Dec. 30, 1924.

1,520,942

J. H. R. GARRETT

INTERNAL COMBUSTION ENGINE

Filed Dec. 16, 1922

5 Sheets-Sheet 1

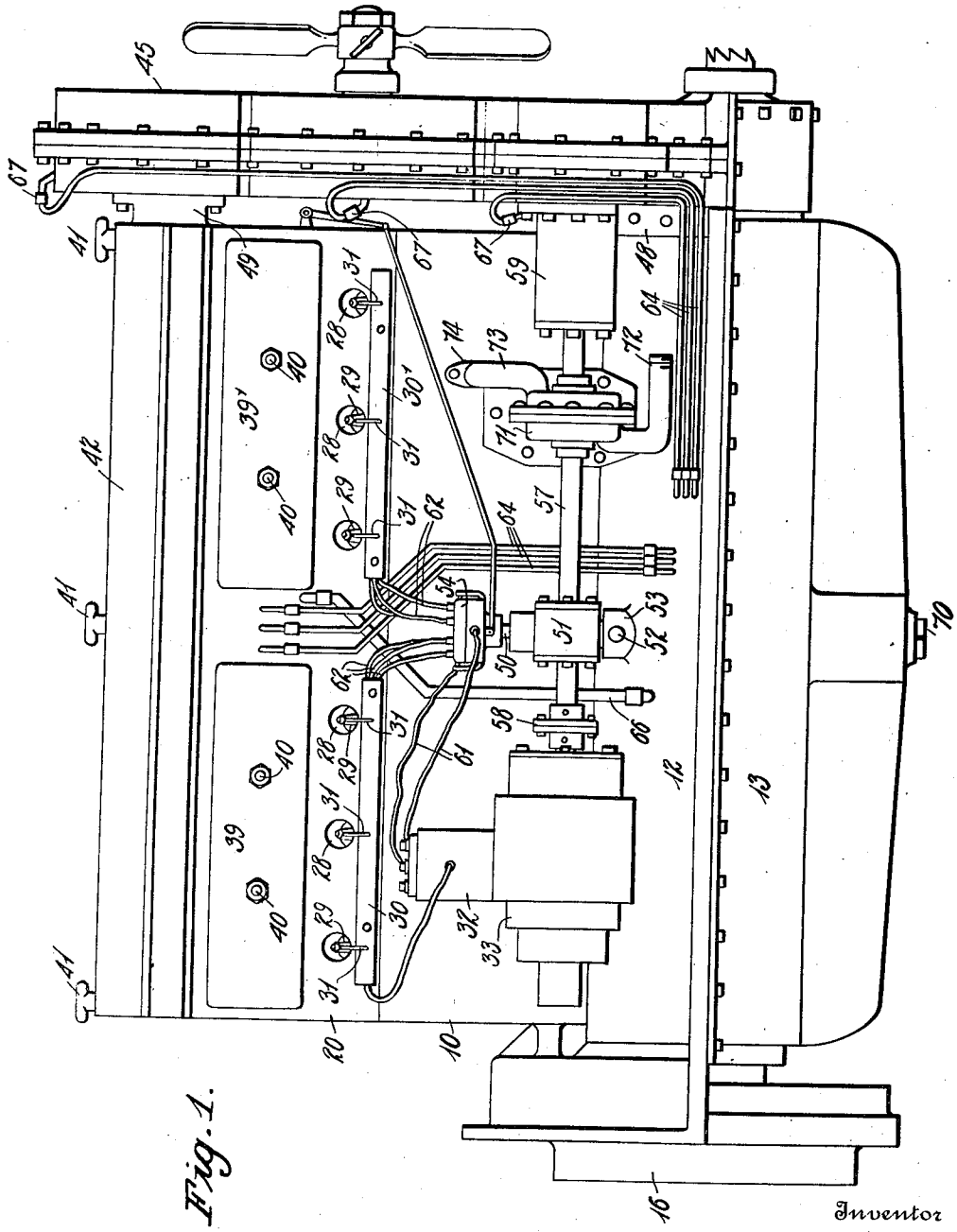


Fig. 1.

