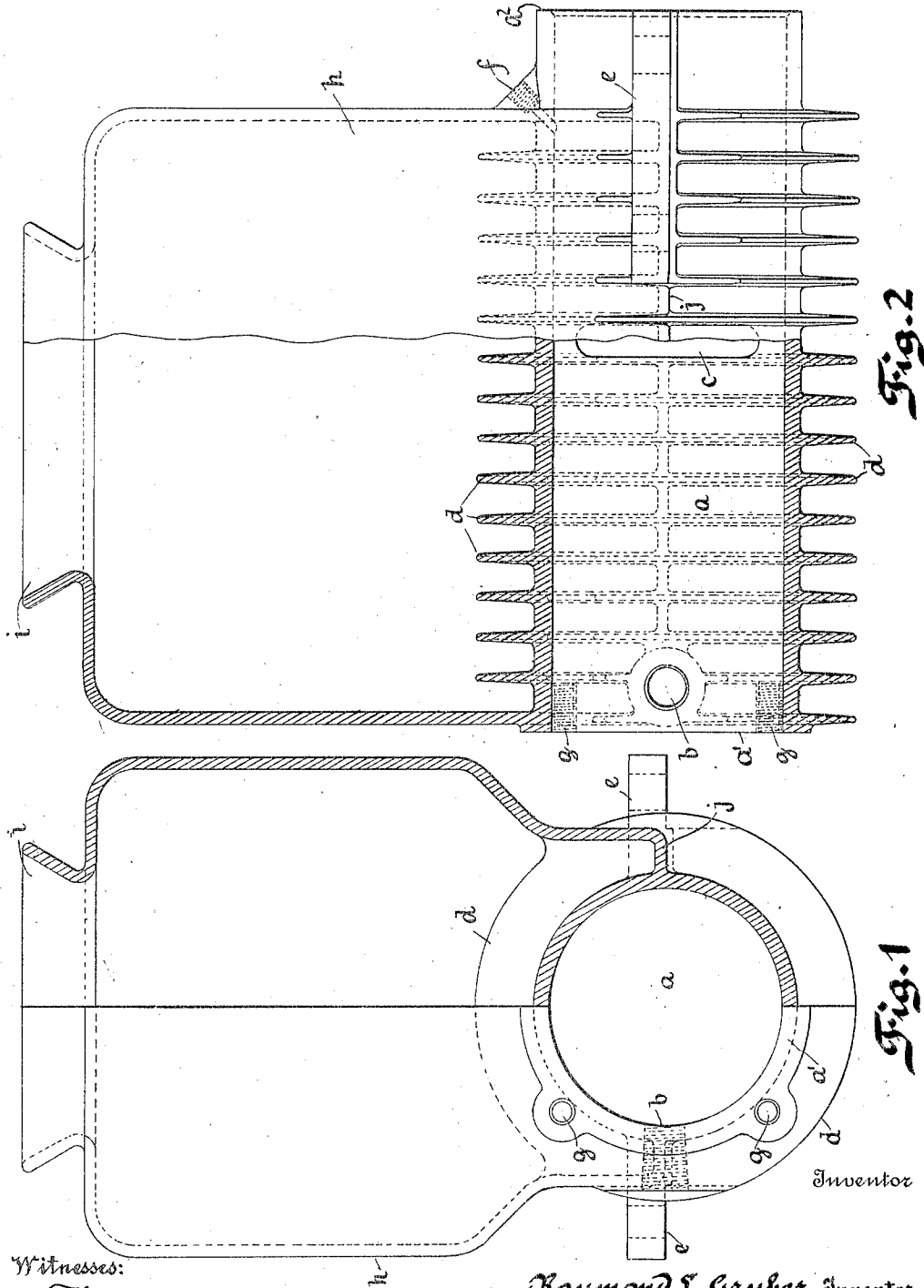


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 WATER JACKETED CYLINDER FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED FEB. 9, 1911.

1,009,837.

Patented Nov. 28, 1911.



Witnesses:

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RAYMOND L. GRUBER, OF MILWAUKEE, WISCONSIN.

WATER-JACKETED CYLINDER FOR INTERNAL-COMBUSTION ENGINES.

1,009,837.

Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed February 9, 1911. Serial No. 607,523.

To all whom it may concern:

Be it known that I, RAYMOND L. GRUBER, of Milwaukee, Wisconsin, have invented a Water-Jacketed Cylinder for Internal-Combustion Engines, of which the following is a specification.

This invention relates to internal combustion engines, and more especially to those which are exposed to weather-conditions.

