Nov. 1, 1927. 1,647,848

L. M. WOOLSON

INTERNAL COMBUSTION ENGINE

Filed April 6, 1922

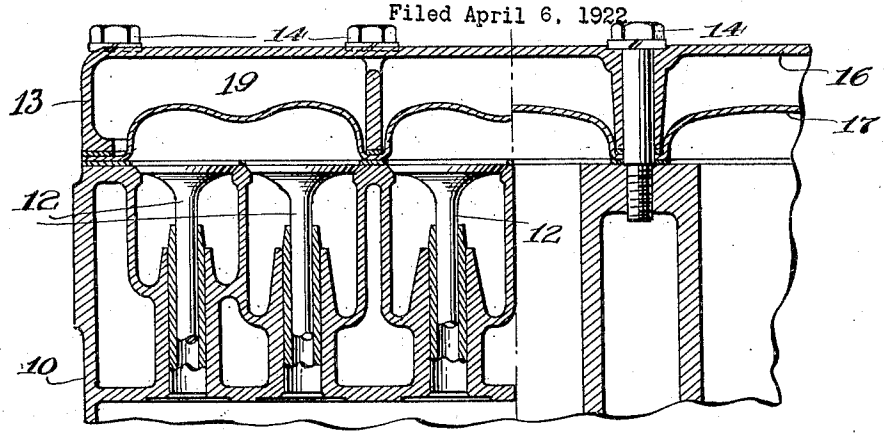


Fig. 1

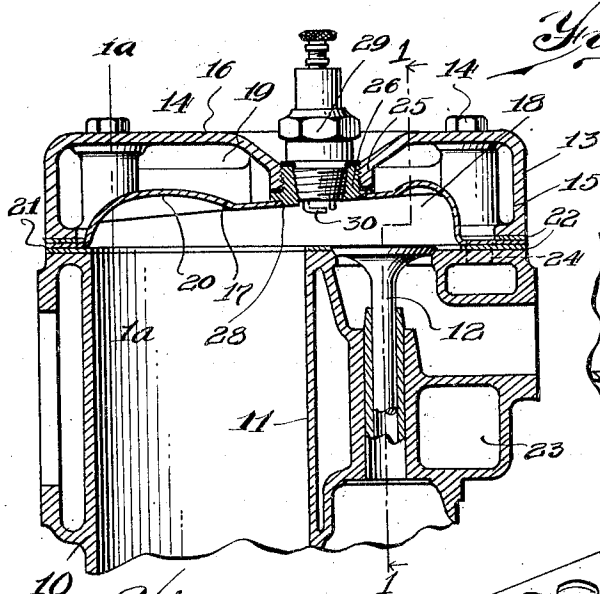


Fig. 2

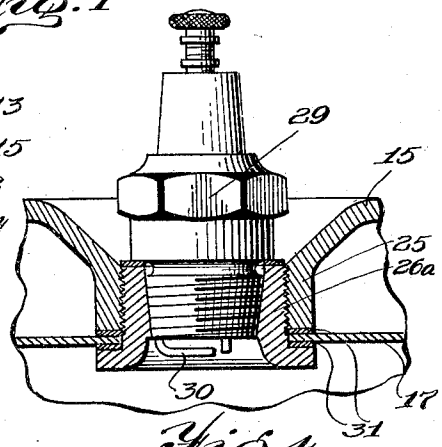


Fig. 4

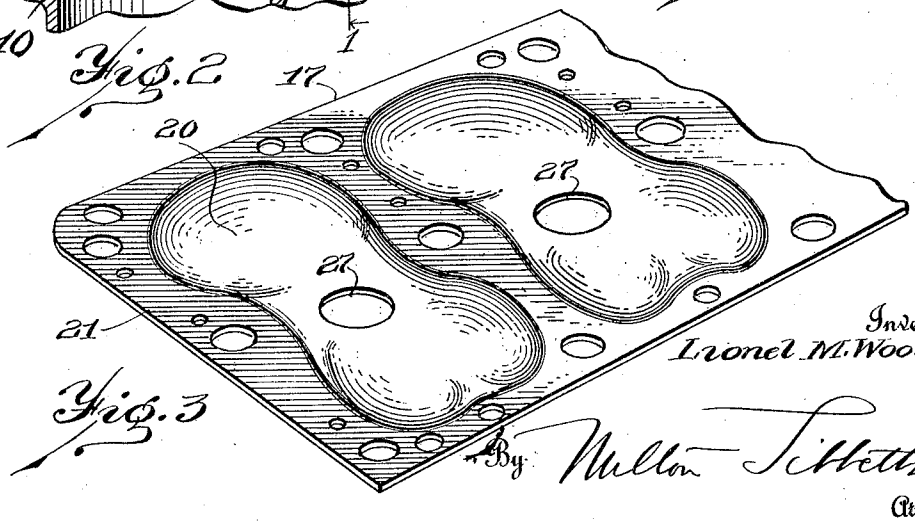


Fig. 3

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UNITED STATES PATENT OFFICE.

LIONEL M. WOOLSON, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

INTERNAL-COMBUSTION ENGINE.

Application filed April 6, 1922. Serial No. 550,021.

This invention relates to internal combustion engines and particularly to the construction of the cylinder and head parts of the engine.

One of the objects of the invention is to provide a thin wall between the combustion chamber and the water jacket so that the heat may be more readily transferred to the water in the jacket.

Another object of the invention is to provide a cylinder head with a sheet metal wall for the inner part of the jacket to thereby facilitate the casting of the jacket and for other purposes.

Another object of the invention is to provide a sheet metal wall for the combustion chamber to obtain manufacturing and structural advantages.

Other objects of the invention will appear from the following description taken in connection with the drawings, which form a part of this specification, and in which:

Fig. 1 is a vertical section, partly on the line 1—1 of Fig. 2 and partly on the line 1^a—1^a thereof;

Fig. 2 is a vertical transverse section through the engine shown in Fig. 1;

Fig. 3 is a perspective view of the sheet metal combustion chamber wall illustrated in the other figures; and

Fig. 4 is an enlarged detail view showing a second form of connection between the sheet metal wall and the cylinder head casting.

Referring to the drawings 10 represents a cylinder block which may comprise one or several cylinders. In the form shown there are several cylinders 11 which are open at the combustion end and which are provided with inlet and exhaust valves 12. The upper end of the cylinder block is machined off flat as shown in Figs. 1 and 2 to receive a cylinder head 13 which is detachably connected to the cylinder block as by a series of bolts 14.

