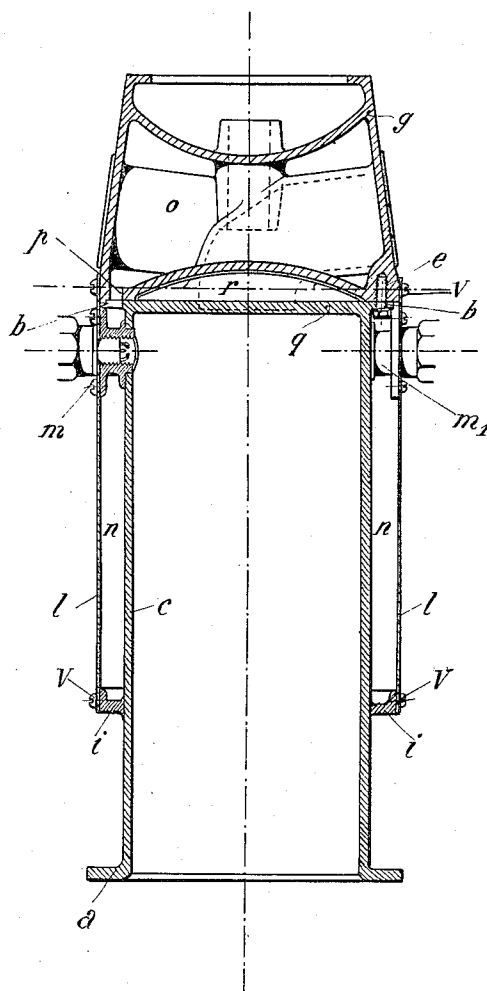


G. CATTANEO.
CYLINDER OF INTERNAL COMBUSTION ENGINES.
APPLICATION FILED APR. 27, 1918.

1,416,170.

Patented May 16, 1922.
4 SHEETS—SHEET 1.

Fig. 1



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Fig. 2

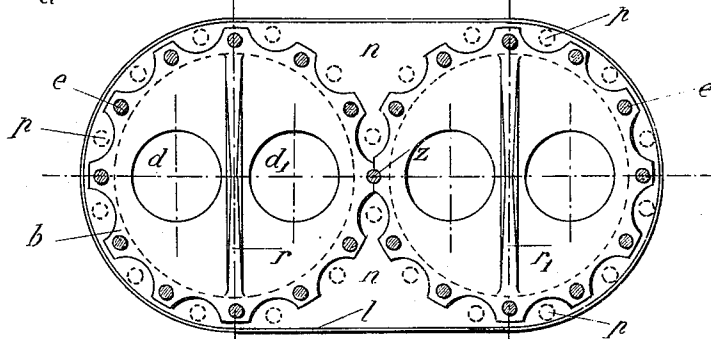
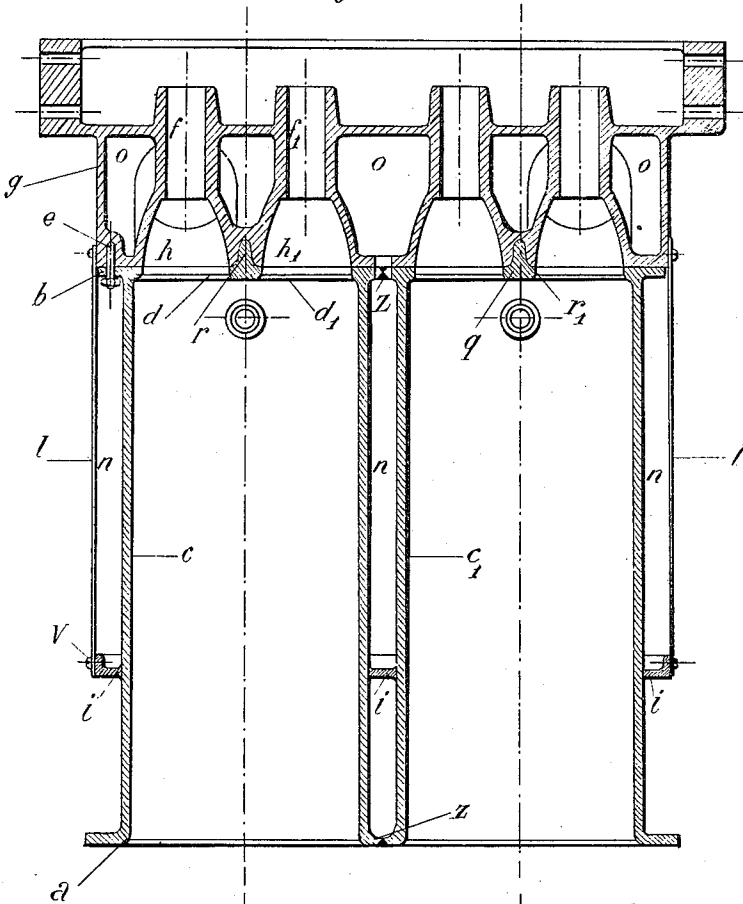


Fig. 3

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4 SHEETS—SHEET 3.