10 The object of my invention is to combine in a single engine the water-cooling and air-cooling principles, embodying the advantages of both, without the disadvantages of either.

15 The advantages in general of providing a water-jacket for the cylinders of internal combustion engines are well-known, providing as they do for ample radiation surface, and keeping the temperature of the cylinder-walls at a minimum; but on the other hand
20 the water in the jacket is likely to freeze in cold weather, and burst the jacket-walls, thereby rendering the engine useless. Also should the water be allowed to dry up, the
25 cylinder will be deprived of any cooling means, since it is insulated from the outer air to a large degree by the walls of the jacket.

In my invention I provide a water-jacket
30 which envelops only one longitudinal half of the cylinder, the other half being provided with external air-cooling ribs or the like for cooling by an air current. There being no inclosed space with parallel walls,
35 the freezing of water in the jacket cannot burst its walls, and on the other hand should the water dry up, there is still sufficient air-cooling surface to keep the cylinder at a reasonable temperature. The water, being
40 in contact with one-half of the cylinder, practically keeps the whole at nearly the same temperature, on account of the rapid conducting qualities of the metal, as if it were in contact with the whole circumference.
45

For the better understanding of my invention I have illustrated in the accompanying drawing an improved form thereof; and herein—

50 Figure 1 is an end-view of the cylinder casting, the right-hand half being sectioned upon a median plane; and Fig. 2 is a side elevation thereof, of which the left-hand portion is sectioned upon a median plane.

55 The cylinder-bore is designated a , of which the head-end is shown at a' , and the crank-

end at a'' . At the head-end a' is shown a taper-threaded portion b for the spark-plug, and at the opposite end of the stroke is an aperture c , which forms a relief-exhaust
60 when the engine is at the bottom of its stroke, this being an independent invention which is not herein claimed, but which I propose to claim in a separate application. The cylinder is surrounded by the usual
65 radiation ribs d or other like means for providing sufficient cooling surface, and at one end of the cylinder in the present model are placed outstanding lugs e for supporting it. At f is shown a lubrication passage, and at
70 g the threaded apertures for the studs which secure the cylinder-head in place.

That portion of the casting which forms the water-jacket is designated h , inclosing a water-chamber of sufficient capacity for the
75 desired quantity of cooling water, and provided at the top with a flanged aperture i to receive the water. Of course my invention is not limited to this particular form of water-chamber, or style of engine, for
80 while the present model is intended for use without a special water-cooling apparatus or condenser, it is equally adapted for use with such an apparatus.

The principle of the invention consists in
85 placing the bottom of said chamber at j , which is at or about the horizontal median plane of the cylinder, thus causing the upper half only to be surrounded by water, and leaving the outer half open to the atmosphere. The walls at the lower end of the
90 chamber, one of which is constituted by the cylinder-wall, are made to diverge as shown, whereby any water which freezes in the bottom will be forced upwardly by the expansion
95 against the diverging walls, and cracking of the latter prevented.

From the above description it will be readily seen that my invention is not limited to special forms and mechanical constructions
100 such as I have hereinabove shown by way of illustration, but that the principles thereof are expressible in a variety of ways as will be well understood by those skilled in the art; therefore the scope of my claims
105 is to be interpreted in view of such alternative constructions.

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

110 1. In an internal-combustion engine, a cylinder having one longitudinal half water-

jacketed, and the other longitudinal half exposed to the atmosphere and provided with atmospheric cooling surfaces.

2. In an internal-combustion engine, a cylinder divided longitudinally into two portions, one of which is water-jacketed, and the other exposed to the atmosphere.

3. In an internal-combustion engine, a cylinder having a water-jacket adjacent to the walls of one longitudinal half thereof, said jacket having outer walls which diverge from those of the cylinder all the way to the upper edge of the latter, thereby providing expansion room against the freezing of the water contained therein.

4. In an internal-combustion engine, a cylinder provided with a set of encircling radiation ribs and divided longitudinally into two parts, and a water-jacket inclosing one of said parts.

5. In an internal-combustion engine, a horizontal cylinder divided longitudinally

into two parts, and a water-jacket inclosing the uppermost part and having its outer walls diverging upwardly from those of the cylinder, whereby to provide expansion room against the freezing of the water contained therein.

6. In an internal combustion engine, a horizontal cylinder divided longitudinally into two parts, and a water-jacket inclosing the uppermost part and having its outer walls diverging upwardly from those of the cylinder, whereby to provide expansion room against the freezing of the water contained therein, the lowermost of said parts being provided with radiation surfaces for atmospheric cooling.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

RAYMOND L. GRUBER.

Witnesses:

F. H. HAMILTON,
G. A. MESSER.