The cylinder head 13 comprises two principal parts, a casting 15 which has an outer wall 16, and a sheet metal part 17 which covers the opening left in the lower face of the casting 15 and which also forms the wall of the combustion space 18 at the upper end of the cylinder. Between the walls 16 and 17 is a water jacket 19. This sheet metal part 17 forms a thin wall between the combustion space 18 and the water jacket 19 so that the heat of combustion may be rapidly dissipated to the water in the jacket 19.

The sheet metal part 17 is bulged upwardly over the cylinders and valves to form the combustion chambers 18, being shown as of somewhat spherical shape over the cylinders as at 20, and it is also formed with a flange 21 which conforms to the shape of the top of the cylinder block 10. This flange is arranged to be clamped between the casting 15 of the detachable cylinder head and the cylinder block 10 when the bolts 14 are screwed down. There may also be gaskets 22 arranged above and below the flange 21 for the purpose of making a tight joint between the flange and the parts between which it is clamped.

The cylinder block 10 is also preferably water jacketed as at 23 and a series of openings such as that shown in dotted lines in Fig. 2, at 24, may be provided to permit the water to pass from the jacket 23 in the cylinder block to the jacket 19 in the head. These openings 24 pass through the flange 21 and the gaskets 22.

For the purpose of inserting a spark plug through the cylinder head so that its inner end will be within the combustion chamber 18, the casting 15 is formed with a downwardly extending boss 25 and a sleeve 26 is threaded into the boss from the inner side. The sheet metal part 17 is formed with an opening 27 to coincide with the inner end of the sleeve 26 and the sheet metal and sleeve are welded together as shown at 28 in Fig. 2. The sleeve 26 is threaded interiorly to take a spark plug 29, the points 30 of which are, by the arrangement above described, arranged substantially central in the combustion chamber 18 so that the flame produced by the spark plug is propagated radially to every part of the combustion chamber.

