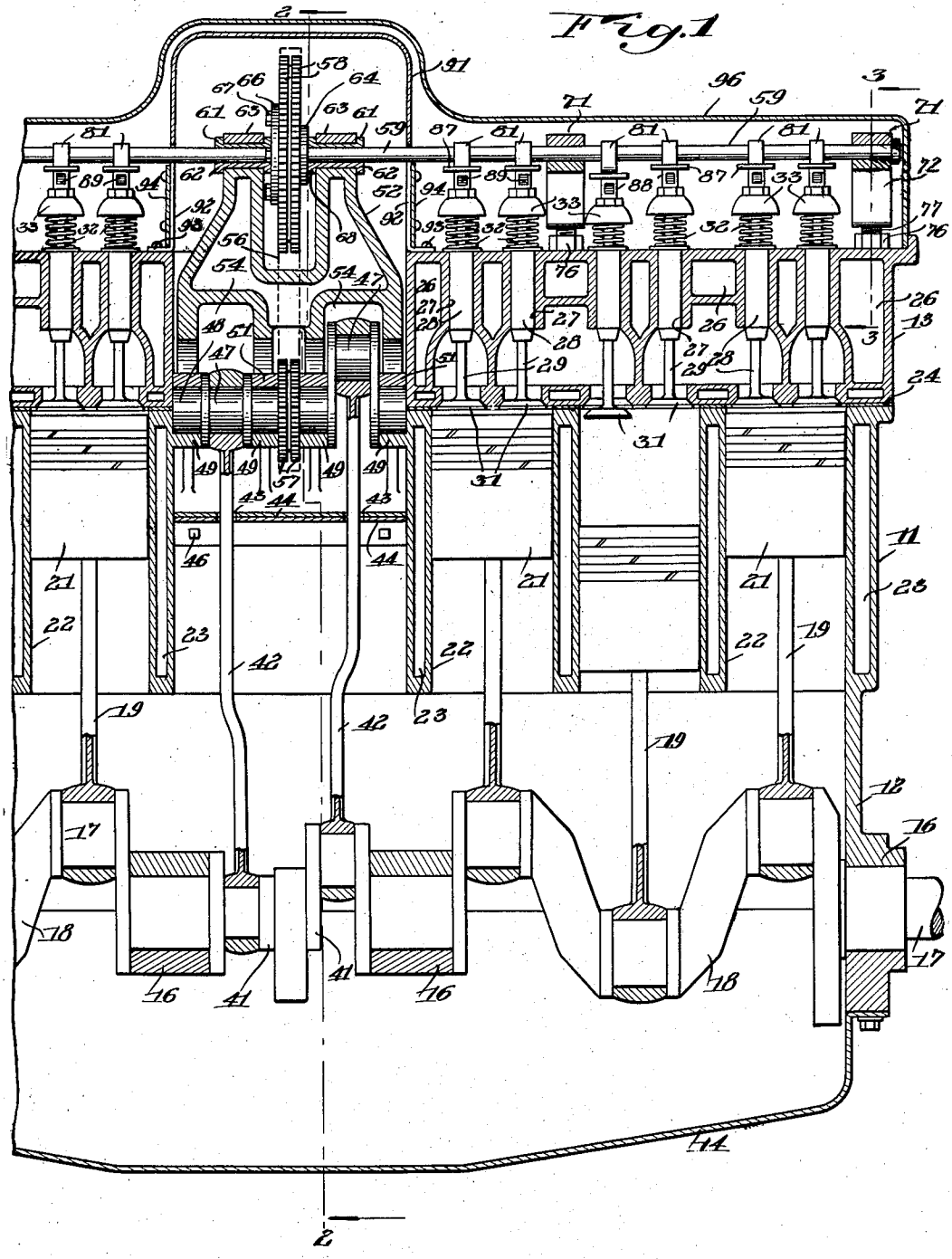
Jan. 9, 1940. J. R. McNEIL 2,186,259

INTERNAL COMBUSTION ENGINE

Filed Dec. 16, 1938 2 Sheets-Sheet 1

Fig. 1



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Fig. 2

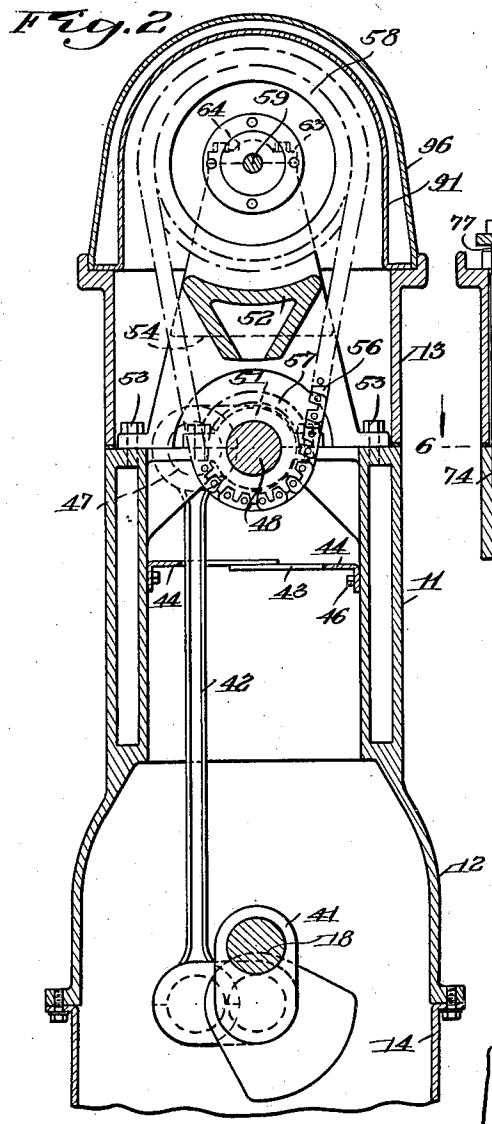


Fig. 3

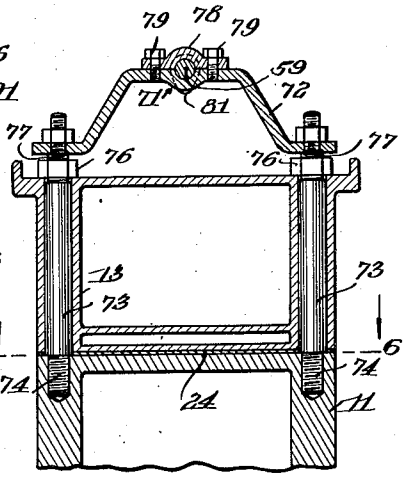


Fig. 4