Fig. 4

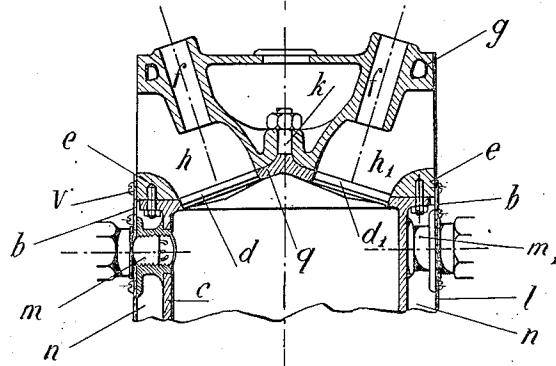
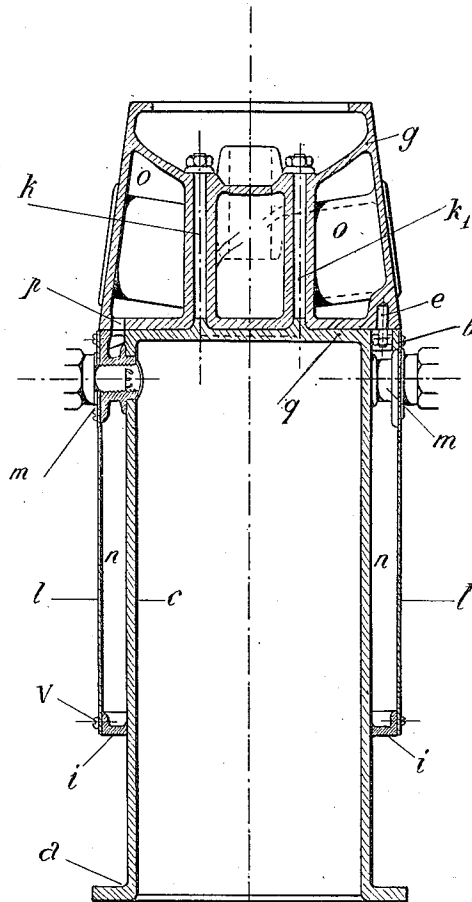


Fig. 7

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4 SHEETS—SHEET 4.