In Fig. 4 another form of connection of the sheet metal part 17 to the casting 15 is shown. In this case the sheet metal part, in-

stead of being welded to a sleeve, is clamped between the sleeve 26a and the inner end of the boss 25, with gaskets 31, so that a gas-tight joint is made. In this case also a spark plug 29 is inserted in the sleeve.

It will be understood that various forms of the invention other than those described above may be used without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an internal combustion engine, the combination with a cylinder block having an open combustion end, of a head detachably connected to the cylinder block, and a separate sheet metal part forming the upper wall of the combustion chamber of the engine and clamped between the head and cylinder block.

2. In an internal combustion engine, the combination with a cylinder block having an open combustion end, of a head detachably connected to the cylinder block, and a stamped sheet metal liner arranged between the head and cylinder block and forming the top and side walls of the combustion chamber.

3. In an internal combustion engine, the combination with a cylinder block having an open combustion end, of a head detachably connected to the cylinder block and comprising inner and outer jacket walls of separate parts, the inner jacket wall being formed of sheet metal and having parts clamped between the cylinder block and the outer part of the head.

4. In an internal combustion engine, the combination with a cylinder block having an open combustion end, of a head detachably connected to the cylinder block and comprising a casting having an outer jacket wall only, and a stamping secured to the casting and forming the inner jacket wall of the head, said stamping also forming the wall of the combustion chamber.

5. In an internal combustion engine, the combination with a cylinder block having an open combustion end, of a head detachably connected to the cylinder block and comprising a casting having an outer jacket wall only, and a thin stamping secured to the casting and forming the inner jacket wall of the head, said stamping also forming the wall of the combustion chamber and being clamped between the head and the cylinder block.

6. An engine comprising a water jacketed head having a sheet metal wall forming the combustion chamber, said sheet metal wall being detachably secured to the cylinder proper.

7. In an internal combustion engine, the combination with a cylinder, of a head therefor comprising a casting having a water jacket open towards the combustion chamber, said casting having a boss extending into the head, and a sheet metal wall covering the open part of the jacket and forming the wall of the combustion chamber, and means for securing said sheet metal wall to said boss.

8. In an internal combustion engine, the combination with a cylinder, of a head therefor comprising a casting having a water jacket open towards the combustion chamber, said casting having a boss extending into the head, and a sheet metal wall covering the open part of the jacket and forming the wall of the combustion chamber, and means for detachably securing said sheet metal wall to said boss.

9. In an internal combustion engine, the combination with a cylinder having an open combustion end and having a valve arranged at one side thereof, of a sheet metal part forming a combustion chamber over the end of the cylinder and over said valve, a head part arranged over the sheet metal part and forming a water jacket over and around said combustion chamber, and means for detachably securing said head part to the cylinder with a portion of the sheet metal part clamped between the head part and the cylinder.

10. In an internal combustion engine, the combination with a cylinder block comprising several cylinders open at their combustion ends, of a sheet metal part covering the combustion end of the cylinder block and comprising parts forming the combustion chambers of the respective cylinders and parts forming flanges around the combustion chambers and resting against the end of the cylinder block, and a cylinder head casting arranged over said sheet metal part and forming a water jacket over and around the combustion chambers, and means for detachably securing said head casting to said cylinder block with the flanged part of said sheet metal part between the head casting and the block.

11. In an internal combustion engine, the combination with a cylinder block comprising a plurality of cylinders open at their combustion ends, of a single sheet metal part covering the combustion ends of a plurality of said cylinders and comprising bulged out portions over the ends of the cylinders and flanged portions around the cylinders resting against the end of the cylinder block, and a head part arranged over said sheet metal part and forming a water jacket around the bulged out portion of said sheet metal part, and means for detachably securing said head part to the cylinder block with the flanged portion of the sheet metal part clamped between the head part and the cylinder block.

12. In an internal combustion engine, the combination with a cylinder having an open

combustion end, of a sheet metal part over the combustion end of the cylinder and having a portion bulged out over the cylinder end to form the combustion chamber and having a flanged portion around the open end of the cylinder, and a head part arranged over the sheet metal part and forming a water jacket over and around said combustion chamber, and means for detachably securing said head part to the cylinder with the flanged portion of the sheet metal part between the head part and the cylinder.

In testimony whereof I affix my signature.

LIONEL M. WOOLSON.