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5 Sheets-Sheet 2

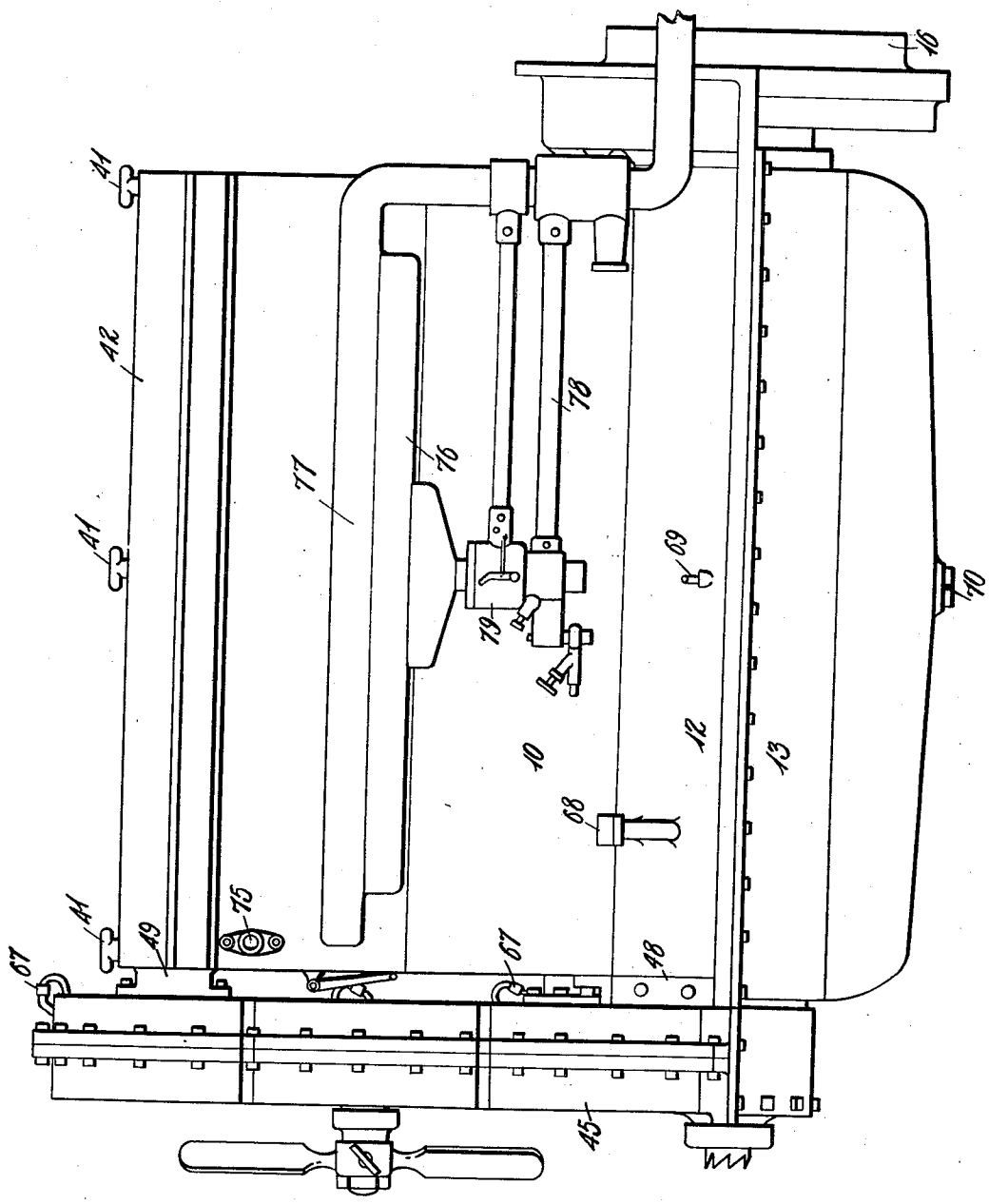


Fig. 2.

