

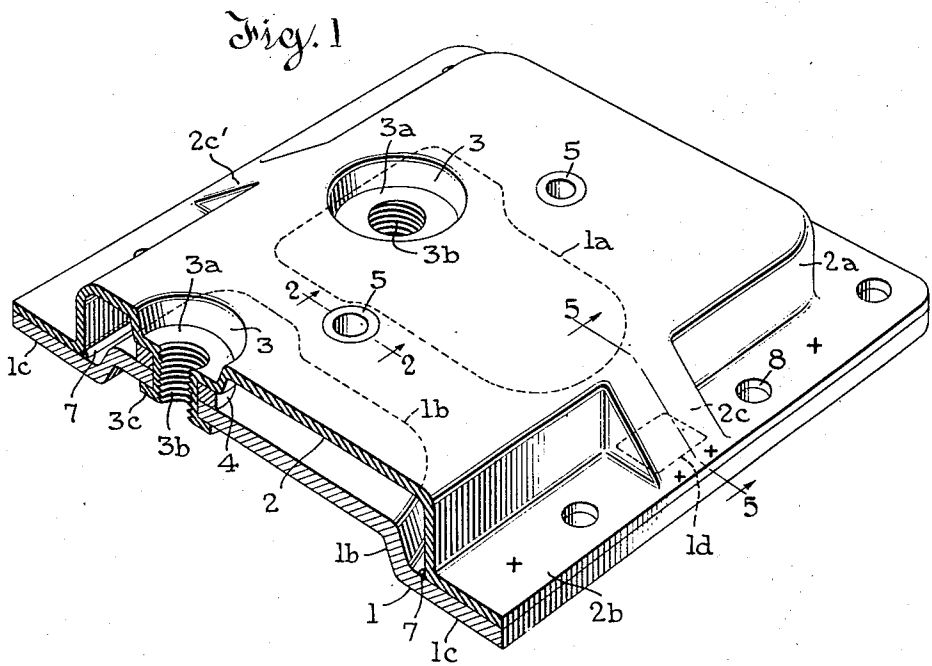
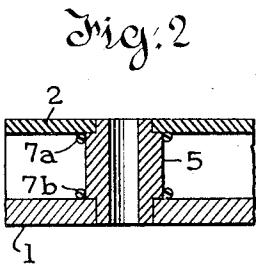
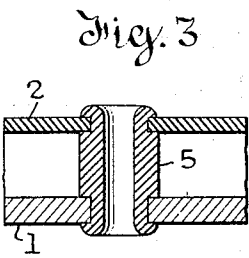
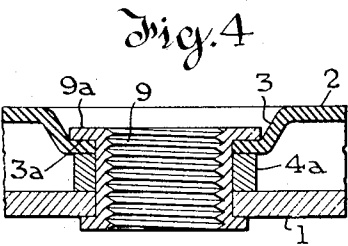
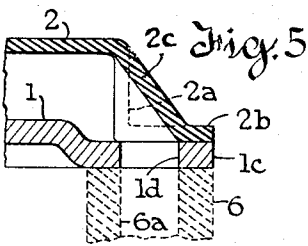
March 22, 1949.

R. G. OLSON

2,465,260

CYLINDER HEAD CONSTRUCTION FOR WATER COOLING

Filed Sept. 6, 1944



Inventor
Raymond G. Olson
Ralph B. Stewart
Attorney

UNITED STATES PATENT OFFICE

2,465,260

CYLINDER HEAD CONSTRUCTION FOR
WATER COOLING

Raymond G. Olson, Chevy Chase, Md.

Application September 6, 1944, Serial No. 552,889

8 Claims. (Cl. 123-173)

1

This invention relates to cylinder head constructions for internal combustion engines. In particular, it is concerned with a fabricated cylinder head construction embodying a water jacket and having all of the walls thereof formed entirely of pressed sheet-metal.

General objects of my invention are to construct a cylinder head of light weight but adequate strength; to devise a construction having improved cooling efficiency; and to devise a construction which may be manufactured easily and in large numbers at low cost.

Other objects are to devise a cylinder head construction embodying a water jacket, the walls of which are formed of only two parts which are pressed from sheet-metal; to devise a cylinder head construction which is devoid of cast metal and is made entirely of metal which has been rolled, wrought, or forged; to provide a novel construction at the places where the spark plugs are located; to provide a novel construction in places where the cylinder head is bolted to the cylinder block; and to provide a novel construction of water passages from the cylinder head to the water jacket around the cylinders.

The preferred form of my invention and certain variations thereof are illustrated in the accompanying drawing in which

Figure 1 is a perspective view of a portion of a cylinder head for a multiple cylinder engine, the construction being shown in section along a vertical plane passing transversely through one of the spark plug holes;

Figure 2 is a fragmentary sectional view of Figure 1 taken in a vertical plane along the line 2-2;

Figure 3 illustrates a modified construction of the arrangement shown in Figure 2;

Figure 4 illustrates a modified construction at the spark plug opening; and

Figure 5 is a fragmentary sectional view of Figure 1 taken in a vertical plane along the line 5-5.