Fig. 5

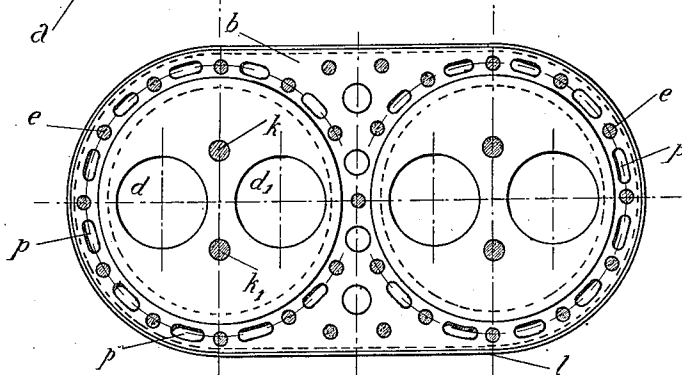
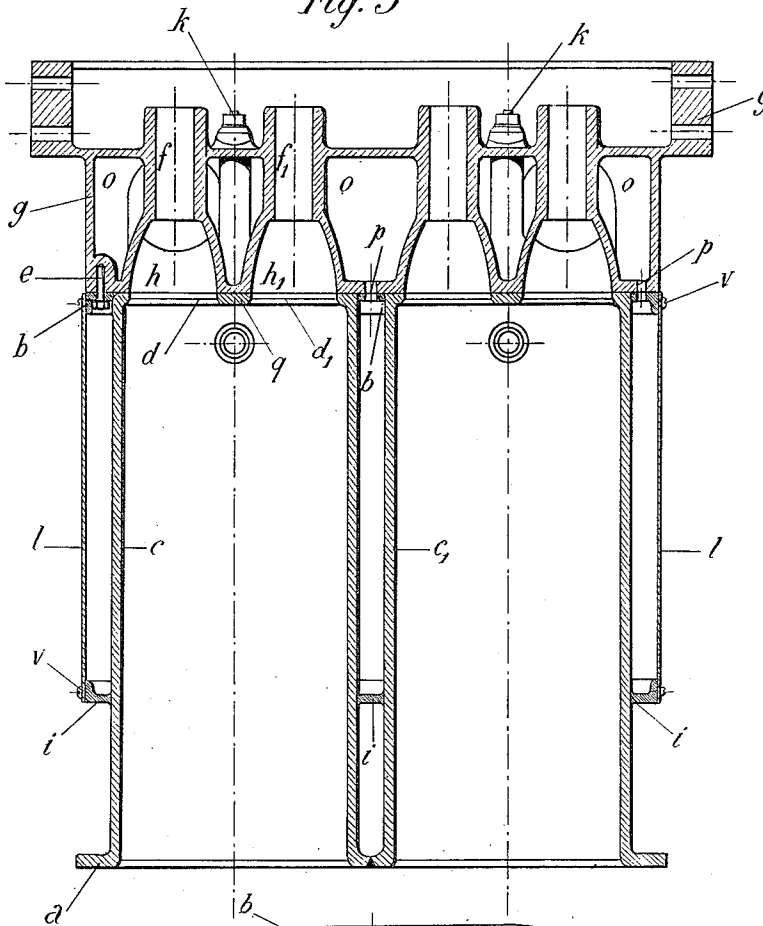


Fig. 6

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UNITED STATES PATENT OFFICE.

GIUSTINO CATTANEO, OF MILAN, ITALY.

CYLINDER OF INTERNAL-COMBUSTION ENGINES.

1,416,170.

Specification of Letters Patent.

Patented May 16, 1922.

Application filed April 27, 1918. Serial No. 231,284.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, GIUSTINO CATTANEO, employe, a subject of the King of Italy, resident of Milan in the Kingdom of Italy, No. 79 Via Monte Rosa, have invented new and useful Improvements in the Cylinders of Internal-Combustion Engines, (for which I have filed an application in Italy April 18, 1917, Patent No. 159,484, May, 1917,) of which the following is a specification.

The present invention relates to cylinders for internal combustion engines and has for its principal object to provide the cylinder or cylinders of such engines with water jackets which will be both light and strong, and which, furthermore, may be readily assembled therewith and detached therefrom for purposes of inspection and repair.

It is well known that water jackets cast in one piece with the cylinders or made integral therewith are necessarily much heavier than required by the function they have to perform, owing to practical difficulties in casting bodies having walls which differ considerably in thickness. It has therefore been proposed to use separate steel or aluminum jackets which were united to the cylinders by welding. In addition to the fact that the welding was often expensive and difficult to perform, these jackets were thus permanently secured to the cylinders. Now, I have found that considerable advantages are obtained by detachably securing water jackets of sheet metal to the cylinder walls, locating the valve seats in the end walls of the cylinders, and detachably securing the cylinder heads to such end walls, and my present invention contemplates the provision of single and multi-cylinder structures with these features incorporated therein.

Referring to the accompanying drawings which illustrate, by way of example, several embodiments of my invention:—

Figs. 1, 2, 3 are diagrammatic illustrations, in cross and longitudinal section and plan respectively, of a set of cylinders the superstructure of which is removed; Figs. 4, 5 and 6 are similar sections and plan of a modified construction and Fig. 7 shows a further modified construction of a cylinder head.

With reference to Fig. 1, 2 and 3 the cyl-

inders proper —*c-c'*—, are closed at the top by the end walls —*q*— which form the explosion chambers and in which are contained the seats —*d-d'*— for the inlet and exhaust valves. At the lower end a flange —*a*— is fitted to the cylinders and serves to secure the cylinders to the crank case; at the top a further flange —*b*— is provided forming an extension of the upper surface of the cylinder end. The water jacket round the cylinder is closed at the bottom by a plate —*i*— encircling the two cylinders to which it is welded by the autogenous process.

Further, the two cylinders are welded together by the same process at the points —*z*— where the respective flanges —*b*— and —*a*— meet together, so that they form a single block.