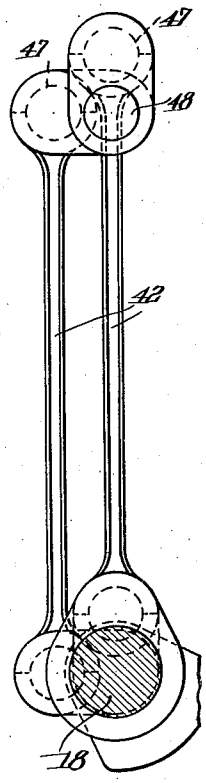


Fig. 5

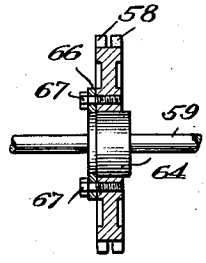


Fig. 6

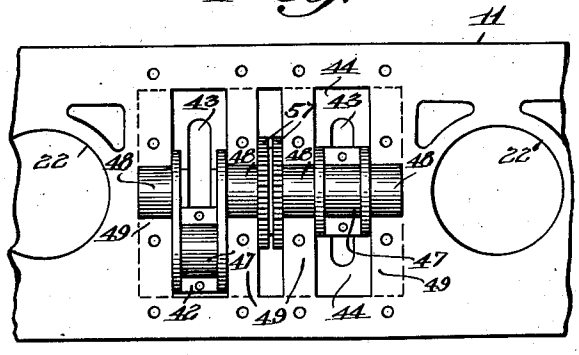
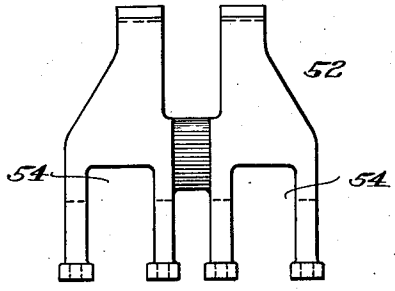


Fig. 7



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UNITED STATES PATENT OFFICE

2,186,259

INTERNAL COMBUSTION ENGINE

Joseph R. McNeil, Rochester, N. Y.

