April 24, 1928.

1,667,213

P. MARCHETTI

INTERNAL COMBUSTION MOTOR

Filed June 2, 1925

2 Sheets-Sheet 1

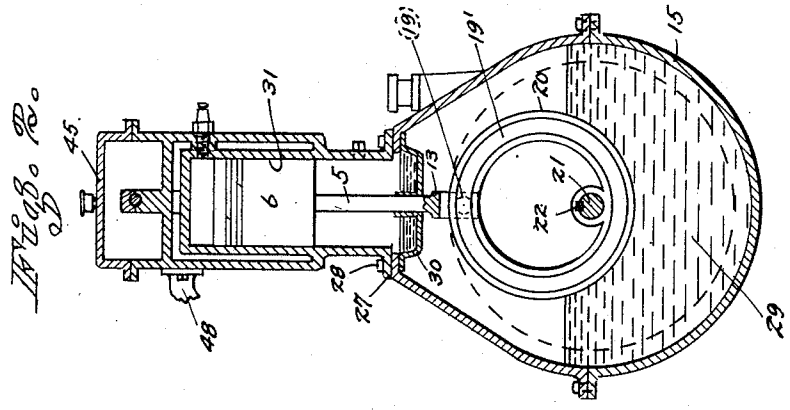

Fig. 2.

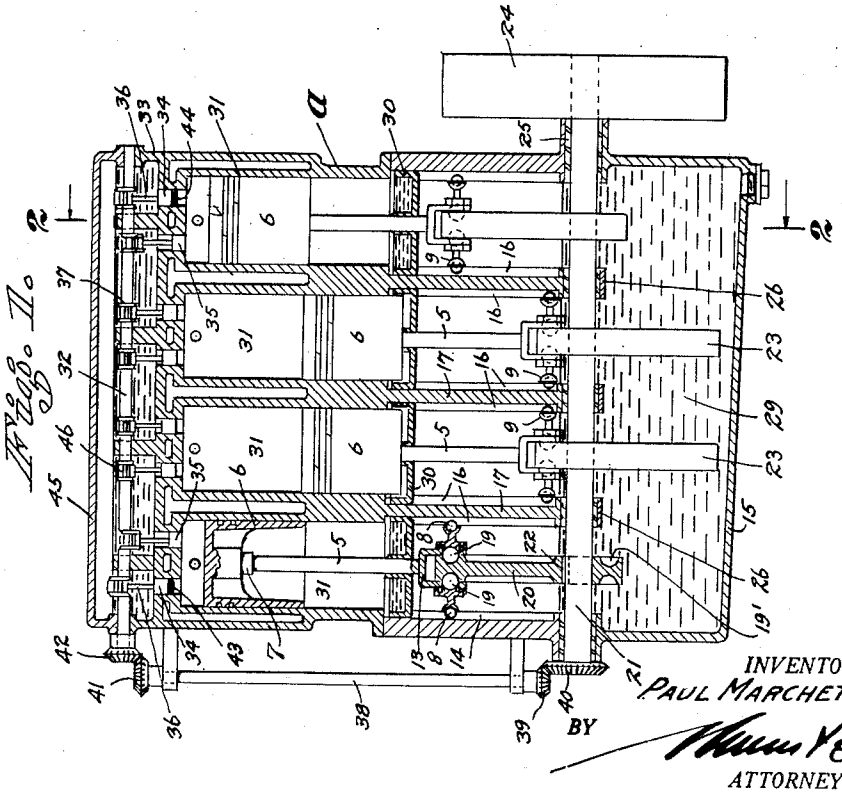

Fig. 1.

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Fig. 6.

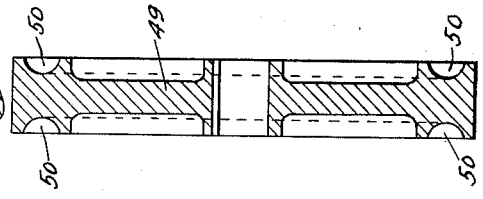


Fig. 5.

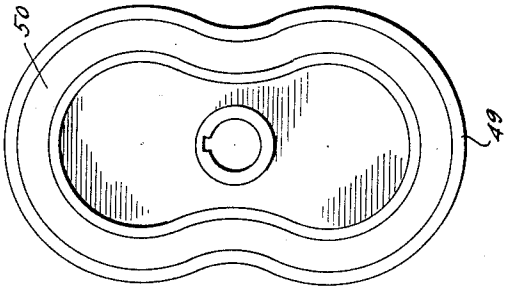


Fig. 3.

