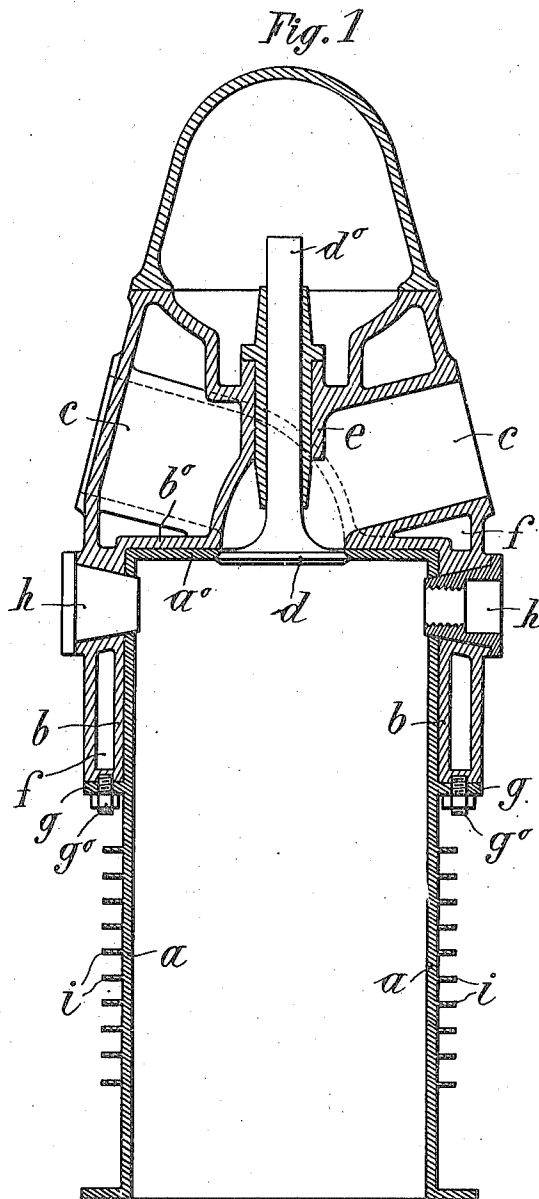


M. BIRKIGT.
CYLINDER, PARTICULARLY FOR EXPLOSION ENGINES.
APPLICATION FILED JUNE 21, 1915.

1,233,964.

Patented July 17, 1917.
3 SHEETS—SHEET 1.



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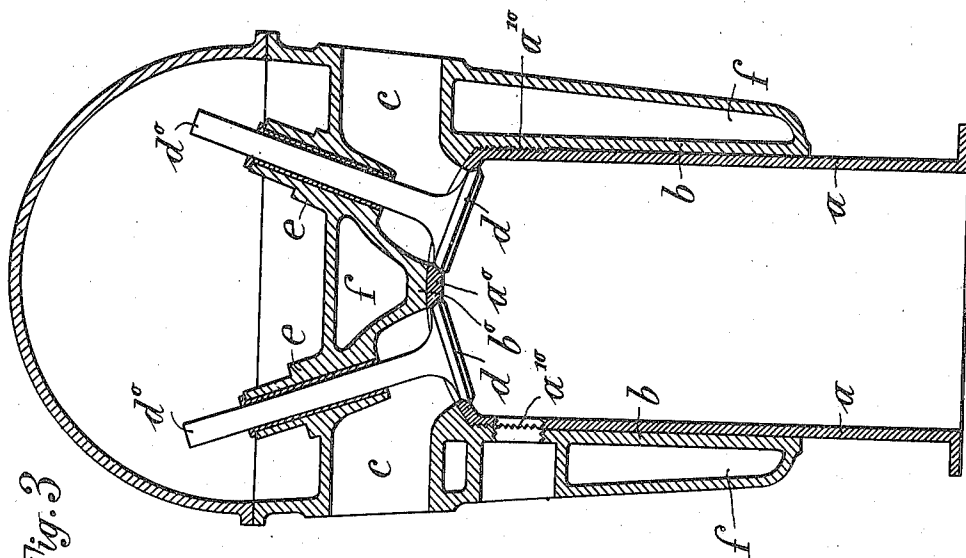


