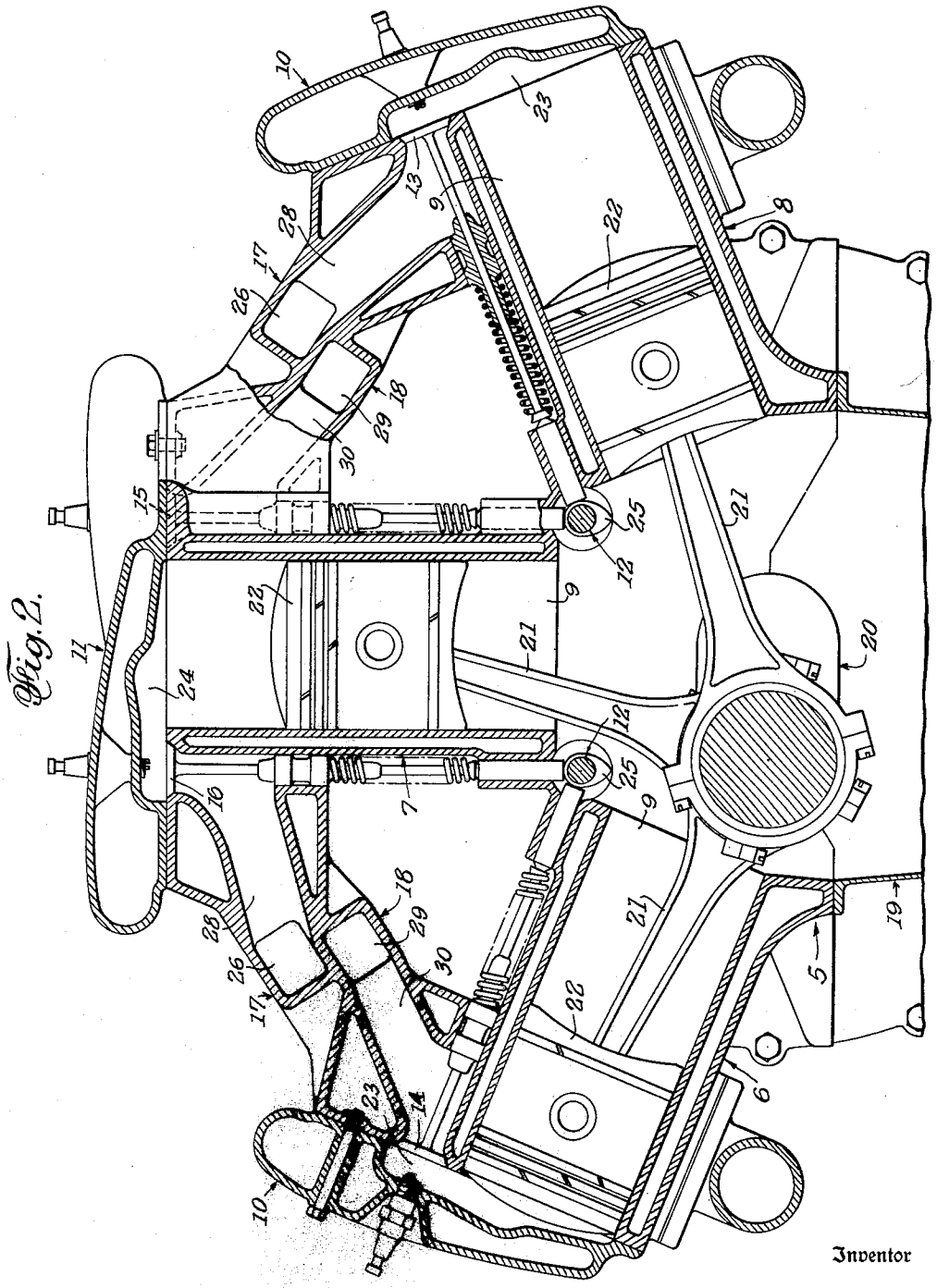


Fig. 2.

Inventor

PAUL R. MORISSETTE

By C. G. Stratton

Attorney

United States Patent Office

2,722,923

Patented Nov. 8, 1955

2,722,923

INTERNAL COMBUSTION ENGINE

Paul R. Morissette, Van Nuys, Calif.

Application June 29, 1953, Serial No. 364,638

6 Claims. (Cl. 123—55)

This invention relates to improvements in internal combustion engines having a plurality of cylinders.