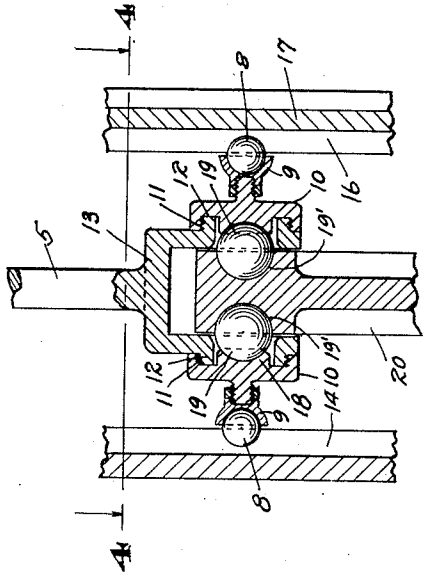
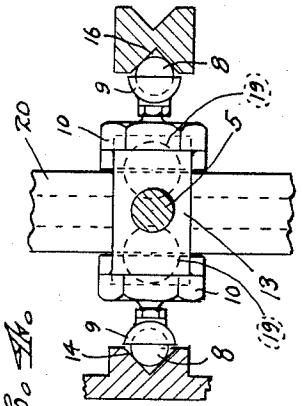


Fig. 4.



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UNITED STATES PATENT OFFICE.

PAUL MARCHETTI, OF STOCKTON, CALIFORNIA, ASSIGNOR TO MARCHETTI MOTOR PATENTS, INCORPORATED, A CORPORATION OF NEVADA.

INTERNAL-COMBUSTION MOTOR.

Application filed June 2, 1925. Serial No. 34,374.

The present invention relates to improvements in internal combustion motors of the reciprocating type.

The general object of the invention is the provision of a construction adapted for reducing vibration in a reciprocating internal combustion motor, and further adapted to increase the general efficiency of the motor.

The above and other objects are accomplished by instrumentalities pointed out in the following specification.

The invention is clearly defined in the claims.

A satisfactory embodiment of the invention is illustrated in the accompanying drawings forming part of the specification and in which:

Figure 1 is a vertical, longitudinal section of a motor constructed in accordance with my invention.

Figure 2 is a vertical cross section on the line 2—2 of Figure 1 and looking in the direction of the arrows.

Figure 3 is an enlarged detail section showing the connection between the cam and piston rod.

Figure 4 is a sectional plan view on the line 4—4 of Figure 3, looking in the direction of the arrows.

Figure 5 is a detail front elevation of the modified form of cam.

Figure 6 is a central vertical section of the cam shown in Figure 5.

In the drawings A indicates generally a reciprocating internal combustion motor of the four cycle, four cylinder type. It will be understood that this showing is merely illustrative and that the invention about to be described may be used equally as well with motors consisting of a greater or less number of cylinders than shown.

The piston rod 5 on the left in Figure 1, has its inner end directed into the hollow piston 6, and screwed into or otherwise rigidly secured to a central boss 7. The outer end of the rod 5 is provided with a cross head including a pair of oppositely disposed bearing balls 8, arranged in cups 9, which are detachably connected to caps 10, removably secured as by screw threads 11 to oppositely disposed annular bosses 12, carried by a yoke 13 depending from rod 5. One member 14 of a cross head guide is carried by one end of the shaft casing 15 and the opposite member 16 of the cross head guide is carried by one of the bearing hangers 17, depending from the base of the cylinder block. The bearing balls 8—8 are slidable in the cross head guides 14 and 16 so that only rectilinear movement is permitted on the part of the rod 5 and the parts connected thereto, as just described.

The inner faces of caps 10 are provided with seats 18 for a pair of oppositely disposed balls 19, which extend into oppositely disposed circular cam grooves 19 on the opposite faces of a disk 20, which extends into the yoke 13 and is eccentrically disposed on engine shaft 21 to which it is keyed, as indicated by 22 in Figure 2.

With this construction it is obvious that the piston rod 5, in reciprocating, operates to rotate cam disk 20, which transmits rotary movement to engine shaft 21.

The exact counterpart of the construction described in connection with the piston on the left in Figure 1, is employed for the other pistons of motor A, and disks 23, corresponding with disk 20, are employed for the several piston rods. The high or outermost points of alternate disks are spaced apart for an angular distance of approximately 180° in the type of motor shown, in order to obtain the conventional sequence of compression and exhaust in the end cylinders during the intake and firing strokes of the intermediate cylinders.

