

PUBLISHED
MAY 11, 1943.
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AIR CHARGE COOLING DEVICE
Filed Sept. 26, 1939

Serial No.
296,654

Fig. 1

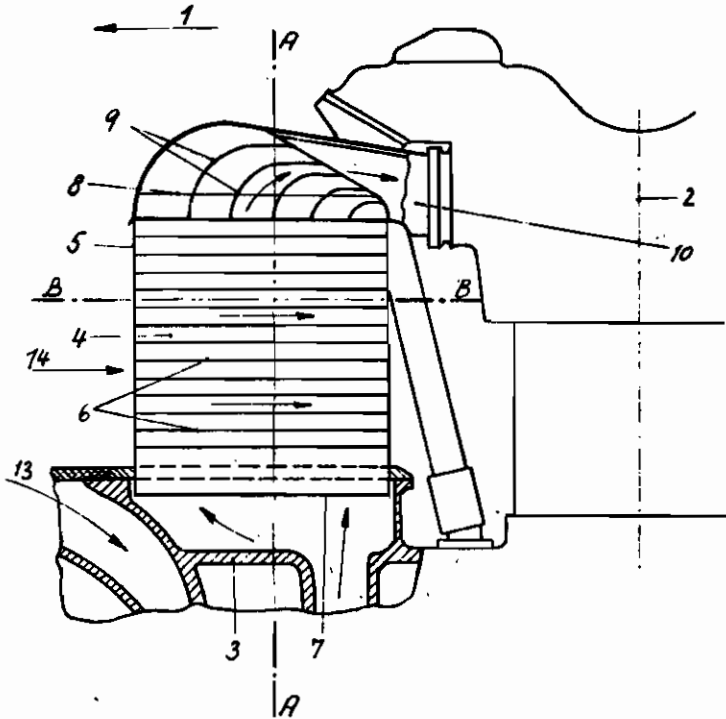


Fig. 2

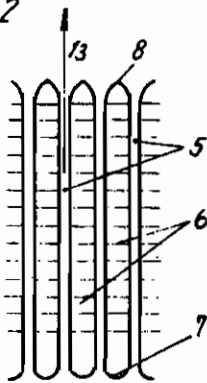
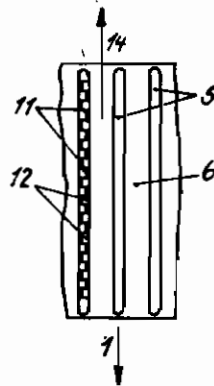


Fig. 3



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ALIEN PROPERTY CUSTODIAN

AIR CHARGE COOLING DEVICE

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Application filed September 26, 1939

This invention relates to a cooling device for the charging air for air-cooled radial engines especially double-row radial engines with the blower arranged in front of the cylinders seen in the direction of movement.

By precompressing the air in the blower the temperature of the charging air is raised as is known to such a degree that this will have a deleterious influence upon the working conditions and particularly on the charging degree of the engine and consequently on the output yield. In the constructions hitherto known provision was made for this reason to make the charging air flow through coolers interposed between the blower which is arranged behind the cylinders and the corresponding cylinder.

The object of the invention is applied as already mentioned in the foregoing, to engines with the blower arranged in front of the cylinders and differs considerably from the constructions already known.

The device according to the invention will be arranged like the corresponding blower in front of the cylinders seen in the direction of movement and is flown through by the undivided cooling air stream for the cylinders. In this manner not only the whole of the entering air is conducted to the cooling device, but also fresh air in contrast to the arrangements hitherto known in which the air after passing over the cylinders was already preheated. The increase in temperature of the cooling air for the cylinders resulting therefrom is not essential and may be compensated by slightly increasing the air entrance cross sectional area in the engine covering or by correspondingly increasing the output of the blower.

According to the invention there is provided around the periphery of the blower an annular cooler which may be subdivided in single coolers, in which case the intermediate spaces between two neighbouring coolers may, if existent, be provided with baffles. The annular cooler or the single coolers comprises tubes arranged radially or parallel or approximately parallel relatively to each other which in order to obtain a great surface and a more efficient transfer of heat are given a great length relatively to their width. To further increase the cooling effect the tubes are connected externally by means of plates or ribs being arranged normal to the tubes and at a distance of spacing one upon another. Besides that they are arranged in such a manner that the longitudinal axis of their cross sections coincides or approximately coincides with the direction of movement. To stiffen the tubes and to further increase the heat transfer from the charging air to the plates or ribs and finally to

the cooling air the tubes according to the invention are subdivided by walls into a plurality of conduits.

A further advantage of the construction consists in the fact that a certain number or all cylinders have a common cooler which causes the charging air for more cylinders to flow at first through the tubes of the coolers, which are located in a plane extending more or less vertically to longitudinal axis of the engine and terminate on a level with the cylinders heads, after which the charging air is deflected about 90° by means of guide plates and being distributed only then to the different suction pipes leading to the cylinders.

Further details and advantages will be understood from the following description.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, wherein:

Figure 1 is a longitudinal section of the cooler according to the invention, the section plane extending between two tubes in a radial direction relatively to the longitudinal axis of the engine.

Fig. 2 is a section on line A—A and

Fig. 3 is a section on line B—B of the cooler according to Fig. 1.

In front of the plane extending through the cylinders 2 of a radial engine seen in the direction of movement 1 there is arranged coaxially with the longitudinal axis of the engine a charging blower 3 shown in the drawing partly in section, to which the charge cooler 4 is attached. The charge cooler comprises tubes 5 which are of great length relatively to their width and between which there are arranged parallel cooling plates 6 in spaced relation one upon another surrounding the tubes and extending vertically to their longitudinal direction. On both their ends 7 and 8 the opposite walls of two neighbouring tubes 5 are connected with one another so that, as shown in Fig. 2, the resistance to the charging air stream flowing through the coolers 4 is as low as possible.

Near the upper end of the tubes 5 begin the guide plates 9 which lead the charging air stream into the suction pipes 1 serving to connect the coolers to the cylinders.

To increase the heat transfer and the strength of the tubes 5 these may be provided with walls 11, as shown in Fig. 3 thus dividing each tube 5 into a number of conduits 12.

The course of the charging air stream 13 and of the cooling air stream 14 is illustrated by arrows.

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