Referring to the drawing, the cylinder head is constructed principally of two parts 1 and 2 both of which are formed from pressed sheet-metal, preferably rolled steel. The lower part 1 is formed from a plate of heavier gauge material than the other part 2 and is stamped or shaped to include the combustion chambers 1a and 1b which are located above the cylinders. Except for the combustion chamber recesses, the part 1 is otherwise flat, and it has a flat marginal portion 1c extending entirely around the construction. The upper part 2 is also formed from a flat plate, and its general shape is that of

2

an inverted tray having a flat bottom wall, a vertical wall 2a and a flat marginal flange 2b extending entirely around the structure and resting on the marginal portion 1c of the plate 1. The plate 2 is also provided with recesses or depressions 3 located at the spark plug positions, and preferably these depressions are formed with flat annular bottom portions 3a surrounding an integral sleeve portion 3b which is threaded to receive the spark plug, the lower end of the sleeve extending through a hole formed in plate 1 and being turned over against the lower face of this plate as shown at 3c. A spacing washer or ring 4 is positioned to surround the sleeve 3b and is interposed between the annular bottom 3a and the top side of plate 1. Sleeves 3b serve to clamp plates 1 and 2 together at the spark plug positions.

At points lying between adjacent combustion chambers, the plates 1 and 2 are provided with aligned holes which receive the reduced ends of sleeves 5 through which suitable bolts may pass for the purpose of clamping the cylinder head to the cylinder block. Similar arrangements may be provided at each end of the cylinder head. By this construction, the sleeves 5 receive the entire clamping force of the bolts and there is no tendency to distort or crush the water jacket construction embodied in the cylinder head.

The flat horizontal marginal flange 2b of the upper part 2 extends entirely around the head construction except that at suitable points indicated at 2c and 2c' the vertical wall 2a and the flange 2b are formed into a passageway which extends over an opening 1d formed in the marginal portion 1c of plate 1. This construction provides a passageway from the water space in the cylinder head to the space in the water jacket surrounding the cylinders in the cylinder block. This arrangement is clearly illustrated in Figure 5 where it will be seen that the marginal portion 1c of the plate 1 is seated on the upper face of the cylinder block 6 and the opening 1d is an alignment with a passage 6a leading to or forming part of the water space of the cooling jacket surrounding the cylinders in the cylinder block. A suitable opening will be provided in the central portion of plate 2, preferably at one end, to which a suitable water connection may be made.

In forming my improved cylinder head construction, the parts 1 and 2 are first stamped into proper shape, including the formation of the various depressions, recesses and apertures in the two plates. In assembling the parts, they

3

may be assembled in normal position with plate 1 on the bottom or in inverted position with plate 2 on the bottom. In either case, ring 4 is provided around each spark plug opening and a spacer sleeve 5 is provided for each bolt hole. Also, before parts 1 and 2 are brought together, copper wire, or copper in any other suitable form, is arranged along each joint where two parts come into contact, and this is for the purpose of brazing the two parts together at the joint. For example, for the joint between the two flanges 1c and 2b, the copper wire may be arranged as shown at 7 in Figure 1, and for brazing the joints between spacer sleeve 5 and the parts 1 and 2, rings of copper wire may be arranged around the sleeve as shown at 7a and 7b in Figure 2. It will be understood that all joints which might allow leakage for either water or gas are to be brazed. After the parts are assembled, parts 1 and 2 are secured together temporarily by spot welding the flange 2b to the flange 1c at various points such as those indicated by the mark + in Figure 1. The lower ends of spark plug sleeves 3b may be turned or rolled over as shown at 3c in Figure 1. After this, the assembled structure is placed in an oven and heated in an atmosphere of hydrogen to a temperature ranging from 2040° F. to 2200° F. and is maintained at this temperature sufficiently long to permit the melting of the copper which then flows into the adjacent joints and forms a fluid-tight seal at each joint. After the brazed structure has been allowed to cool, it may then be machined into finished form by threading of sleeves 3b.

Figure 3 shows a modified arrangement of spacer sleeve 5. In this construction the reduced ends of the sleeve extend beyond the plates 1 and 2 and are turned over to form clamping beads as shown. It will be understood that the lower bead must not extend beyond the lower face of plate 1 by a distance greater than the thickness of the gasket to be inserted between the cylinder head and the cylinder block.

Figure 4 shows an alternative construction at the spark plug opening. In this arrangement a separate internally threaded sleeve 9 is provided for receiving the spark plugs, the upper end of the sleeve being turned over at 9a and bearing against the annular bottom wall 3a of the recess 3, and the lower end of the sleeve being turned over against the underface of plate 1. Also, the spacer ring 4a may be formed as a separate sleeve or an integral extension of the walls of the recess 3 formed in plate 2. It will be obvious that other variations are possible within the scope of my invention.

