E. G. HOLTHAUS.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED APR. 1, 1920.

1,359,598. Patented Nov. 23, 1920.

Fig. 1

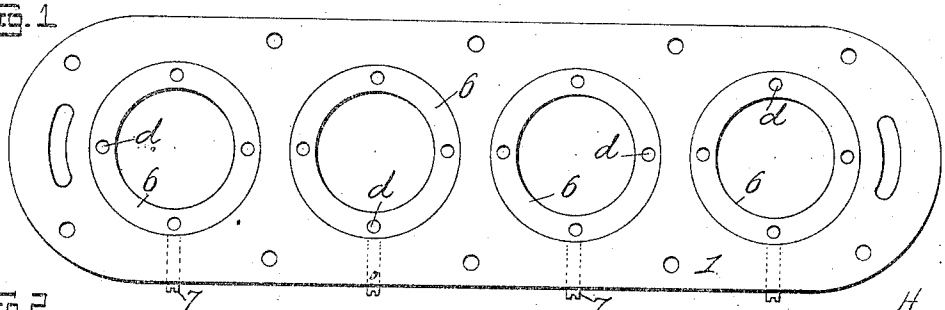


Fig. 2

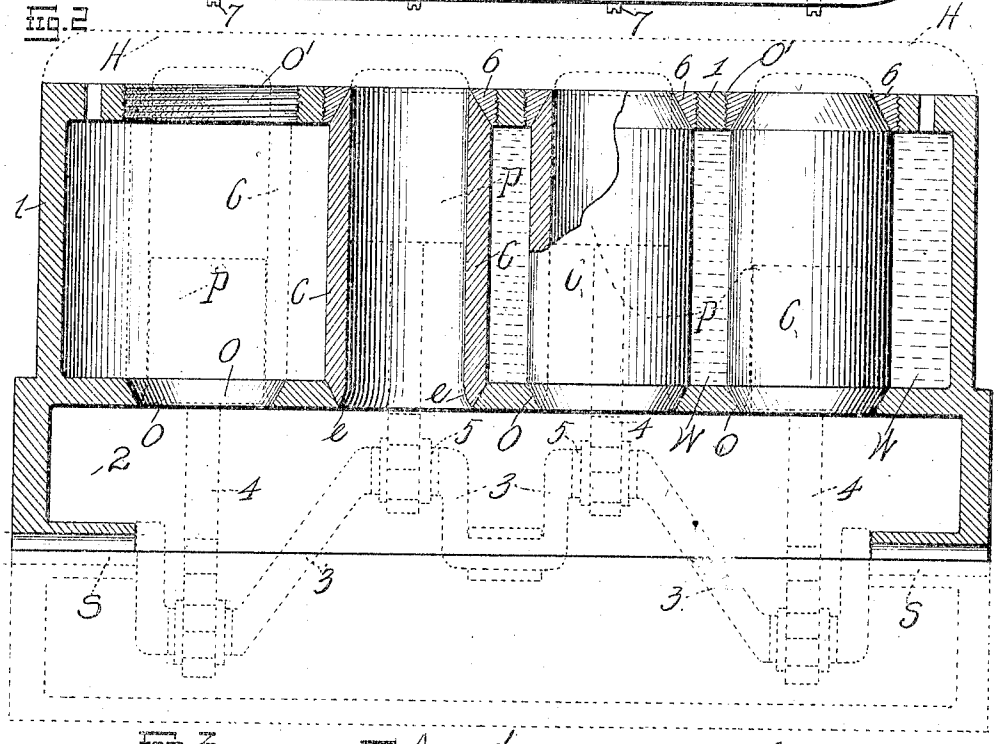


Fig. 3

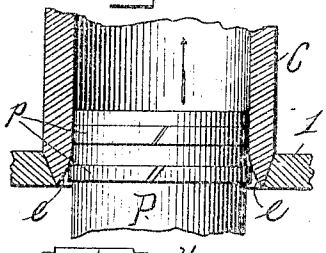


Fig. 4

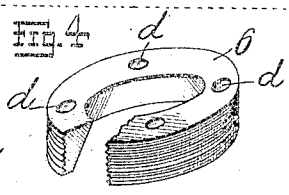


Fig. 5

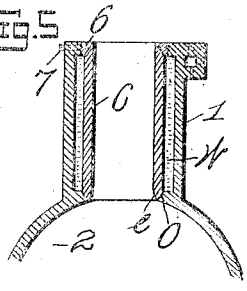
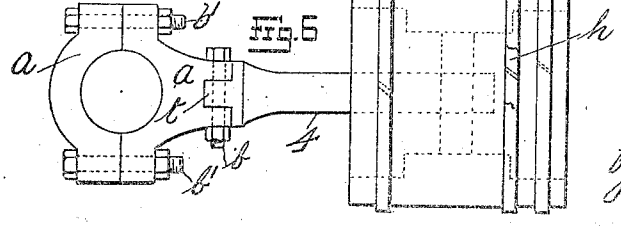


Fig. 6



Inventor

Elmo G. Holthaus

by Emil Starek Atty.

UNITED STATES PATENT OFFICE.

ELMO G. HOLTHAUS, OF ST. LOUIS, MISSOURI.

INTERNAL-COMBUSTION ENGINE.

1,359,598. Specification of Letters Patent. Patented Nov. 23, 1920.