The length of a straight or in-line engine is controlled by the number and size of the cylinders. A shorter and, therefore, more compact engine is obtained by arranging the cylinders in two banks or rows in the form of a V. The length of such an engine is controlled by half the number and the size of the cylinders. An object of the present invention is to provide a still more compact internal combustion engine by arranging the cylinders in three banks or rows in what may be termed a W-form, the length of the engine, thereby, being controlled by a third of the number and the size of the cylinders.

Another object of the invention is to provide a three-bank engine in which the banks of cylinders are arranged with relation to a common crankshaft in the general form of a W, in which the cylinders comprising the two outer banks are of generally conventional design, and in which the cylinders of the middle bank, with respect to the arrangement of the intake and exhaust valves thereof, are alternately oppositely disposed in relation to the center line of the bank.

A further object of the invention is to provide a three-bank engine having novel and improved fuel and exhaust manifolding to provide for substantial uniformity of fuel supply to the different cylinders and uniform subjection of the engine to the heat generated by the combustion therein.

In addition to compactness, it is a still further object of the invention to provide an internal combustion engine that is smoother in operation, generates more horsepower per unit of weight as compared to straight and V engines, is more economical of fuel, and is easier starting.

The present W design lends itself advantageously to long stroke-small bore cylinder design that results in low cubic inch size of the engine cylinders even when the number of cylinders is increased over the standard six and eight cylinder engines now in use.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a top plan view of an internal combustion engine according to the present invention.

Fig. 2 is a cross-sectional view taken approximately on line 2—2 of Fig. 1.

Figs. 3 and 4 are diagrammatic views showing a preferred pairing of the cylinders of the twelve cylinder engine that is illustrated in Figs. 1 and 2.

The engine that is illustrated comprises, generally, a cylinder block 5 formed to have three banks 6, 7 and 8 of cylinders 9, similar cylinder heads 10 for the banks 6 and 8, a cylinder head 11 for the bank 7, two valve-operating camshafts 12, conventionally arranged intake and exhaust valves 13 and 14, respectively, for the cylinders of the outer banks 6 and 8, alternately oppositely arranged intake and exhaust valves 15 and 16, respectively, for the cylinders of the middle bank 7, an intake manifold 17 interconnecting the intake valve ports of the cylinders of each outer bank with the respective intake valve ports of the middle bank, substantially similar exhaust manifolds 18, an oil pan 19 connected to the bottom of block 5, a crankshaft 20 common to the three banks, connecting rods 21 connected to the crank throws of the crankshaft, and pistons 22 on the ends of the connecting rods and operable in cylinders 9.

According to the invention, the bank of cylinders 7 is arranged centrally between the banks 6 and 8 and the latter are preferably arranged at an included angle of 130 degrees. This angle may vary somewhat and may be as great as 150 degrees, in which case, the size of the cylinder bores may be increased, or as small as 120 degrees with a resultant reduction in the size of the cylinder bores. The banks are arranged so that the center lines of the same meet at the axis of rotation of crankshaft 20.

Except for the angle at which each of the cylinder banks 6 and 8 is disposed, the same are similar except oppositely formed, as shown. The similarity resides in the comparable arrangement of the intake and exhaust valves 13 and 14, the same being disposed on the inner sides of said banks 6 and 8, i. e., on the sides directed toward the middle bank 7. Accordingly, the cylinder heads 10 of said banks are alike but opposite so that the combustion chambers 23 formed in said heads are suitably related to the pistons 22 and the valves 13 and 14 of the cylinders 9 of said banks 6 and 8.

The cylinder head 11 is formed differently from heads 10 in that the combustion chambers 24 thereof are alternately directed to enclose the valves 15 and 16 of adjacent cylinders 9 of bank 7. Thus, with four cylinders in bank 7, two of them have the valves 15 and 16 on one side with respect to the center line of the bank, and the other two have said valves on the opposite side. This is clearly shown in Fig. 1. In this manner, bank 7 and the valves 15 and 16 thereof have the same relationship to banks 6 and 8 and the engine, on one side of the center line of bank 7, 7 is the same as on the opposite side.

The two camshafts 12 are each positioned so as to be symmetrically disposed in relation to the valves of each respective outer bank 6 or 8 and the valves, on the same side, of bank 7. In other words, said camshafts are spaced at the intersections of the valve axes. Since each camshaft controls twelve valves (if the engine has twelve cylinders), each is provided with twelve suitably aligned and angularly phased lobes 25, whereby the valves are opened and closed in proper sequence.