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INTERNAL COMBUSTION ENGINE

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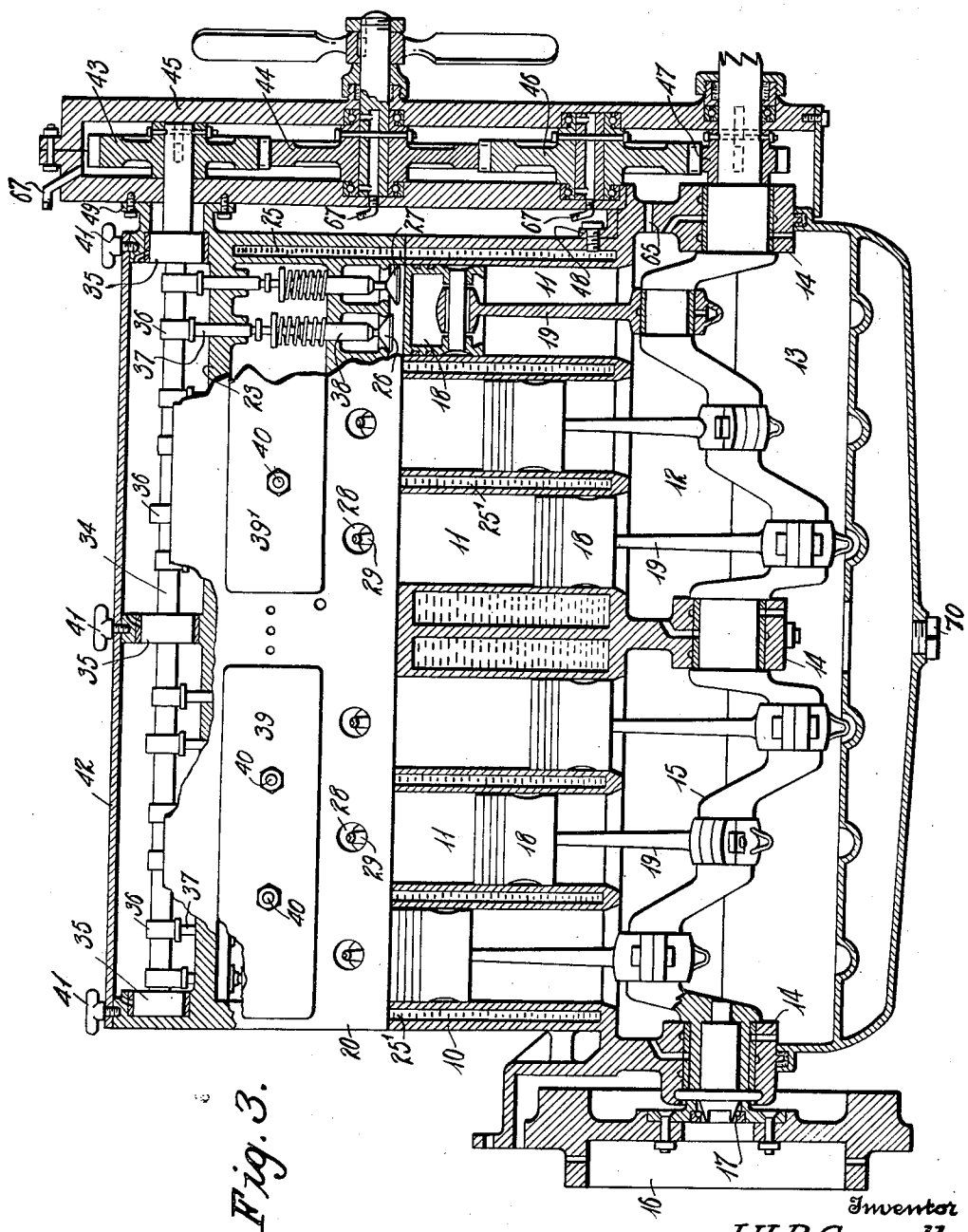


Fig. 3.

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INTERNAL COMBUSTION ENGINE

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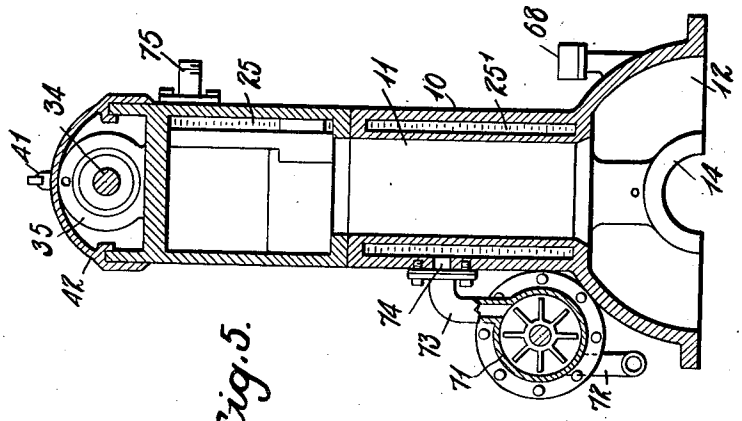


Fig. 5.

