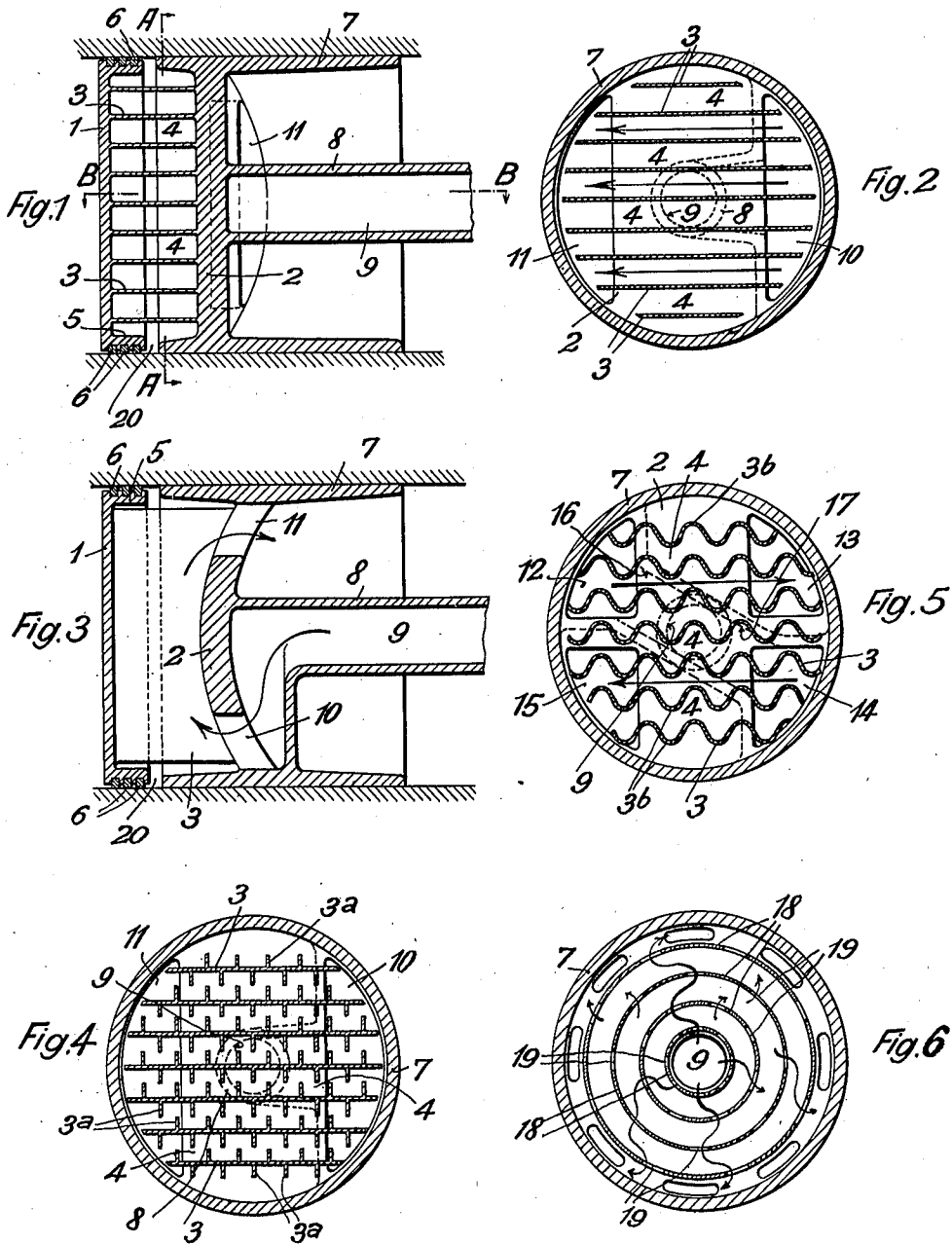


A. RIEDLER.
COMBUSTION ENGINE.
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1,292,882.

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Inventor:

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UNITED STATES PATENT OFFICE.

ALOIS RIEDLER, OF BERLIN, GERMANY.

COMBUSTION-ENGINE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ALOIS RIEDLER, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented certain

5 new and useful Improvements in Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it
10 appertains to make and use the same, reference being had to the accompanying drawing, and to letters or figures of reference marked thereon, which form a part of this specification.

15 The present invention has reference to improvements in combustion engines, and relates more specifically to engines of this type in which the piston is air or mixture cooled.

20 The well known means for air or mixture cooling the piston of combustion engines do not operate successfully for the reason that they do not satisfactorily carry away the heat to the outside air. In the prior
25 art the main portion of the heat taken up by the piston flows through the metal to the cylindrical guide extension of the piston, while only a relatively small portion of the heat passes over into the cooling medium
30 (air or mixture) flowing through the piston.

According to the present invention the heat conveyance to the outside air is considerably enhanced by providing between the piston bottom proper and a false bottom, spaced apart therefrom in the piston
35 body, a system of connecting ribs of suitable conformation, which ribs extend parallel to the piston axis and to one another and form guide channels for the cooling
40 medium. In one form of construction I provide means for cooling the connecting ribs supporting the piston bottom by sending oppositely directed cooling currents through between them, so that the middle
45 members are acted on in counter current manner. The connecting members can further be provided with flanges or they may be corrugated for enhancing the cooling action.

50 In the accompanying drawing are shown several constructional embodiments of my invention.

Figure 1 represents an axial longitudinal section through a piston of my invention;

Fig. 2 shows a cross-section therethrough 55 on line A—A, and

Fig. 3 a longitudinal section on line B—B of Fig. 1;

Figs. 4, 5 and 6 represent cross-sections 60 through three different modified constructions of pistons, all differing from the first illustrated construction and from one another in the specific form of the connecting ribs.

