

April 12, 1938.

J. R. RIPPE

2,113,904

ENGINE CONSTRUCTION

Filed Feb. 20, 1935

3 Sheets-Sheet 1

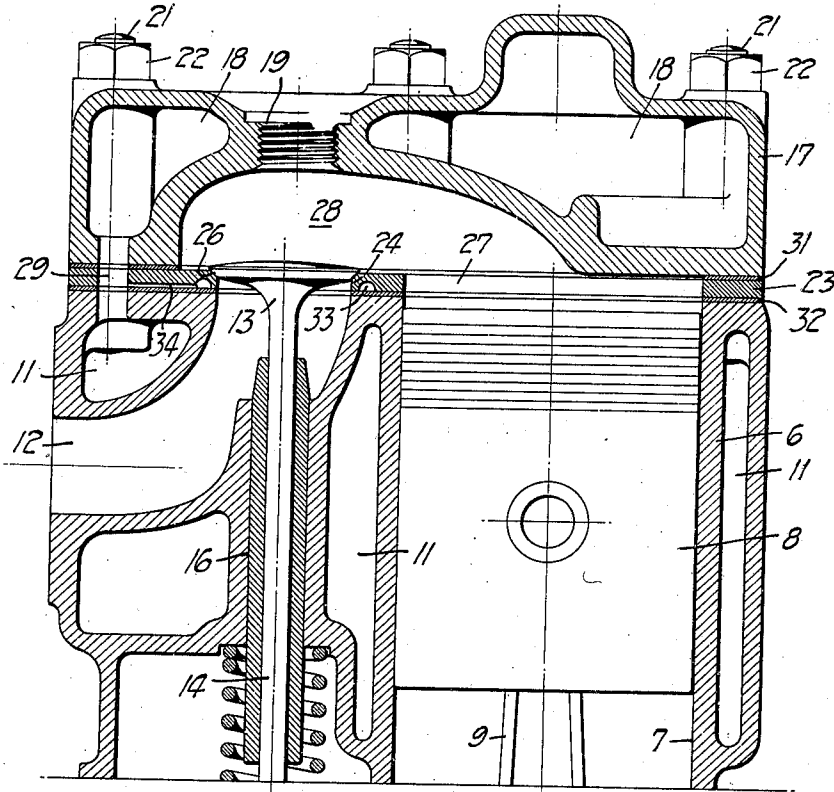
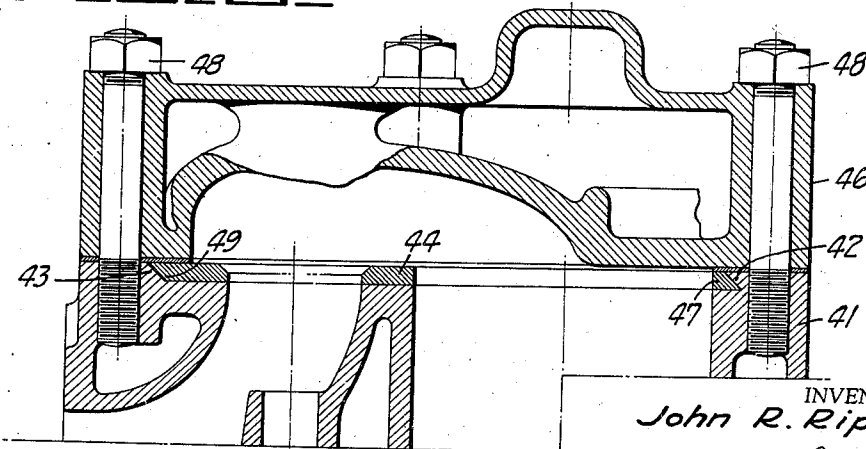


FIG. 1.

FIG. 2.



