

July 12, 1932.

M. J. B. BARBAROU

1,866,873

INTERNAL COMBUSTION ENGINE

Filed Dec. 21, 1929

2 Sheets-Sheet 1

Fig. 1

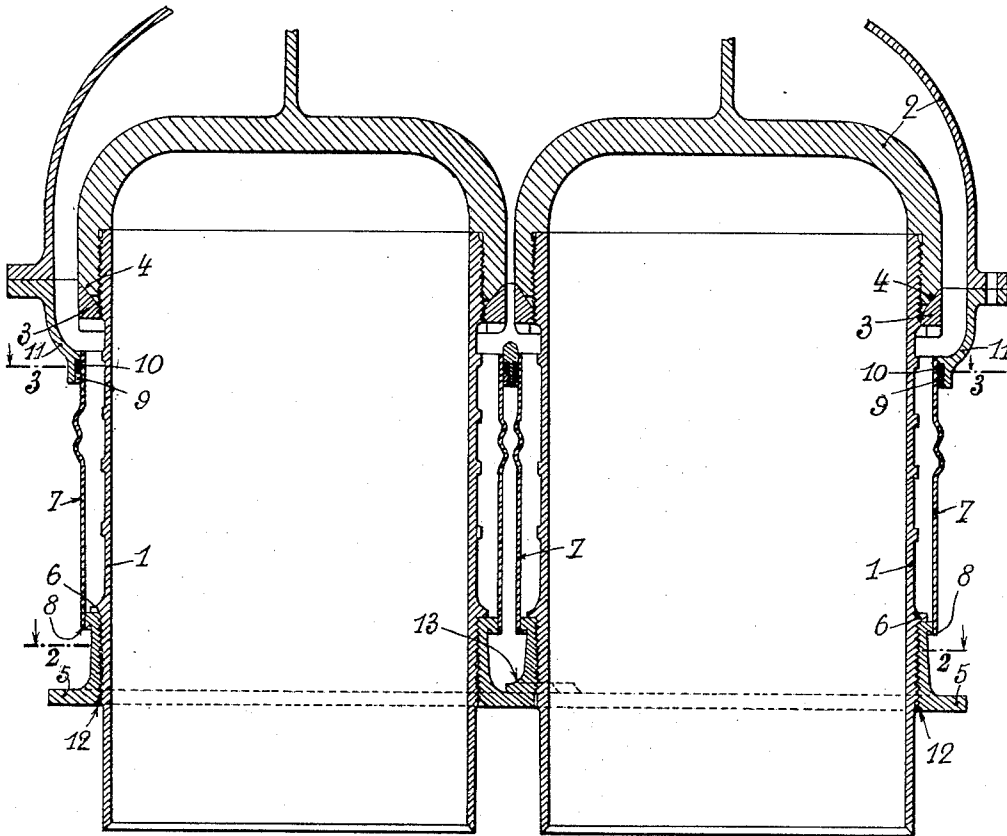
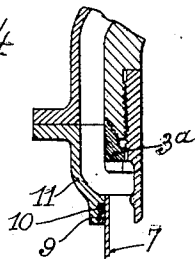


Fig. 4



Marius Jean-Baptiste Barbarou

INVENTOR:

By *Attorney*
his Attorney.