Engine shaft 21 extends through shaft casing 15 and carries at one end a fly-wheel 24, and its end portions are disposed in bearings 25 at the opposite ends of casing 15, and are further disposed in bearings 26 at the lower ends of the hangers 17. Shaft casing 15 is secured to the base 27 of the engine block as by bolts 28 and is as usual, formed of metal and made liquid tight to provide a receptacle for a column of lubricant 29, the level of which may be disposed at a point above engine shaft 21, so as to provide an oil bath for the bearings of the said shaft and for the working faces of the disks, as these are rotated by the piston rods 5. The action of the disks in rotating through the column of lubricant 29, feeds lubricant to the cross heads and the guides therefor, either by lifting or splashing the lubricant.

A series of lubricant containing trays 30 are disposed at the base of the cylinder block and are in communication with the interiors of the cylinders 31. These trays are secured

to the upper end of casing 15 so that the lower ends of the pistons dip into the lubricant contained in the trays at the end of the down or out strokes of the pistons, as shown in Figure 1. In this way lubricant is carried to the walls of the cylinders 31 during the up strokes of the pistons.

The valve shaft 32 extends through a casing 33, superimposed on the cylinder block, and is rotatable in bearings at the ends of the casing. The slidable intake valve 34 and similarly movable exhaust valve 35 are connected to the valve shaft 32 in any preferred manner, as by means of crank rods 36 connected to crank hangers 37, carried by shaft 32. The crank shaft is rotated by a shaft 38 connected by a bevel pinion 39 to the bevel gear 40 on engine shaft 21, and further connected by bevel gears 41 and 42 to valve shaft 32.

The crank arms 35 for the exhaust and intake valves of each cylinder are arranged in such angular relation that the said valves will be successively lifted or moved upwardly to expose the intake and exhaust ports 43 and 44 to the interior of the cylinder; and the construction, disposition and arrangement of the ports 43 and 44 are such that the valves will close these ports throughout the compression and firing strokes of the pistons. Valve casing 33 is provided with a detachable head 45 which co-operates with the casing to provide a liquid tight container for a column 46 of lubricant, which surrounds the valve shaft 32. The valves 34 and 35 are cylindrical and are slidably fitted in the inlet and exhaust ports 43 and 44, which communicate through lateral passages 47 with their respective manifolds as indicated at 48.

The modified form of connection between the engine shaft 21 and piston rod 5, shown in Figure 5, comprises an oblong body 49, each of the opposite faces of which is provided with a pair of cam grooves 50, each having a compound curvature and communicating one with the other. This construction is distinguished from the groove 19 in that with the latter one complete revolution of the shaft 21 is had with each reciprocation of the piston, whereas with the form shown in Figures 5 and 6, two complete reciprocations of the pistons will take place to one revolution of the shaft.

It is evident that the use of the modified form, as shown in Figures 5 and 6, will provide a relatively high speed motor, and by duplicating the number of grooves and extending these in directions opposite to those indicated in Figure 5, a motor of still higher speed can be obtained.

It is evident that the motor of the present invention is practically vibrationless because of the absence of pivotal connections between the piston rods and pistons, invariably found with motors of the reciprocating type. The connection between the piston rod and the engine shaft is such that the use of the conventional crank pin connection is eliminated, together with the attendant vibration due to the use of that structure. The provision of the slidable valves eliminates the use of noisy tappets and spring operated poppet valves and the resultant frequent adjustments and valve grinding.

Although I have shown and described one embodiment of my invention, it is to be understood that the same is susceptible to varous changes; and I reserve the right to employ such as may come within the scope of the appended claims.

I claim:—

1. In a device of the type described a piston, a piston rod rigidly secured thereto, a cam groove, a ball-bearing mounted in said groove, adjustable means carried by said rod for moving the ball-bearing with respect to the groove, a guide groove for said rod, a ball-bearing mounted in said groove and a cup receiving said ball-bearing and being adjustably secured to said rod.

2. In a device of the type described, a piston, a piston rod rigidly secured to said piston, a pair of guide grooves for said piston rod, a rotatable member having a double cam groove therein, ball-bearings disposed in said grooves, adjustable means carried by said rod for moving said ball-bearings into the grooves, ball-bearings disposed in said first named rod guiding grooves, cups for receiving said last named ball-bearings, and being adjustably connected to said piston.

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