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3 Sheets-Sheet 2

FIG. 3

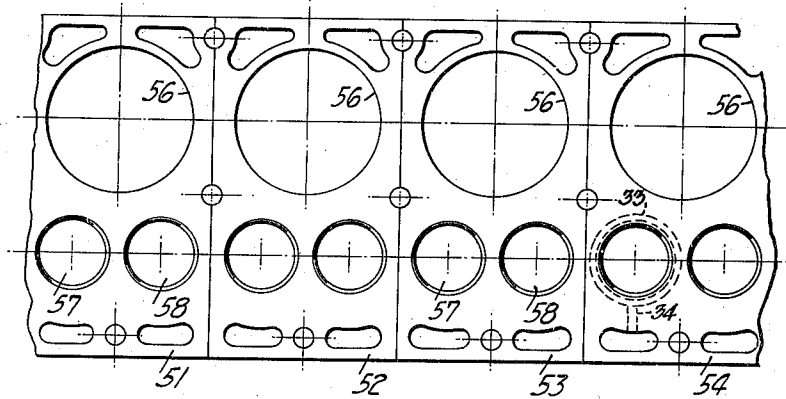
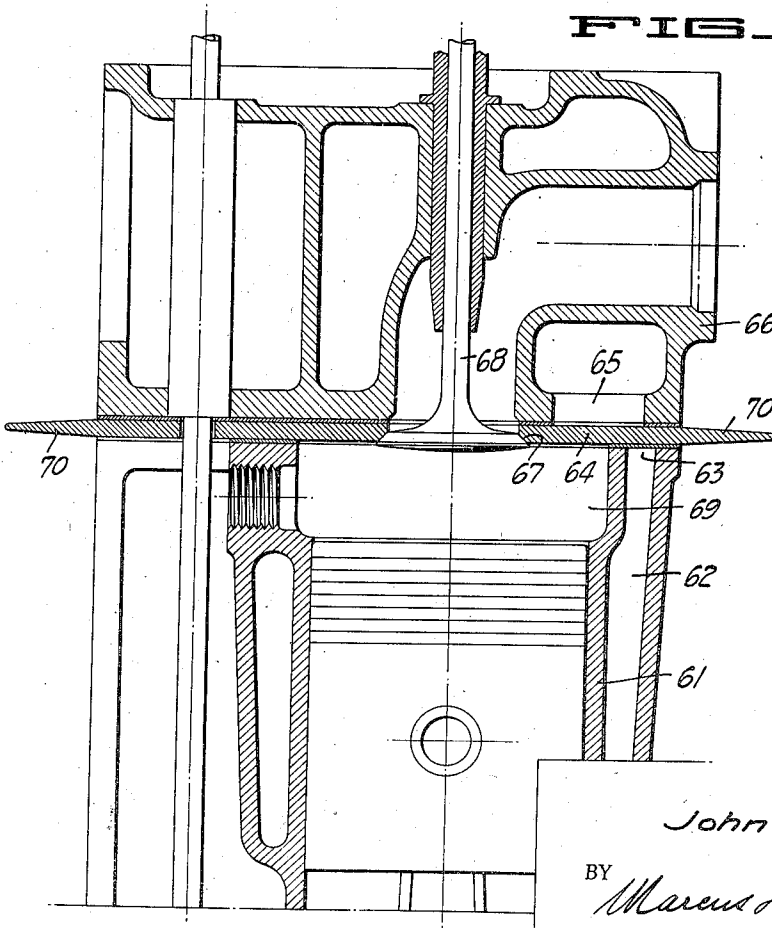


FIG. 4



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3 Sheets-Sheet 3

FIG. 5.