The type of valves shown is generally conventional and may be varied.

The intake manifold 17 and exhaust manifold 18 are shown as preferably integral but are divided into two parts each, as best seen in Fig. 2, the parts spanning between the middle bank 7 and the respective outer banks 6 and 8. Each part of the intake manifold 17 is shown with a common passage 26, at 27 of which a suitable carburetor may be attached, and with as many ducts 28 branching from said passage, as valve ports that are served thereby. Similarly, each exhaust manifold 18 is shown with a common passage 29 and ducts 30 that are connected to the exhaust valve ports. Essentially, there-

fore, the engine manifolds, on each side, are alike and are disposed in the spaces between the cylinder banks. Thus, the manifolds reside within the peripheral confines of the engine and their position contributes to the compactness of the engine.

It will be realized that the number of cylinders falls in multiples of three and that the engine may comprise six, nine, twelve, or more cylinders. The twelve cylinder engine that is illustrated has the pistons thereof paired, as shown in Fig. 3 wherein the cylinders are shown in their normal arrangement. Fig. 4 shows the twelve crank thows of crankshaft **20**. These two figures show that cylinders **1** and **9**, **5** and **6**, **2** and **10**, **7** and **11**, **3** and **4**, and **8** and **12** are paired so their pistons move in unison. In other respects, conventional engine design is employed to arrange the firing order of the cylinders, place the spark plugs, provide for cooling, etc.

While I have illustrated and described what I now contemplate to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

Having thus described the invention, what I claim and desire to be secured by Letters Patent is:

1. An internal combustion engine comprising three banks of cylinders arranged in the form of a **W**, each cylinder of each bank being provided with intake and exhaust valves, the valves of the cylinders of the two outer banks being disposed on the inner side, the valves of the cylinders of the middle bank being disposed alternately on opposite sides, intake and exhaust manifolds communicating with the valves of each outer bank of cylinders and the valves on the same side of the middle bank of cylinders.

2. The invention as defined in claim 1 in which the outer banks are disposed to include an angle less than 180 degrees and more than 120 degrees, and the center bank of cylinders being disposed to bisect said angle.

3. An internal combustion engine comprising three banks of cylinders arranged in the form of a **W**, each cylinder of each bank being provided with intake and exhaust valves, the valves of the cylinders of the two outer banks being disposed on the inner side, the valves of the cylinders of the middle bank being disposed alternately on opposite sides, intake and exhaust manifolds communicating with the valves of each outer bank of cylinders and the valves on the same side of the middle bank of cylinders, and a valve-controlling camshaft arranged between each pair of adjacent banks.

4. An internal combustion engine comprising three banks of cylinders arranged in the form of a **W**, each cylinder of each bank being provided with intake and exhaust valves, the valves of the cylinders of the two outer banks being disposed on the inner side, the valves of the cylinders of the middle bank being disposed alternately on opposite sides, intake and exhaust manifolds communicating with the valves of each outer bank of cylinders and the valves on the same side of the middle bank of cylinders, the manifolds being disposed between the respective banks of cylinders and within the outer periphery defined by said banks.

5. An internal combustion engine comprising three banks of cylinders arranged in the form of a **W**, each cylinder of each bank being provided with intake and exhaust valves, the valves of the cylinders of the two outer banks being disposed on the inner side, the valves of the cylinders of the middle bank being disposed alternately on opposite sides, a pair of cam shafts arranged parallel with said three banks of cylinders, cams on said cam shafts, valve stems directly engaged by and reciprocably operated by said cams, intake and exhaust manifolds communicating with the valves of each outer bank of cylinders and the valves on the same side of the middle bank of cylinders, the manifolds being disposed between the respective banks of cylinders and within the outer periphery defined by said banks.

6. The invention as defined in claim 5 in which the outer banks are disposed to include an angle between them of less than 180 degrees and more than 120 degrees.

References Cited in the file of this patent

UNITED STATES PATENTS

1,425,057	Rowledge	Aug. 8, 1922
1,535,084	Angle	Apr. 28, 1925
1,885,576	Barkeij	Nov. 1, 1932

FOREIGN PATENTS

104,761	Great Britain	Mar. 22, 1917
337,475	Great Britain	Nov. 6, 1930
920,390	France	Jan. 4, 1947