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Fig. 2

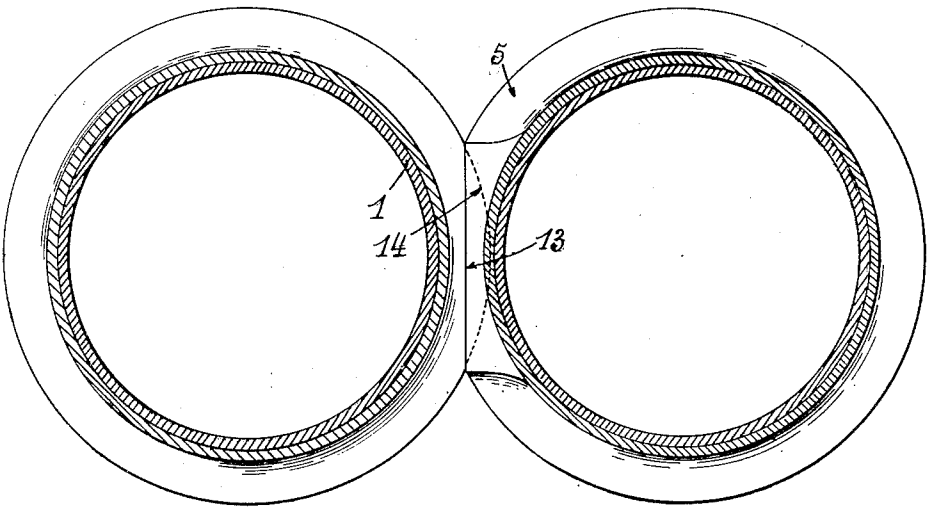
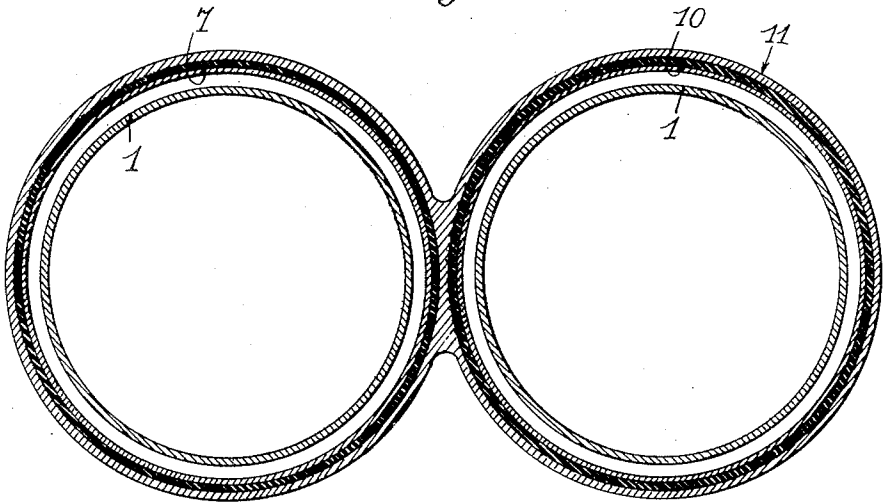


Fig. 3



Marius Jean-Baptiste Barbarou

INVENTOR,

By *Chas. H. Hunk*
his Attorney.

UNITED STATES PATENT OFFICE

MARIUS JEAN-BAPTISTE BARBAROU, OF PARIS, FRANCE

INTERNAL COMBUSTION ENGINE

Application filed December 21, 1929, Serial No. 415,768, and in France February 2, 1929.

The present invention relates to improvements in internal combustion engines or the like, and more particularly to internal combustion engines whose cylinders are made in two parts, that is a cylinder proper or barrel made of steel, and a cylinder head made of a light metal such as aluminium, duralumin, etc.

The invention has for its object to secure a strong connection between the cylinder and cylinder head and a light and inexpensive construction of the cooling jackets.

An important feature of the engine according to the invention resides in that each cylinder, which is screwed in a known manner into its cylinder head, is maintained therein by a lock-nut or threaded ring screwed on the cylinder or cylinder head and having a tapered or like fit upon said cylinder head, or cylinder, respectively, said ring being made of a metal having the same coefficient of expansion as the cylinder proper.

According to another feature of the invention, the outer wall of the jacket of each cylinder is formed into several parts adapted for a ready mounting and inexpensive construction.

Other features of the invention will be specified in the following description. In the accompanying drawings, which is given solely by way of example:

Fig. 1 is a vertical section of a pair of adjacent cylinders of an engine according to the invention.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a sectional detail view of Fig. 2, showing a modified construction.