The piston bottom 1, of the lightest possible construction, is connected to the false 65 bottom 2, which is provided in the piston body further inward, by means of the connecting or supporting ribs 3 in the shape of plates. These plates extend parallel to the 70 piston axis and to one another, so that between them a system of parallel flues or channels 4 is formed for the passage of the cooling medium. The piston bottom 1 is provided in the usual manner with the pack- 75 ing rings 6, and beyond the false bottom 2 the cylinder shaft 7 extends for guiding the piston, which shaft is preferably made of cast iron or other material of favorable friction property. The piston rod 8, fixed on 80 the piston part 2, is hollow and its interior conduit 9 serves for the introduction of the cooling medium, which passes through the aperture 10 in the false bottom to the channels 4 and finally out through the aperture 85 11, with the result that the members 3 and thereby the piston bottom and the entire piston are very thoroughly cooled. Obviously the cooling medium may be passed in and out of the system also in any other suit- 90 able manner.

For enhancing the operative action of the connecting ribs 3, they may be provided on either face with cross flanges 3^a, as shown in Fig. 4. The use of corrugated plates 3^b 95 (Fig. 5) has proved highly serviceable. Such connecting ribs combine high mechanical resistance and excellent cooling efficiency, since they present in relatively small space a large active surface. 100

In all of these constructions the cooling current can also be sent through the piston in two parts with oppositely directed flow, as illustrated in Fig. 5. At each side of the piston are provided two independent aper- 105 tures or ports 13, 14 and 12, 15 respectively. The aperture 12 communicates with the piston rod interior 9 by means of the bore 16,

and the aperture 14 by means of the bore 17. The cooling medium introduced through the piston rods passes on the one hand through the bore 16 and on the other hand through the port 12 and at the same time through the bore 17 and the aperture 14 to the passages 4. From here the first part of the cooling medium is conducted away through the port 13, and the second part through the port 15, with the result that two parallel, but oppositely directed, cooling currents 12-13 and 14-15 are set up.

In the modification according to Fig. 6 the connecting members are in the shape of coaxially nested sheet metal cylinders 18, which are circumferentially provided with orifices 19. The interior of the innermost cylinder 18 operatively communicates with the hollow interior 9 of the piston rod 8, through which the cooling medium is introduced, which latter then passes successively through the orifices 19 into the several cylinders and finally into the annular chamber formed by the largest cylinder 18 and the piston part 7, from where it is then conducted away in suitable manner.

Obviously, in the constructions illustrated by the Figs. 1-5 the connecting members 3 or 3^b respectively can also be provided with orifices for the passage of the cooling medium.

The piston bottom 1 can be so widely spaced apart from the piston part 7, that the joint line is widened to an annular slot 20 (Figs. 1 and 3), which latter can then be used to conduct away the piston lubricant into the piston interior and thereby also aid in the cooling operation.

The favorable heat distribution and conveyance, as described, assures a highly satisfactorily piston cooling action with only relatively small quantities of cooling medium. In engines of small piston diameter even a comparatively small amount of air or mixture as cooling medium suffices to keep the piston sufficiently cool.

What I claim is:—

1. In a piston for combustion engines, a piston bottom, a cylindrical shaft spaced from said bottom, a false bottom formed integral with the cylindrical shaft, connecting webs between the piston bottom and false bottom arranged to form separate channels across the interior of the piston, means to conduct cooling medium to one end of said channels, and means to withdraw said medium from the other end thereof.

2. In a piston for combustion engines with air or mixture cooling, a piston bot-

tom, a cylindrical shaft spaced apart from said bottom and providing an annular slot between said bottom and shaft, a false bottom formed integral with the piston shaft, a hollow piston rod formed integral with the false bottom and heat conducting members connecting the piston bottom to the false bottom and forming guide channels for the cooling medium, the piston bottom being provided with two diagonally arranged apertures connecting the interior of the hollow piston to the guide channels, and two diagonally arranged exhaust apertures for the cooling medium also connected to the guide channels, the cooling medium being broken up into two currents flowing in the guide channels of one piston-half in one direction and in the channels of the other piston-half in the opposite direction, whereby the middle conducting member is acted upon in a counter current manner by the cooling medium.

3. In a piston for combustion engines with air or mixture cooling, a piston bottom, a cylindrical shaft spaced apart from said bottom and forming an annular slot between said two piston parts, a false bottom formed integral with the piston shaft, a hollow piston rod formed integral with the false bottom, and ribs of corrugated plates connecting the piston bottom to the false bottom and forming guide channels for the cooling medium, the piston bottom being provided with two diagonally arranged apertures connecting the interior of the hollow piston to the guide channels, and two diagonally arranged exhaust apertures for the cooling medium also connected to the guide channels, the cooling medium being broken up into two currents flowing in the guide channels of one piston-half in one direction and in the channels of the other piston-half in the opposite direction, whereby the middle corrugated plate is acted upon in a counter current manner by the cooling medium.

4. In a piston for combustion engines, a piston bottom, a cylindrical shaft spaced from said bottom, a false bottom formed integral with the cylindrical shaft, connecting webs between the two bottoms forming substantially parallel channels across the piston, both ends of each channel communicating with the space between the piston bottom and cylindrical shaft, means to admit a cooling medium to one of said channels and means to withdraw said medium from the other end thereof.

In testimony that I claim the foregoing as my invention, I have signed my name.

ALOIS RIEDLER.