Fig. 3

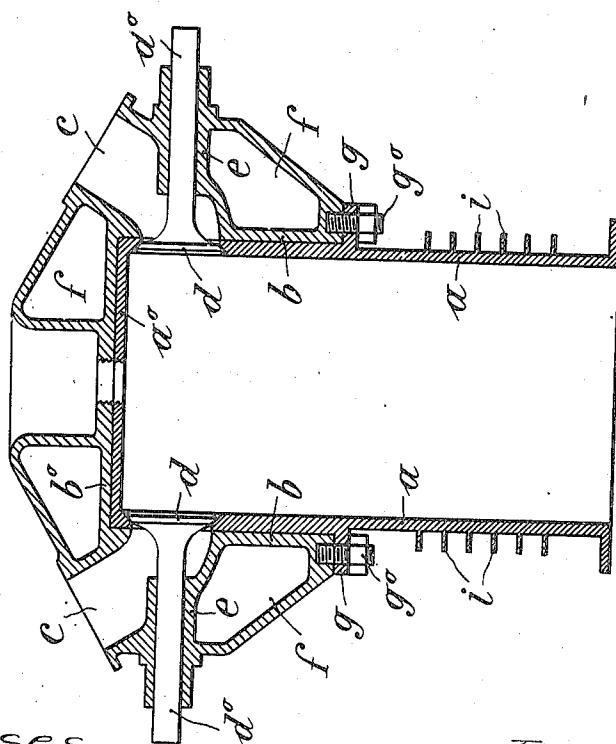


Fig. 2

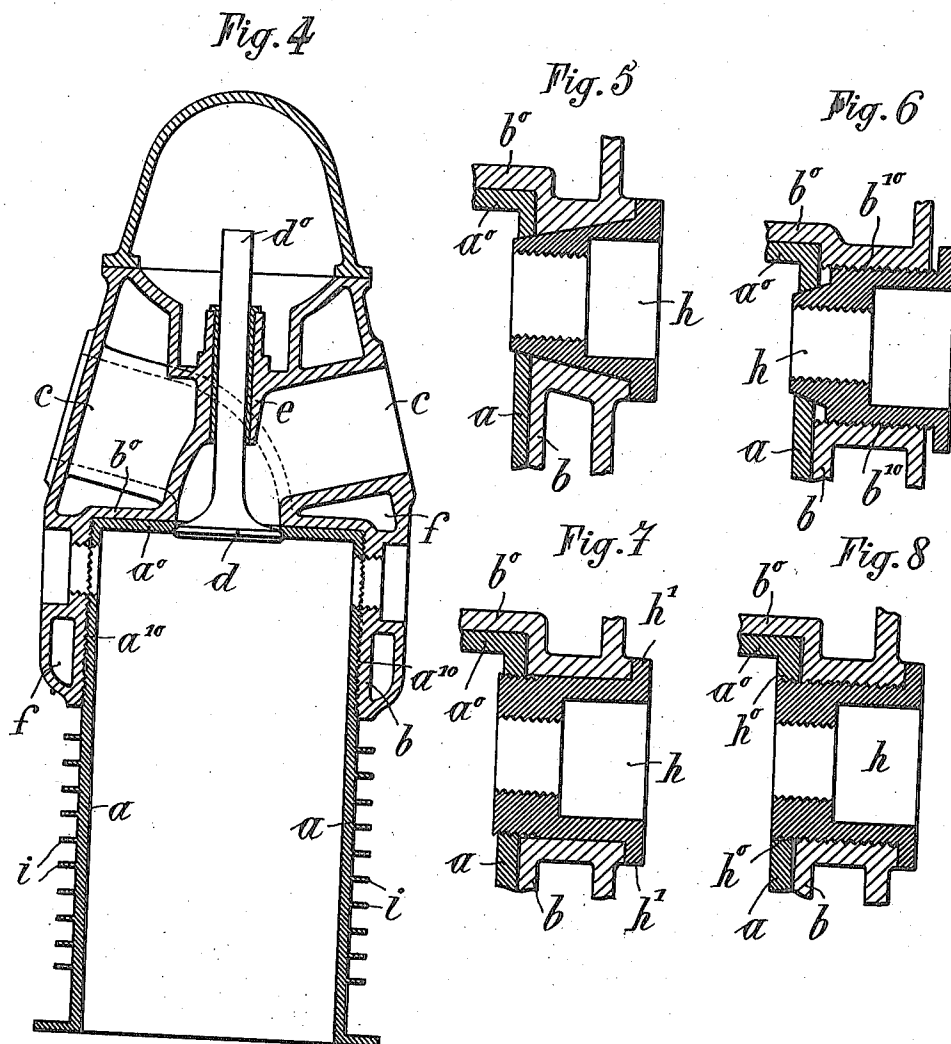
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UNITED STATES PATENT OFFICE.