On the surface formed by the top flanges —*b*— and cylinder bottom —*q*— rests the cylinder head —*g*— which is an aluminium casting which serves as guide at —*f-f'*— for the inlet and exhaust valves, and as inlet and exhaust chambers for said valves at —*h-h'*—. The cylinder head supports the cam shaft controlling the inlet and exhaust valves and closes at —*o*— the water jacket for cooling the cylinder end and the valve box; the cylinder head has no parts in common with the explosion chamber, the latter being formed only by the cylinders.

The cylinder head is secured to the cylinders by a set of bolts —*e*— so as to form a rigid whole and to ensure the perfect tightness of the two adjacent surfaces.

The outer shell —*l*— of the water jacket consists of sheet steel or other metal, the top end of which is secured to the outer surface of the cylinder head —*g*—, and the bottom end of the flange of the plate —*i*—, said connections are secured by means of screws, the joints being suitably packed. The resulting water jacket —*n*— surrounding the cylinder is perfectly air-tight and has no communication whatever with the explosion chamber. The connection between the cylinder jacket —*n*— and the head jacket —*o*— is made through a set of ports —*p*—, which may be so distributed round the cylinder end as to ensure a more active water circulation where the parts are more liable to be heated.

The studs $m-m'$ for the spark plugs are fixed to the cylinder in any suitable manner, and the air-tightness of the water jacket can be obtained by means either of a blocking nut or of a set of screws with suitable packing as shown in Fig. 1.

Figs. 4, 5, 6 show a similar arrangement; here however the upper flange b of the cylinders is welded on to the cylinders by the autogenous process just like the bottom plate i of the water jacket. The jacket shell l is fixed to the flanges i and b independently from the cylinder head either by screwing or welding. The bolts e in this case, beside securing g to the cylinder and ensuring a tight joint between the two connecting surfaces, and therewith also between the water jackets n and o , must ensure also the air-tightness of n .

In order to prevent the cylinder ends being deformed by the pressure exerted thereon by the explosion reinforcing ribs r (Figs. 1, 2, 3) may be provided on the said ends, or the ends may be strengthened by providing a stronger connection of the same with the cylinder head through dowel pins $k-k'$ as shown in Figs. 6 and 7.

The bottom of the cylinder instead of flat shape can be conical or ball shaped, as for instance when the axis of the valve spindles is not parallel to the cylinder axis; this case being illustrated in Fig. 7.

The figures illustrate the case of two cylinders arranged in a single set, but the method can be applied also to single cylinders as well as to sets of three, four or more cylinders.

The advantages afforded by the arrangement above described are obvious; owing to the ease of construction which involves no special difficulties as to casting or workmanship. The maximum lightness is obtained since the weight of the various cylinder portions can be distributed according to the duty they are to perform without prejudicing their strength nor complicating their workmanship.

The chief advantage however lies in the possibility of constructing the cylinders in two parts without prejudicing at all the

tightness of the explosion chamber, the latter being formed by one of the two parts only.

Having now described my invention and how the same is to be carried out, what I claim as my invention, is:

1. In an internal combustion engine, the combination of a cylinder, valve seats in the end wall of said cylinder, a cylinder head detachably secured to the end wall of said cylinder, said cylinder head comprising gas and air conduits, valve supporting and guiding means and a water jacket, a plate encircling the cylinder and welded thereto, and a jacket of sheet metal detachably secured to said cylinder head and plate and forming with the cylinder walls and said plate a watertight receptacle.

2. In an internal combustion engine, the combination of a cylinder, valve seats in the end wall of said cylinder, an outer flange on said cylinder in alignment with the end wall thereof, a cylinder head bolted to said flange, said cylinder head comprising gas and air conduits, valve supporting and guiding means and a water jacket, a plate encircling the cylinder and welded thereto, a jacket of sheet metal screwed to said flange and plate and forming with the cylinder walls and plate a watertight receptacle, and ports through said flange connecting said receptacle with the water jacket in the cylinder head.

3. In an internal combustion engine, the combination of a plurality of cylinders arranged side by side, valve seats in the end walls of said cylinders, two plates encircling said cylinders and welded thereto, one of said plates being in alignment with the end walls of said cylinders, a common cylinder head bolted to the latter plate, said cylinder head comprising gas and air conduits, valve supporting and guiding means and a water jacket, a jacket of sheet metal screwed to both said plates and forming therewith and with the cylinder walls a water tight receptacle, and a connection through one of said plates between said receptacle and the water jacket in the cylinder head.

In testimony whereof I affix my signature.
GIUSTINO CATTANEO.