Nov. 20, 1928. 1,692,385

F. H. ROYCE

COOLING DEVICE FOR THE CYLINDERS OF INTERNAL COMBUSTION ENGINES

Filed July 31, 1926

Fig. 1.

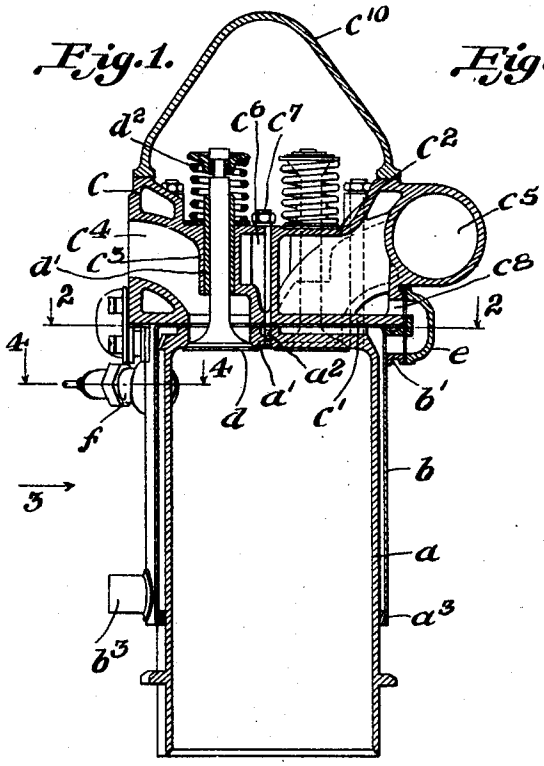


Fig. 3.

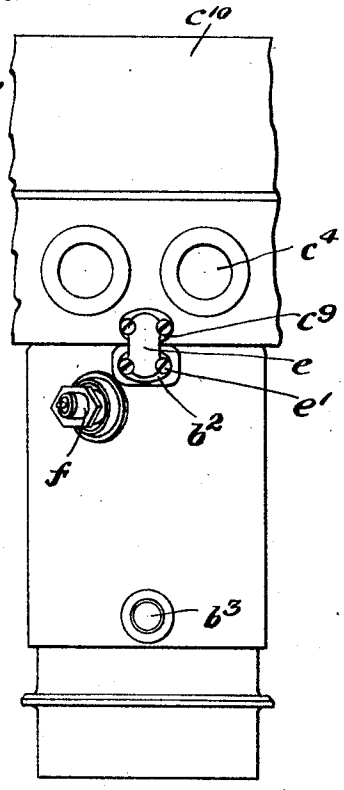


Fig. 2.

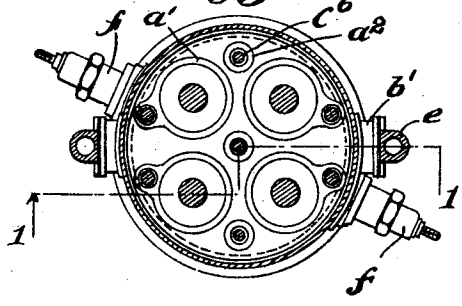
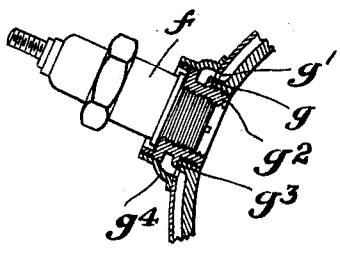


Fig. 4.



Inventor

Frederick H. Royce

By Mason Fenwick & Lawrence

Attorneys

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UNITED STATES PATENT OFFICE.

FREDERICK HENRY ROYCE, OF ELMSTEAD, WEST WITTERING, NEAR CHICHESTER, ENGLAND, ASSIGNOR TO ROLLS-ROYCE LIMITED, OF DERBY, ENGLAND.

COOLING DEVICE FOR THE CYLINDERS OF INTERNAL-COMBUSTION ENGINES.

Application filed July 31, 1926. Serial No. 126,283, and in Great Britain September 24, 1925.

This invention has reference to cooling jackets for the cylinders of internal combustion engines and has for its object better efficiency, more reliability, and greater facility of construction than are secured by some or all of the methods of construction heretofore in use.

The invention applies to cylinders with non-detachable heads, and with mushroom valves.

It is desirable that the water in the jacket shall be spread as far as possible over the whole area of the cylinder to be cooled and in particular shall extend as close as possible to the valve seats, and that without causing any undue lengthening of the valve stems.

According to this invention the cylinders are constructed with short outwardly extending nozzles around the orifices in the cylinder head, (preferably limited to the valve orifices) of the depth of the jacket, the jacket is constructed of steel or copper, with corresponding openings, the outer faces of the nozzles and the stud bosses formed on the cylinder and corresponding surfaces on the inside of the jackets are tinned, and the contiguous surfaces are sweated together under pressure, and a flat surface is left on the jacket for making the necessary gas joints when the cylinders are bolted to the overhead casting carrying the bends. The skirt of the jacket is by preference welded to a flange formed on the cylinder in well known manner.