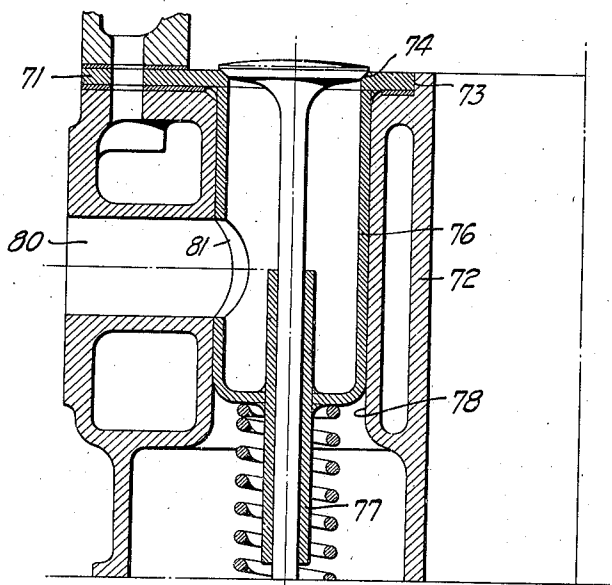
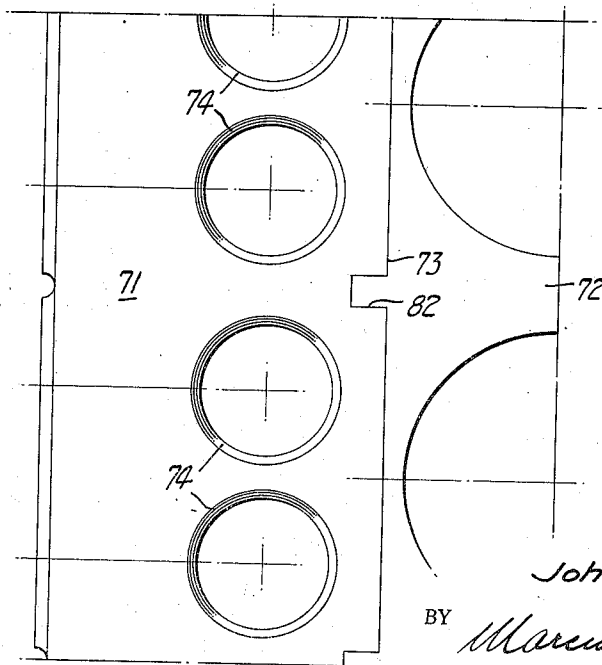


FIG. 6.



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ENGINE CONSTRUCTION

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Application February 20, 1935, Serial No. 7,364

6 Claims. (Cl. 123—188)

My invention relates primarily to internal combustion engines provided with valves of the poppet type, and is especially related to engines having separable cylinder heads and cylinder blocks.

5 In modern internal combustion engines it is important that the valves, almost universally of the poppet type, be provided with valve seats which are satisfactory from the standpoints of long life and ready replacement when damaged. It is likewise a valuable design feature to construct the valve seat of a special material different from the material of the engine as a whole.

10 It is therefore an object of my invention to provide in an engine means for providing valve seats which are especially durable and readily replaceable when worn.

15 Another object of my invention is to provide an easily constructed unit containing a plurality of valve seats.

20 A further object of my invention is to provide means for readily transferring heat from a valve seat to the cooling medium.

25 An additional object of my invention is to provide means for readily varying the compression volume of an internal combustion engine.

The foregoing and other objects of my invention are attained in the embodiment illustrated in the drawings, in which

30 Fig. 1 is a cross-section on a transverse axial plane through an L-head engine of conventional type.

Fig. 2 is a view similar to Fig. 1, of a modified form of engine in accordance with my invention.

35 Fig. 3 is a plan of an engine with the cylinder head removed therefrom in order to show a modified form of my invention.

40 Fig. 4 is a cross-section on a transverse axial plane of an overhead valve or I-head valve engine disclosing my invention incorporated therein.

Fig. 5 is a further modified form of engine, parts being in cross-section on a transverse axial plane.

45 Fig. 6 is a plan view of the engine shown in Fig. 5, with the cylinder head removed.

50 In its preferred form the engine of my invention includes a cylinder block, a detachable cylinder head, and valve mechanism, and incorporates a plate interposed between the cylinder block and the cylinder head for carrying the valve seats.

