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CYLINDER HEAD STRUCTURE FOR INTERNAL-COMBUSTION ENGINES

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2 Sheets-Sheet 1

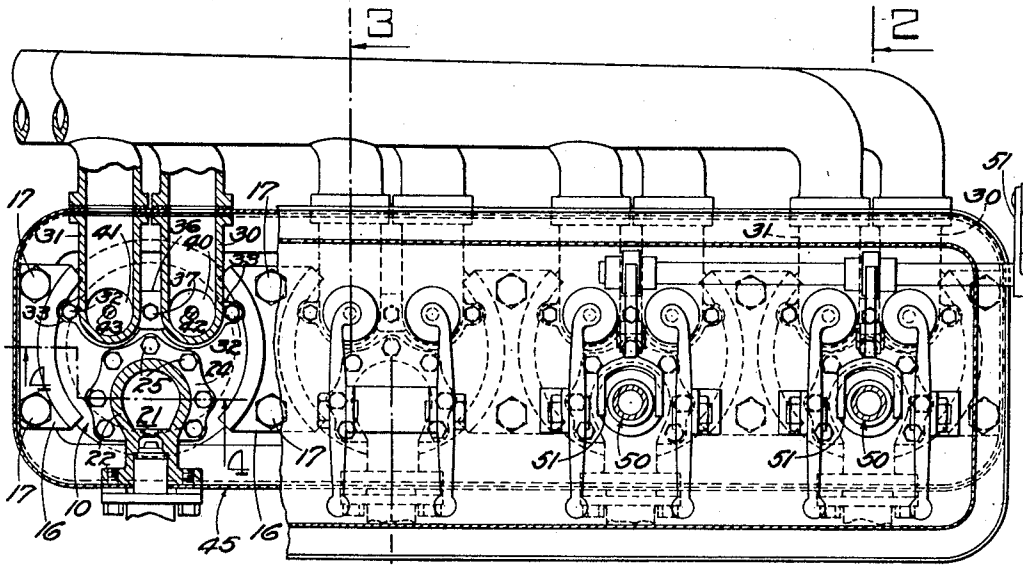


FIG-1

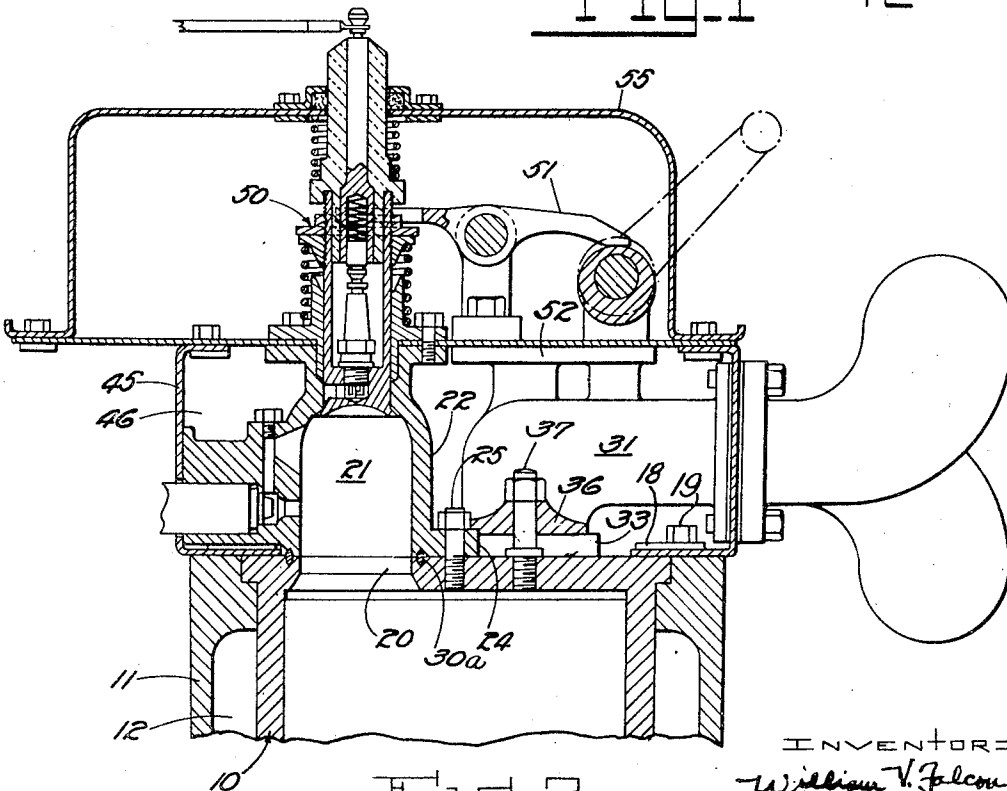


FIG-2

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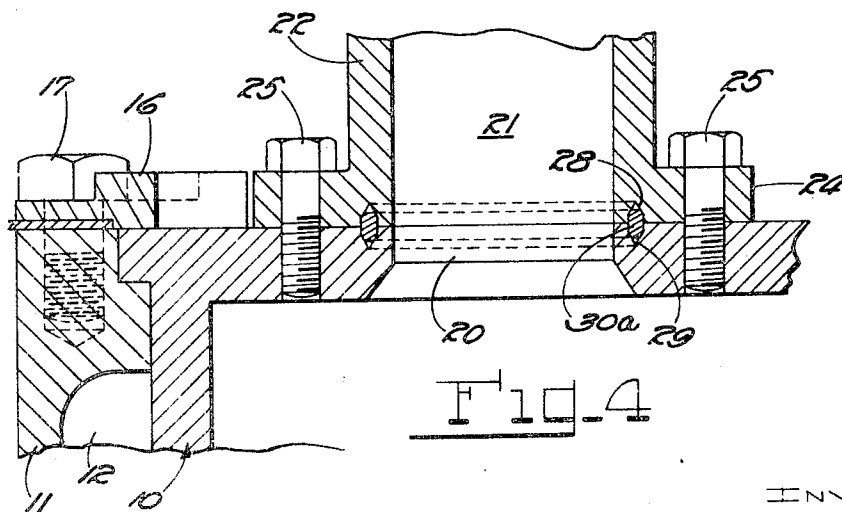
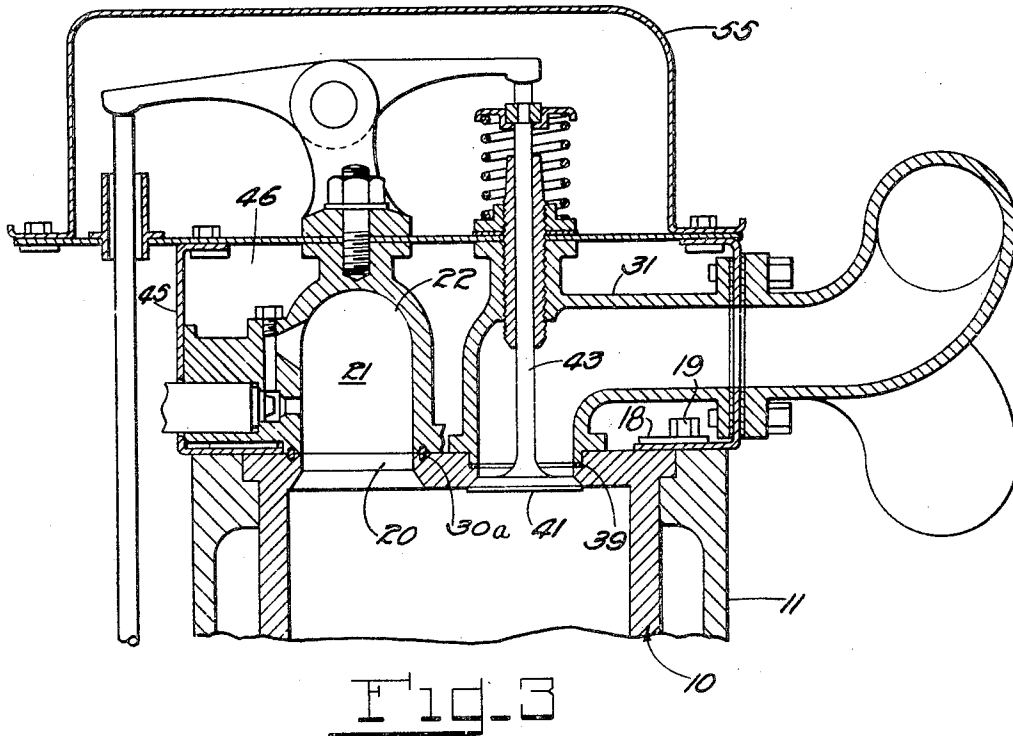
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CYLINDER HEAD STRUCTURE FOR INTERNAL-COMBUSTION ENGINES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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CYLINDER HEAD STRUCTURE FOR
INTERNAL-COMBUSTION ENGINES

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1 Claim. (Cl. 123—41.84)

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This invention relates to internal combustion engines, particularly Diesel engines, and more particularly to the cylinder head structure thereof.

Conventional cylinder head castings for internal combustion engines, particularly Diesel engines, are heavy and expensive. Such castings require a great deal of core work and the capacity of the water jacketing is limited. Parts subjected to high temperatures because of lack of cooling capacity in the conventional cylinder head structure must be specially made.

Accordingly the principal object of the invention is to reduce the weight and the cost of the cylinder head structure and to increase its cooling capacity in an internal combustion engine. It is also an object to provide in an internal combustion engine a simplified cylinder head structure which may be readily disassembled into its component parts.

