

- [54] **RECIPROCATING PISTON INTERNAL COMBUSTION ENGINE**
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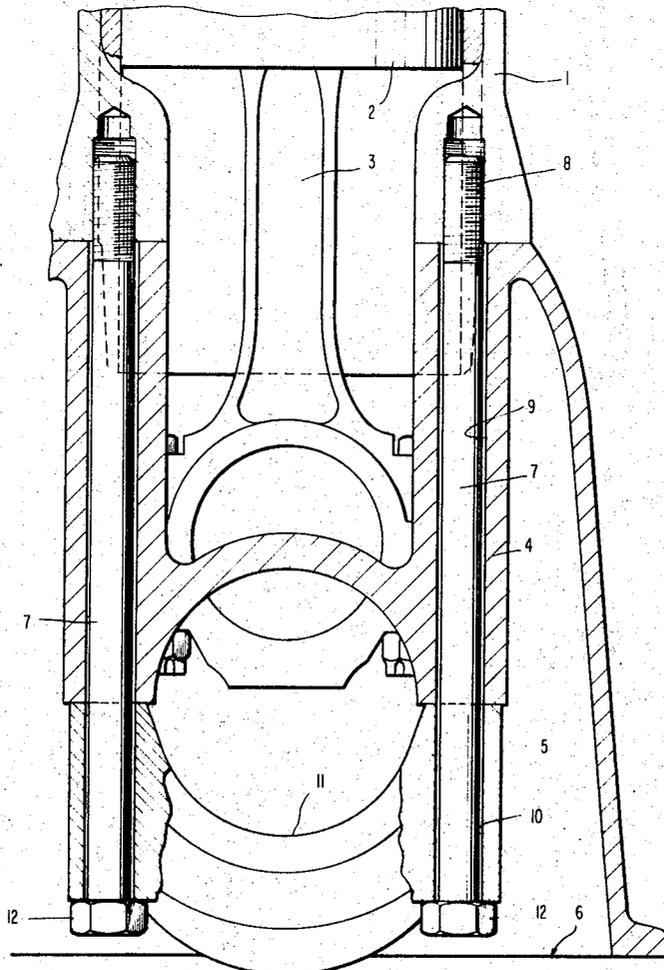
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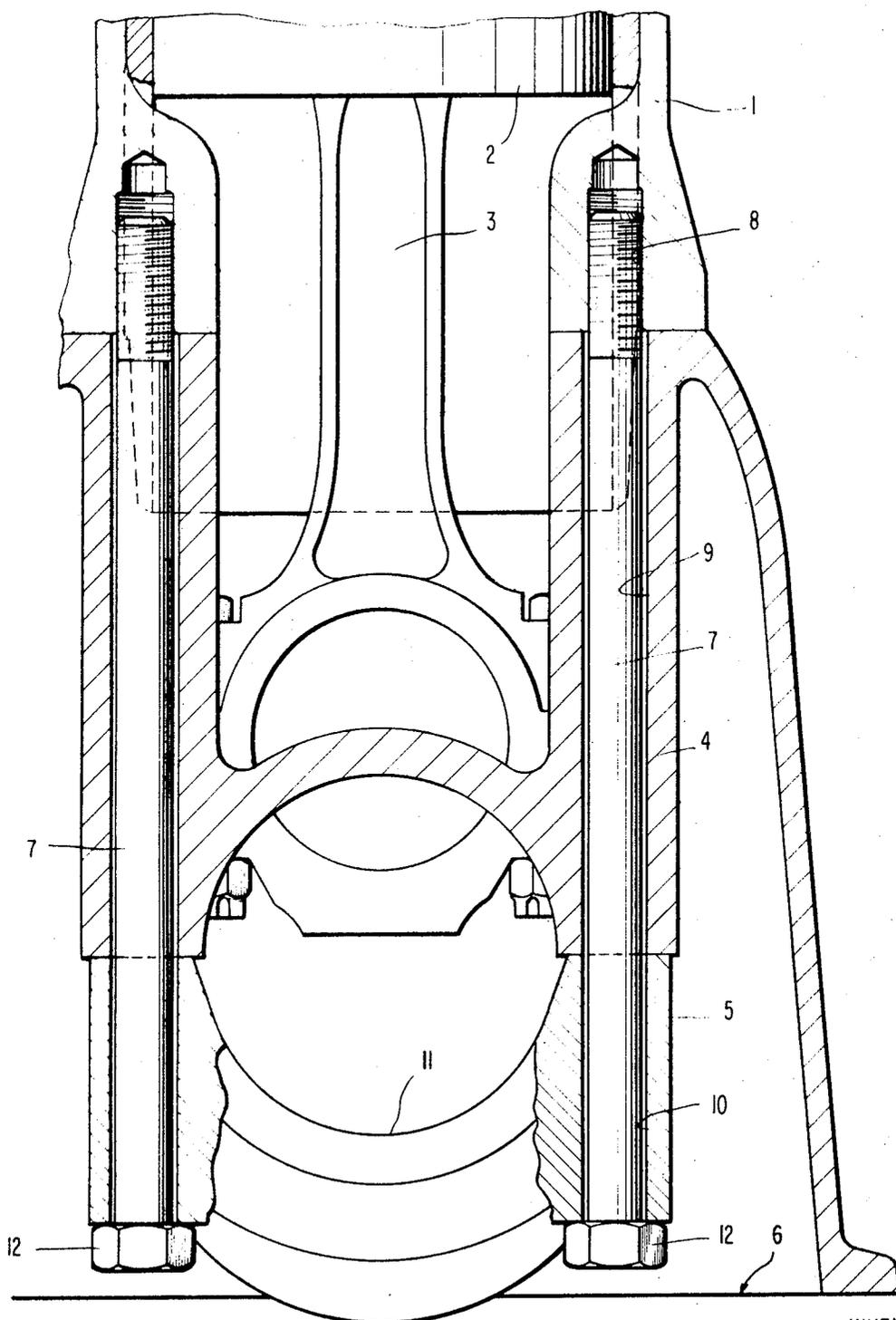
[57] **ABSTRACT**  
 A reciprocating piston internal combustion engine with a cylinder block as well as with a main bearing and a main bearing cover of a crankcase which are connected with each other by bolts whereby the bolts extending from the cylinder block to the main bearing cover only engage at the same whereas they extend freely through the main bearing so that the forces acting on the main bearing are transmitted directly to the cylinder block or the main bearing cover.