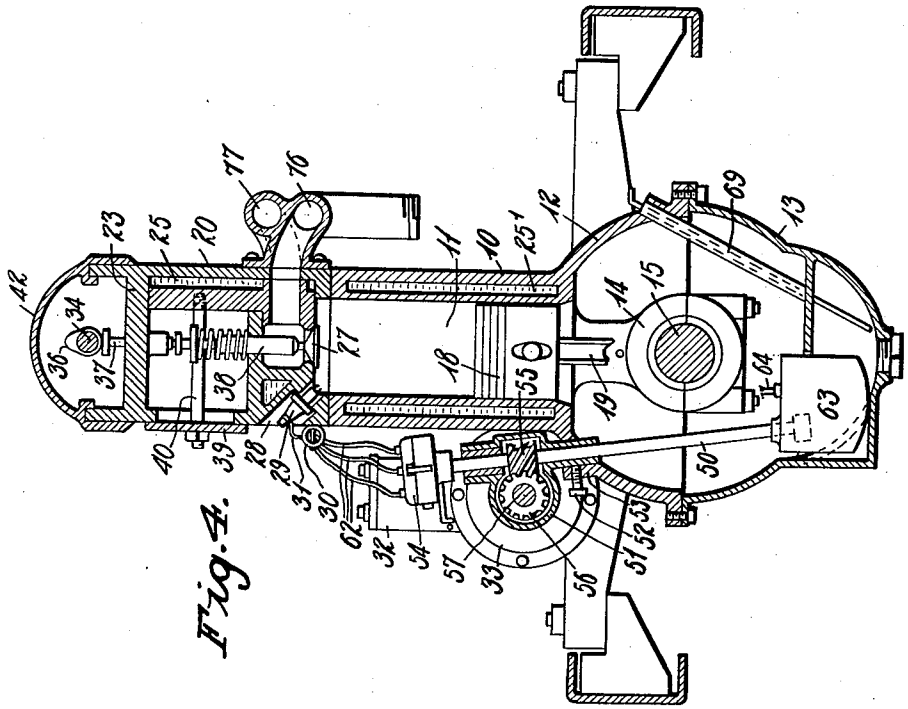


Fig. 4.

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Filed Dec. 16, 1922 5 Sheets-Sheet 5

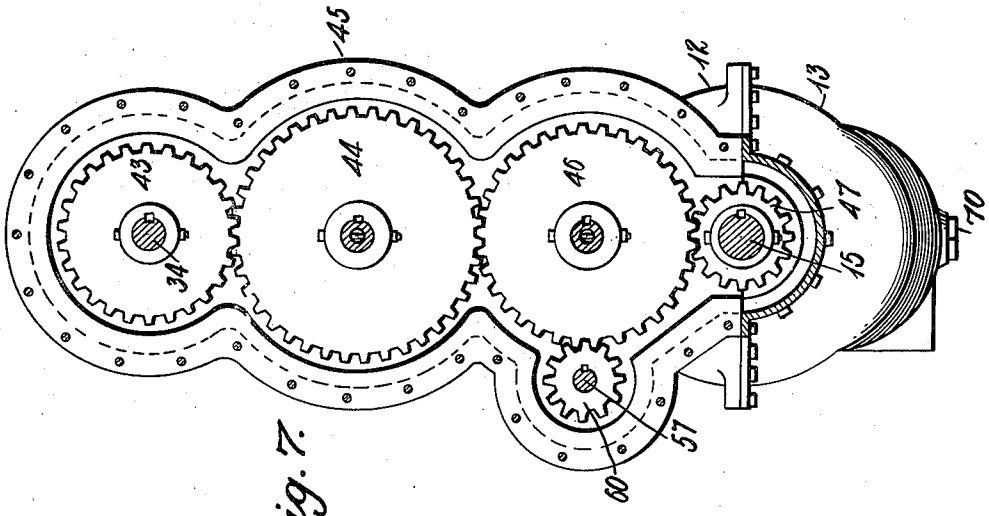


Fig. 7.