Accordingly I provide a cylinder head structure of a built-up type associated with a cylinder liner of high grade material. The said structure includes a separate combustion space casting or chamber unit of the same material as the cylinder liner which is attached to the top of the liner with a special leak-proof and high pressure gasket, and separate exhaust and intake passage casings also separately mounted and attached to the top of the cylinder liner with all of the said parts of the cylinder head structure enclosed in a separately attached large built-up water jacket of inexpensive sheet material. Only the cylinder liner itself and the combustion chamber casting are made of high grade material, the remaining parts being conveniently made of any low grade metals such as ordinary sheet steel, aluminum alloy and the like.

Further objects of the invention will be apparent from the description and illustration of a preferred embodiment, the details of which, however, are illustrative and not intended to limit the invention beyond the requirements of the prior art.

In the drawings:

Fig. 1 is a plan view of the structure of the invention;

Fig. 2 is a section taken along the lines 2—2 of Fig. 1;

Fig. 3 is a section taken along the lines 3—3 of Fig. 1; and

Fig. 4 is a partial, enlarged sectional view of part of the structure.

In the drawings a so-called closed cylinder liner 10 is shown inserted in a cylinder block casting 11 with the water jacket space 12 between them.

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The liner 10 is the usual steel casting of high grade material such as chrome, or nickel steel alloy suitable for the purpose. The engine illustrated is a four cylinder engine and therefore there are four liners 10. Each liner 10 is inserted in the block 11 and secured by a pair of plates 16 and the studs or screws 17. The liners 10 are also secured to the block 11 by plates 18 and the studs or screws 19. Each liner 10 has an opening 20 leading through a combustion space 21 within a combustion chamber 22 secured to the top of the liner 10. The combustion chamber 22 may be cast of any suitable material of high tensile strength for instance, the same material as in the liner 10. The combustion chamber 22 has a flange or shoulder 24 abutting the top of the liner 10 and through which it is secured to the liner by a plurality of studs or screws 25. The combustion chamber 22 has a circular gasket groove 28 which is wedge-shape in section and which cooperates with a similar circular gasket groove 29 in the top of the liner 10. A gasket 30a in the grooves 28 and 29 forms a pressure leak-proof joint between the chamber 22 and the interior of the cylinder liner 10 when the screws 25 are set up to compress the gasket 30a.

Separately attached to the top of each liner 10 is an intake passage casing 30 and an exhaust passage casing 31. These casings are secured by studs or screws 32 through flanges 33 and by plates 36 between them held down to the block 11 by studs or screws 37. Each intake casing 30 and exhaust casing 31 is a separate unit and each forms a separate passage to the top of the cylinder liner 10 and is sealed off as by a suitable gasket 39. The intake and exhaust passage casings 30 and 31 can be made of any light material such as aluminum and, as will presently appear, need not be of the high quality material of the liner 10 or the combustion chamber 22. The intake and exhaust valves 40 and 41 and their stems 42 and 43 are supported in the intake and exhaust passage casings 30 and 31 as shown in the top of the cylinder liner 10.

Bolted to the cylinder block 11 and surrounding the structure of the combustion chamber 22 and the exhaust and intake passage casings 31 and 32 is a separate built up water jacket 45 which may be conveniently made of pieces of thin gage sheet steel, aluminum or other light, inexpensive metal bolted together. The space confined by the water jacket 45 and surrounding the combustion chamber 22 and the intake and exhaust passage casings 30 and 31 forms a water jacket space 46 through which cooling liquid can freely

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be circulated by the usual circulation system. A starting mechanism which may be of any suitable type is indicated at 50 and is shown fitted through the top of the water jacket structure 45 to the top of the combustion chamber 22. Its actuating levers 51 may be conveniently bolted through the top of the water jacket 45 to flanges 52 on the intake and exhaust passage casings 30 and 31. The starting mechanism 50 and actuating levers 51 may be conveniently supported and enclosed in an upper housing 55 made out of the same material as the water jacket 45 which also serves as a protection against dust and dirt.

It will thus be seen that the combustion chamber 22 and the exhaust and intake passage casings 30 and 31, within the confines of the cylinder head structure which is defined by the water jacket 45 are kept adequately cool. It will also be apparent that the cylinder head structure while forming a strong integral relationship with the cylinder liner 10 for the desired purposes is also very light and simple.

I claim:

In an internal combustion engine a cylinder block, a removable cylinder liner inserted in and

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bolted to said block, said cylinder liner having a top wall and holes in said wall, a removable combustion chamber casing bolted over one of said holes and to said top wall, separately removable intake passage and exhaust passage casings, each respectively bolted over one of the remaining holes in said top wall, and a removable built up sheet metal water jacket comprising several parts bolted together and over said liner and surrounding all of said casings.

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