Preferably the waterway between the cylinder jacket and the water cooling passages of the valve casing is not made through the joint but is made by means of an external U shaped tube or conduit connecting orifices in the said two jackets.

The sparking plug is preferably located in the side of the cylinder, and the joint between the jacket and the plug hole is preferably made by an annular suitably shaped steel pressing, which is welded or otherwise secured to and around the plug hole and to and around the orifice in the jacket. The supply connection is formed in the usual way.

An example of this invention is illustrated in the accompanying drawings.

Fig. 1 is a section of the cylinder on line 1—1 of Fig. 2 the camshaft and valve operating mechanism being omitted. Fig. 2 is a sectional plan view on line 2—2 of Fig. 1 i. e. through the sweated joint between jacket and cylinder head, Fig. 3 is an external elevation of the cylinder viewed in the direction of arrow 3, and Fig. 4 is an enlarged section of the sparking plug nozzle on line 4—4 of Fig. 1, the plug itself being in elevation.

a is a cylinder, the barrel of which is machined from a steel forging, a^1 are upstanding flanges around the valve orifices, (four in number) formed in the head of the cylinder a^2 are upstanding bosses constituting extensions of the screwed stud holes and a^3 are flanges on the cylinder a to which the lower end of the water jacket is welded. The faces of the orifices a^1 and bosses a^2 are tinned. b is the water jacket made of pressed steel. The interior surface of the end of the jacket where contiguous with the faces of the flanges and bosses are also tinned and the tinned surface of the jacket and that of the surfaces of the faces of the orifices a^1 and of the bosses a^2 are sweated together under pressure. b^1 is a nozzle welded to the jacket b for purposes hereinafter described with an oval flange b^2 round the edge of its orifice for the purpose hereinafter described. b^3 is a nozzle also welded to the jacket to form the water inlet, through which water is pumped, the water issuing from a nozzle (not shown) in the casting hereinafter referred to. c is the valve gear casing made of aluminium, constituted generally by two plates, the bottom plate c^1 being flat and the upper plate c^2 being trough shaped, and having side walls with holes therethrough for the inlets and outlets, and comprising in one casting the valve guide supports c^3, the bends c^4 and induction pipe c^5. The casing c is secured to the cylinder head by studs c^6 and nuts c^7. c^8 is an opening having an oval facing c^9 for the purposes hereinafter described, and c^{10} is the cover of the casing. One such casting may serve any number of cylinders as convenient. d are the valves, d^1 valve guides and d^2 the valve springs. e is a U pipe or connection uniting the holes or orifices b^1 and c^8 and connecting the interior of the water jacket and of the casting, formed with flanges which seat on the flanges b^2 and facing c^9 and is secured thereto by screws e^1.

Two ignition plugs f are provided, g are upstanding internally threaded orifices formed on the cylinders, passing through orifices g^1 in the jacket, g^2 is a hollow externally and internally threaded plug con-

stituting the sparking plug socket, having a shoulder g^3, which is screwed into the upstanding orifice g, its shoulder g^3 seating on the face of the upstanding orifice g, and g^4 is an annular member which after the said plug has been screwed in, is welded to the jacket and to the plug there being a cavity for the cooling water all around the hollow plug g^2.

With the arrangement of parts as above described the cooling water is brought close to and surrounds the sparking plug hole and the valve orifices, the length of the valve stems is kept as short as possible, the leaking of any of the joints of the water jacket is rendered practically impossible, facility of construction is attained, and the whole arrangement is generally more efficient than arrangements heretofore in vogue.

What I claim is:—

1. In a water cooled internal combustion engine, a cylinder, a water jacket enveloping and spaced from the top and sides of said cylinder and having its lowered ends secured with water tight fit to said sides, the top of said cylinder and jacket being provided with valve and bolt receiving bossed apertures having their bosses extending in watertight fit against the top of said jacket, a valve casing seated on the top of said jacket and detachably fixed to said cylinder and having cooling passages therein, and means providing a passageway for cooling liquid between said jacket and the passages in said casing, and a spark plug socket extending into said cylinders and secured to the water jacket and cylinder with a water passage from said jacket around said socket.

2. In a water cooled internal combustion engine, a cylinder having a closed top provided with valve apertures and seats, a valve casing detachably secured to said top, and a water jacket enveloping said cylinder and extending over said top between said head and casing.

3. In a water cooled internal combustion engine, a cylinder having a closed top provided with valve apertures and seats, a casing detachably secured to said top and having water circulating passages therein, a water jacket extending across said top between said casing and top and around said cylinder, and a conduit connecting said jacket to the passages in said valve casing.

4. The combination with the device set forth in claim 3, of a spark plug socket extending through the said jacket into said cylinder, and means for fixing said socket to said jacket and cylinder and providing a water passage around said socket.

In witness whereof I have signed this specification.

FREDERICK HENRY ROYCE.