A. ZONA.

CYLINDER OF INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JULY 3, 1914.

1,177,162.

Patented Mar. 28, 1916.

2 SHEETS—SHEET 1.

Fig. 1

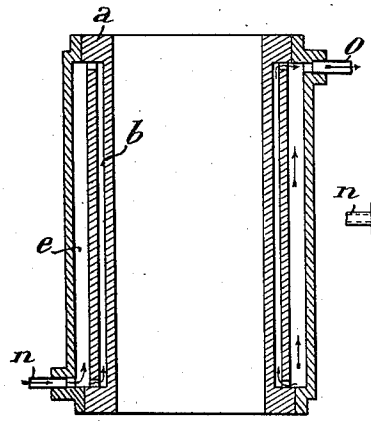


Fig. 2

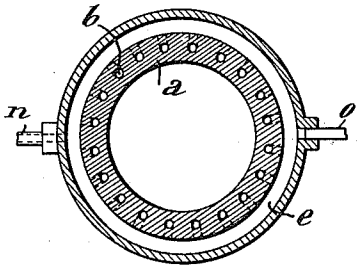


Fig. 3

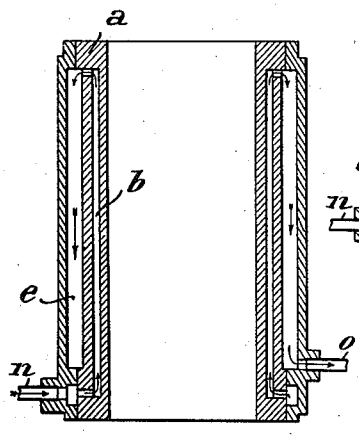
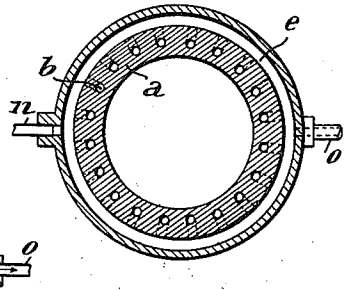


Fig. 4



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5.

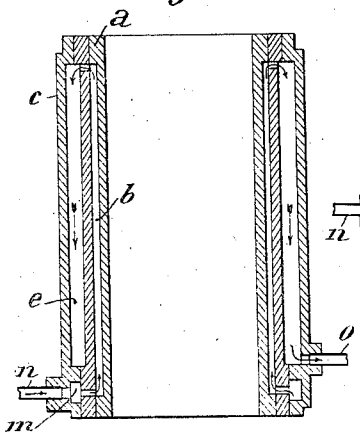


Fig. 6

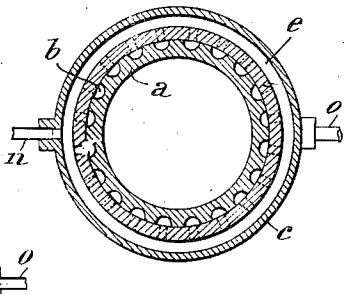


Fig. 7

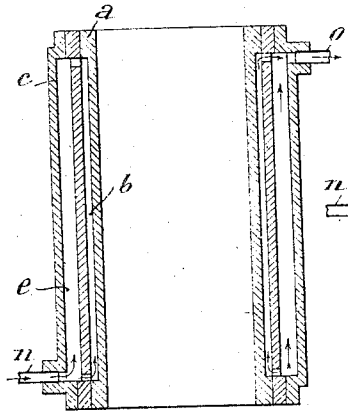
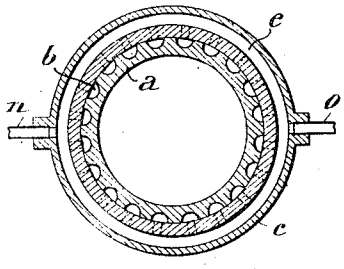


Fig. 8



WITNESSES

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CYLINDER OF INTERNAL-COMBUSTION ENGINES.

1,177,162. Specification of Letters Patent. Patented Mar. 28, 1916.

Application filed July 3, 1914. Serial No. 848,875.

To all whom it may concern:

Be it known that I, ACHILLE ZONA, a subject of the King of Italy, residing at Sampierdarena, (whose post-office address is Via Cristoforo Colombo N. 91–7, Sampierdarena,) Italy, have invented certain new and useful Improvements in the Cylinders of Internal-Combustion Engines, of which the following is a specification.

This invention relates to the cooling of the cylinder walls of internal combustion engines.

The object of the present invention is to provide an improved construction of cooling means for internal combustion engines consisting of the provision of a number of holes or ducts in the walls of the engine cylinder extending for substantially the whole length thereof, the said holes or ducts communicating at their upper and lower ends by means of radial ports with an annular space which is directly connected with inlet and outlet passages for the cooling liquid.

This invention is illustrated by way of examples in the accompanying drawings, wherein:

Figure 1 is a sectional view of a cylinder arranged in accordance with this invention, and Fig. 2 is a section on the line A—B; Fig. 3 is a sectional view of a second modified form of the invention and Fig. 4 is a section of the same form on the line A—B. Fig. 5 is a sectional view of a third modification and Fig. 6 is a section of the same form on the line A B. Fig. 7 is a sectional view of a fourth modification and Fig. 8 is a section of the same form on the line A B.

As shown by Figs. 1, 2, 3 and 4 the cylinder walls —*a*— are provided with a set of holes —*b*— communicating with the inlet pipe —*n*— and the outlet pipe —*o*—. The liquid which circulates in said holes reduces the differences of temperature which exist between the inner and the outer surface of the cylinder. The cylinder can be also formed in two pieces —*a*— —*c*— as shown by Figs. 5, 6, 7, and 8. In this case the outer surface of the inner cylinder —*a*— is provided with a set of grooves —*b*— having or not a rectilinear form and communicating with an inlet pipe —*n*— and an outlet pipe —*o*—.

In the construction of two cylinders different materials can be used (for instance: cast-iron for the inner and steel for the outer casing). The outer casing can be mounted in any suitable manner and can be also provided with said grooves which communicate, as usual, with the pipes —*n*— and —*o*—.

The circulation can be disposed in different ways, for instance as shown in Figs. 1 and 4 in which the holes directly communicate with the outer cooling jacket of the cylinder —*e*— (parallel circulation) or as shown in Figs. 2 and 3, in which the liquid is obliged to pass in a chamber —*m*— and afterward, across the holes or the grooves, in an external pipe or in the outer cylinder jacket (series circulation).

It will be evident the details shown in the drawings may be modified to suit circumstances without departure from the distinguishing features of the invention.

Having now fully described my said invention and the manner in which the same is to be performed, what I claim and desire to be secured by Letters Patent of the United States is:

1. An internal combustion engine cylinder having a number of cooling holes or ducts extending substantially the whole length of the wall thereof and radial ports at the upper and lower ends connected therewith in combination with an outer cylinder forming an annular space with which the ports communicate, inlet and outlet passages being provided in the outer cylinder for the ingress and egress of the cooling liquid.

2. An internal combustion engine cylinder having on its outer surface a number of grooves extending substantially the whole length of the wall thereof and an outer casing of different metal surrounding said engine cylinder and provided with radial ports

at the upper and lower ends which communicate with said grooves, in combination with an outer cylinder forming an annular space with which the ports communicate, inlet and outlet passages being provided in the outer cylinder for the ingress and egress of the cooling liquid.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

ACHILLE ZONA.

Witnesses:
A. BORAGINO,
C. A. FERRARI.