MARC BIRKIGT, OF BOIS-COLOMBES, FRANCE.

CYLINDER, PARTICULARLY FOR EXPLOSION-ENGINES.

1,233,964.

Specification of Letters Patent.

Patented July 17, 1917.

Application filed June 21, 1915. Serial No. 35,332.

To all whom it may concern:

Be it known that I, MARC BIRKIGT, engineer, citizen of the Republic of Switzerland, residing at Bois-Colombes, Seine, France, have invented certain new and useful Improvements in Cylinders, Particularly for Explosion-Engines, of which the following is a specification.

This invention relates to cylinders, particularly for explosion engines and has for its object to make cylinders lighter but as strong as those of the same power hitherto designed.

The invention consists in providing cylinders with a separate jacket which is made so that it rests on the cover of the cylinder and surrounds the said cylinder, to which it is secured along the whole or part of its length. This jacket, while forming a tank for the cooling liquid, contains the valve gear and other accessory parts without their being exposed to the pressure obtaining in the cylinder.

The invention further comprises certain arrangements, more fully referred to hereinafter.

In the accompanying drawing given by way of example,

Figure 1 shows in vertical axial section an explosion engine cylinder;

Figs. 2 to 4 show respectively, also in axial vertical section, a second, third and fourth modified construction of explosion engine cylinders;

Figs. 5 to 8 show constructional details.

According to this invention there is made in the known manner a cylinder a of steel or any other strong metal, with a head a^0 in one piece, and either in the cylinder head a^0 or in the walls of the cylinder a , are provided seats suitable for receiving the suction and exhaust valves.

A casing or jacket b is constructed of a light metal, such as aluminium which, in addition to its light weight, has the advantage of being of great conductivity. The jacket rests with one of its faces b^0 on the head a^0 of the cylinder a , and surrounds the cylinder on the whole or a portion of its length.

The jacket comprises two conduits c terminating respectively at the seats of the suction and discharge valves d , and two bosses e which form respectively guides for the spindles a^0 of the suction and exhaust valves. The jacket b constitutes a tank f suitable for receiving the cooling liquid, for instance

water, and the said tank is preferably independent of the cylinder, so as to avoid any joint between the jacket and the cylinder, through which the water might leak.

The jacket b thus constructed is mounted so that its faces b^0 rest on the head a^0 of the cylinder a . In order to secure these two parts together, the jacket b is built so that it is a fit over the cylinder a and is secured to the said cylinder by means of pins g^0 as shown in Figs. 1 and 2 of the drawing; in which case the said cylinder is provided with a shoulder g ; or the jacket b is drawn over the cylinder a , and there is provided a screw thread a^{10} on the cylinder on which is screwed a corresponding thread provided in the jacket b , as shown in Fig. 3.

The screw thread a^{11} is cut in the whole or part of the length of the jacket, and it is shown screwed throughout in Fig. 4, this arrangement having the advantage of increasing the surface of conductivity and consequently of insuring better cooling as the screw threads increase the cooling surface; in the latter cases, the valve holes in the cylinder are preferably drilled after the jacket is put in place.

In the two parts, at the point where the said sparking plug is to be mounted and at right angle to the wall, is drilled a conical hole, the large base of which faces outward; the said hole, the surface of which is partly constituted by the metal of the cylinder, and partly by the metal of the casing or jacket, is ground, and in the cone thus ground, is mounted a part h intended to receive the sparking plug, for instance by means of a screw thread, as shown in Fig. 5. A tight joint is thus insured by the thorough contact of the socket, avoiding, in the portion of the cone made in the cylinder, any leakage of compressed gases, and insuring in the portion of the cone made in the jacket, a thorough contact assisting the cooling of the plug by conductivity.