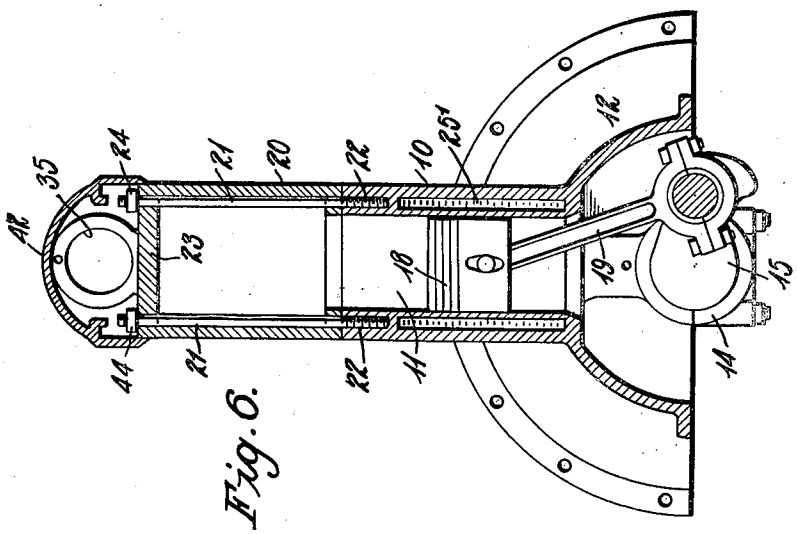


Fig. 6.

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Patented Dec. 30, 1924. 1,520,942

UNITED STATES PATENT OFFICE.

JOHN HARDING RAYMOND GARRETT, OF URBANA, ILLINOIS.

INTERNAL-COMBUSTION ENGINE.

Application filed December 16, 1922. Serial No. 607,319.

To all whom it may concern:

Be it known that I, JOHN HARDING RAYMOND GARRETT, a citizen of the United States, residing at Urbana, in the county of Champaign and State of Illinois, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

This invention has reference to internal combustion engines and is particularly directed to motors of the inclosed overhead valve type.

This invention has for its primary purpose the provision of a motor of the above described character which is of generally improved construction and design, an essential feature of which is the installing of the moving parts of the motor in such manner that ready and convenient access may be had thereto whenever desired for any purpose.

With the above and other objects in view the invention resides in the particular combination, arrangement and construction of parts hereinafter described and explained, reference being had to the accompanying drawings wherein:

Figure 1 is a view in side elevation of the proposed motor.

Figure 2 is an elevational view of the opposite side thereof.

Figure 3 is a vertical longitudinal view, partly in elevation and partly in section to disclose the working parts of the device.

Figure 4 is a vertical transverse sectional view disclosing the valve and distributor mechanism.

Figure 5 is a similar view disclosing the pump mechanism of the water cooling system,

Figure 6 is a vertical transverse section thru the motor disclosing the manner of assembling the cylinder blocks and valve head, and

Figure 7 is a vertical transverse section thru the gear casing of the motor and disclosing the timing gears.

Describing the invention in detail, 10 designates the cylinder block of the motor which, in the present instance, is shown as being provided with six cylinders 11. To the lower end of the block is integrally formed the upper half of the crank case 12, the lower half 13 being bolted thereto in the usual manner as illustrated. Bearing 14 supports the crank shaft 15, as shown in Figure 3, and the usual fly-wheel 16 is fastened to the crank shaft at the rear end of the motor as shown, a ball bearing 17 being provided for the end of the transmission shaft, not shown.

Operating within each cylinder is a piston 18 having connection with the crank shaft thru the medium of a connecting rod 19. It will be observed that each cylinder of the block opens outwardly of the upper end thereof and is thus in communication with the interior of the cylinder head 20 which surmounts the block.

Head 20 is detachably connected to the cylinder block by means of long attaching bolts 21 threadedly engaged in the cylinder block as shown at 22 and penetrating the upper wall or partition 23 of the cylinder head, to which they are secured by fastening nuts 24. The cylinder head is hollow and formed of a double thickness along the side and bottom walls to provide a water jacket space 25 communicating with the water jacket space 25′ of the cylinder block. In line with each of the cylinders of the block the bottom wall of the cylinder head is provided with a pair of valves 26 and 27 forming the intake and exhaust valves respectively of the motor.

Opening inwardly of one side of the bottom wall of the cylinder head and inclined with respect thereto are a plurality of openings 28 arranged so as to respectively align with the cylinders of the block. These openings cummunicate with the upper end or explosion chamber of the cylinder and receive spark plugs 29. On one side of the cylinder head and coextensive with the series of openings is arranged housings 30 and 30′ for the spark plugs wires 31, the said housings being in electrical connection with a spark coil 32 associated with generator 33 of the sparking system which will be later described.