Although the engine of my invention is susceptible of many modifications in accordance with the particular environment in which it is to be utilized, I have disclosed it herein in several

major modifications to illustrate the principles involved. For example, as shown in Fig. 1, in a typical L-head internal combustion engine there is provided a cylinder block 6 in which there is a cylinder bore 7 forming a guide for a piston 8 connected by means of a connecting rod 9 to the engine mechanism in the customary fashion, not shown. The cylinder block 6 not only incorporates a water jacket 11 surrounding the cylinder bore 7 and certain other parts of the engine, but likewise is provided with a gas passage 12. This latter can be either for the inlet of mixture to be exploded, for the admission of air in the event the Diesel cycle is employed, for the exhaust of products of combustion, or for both inlet and exhaust functions in the event the engine is of the single-valve type. In any event, flow through the passage 12 is governed by a poppet valve 13 of the standard kind, the stem 14 of which extends through a suitable guide 15 in the cylinder block to an appropriate actuating mechanism (not shown).

To close the cylinder block and to provide an appropriate combustion chamber, a detachable cylinder head 17 overlies both the cylinder bore 7 and the valve 13. The cylinder head incorporates a water jacket 18 and is provided with a threaded aperture 19 for the reception of a spark plug or a fuel injection mechanism. The cylinder head 17 is secured to the cylinder block 6 by means of suitable hold-down studs 21 with their accompanying nuts 22, in the conventional fashion.

55 In accordance with my invention I provide, between the cylinder block 6 and the cylinder head 17, a plate 23 which is a planar sheet, preferably of metal, substantially coextensive with the outlines of the cylinder head 17. The plate is provided with an aperture 24, in order to accommodate the valve 13, and the wall of the aperture to conform to custom is tapered, as at 26, to provide an appropriate seat for the valve. The material of the plate is preferably such as is especially adapted for use in conjunction with the valve 13, and need not be, and usually is not, of the same material that constitutes the block 6 or the head 17. The plate 23 is provided with a large opening 27 affording communication between the cylinder bore 7 and the combustion chamber 28 within the head 17, and is also provided with openings 29 for the passage of cooling medium from the jacket 11 to the jacket 18. On opposite sides the plate 23 preferably is abutted by gaskets 31 and 32 of conventional con-

struction in order to provide appropriate gas and liquid seals.

The thickness of the plate 23 is any amount desired, and I contemplate that plates of materially different thicknesses can be employed, simultaneously or successively, in the same engine in order to increase or decrease the volume of the combustion chamber 28 to vary the compression ratio of the engine. Furthermore, I contemplate that when the valve seats 26 are materially drawn and worn, rather than refinishing them (although such can be effected if desired) the entire plate 23 will be removed and replaced. For this purpose, the plate 23 can be secured to the block 6 by fastenings (not shown) other than those which hold the head 17 in place. I do not contemplate that such replacement will often be necessary, however, particularly in view of the fact that the flow of heat from the valve seat 26 can readily be controlled, not only by selecting appropriate material for the gaskets 31 and 32 but likewise by arranging for a direct heat flow from the seat 26 to the water passage, such as 29 for example. This heat flow can be facilitated by recessing the plate 23 to provide an annular channel 33 encompassing the valve seat 26 and connected by a duct 34 in the plate 23 with the passage 29, in order to provide localized cooling water circulation around each valve. In this way, localized hot spots surrounding the valve can by appropriate design be completely eliminated from the construction. Of course, if desired, the gaskets 31 and 32 can be omitted, by providing a sufficiently accurate fit between the plate 23, on the one hand, and the cylinder block 6 and the cylinder head 17, on the other hand. But customarily I prefer to employ the two gaskets as shown.