In a modified form a conical hole is also formed and subsequently ground, but this hole is only provided in the wall of the cylinder a , while in the jacket b is drilled a cylindrical hole b^{10} of a diameter at least equal to the largest diameter of the conical hole made in the cylinder a , and subsequently tapped, the said cylindrical hole being made so that, as soon as the jacket b is put in place on the cylinder a , its axis coincides with the axis of the conical hole.

Into the tapped hole *b* is screwed a part *h* adapted to receive the plug and comprising a tapering part which engages with the conical hole as shown in Fig. 6 of the drawing. In this case the tight joint is insured by the thorough contact of the tapering portion of the part *h* with the walls of the conical hole provided in the wall of the cylinder, and the cooling of the plug is insured by contact of the screw threads.

In another modified form the jacket *b* is provided with a plain hole followed by a tapped hole of the same diameter which is made in the wall of the cylinder *a*, and a part *h* intended to receive the sparking plug is then made so as to enable it to be drawn into the hole of the jacket, and screwed with its screw threaded end into the tapped portion of the cylinder *a*. This part *h* has a shoulder *h*¹ which, when the part is in place, exercises a pressure on the inner wall of the jacket against the cylinder, as shown in Fig. 7 of the drawing. In this case, a tight joint is insured by the thorough contact between the wall of the casing and the cylinder.

According to another modification the cylindrical hole is tapped throughout so that the part *h* adapted to receive the plug, is screwed simultaneously into the jacket *b* and into the cylinder *a*, a packing *h*², for instance of red lead, insuring a tight joint with the screw thread, as shown in Fig. 8 of the drawing.

For the preparation of the conduits for the circulation of water in the jacket, is used a process consisting in enameling the walls in accordance with a patent application filed on the same date and by the same applicant.

Obviously the invention is not limited to those methods of carrying it out, which have been described, but comprises on the contrary, any modification within the scope of the claims. The engine may have a different kind of distributing mechanism from a valve gear, while the outer surface of the cylinders, which is not covered by the jacket, may be provided with ribs *i* adapted to increase the cooling surfaces.

I claim:—

1. In an internal combustion engine, the combination of a cylinder comprising a head and side walls formed as a unit and adapted to sustain within it the force of the explosions, the upper portion of the cylinder and head being of uniform cross-section, a jacket formed separately from the cylinder and having a recess of uniform cross-section to removably receive and closely fit the upper portion

of said cylinder and its head, said jacket forming a unit having a space for the cooling liquid which space is inclosed by the jacket independently of the walls of the cylinder, and controlling valves for the cylinder carried by said jacket.

2. In an internal combustion engine, the combination of a cylinder having a head and side walls of regular uniform cross-section, the cylinder and its head being adapted to sustain within it the force of the explosions, and a water jacket having a water space inclosed by the walls of the jacket, said jacket having a recess of regular uniform cross-section to removably receive and closely fit the head and side walls of the cylinder.

3. In an internal combustion engine, the combination of a cylinder having a head and side walls of uniform cross-section, and a water jacket composed of aluminum and having a recess of uniform cross-section to removably receive and closely fit the head and side walls of the cylinder.

4. In an internal combustion engine, the combination of a cylinder comprising a head and side walls, the upper portion of the cylinder and head being of regular uniform cross-section, the cylinder and its head being adapted to sustain within it the force of the explosions, a liquid cooling jacket formed separately from the cylinder and having a recess of regular uniform cross-section to closely and removably fit upon the head and side walls thereof, the cylinder having valve seats and controlling valves coöperative with the seats of the cylinder and carried and guided by said jacket.

5. In an internal combustion engine, the combination of a cylinder embodying a head and side walls, and a jacket for cooling liquid, said jacket having a cylindrical recess threaded onto the cylinder.

6. In an internal combustion engine, the combination of a cylinder having a head and side walls of uniform circular cross-section, and a water jacket having a water space inclosed by the jacket and having a cylindrical recess to receive and closely fit the head and side walls of the cylinder, the jacket also having valve-guiding and supporting means carried thereby.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MARC BIRKIGT.

Witnesses:

G. INGENAULL,
MATEO J. SRAN.