**8 Claims, 1 Drawing Figure**



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## RECIPROCATING PISTON INTERNAL COMBUSTION ENGINE

The present invention relates to a reciprocating piston internal combustion engine with a cylinder block as well as with a main bearing and a main bearing cover of a crankcase, which are connected with each other by means of bolts.

With known reciprocating piston internal combustion engines of the aforementioned type, the main bearing is connected with the cylinder block, on the one hand, and with the main bearing cover, on the other, by different bolts which are arranged mutually offset over the circumference. An unfavorable force flow in the main bearing results therefrom. Additionally, force-conducting or force-transmitting threads are provided in the main bearing so that the danger of crack formations exists in the main bearing made, as is customary, of light-weight metal.

The present invention is concerned with the task to eliminate the aforementioned disadvantages. The underlying problems are solved according to the present invention in that the bolts extending from the cylinder block to the main bearing cover engage exclusively at the same whereas they extend freely through the main bearing so that the forces acting on the bolts are transmitted directly to the cylinder block or the main bearing cover.

By the construction of the reciprocating piston internal combustion engine according to the present invention, no threads and therewith also no threaded bushes are present in the main bearing. The force flow in the main bearing is very favorable, especially as the forces acting on the main bearing are transmitted by way of large and contiguous separating surfaces to the cylinder block and the main bearing cover and not in a point-like manner to the bolts. The manufacture and assembly is considerably simplified by the present invention compared to the prior art reciprocating piston internal combustion engines. The bolts may be inserted both from the main bearing cover with threads in the cylinder block as also from the cylinder block with threads in the main bearing cover.