As indicated in Fig. 2, the general construction is approximately the same, but in this instance the design does not contemplate that the removable plate carrying the valve seat will extend for the full outline of the cylinder head. Rather, in this arrangement the cylinder block 41 is provided on the one hand with an undercut groove 42, and on another portion with an outwardly and upwardly flaring chamfer 43. The removable plate 44 is complementarily contoured, so that when the cylinder head 46 is detached from the cylinder block the plate 44 can be introduced first with the bevelled edge 47 fitting into the under-cut groove 42, and the replacement of the cylinder head 46 and the tightening of the head nuts 48 will force the inclined face 49 on the plate closely to abut the chamfer 43 and position the parts accurately. Otherwise, the construction is substantially as heretofore described.

In Fig. 3 I have indicated the utilization of a plurality of separate plates 51, 52, 53 and 54, for example, on a cylinder block in which the cylinder bores 56 are arranged in line adjacent the successive pairs of valve ports 57 and 58, respectively, in the cylinder block. The individual removable plates can be replaced in the event there is damage adjacent any one of the cylinders or adjacent any one of its associated valves, without otherwise disturbing the assembly.

In Fig. 4 there is disclosed an arrangement in which the cylinder block 61 is surrounded by a water jacket 62, differing from customary practice in that the upper end of the water jacket is not closed, except at widely spaced intervals,

by any cast material, but is ordinarily left with its upper portion 63 open. The closure is then effected by the plate 64 which is interposed between the block 61 and the cylinder head 66 and which also carries seats 67 for the overhead valves 68. In this fashion the plate 64 not only serves as a valve seat and a closure for the combustion chamber 69, but also serves as a closure for the water space 62 in order greatly to simplify the coring of the water space in the manufacture of the block 61. Similarly, the plate 64 can serve as a closure for the water space 65 in the head 66, to simplify the coring thereof. In addition, the plate 64 can be extended beyond the block and head to provide cooling fins 70 in the air stream.

In the arrangement shown in Figs. 5 and 6, the plate 71 does not extend for the full width of the cylinder block 72 but is fitted in a recess 73 thereof and carries a succession of valve seats 74. The interengagement of the plate 71 and the block 72 can be of the bevelled construction shown in Fig. 2, if desired. Preferably, the plate is provided with a valve cage 76 and a valve stem guide 77, both of which fit in a bore 78 in the cylinder block 72. Chamber 78 has a port 80 registering with an opening 81 in the cage 76 to afford a suitable gas passage. With this arrangement, the entire valve assembly can be removed by removing the plate 71, leakage along the longitudinal boundary of which is precluded by offsets 82.

I claim:

1. In an engine, a cylinder block, a cylinder head detachable from said block and forming a combustion chamber therewith, a poppet valve controlling flow to and/or from said combustion chamber, and a seat for said valve in the form of a plate of about the thickness of the head of said valve disposed between said cylinder head and said cylinder block.

2. In an engine having a cylinder block, a cylinder head, and a poppet valve, the combination of a plate forming a seat for said valve, said plate being disposed between said cylinder block and said cylinder head and being defined by two parallel planes one of which is substantially the plane of the head of said valve.

3. In an engine having a cylinder block, a cylinder head detachable therefrom and valves for said cylinder, the combination of a single thickness of metal constituting a planar plate interposed between said cylinder block and said cylinder head and having apertures therein for the reception and seating of said valves.

4. In an engine having a cylinder block, a cylinder head adapted to overlie said block, and a relatively thin, uniform, substantially solid metal plate having valve seats formed therein interposed between said cylinder block and said cylinder head.

5. As an article of manufacture for use in a poppet valve engine, a metal plate formed to provide a plurality of poppet valve seats and being substantially free of internal cavities.

6. In an engine having a cylinder block, a cylinder head adapted to overlie said block, and a metal plate interposed between said head and said block, said plate being formed to provide a plurality of engine valve seats and being substantially free of internal cavities.

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