Application filed April 1, 1920. Serial No. 370,431

To all whom it may concern:

Be it known that I, ELMO G. HOLTHAUS, a citizen of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

The present invention has relation to improvements in internal combustion engines, being particularly directed to the cylinder block of the engine and the cylinder therefor. The object of the invention is to provide a block with removable cylinders so that in the event any cylinder needs repairing or the piston packing therefor requires renewal, said cylinder may be withdrawn from the block upon removal of the cylinder head without disturbing any other cylinder of the series, where a plurality of cylinders is employed. A further object is to provide a simple construction by which a cylinder is secured in position in the block; to provide the cylinder with means for guiding thereinto the packing rings carried by the piston during the insertion of the piston into the cylinder when the latter is being restored to its position in the block; and finally to provide a block and cylinders therefor which may be applied to any prevailing type of internal combustion engine without entailing any material changes of construction in the latter, all as will be clearly apparent from the following detailed description of the invention in connection with the accompanying drawings in which—

Figure 1 represents a top plan of the cylinder block; Fig. 2 is a middle longitudinal section of the same taken lengthwise of the cylinders; Fig. 3 is an enlarged longitudinal sectional detail of the inner end of a cylinder showing the manner of passing the piston with its packing rings into the cylinder; Fig. 4 is a perspective of the screw ring for fastening a cylinder, a part of the ring being broken away; Fig. 5 is a cross-section on a smaller scale through one of the cylinders taken at right angles to the section shown in Fig. 2; and Fig. 6 is a detached plan of the piston and its connecting rod.

Referring to the drawings, 1, represents a hollow or chambered cylinder-block cast integrally with the upper section of the crank-case 2, the bottom and top walls of the block being provided with a plurality of openings O, O′, respectively, said openings being disposed in pairs concentrically about common axes for the reception of a series of removable cylinders C, each cylinder being provided with a reciprocating piston P equipped with split metal packing rings *p* confined in the usual peripheral annular grooves *h* of the piston as well understood in the art. The crank-shaft S of the engine traverses the crank-case 2, the crank arms 3 of the shaft being connected to the several pistons by the connecting rods 4, the pistons operating in pairs as indicated in the drawings wherein the parts last alluded to follow the general design of such parts in engine construction. In the present improvement however the strap *a* encircling the crank-pin 5 is coupled to the connecting rod by a bolt *b* passed through the tongue *t* of the connecting rod and the walls of the recess by which the tongue is received, formed in the adjacent section of the strap. As obvious from the drawings, by pulling out the bolt *b* the piston with its connecting rod may be detached from the strap, thereby permitting access to the bolts *b′* whenever it becomes necessary to tighten the strap to the crank pin. In the present embodiment of my invention the bottom wall of the block forms the dividing wall or partition between the chamber of the block and the crank case.

As pointed out above, the bottom wall of the block is provided with a series of openings O, said openings tapering inwardly or toward the crank case, the inclined walls of said openings forming seats for the inner tapered or beveled ends of the cylinders. The openings O′ in the top wall of the block on the other hand, are bounded by threaded cylindrical walls to which are screwed the screw cylinder rings 6, the latter having inner outwardly tapering walls for engaging the beveled outer terminals of the cylinder, a cylinder when once in place being held tightly to its seat by the clamping action of the ring 6, the sloping contacting surfaces between the cylinder and its seat and between the cylinder ring and the cylinder forming water-tight joints so that no packing or gaskets are necessary to prevent

leakage. The rings 6 when fully driven home are set-screwed against unscrewing by the screws 7 driven through the side wall of the block (Fig. 1). To remove a cylinder at any time, all that need be done is to loosen a set screw 7, and unscrew the ring 6 (the ring being provided with depressions *d* for the insertion of the fingers of a suitable wrench) thus leaving the cylinder free to be pulled out through the top of the block. Of course, the cylinder head H, with which the present invention however is not concerned, must first be detached from the block to gain access to the cylinders. The openings O′ are of slightly larger diameter than the openings O and larger than the outside diameters of the cylinders, so that when any ring 6 is removed, it leaves the cylinder free to be withdrawn through the opening O′ without binding or friction. The cylinders are surrounded by a water-jacket W formed in the block through which circulation is established by any of the usual methods known to the art.

The inner end of the bore of each cylinder terminates in an outwardly flaring portion *e* the purpose of which is to guide the packing rings *p* into the cylinder by gradually compressing or contracting the rings during the insertion of the piston (in the crank case) back into the cylinder when the latter is restored to its block. Thus, in Fig. 3, it will be seen that the packing rings carried by the piston expand or open out their full extent when free or out of the cylinder; and to restore them to the cylinder they must be compressed. This compression is done automatically by the gradually contracting walls of the flaring portion *e* as the piston is pushed into the cylinder.

Features shown but not alluded to are well understood in the art, and being foreign to the present invention no description thereof is herein attempted.

Having described my invention what I claim is:

1. In combination with a cylinder block chambered for the circulation of a cooling medium, a crank-case, a dividing wall or partition between the crank-case and block, said wall and the wall opposite thereto being provided with openings disposed in pairs about concentric axes, a cylinder insertible into each pair of openings, the walls of the openings in the partition wall aforesaid tapering toward the crank-case and the cylinder having correspondingly tapered inner ends for seating against said walls, and means interposed between the opposite or outer ends of the cylinders and the walls of the openings receiving the same for securing the cylinders to the block.

2. In combination with a hollow cylinder block for internal combustion engines having a top wall and a bottom wall, a crank-case separated therefrom by the bottom wall, the walls aforesaid being provided with openings disposed in pairs concentrically about common axes, the walls of the inner openings tapering toward the crank case, a cylinder inserted into each pair of openings and having tapering ends, the inner end being seated against the sloping walls of the inner opening, a screw ring screwed into the opening of the top wall and provided with inner outwardly tapering walls operating to engage the outer tapered end of the cylinder, whereby the cylinder is locked in position in the block and the sloping contacting surfaces of the several formations are brought into firm engagement to form water-tight joints.

In testimony whereof I affix my signature in presence of two witnesses.

ELMO G. HOLTHAUS.

Witnesses:
EMIL STAREK,
JOS. A. MICHEL.