Application December 16, 1938, Serial No. 246,186

2 Claims. (Cl. 123—59)

My invention relates to internal combustion engines.

An object of my invention is to provide an internal combustion engine of the overhead valve type, which is simple in construction and quiet in operation.

Another object of my invention is to provide an internal combustion engine of the overhead valve type wherein the push rods and rocker arms normally employed for actuating the intake and exhaust valves are eliminated.

A further object of my invention is to provide a simplified way of replacing the chain for driving the cam shaft from which the intake and exhaust valves are actuated.

Other objects and advantages of my invention will be apparent from the following description, when taken in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view taken through the internal combustion engine of my invention;

Fig. 2 is a sectional view, taken substantially on the line 2—2 of Fig. 1, in the direction indicated by the arrows;

Fig. 3 is a view taken on the line 3—3 of Fig. 1 in the direction indicated by the arrows;

Fig. 4 is a view showing the connecting rod assembly for driving the jack shaft;

Fig. 5 is a sectional view showing the method of mounting the chain sprocket on the cam shaft;

Fig. 6 is a view taken on the line 6—6 of Fig. 3 in the direction indicated by the arrows; and

Fig. 7 is a view showing the casting for supporting of the cam shaft and the driven chain sprocket.

The internal combustion engine of my invention is of the overhead valve type and comprises the usual cylinder block 11, crank case 12 and cylinder head 13. The crank case 12 has the usual crank case pan 14 and has mounted in suitable bearings 16 a crank shaft 17. The crank shaft has the conventional cranks 18 for actuating the pistons as the crank shaft is rotated.

While I have shown only four cylinders of my novel internal combustion engine, it will be understood that two additional cylinders (not shown) are provided. Moreover, it will be apparent that the invention may be also applied to an engine having four, eight or any other desired number of cylinders. The cranks 18 are adapted to drive connecting rods 19 which are operatively connected to pistons 21 in any conventional manner. The pistons are operable in cylinders 22 which are suitably water-jacketed, as indicated at 23. The cylinder head is mounted above the cylinder and is secured to the cylinder in any conventional manner, being separated therefrom by a gasket 24. The cylinder head is properly cored, as shown at 26, for enabling the circulation of cooling water through the head.

Located in the cylinder head, preferably directly above each cylinder, is a pair of bored openings 27. In each of the bored openings of the cylinder heads is a valve stem guide 28. The valve stem guides serve to support and guide intake and exhaust valve stems 29, which carry at their lower ends intake and exhaust valves 31. The valve stems extend upward above the cylinder head and are provided with concentrically arranged valve springs 32 held in position by spring hoods 33. The springs normally retain the valve stems in their uppermost position so that the valves are held on their seats in a closed position.

Integral with the crank shaft 17 are a pair of cranks 41 which are adapted to actuate connecting rods 42, which extend upward from the crank shaft through an opening formed in the cylinder block. While I have shown the connecting rods as slightly bent to better space them along the crank shaft, it will be appreciated that by varying the proportioning of the parts the connecting rods 42 may be straight if desired. The connecting rods 42 extend upward through slots 43 formed in a pair of plates 44, which are secured as shown at 46 to the walls of the cylinder block. The plates 44 act as a shelf to prevent parts from dropping into the crank case during the repairing of the motor or replacement of the chain drive presently described.

The connecting rods 42 are connected to cranks 47, which are offset 90 degrees from each other (Fig. 4) and are formed integral with a jack shaft 48. The jack shaft 48 is mounted in suitable bearings, half of which, as shown at 49, are formed integral with the cylinder block, and the other half of which, as shown at 51, are formed integral with a one-piece casting 52. The casting 52 is secured to the cylinder block 11 by means of studs 53 (see Fig. 2). The casting 52 is suitably cored out, as shown at 54, to enable the operation of the cranks 47 and is suitably shaped to provide space for the operation of a timing chain 56.

The timing chain is driven by a pair of sprockets 57 mounted on the jack shaft 48 and drives a pair of sprockets 58 mounted upon a cam shaft 59. Preferably the sprockets 57 and also the sprockets 58 are formed integral with a slight space between them for the reception of a web

on the chain as is well known in the art to which this invention applies. The casting 52 serves as a support for the cam shaft 59. Mounted on the cam shaft are a pair of bushings 61 which are supported from the casting 52 as shown at 62. A pair of caps 63 serve to hold the bushings 61 in position.