From the foregoing description it will be seen that my cylinder head construction is simple and rugged, and may be manufactured in quantity at low cost. The lower plate 1 is formed of sheet steel of sufficient thickness to withstand the explosion pressures developed in the cylinders and exerted against the combustion chambers formed in this plate. The upper plate 2 is preferably formed of relatively thin sheet-metal to provide efficient heat radiation from the water jacket. It will also be seen that the two flat marginal portions of plates 1 and 2 are arranged in contact and, when brazed in the manner described, form a water-tight joint between the two plates and constitute an integral flange surrounding the water jacket embodied in the head construction.

The lower face of this flange forms the seating surface for the head when it is bolted to the

4

cylinder block as shown in Figure 5. The bolt holes 8 are formed in this flange and are positioned entirely outside of the jacket space of the head.

I claim:

1. In a cylinder head construction, a lower plate member formed of pressed sheet-metal and having a flat marginal portion, an upper plate formed of pressed sheet-metal and having an outwardly extending flat marginal portion arranged in contact with the marginal portion of the lower plate and having the central portion thereof recessed to provide a water jacket between said plates, said marginal portions being joined together to provide a fluid-tight joint between said plates and forming an integral flange surrounding and extending outwardly from said jacket, and said flange being provided with spaced holes for bolting said head to a cylinder block, and the lower face of said flange constituting a seating surface for said head.

2. A cylinder head construction according to claim 1 in which the marginal portion of the lower plate is provided with an aperture positioned to communicate with the water jacket in the cylinder block, and the recessed part of the upper plate is extended over said aperture to provide a water passage from said aperture to the jacket space within said head construction.

3. In a cylinder head construction for a multi-cylinder engine, a lower pressed sheet-metal plate having a plurality of combustion chambers formed therein and having a flat marginal portion surrounding said chambers, an upper pressed sheet-metal plate having an outwardly extending flat marginal portion arranged in contact with the marginal portion of said lower plate and having the central portion thereof recessed to provide a water jacket above said combustion chambers, said plates being provided with aligned bolt holes at points between adjacent combustion chambers, and spacer sleeves located between said plates and surrounding said holes, said sleeves having an enlarged central portion serving to space said plates and reduced end portions extending through said holes, whereby said sleeves receive the pressure of the clamping bolts.

4. In a cylinder head construction, a pair of spaced plates forming the upper and lower walls of a cooling jacket, said plates having vertically aligned holes, spacer means arranged coaxially with said holes and serving to maintain said plates in predetermined spaced relation, and means for clamping said plates together at said aligned holes comprising a sleeve mounted within said spacing means, said clamping sleeve being threaded to form a support for a spark plug.

5. A cylinder head construction according to claim 4 wherein said clamping sleeve is formed integrally with one of said plates and the free end thereof extends through the hole formed in the other plate and is turned over against the outer surface of said other plate.

6. A cylinder head construction according to claim 4 wherein said spacer means comprises a sleeve formed integrally with one of said plates and abuts against the inner surface of the other plate.

7. In a cylinder head construction for a multi-cylinder engine, a lower pressed sheet-metal plate having a plurality of combustion chambers formed therein and having a flat marginal portion surrounding said chambers, an upper pressed sheet-metal plate having a flat marginal portion arranged in contact with the marginal portion

5

of said lower plate and having the central portion thereof recessed to provide a water jacket above said combustion chambers, said marginal portions being joined together to provide a fluid-tight joint between said plates and forming an integral flange surrounding said jacket, said lower plate being provided with an aperture in the marginal portion thereof positioned to communicate with the water jacket in the cylinder block, and the recessed part of the upper plate being extended over said aperture to provide a water passage from said aperture to the jacket space within said head construction, said lower plate being provided with a spark plug aperture in each combustion chamber, and said upper plate having integrally formed, internally threaded sleeves extending into said spark plug apertures and having the ends thereof turned over against the underface of said lower plate.

8. In a cylinder head construction, upper and lower plates each having a flat outwardly extending marginal portion of substantially the same area and configuration, and at least one plate having the central portion thereof shaped to provide jacket space between said plates when said marginal portions are arranged in superposed relation, and said marginal portions being brazed

6

together to provide a fluid-tight joint between said plates and forming an integral flange surrounding and extending outwardly from said jacket, the lower face of said flange constituting a seating surface for said head and being adapted to be bolted to a cylinder block.

RAYMOND G. OLSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,241,024	Ross	Sept. 25, 1917
1,270,044	Murray	June 18, 1918
1,647,848	Woolson	Nov. 1, 1927
1,720,711	Angle	July 16, 1929
2,113,629	Rabazzana	Apr. 12, 1938

FOREIGN PATENTS

Number	Country	Date
281,106	Great Britain	1927
281,484	Great Britain	1927
636,678	France	1928
794,336	France	1935