Arranged exteriorly of the upper wall of the cylinder hood and extending longitudinally thereof is a cam shaft 34 suitably supported in bearings 35. This shaft is provided with a plurality of cams 36 which engage push rods 37 having a slide bearing in the upper wall of the cylinder head and penetrating the interior of the latter for engagement with the tappets 38 of the valves. The valves are normally closed by spring pressure and are automatically opened by the pressure of the cams on the

push rods, as will be obvious. Access to the interior of the cylinder head for purposes of repairs or replacement of valve parts is provided by means of two closure plates or likes 39 and 39′, which are fastened to the head by means of bolts 40. Arranged over the cam shaft and secured to the cylinder head by means of fastening elements 41 is a hood 42 which serves to enclose the shaft.

The cam shaft is extended at one end and carries a fixed timing gear 43 which meshes with a gear 44 suitably journaled in a gear casing 45, which casing likewise encloses gear 43. A third gear 46 is likewise journaled in the lower end of the casing and is adapted to be driven from a gear 47 provided on the end of the crank shaft, thereby serving to drive gears 44 and 43 for rotating the cam shaft and operating the valves. These intermeshing timing gears are of proper ratio so as to operate the valves at the proper time and the gear casing is preferably made in separate sections so as to be readily engageable about the gear being connected to the cylinder block by flanged coupling 48 and to the cylinder head by a flange coupling 49.

It will thus be seen that the timing gears can be readily and conveniently separated from the valve mechanism and from the cylinder block while at the same time the latter two may be readily disconnected from each other. This arrangement provides for a convenient and economical method of dismantling the engine when repairing or cleaning same, at the same time allowing for quick access to various moving parts.

The sparking mechanism of the engine embodies a vertically disposed distributor shaft 50 suitably journaled in a gear housing 51 located in an opening in the side of the crank case and held in place by a set screw 52 passing thru the securing flange 53 of the housing. At its upper end the distributor shaft is provided with distributor 54 and on the inside of the housing with a spiral gear 55 in mesh with a driving gear 56 fixed on an auxiliary shaft 57. This shaft extends horizontally of the engine on one side thereof and has mounted on one end thereof the generator 33 before referred to. If desired, the auxiliary shaft and the generator shaft may be separate units connected up by a coupling 58 as shown. The opposite end of the auxiliary shaft is engaged in a bearing 59 and is provided with a gear 60 in mesh with timing gear 46, by which it is rotated. Conductors 61 connect the distributor with the sparking coil 32 while conductors 62 connect the distributor with various spark plugs terminals of housings 30 and 30′.

Disposed within the crank case and geared with the lower end of the distributor shaft is an oil pump 63. Leading from this gear driven oil pump are oil distributing lines 64 which extend to the various bearings of the timing and distributor gears and also to the cylinder head. From the bearings the oil drains back into the case in the usual manner thru drain passages 65 while it is returned from the cylinder head thru a return drain pipe 66. To facilitate connecting up the feed lines with the bearings, the latter are provided with couplings or connecting members 67. The crank case is provided in the side with an oil filler cap and screen 68 and an oil gauge 69 and in the bottom with a drain plug 70.

The cooling of the motor is maintained by a circulation of water thru the water spaces or jackets 25 and 25′ by means of a pump 71 mounted on the auxiliary shaft and having an inlet 72 and outlet 73, the latter penetrating the water jacket of the cylinder as shown at 74 in Figures 1 and 5. The return pipe is provided on the opposite side of the motor, as shown at 75 in Figure 7. Communicating with the intake and exhaust cylinder of the valve head are the intake and exhaust manifolds 76 and 77 respectively, the latter having by-pass 78 leading to the carbureter 79 and supplying hot gases thereto for the preheating of the fuel before it is supplied to the intake manifold.

From the foregoing it is thought that the advantages and novel features of the invention will be readily understood and that further detail description thereof is not required.

What is claimed is:

In an internal combustion engine, a motor block presenting a series of cylinders open at their upper ends, a hollow head piece surmounting the said block and presenting intake and exhaust valves for each cylinder means for operating the said valves including push rods penetrating the upper wall of the head piece and engaging the said valves, and removable plates disposed over openings in the side of the head piece, said openings when uncovered providing means of access to the valve parts.

In testimony whereof I affix my signature.

JOHN HARDING RAYMOND GARRETT.