In the construction herein represented, 1 denotes the cylinders, and 2 the cylinder head made of a light metal or alloy, such as aluminium or duralumin. The cylinders 1 are screwed into said cylinder head in the known manner, the latter being preliminarily heated, whereby the metal of the cylinder head fits under tension upon the cylinder, thus providing a more or less tight joint between the cylinder and cylinder head, preventing the exit of gas from the cylinder. According to the invention, the connection is strengthened by

a lock nut or threaded ring 3 screwed upon the cylinder and in contact with the cylinder head upon a tapered surface of contact 4 for example. The ring 3 is made of a metal having the same coefficient of expansion as the metal of the cylinder 1, and, hence, a smaller expansion than the cylinder head. Hence, when the engine is running, the joint between the cylinder and the cylinder head will remain properly fluid tight, since the cylinder head is prevented from freely expanding by said ring 3.

In order to secure the cylinders to the crank-case, each cylinder is provided with a flanged nut 5 which is screwed to the cylinder 1 and engages a shoulder 6 formed upon the outer wall thereof. To nut 5 is secured the cooling jacket for the engine. Said jacket comprises a slightly corrugated sheet metal envelope 7, soldered or welded to nut 5, as shown at 8. Said envelope 7 is provided at the top with a flange 9, secured thereto by soldering or welding, and which engages a rubber ring or like packing member 10 disposed in a groove (Fig. 4) formed in a member 11 attached to the cylinder head 2. The position of flange 9 upon the envelope 7 is so determined that the joint will be tightened by the pressure of the yielding envelope 7; hence the thermal expansion will be taken up by the elasticity of said envelope.

The mounting of a single cylinder is effected in the following manner:

The cylinder 1 is screwed into the cylinder head, and clamped by ring 3. Member 11 is then bolted to the cylinder head. The envelope 7, provided with its flange 9, is secured to nut 5, and the latter is screwed to the body 1 until it engages shoulder 6, whereupon the packing member 10 is compressed; as the rubber is practically incompressible, the elasticity of the envelope 7 will take up the pressure. If need be, nut 5 may be soldered or welded to the cylinder 1, as shown at 12, to strengthen the assembly.

In the case of two adjacent cylinders, as shown in the drawings, the nut 5 of the cylinder which is first to be mounted, is provided with a thicker part 13, recessed at 14 to allow

the nut 5 of the second cylinder to be screwed in place.

In this construction the envelope of the jacket for the circulation of the cooling fluid, may consist of thin sheet metal which is still lighter than a cast aluminium envelope (necessarily thicker); moreover the construction of complicated castings is hereby eliminated, the apparatus is altogether leakless.

In the construction shown in Fig. 4, the threaded ring 3^a has a tapered screw thread, coacting with the tapered lower part of the cylinder head, and a tapered smooth surface coacting with a tapered shoulder of the cylinder; as before, the arrangement is made leakless by the fact that the ring, when in operation, has a less expansion than the cylinder head.

Obviously, the invention is not limited to the form of construction herein described by way of example, and the construction indicated for two cylinders can be employed for engines comprising a greater number of cylinders.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. In an internal combustion engine, a cylinder head, a cylinder screwed therein and a locking member screwed on one of these parts and having smooth parts engaging the other part, said member surrounding portions of both said cylinder and said cylinder head and having a smaller coefficient of expansion than said cylinder head.

2. In an internal combustion engine, a cylinder head, an intermediate member detachably secured to said cylinder head, a cylinder fastened to said cylinder head, an axially yielding jacket, means for securing one end of the latter to the cylinder, and packing means between the opposite end of said jacket and said intermediate member, so arranged as to be tightened between the latter and said jacket by the elastic pressure of said jacket.

3. An internal combustion engine as claimed in claim 2, wherein, said jacket consists of an undulated sheet metal cylinder.

4. An internal combustion engine as claimed in claim 2, wherein said securing means consist of a flanged member whose flange is adapted to be attached to the crankcase, said member being screwed on said cylinder and secured to said jacket and being adapted to engage a shoulder on said cylinder.

5. In an internal combustion engine, a crankcase, a cylinder head, a plurality of cylinders screwed into said cylinder head, and flanged members respectively screwed on said cylinders and adapted for connection with the crankcase, some of said flanged members having a lateral thicker portion formed with a recess adapted to be engaged

by the marginal portion of an adjacent flanged member.

In testimony whereof I have signed my name to this specification.

MARIUS JEAN-BAPTISTE BARBAROU.