INTERNAL COMBUSTION ENGINE CYLINDER BLOCK

ABSTRACT: A single cylinder engine block embodies the upper half of the crankshaft housing and has end flanges adapting the same to be assembled with other like single cylinder blocks to provide an engine having two or four opposed cylinders. The single cylinder or any number of cylinders in line therewith may be employed by adding the necessary crankcase halves thereto.
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This invention relates to an internal combustion engine cylinder block.

The invention is based upon the need for some way to utilize cast engine blocks for a variety of types and sizes of engines when the projected volume of production of any one type or size may not be enough to justify the cost of the dies or of setting up for machining operations for it.

According to the invention, a single cylinder block is cast with the upper half of the corresponding crankcase integral therewith, and is so constructed that it may be employed as a single cylinder or assembled with similar blocks in line, by adding thereto the necessary bottom half of the crankcase. Also, two cylinder blocks may be assembled in opposed relation by securing their respective crankcase halves back to back, or four such cylinder blocks may be similarly assembled to provide an engine in which two cylinders are opposed to two cylinders. Various combinations of cylinders may thus be employed in making up different types of engines and engines with different numbers of cylinders.

The invention provides a simple single cylinder block section which may be readily die cast in volume production. Also the machining operations for any size engine are greatly simplified and reduced in cost by reason of the large number of like block sections to be machined with one setting for the machine tools and avoidance of successive complicated machine setups.

By constructing a cylinder and the adjacent half of the crankcase integral, the expense of machining the mating surfaces heretofore required and also the possibility of leaks therebetween are avoided.

The invention is illustrated in the accompanying drawings in which:

FIG. 1 is a side elevation of a single cylinder cast block taken axially of the crankcase;
FIG. 2 is a vertical section of the block taken on line 2-2 of FIG. 1;
FIG. 3 is a side elevation of a single cylinder engine assembly viewed from the intake side;
FIG. 4 is a similar side elevation of a two cylinder engine assembly;
FIG. 5 is a side elevation of a two cylinder engine assembly with the cylinders opposed; and
FIG. 6 is a similar elevation of a four cylinder engine assembly of the opposed cylinder type.

The engine blocks illustrated are for a two-cycle air cooled engine wherein the fuel intake is on one side and the exhaust is on the other.

When a single cylinder block 1 illustrated is die cast in one piece to provide the cylinder portion 2, closed at the upper end 3 and having circumferential fins 4 thereon, and the upper crankcase half 5 integral with the lower open end of the cylinder.

The crankcase half 5 constitutes the base support for the cylinder portion 2 and extends beyond the cylinder axially of the crankshaft 6 corresponding to the necessary axial separation of two opposed crank throws 7 and 8 as illustrated in FIG. 5.

The crankcase half 5 may also extend forwardly of the cylinder portion 2 to provide a connection 9 for the intake passage and space for a reed valve block (not shown) within the crankcase.

The cylinder portion 2 has incorporated therein a transfer passage 10 on the front side and connecting the crankcase to an inlet port 11 through the wall of the cylinder.

On the back side of the cylinder portion 2, opposite the port 11 the fins 4 are eliminated for a space sufficient to provide the exhaust ports 12.

Ports 11 and 12 will be drilled after casting of the block, but will generally be the same for all blocks regardless of the engine assembly to be employed.

The inlet connection 9 is generally offset from the transverse plane of the cylinder axis a distance approximately one-half of that of the axial extension of the crankcase 5 so that the intake to the crankcase will not be in direct line with the crank but will be close to it.

When a cylinder block 1 is to be employed alone in a single cylinder engine, as illustrated in FIG. 3, a lower crankcase half 13 is assembled complementary to crankcase half 5 and bolted thereto, and identical end plates 14 and 15 close the ends thereof and support the bearings for the crankshaft 16.

When two cylinder blocks 1 are assembled in line to provide a two cylinder alternate firing engine, as illustrated in FIG. 4, the adjacent ends of the corresponding crankcase halves 5 are bolted together, a lower crankcase half 17 is bolted to the crankcase halves 5, and the end plates 14 and 15 are bolted to close the ends of the crankcase and support the crankshaft 18 by suitable bearings.

When two cylinder blocks 1 are assembled in opposed relation, as shown in FIG. 5, the centerline for the cylinders are offset to accommodate the necessary spacing of the crank throws 7 and 8, by reason of the oppositely extending crankcase halves 5. The crankcase halves 5 are bolted to each other and end plates 14 and 15 applied to close the crankcase and support the crankshaft 6.

Four cylinder blocks 1 may be assembled in opposed pairs, as shown in FIG. 6, thus in effect duplicating the assembly of FIG. 5.

Thus engines of different types and sizes may be made up by assembling the basic blocks 1. The only additional parts that require different sizes depending upon the type of the engine to be made are the crankshaft and the lower half of the crankcase.

We claim:

1. A basic cast single cylinder engine block selectively adapted for use alternatively in a single cylinder engine or for assembly with other like blocks to provide a multi cylinder engine of either the inline type or the opposed type, said engine block comprising the complete cylinder and head, and the adjacent crankcase half associated therewith and providing a flanged crankcase parting line in a plane substantially normal to the axis of the cylinder, the ends of said crankcase half being flanged normal to said parting line plane and having corresponding crankshaft openings therein adapted to receive bearings for supporting a crankshaft when selectively assembled as alternatively described herein, said cylinder having air cooling fins thereon, a transfer passage from the crankcase to an inlet port for the cylinder, a fuel-air mixture inlet at one side of said crankcase half intermediate the ends thereof, and an exhaust port for the cylinder.

2. An air cooled two cycle internal combustion engine comprising at least one basic engine block according to claim 1, a complementary crankcase half mating with the flanged crankcase half of said block to provide integral complex end flanges, end closures secured to the corresponding end flanges of the crankcase and having bearings centrally thereof, and a crankshaft and piston assembly carried in said bearings in said end closures.

3. The construction of claim 1 in which the crankcase portion of the block extends axially of the crankshaft beyond the cylinder a distance accommodating the distance between two opposed crank throws, and two such blocks are secured in opposition with their respective crankcase portions mating, end closures for the crankcase, a crankshaft having two closely adjacent opposed crank throws, pistons in the respective cylinders associated with said throws, and bearings in said end closures supporting said crankshaft.

4. The construction of claim 3 in which two such pairs of opposed engine blocks are assembled with the crankcases therefor secured end to end and in which the crankshaft extends the full length of the crankcase.

5. The construction of claim 1 comprising the assembly of two such engine blocks with the cylinders in line and their respective crankcase portions secured together end to end, a complementary crankcase half mating with said crankcase portions of said blocks to provide a crankcase, end closures for the crankcase, a crankshaft assembly having two spaced crank throws, pistons in the respective cylinders associated with the corresponding crank throws, and bearings in said end closures supporting said crankshaft assembly.