As shown in Fig. 5, the cam shaft is provided with a hub 64 upon which the sprocket wheel 58 is mounted. A plate 66 is bolted, as shown at 67, to the sprocket wheel and is held against endwise movement to the right, as viewed in Fig. 5 by the interengagement of frustro-conical surfaces formed on the plate 66 and the hub 64. In assembling the sprocket wheel on the cam shaft 59, the hub 64 is moved to the right until it strikes the abutment 68 formed by the bushing 61. The left-hand bushing 61 is then moved over into engagement with the plate 66 so that the sprocket wheel is retained against endwise movement in either direction.

The cam shaft 59, in addition to being supported by the casting 52, has bearings, generally indicated by the numeral 71, spaced along the cam shaft. These bearings, as shown in Fig. 3, comprise bridging plates 72 generally U-shaped, which are supported by studs 73 which extend through bores in the cylinder head 13 and are threaded into the cylinder block 11, as shown at 74. Nuts 76 serve to hold the studs in position. At their upper ends the studs are provided with shoulders 77, which serve to support the bridging plates 72. Bearing caps 78, held in position by studs 79, retain the cam shaft in position.

Mounted on the cam shaft are a plurality of cams 81, which are adapted to engage cam plates 87. The cam plates 87 may be formed integral with rods 88, which are connected to the valve stems. The rods 88 have flat spots 89 to enable the convenient use of a wrench for adjusting the rods 88 with respect to the valve stems so as to adjust the valves 31 so that they may be properly timed. An oil hood 91 may be provided to enclose the timing chain and sprocket to prevent oil from being splashed over the top of the cylinder head. The oil hood 91 may be slotted as shown at 92 at its sides so as to fit down over the cam shaft. Flanges 93 may be provided on the oil hood for the reception of screws for securing the oil hood to the cylinder head. The slots, except for the portion thereof through which the cam shaft passes, may be closed by pivoted closure plates 94, which, after the oil hood is in position, may be moved to substantially close the slots 92. An engine hood 96 may also be provided to enclose the valve assembly and the cam shaft.

The operation of the internal combustion engine of my invention will be apparent from the above description without further explanation. It is sufficient to state that the crank shaft, through the connecting rods 42, jack shaft 48, sprockets 51 and 58 and timing chain 56, drives the cam shaft 59. Rotation of the cam shaft causes the cams 81 to actuate the valve stems 29. Actuation of the valve stems opens and closes the valves in timed sequence with the operation of the pistons, so that the intake and exhaust valves are opened and closed at the proper times during the cycle of operation.

One of the important features of my invention is the fact that certain of the prevalent sources of noise in the overhead valve type of engine are eliminated. The intake and exhaust valve operating mechanism is driven directly from the cam shaft without the long push rods and the rocker arms normally employed in the overhead valve type of engine.

A further important advantage of my invention is the ease with which the timing chain, if it should break, may be removed and replaced. All that is necessary is to remove the engine hood 96 and the oil hood 91, separate the ends of the chain by removing the pin normally employed to join the ends together, to thereby enable removal of chain from the sprockets. A new chain may then be readily positioned on the sprocket and the ends joined upon inserting the pin in the ends of the chain. The oil hood 91 and the engine hood 96 may then readily be replaced. If any damage should occur to the jack shaft 48, the sprockets 51 or the cranks 47, the entire casting 52 may be conveniently removed by first removing the timing chain 56, then the cam shaft 59, after which the studs 53 may be loosened to enable the casting 52 to be lifted out of the space between the sections of the cylinder head.

While I have described the preferred form of my invention, it will be apparent that various changes and modifications may be made, particularly in the form and relation of parts without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. In an engine having a crank shaft, a cylinder block wherein a plurality of cylinders are provided and a cylinder head wherein a plurality of intake and exhaust valves are mounted, a casting mounted in said cylinder head and supported from said cylinder block, a cam shaft supported from said casting, means for operating said valves from said cam shaft, and means extending through said cylinder block for driving said cam shaft from said crank shaft.

2. In an engine having a crank shaft, a cylinder block wherein a plurality of cylinders are provided and a cylinder head wherein a plurality of intake and exhaust valves are mounted, a casting mounted in said cylinder head and supported from said cylinder block, a cam shaft supported from said casting, means for operating said valves from said cam shaft, and means including a jack shaft and a chain for driving said cam shaft from said crank shaft.

JOSEPH R. McNEIL.