Accordingly, it is an object of the present invention to provide a reciprocating piston internal combustion engine which avoids by simple means the aforementioned shortcomings and drawbacks encountered in the prior art.

Another object of the present invention resides in a reciprocating piston internal combustion engine which not only assures a favorable force flow from the main bearing but also eliminates the necessity of threads or threaded bushings in the main bearing.

A further object of the present invention resides in a reciprocating piston internal combustion engine of the type described above which eliminates the danger of crack formation in light-weight main bearings.

A further object of the present invention resides in a reciprocating piston internal combustion engine which greatly facilitates the manufacture and assembly of the engine.

These and other objects, features and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, one embodiment in accordance with the present invention, and wherein:

The single FIGURE is a partial cross-sectional view through a reciprocating piston internal combustion engine in accordance with the present invention.

Referring now to the single FIGURE of the drawing, reference numeral 1 designates therein a cylinder block within which slides a piston 2 that is connected by way of a connecting rod 3 with a crankshaft (not shown). A crankcase which includes a main bearing 4 and a main bearing cover 5, adjoins the cylinder block 1. The separating plane with respect to an oil pan (not shown) is indicated by reference numeral 6. The main bearing cover 5 and the main bearing 4 are connected with the cylinder block 1 by means of bolts 7 which are inserted in the direction from the oil pan and are screwed into threads 8 provided in the cylinder housing 1. The bolts 7 extend freely through openings or bores 9 and 10 provided in the main bearing 4 and in the main bearing cover 5 so that these parts are held only by clamping forces. The forces exerted by the crankshaft by way of the crankshaft surface 11 on the main bearing cover 5 (which surface 11 is arranged for the reception of a non-illustrated socket shell having bearing surfaces) are absorbed by the bolt heads 12 and are transmitted directly to the cylinder block 1 by way of bolts 7. For the accurate fixing during the assembly, fitting pins (not shown) may be provided between the cylinder block 1 and the main bearing 4 as well as between the latter and the main bearing cover 5. Since these fitting pins may be of conventional construction, they are not shown in the drawing for sake of simplicity.

While we have shown and described only one embodiment in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to those skilled in the art, and we therefore do not wish to be limited to the details shown and described herein, but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

We claim:

1. A reciprocating piston internal combustion engine which includes a cylinder block as well as a main bearing means and a main bearing cover means of a crank case, which are connected with each other by bolt means, characterized in that the bolt means extending from the cylinder block to the main bearing cover means exclusively engage at the cylinder block and the main bearing cover means whereas said bolt means extend freely through the main bearing means so that the forces acting on said main bearing means are transmitted exclusively and directly to the cylinder block or the main bearing cover means, one of said cylinder block and said main bearing cover means including threaded bore means threadably connected to said bolt means, whereby said forces act on said bolt means only through said cylinder block and said main bearing cover means.

2. An internal combustion engine according to claim 1, characterized in that said cylinder block is provided with said threaded bore means while the main bearing means and the main bearing cover means are provided with unthreaded bores so that the bolt means inserted from the exposed end of the main bearing cover means opposite the main bearing means extend freely through the unthreaded bores of the main bearing cover means and main bearing means but threadably engage the threaded bore means in the cylinder block.

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3. An internal combustion engine according to claim 2, characterized in that said bolt means includes a bolt head engaging at the exposed end of the main bearing cover means.

4. An internal combustion engine according to claim 3, characterized in that the main bearing means is made from light-weight metal.

5. An internal combustion engine according to claim 1, characterized in that the main bearing means and main bearing cover means are only held onto the cylinder block by clamping forces exerted by said bolt means.

6. An internal combustion engine according to claim

1, characterized in that the main bearing means is made from light-weight metal.

7. An internal combustion engine according to claim 1, characterized in that said bore means are formed as a completely enclosed bore extending from one end of the main bearing to the other.

8. An internal combustion engine according to claim 1, wherein the surfaces of said main bearing in abutting engagement with said cylinder block and said main bearing cover are planar surfaces extending perpendicular to the longitudinal extent of said bolt means.

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