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Nov. 2, 1926. 1,605,428

C. DORNIER

WATER COOLER FOR AIRCRAFT

Filed Feb. 14, 1925

Fig. 1.

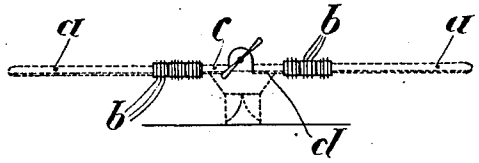


Fig. 2.

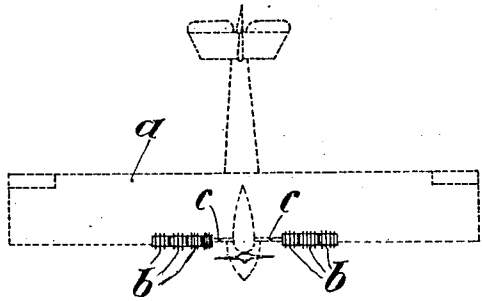


Fig. 3.

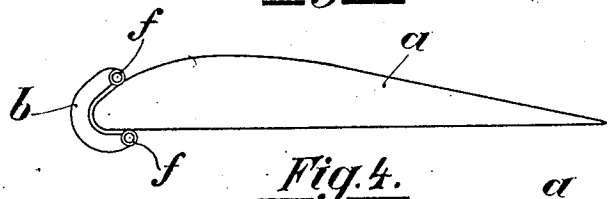
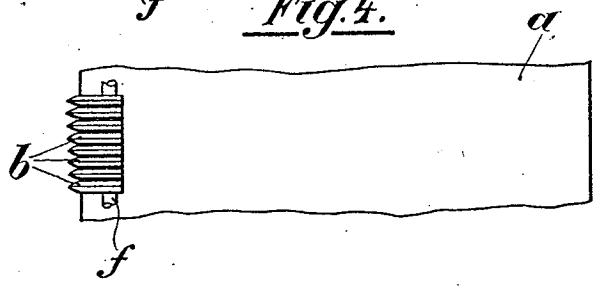


Fig. 4.



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UNITED STATES PATENT OFFICE.

CLAUDIUS DORNIER, OF FRIEDRICHSHAFEN-ON-THE-BODENSEE, GERMANY, ASSIGNOR OF ONE-HALF TO DORNIER-METALLBAUTEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, OF FRIEDRICHSHAFEN-ON-THE-BODENSEE, GERMANY.

WATER COOLER FOR AIRCRAFT.

Application filed February 14, 1925, Serial No. 9,226, and in Germany February 25, 1924.

The present invention relates to water coolers for extracting the heat from the engine cooling water on air-craft, and relates in particular to the construction of a special kind of water cooler applied to the wing of an aeroplane.

In known constructions of coolers as applied to the wings of aeroplanes certain parts of the upper or under side of the wings were formed as flat hollow bodies with thin walls through which the cooling water was conducted.

The disadvantage of these constructions is mainly that, in order to make the cooling effective, comparatively large portions of the wing have to be pressed into service for the purpose. In consequence hereof the danger of leakage is comparatively great and difficulties arise in the building in of these coolers which are integrally connected to the wing. The carrying away of the cooling water in coolers of this kind also causes difficulties in connection with mechanical principles as in them the fall or head which should exist either does not exist at all or is very greatly reduced.

These disadvantages are avoided by the subject matter of the present invention.

The wing supported cooler according to the present invention is confined in its local arrangement exclusively to the front edge of the wing, to the contour of which it closely approximates. In order to obtain the necessary cooling surface thin metal ribs or gills projecting up from the edge of the wing are employed. The invention provides for two possible forms of construction.

According to one kind portions of the contour of the nose or leading edge of the wing are constructed as thin walled hollow bodies through which the cooling water circulates, while the above mentioned ribs or gills are brought in the form of sheet metal plates into close contact with the outer wall of the hollow body which carries the water so as to ensure the heat being carried away in an efficient manner.

According to the other type of construction the ribs which effect the exchange of heat are themselves constructed as thin-walled hollow bodies through which the water flows. The cooling water is supplied to these ribs directly by supply or feed pipes and carried off again into a collecting tank or collecting pipes.

In the main the last named type of construction affords important practical advantages. The arrangement of cooler may be so constructed directly that it is in no way in any direct organic connection with the wing notwithstanding that it closely approximates to the shape thereof. The cooler may therefore be mounted at any desired point on the front edge of the wing. It is also possible to increase or decrease the size of a cooler of this kind without interfering with the construction of the wing and thus adapt it to motors of varying power.

The ribs of the cooler can be readily collected into groups and may be connected together in any desired way. In case of any leakage different elements may thus be easily cut out. The connection between the various groups may be so arranged that they can be operated from the pilot's seat or also automatically if necessary. In this way it is possible to regulate the temperatures of the cooling water separately and accurately during the flight of the machine. The different groups of coolers or elements may conveniently be arranged in two sections which are mounted symmetrically to the central plane of flight on the front edge of both the wings. The advantage of this arrangement is that the cooling system can be increased or reduced in size without the centre of gravity having to be shifted.

A constructional example of the subject matter of the invention is shown in the drawing, in which:

Figs. 1 and 2 are a front elevation and plan of an aeroplane provided with the above described cooling arrangement while,

Figs. 3 and 4 show in side elevation and plan a cooling element in conjunction with a wing.

In Figs. 1 and 2 is shown a cooler consisting of two sections. The groups are mounted on the two halves *a* of the wing and each consists of three cooling elements *b* arranged alongside each other.

The circulating or flow and return pipes *c*, and *d* may be conveniently mounted inside the contour of the wing so as to produce but little resistance to the air.

The continuous tubular passages *f* of the

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different cooling elements *b* are connected in the well known way to the flow pipes *c* and return pipes *d* with stop valves (not shown) placed between them.

The shape of the cooling elements *b* is such that they fit accurately to the contour of the leading edge of the wing *a*.

The cooler is attached to the wing so as to be easily detachable therefrom.

I claim:—

1. A water cooler for air craft engines comprising a pair of circulating pipes, one of said pipes arranged on the upper surface of an air craft wing and the other arranged on the lower surface of the wing; and a plurality of hollow cooling elements secured at each end to and in communication with said pipes, each element having a shape corresponding to the leading edge of the air craft wing and secured on the outside of and to said wing.

2. A water cooler for air craft engines comprising a circulating pipe arranged on the surface of an air craft wing; and a plurality of hollow cooling elements secured to and in communication with said pipe, each element having a shape corresponding to the leading edge of the air craft wing and secured on the outside of and to the leading edge of the wing.

3. A water cooler for air craft engines comprising a pair of tubes adapted to have water circulated therein; and a plurality of hollow cooling plates connected at each end to said tubes and being in the shape corresponding to the leading edge of the air craft wing, said plates being in communication with said tubes and being secured to the outside of the leading edge of the wing.

4. A water cooler for air craft engines comprising a pair of tubes adapted to have water circulated therein; and a plurality of cooling plates connected at each end to said tubes and being in the shape corresponding to the leading edge of the air craft wing, said elements and tubes being secured to the outside of the leading edge of the wing.

In testimony whereof I affix my signature.

CLAUDIUS DORNIER.