L. WAGENSEIL.

ARRANGEMENT OF RADIATORS IN FLYING MACHINES.

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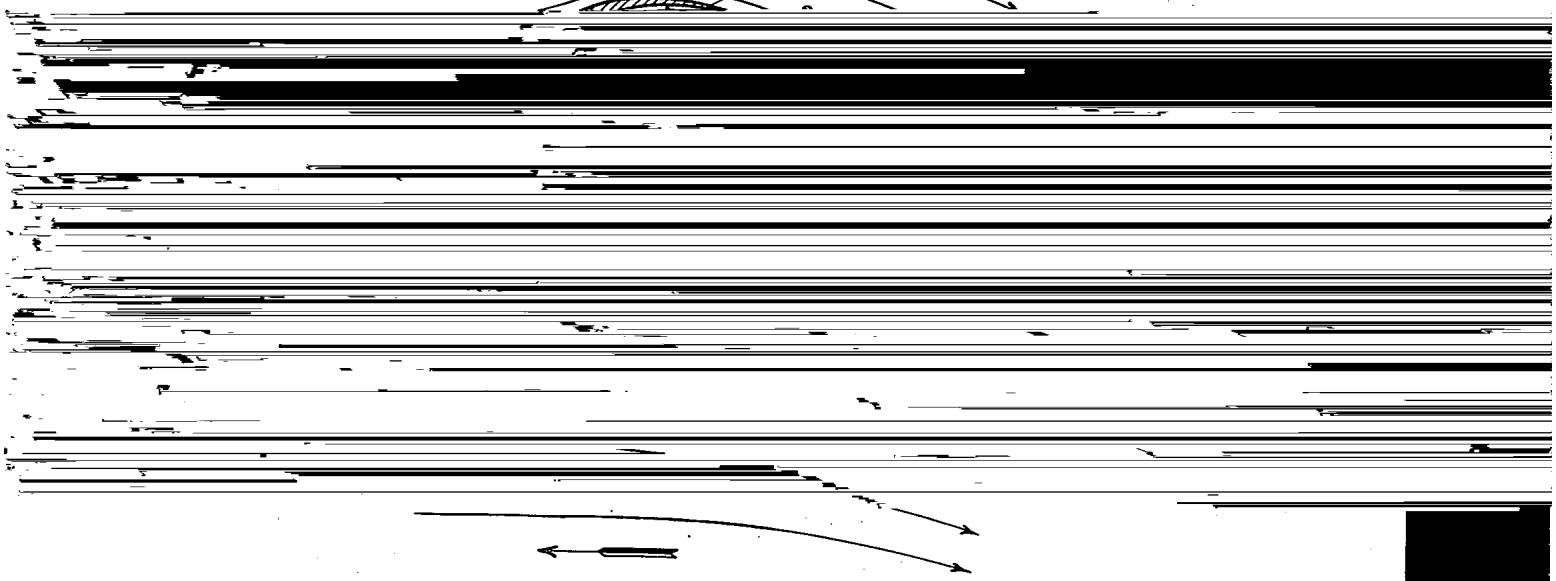
1,412,073.

Patented Apr. 11, 1922.

Fig. 1



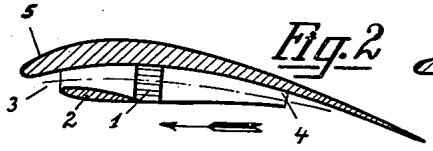


Fig. 2

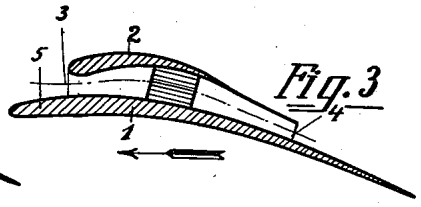


Fig. 3

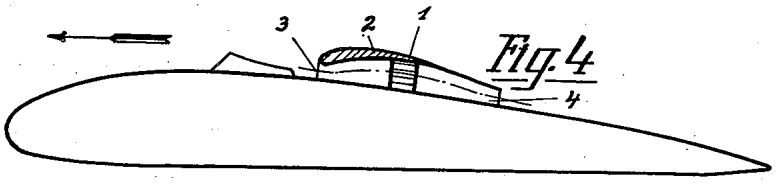


Fig. 4

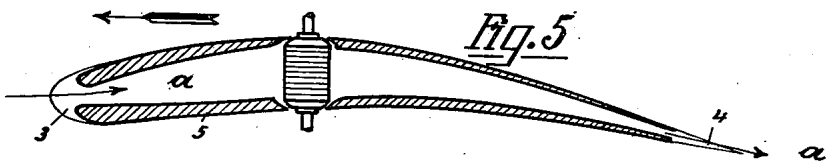


Fig. 5

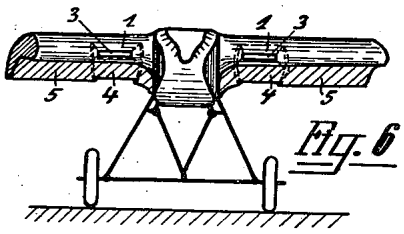


Fig. 6

Inventor.

UNITED STATES PATENT OFFICE.

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ARRANGEMENT OF RADIATORS IN FLYING MACHINES.

1,412,073. Specification of Letters Patent. Patented Apr. 11, 1922.

Application filed June 28, 1920. Serial No. 392,426.

To all whom it may concern:

Be it known that I, LUDWIG WAGENSEIL, a German citizen, residing at Dessau, Germany, have invented certain new and useful Improvements in Arrangement of Radiators in Flying Machines, (for which I have filed an application in Germany March 13, 1917,) of which the following is a specification.

In my copending application for patent of the United States, Serial No. 73,987, filed January 24, 1916, I have disclosed a novel system of arranging the radiator in motor driven vehicles and quite especially in flying machines, the purpose of the said system being to reduce the resistance of the air passing through the radiator by reducing the velocity of the air and in consequence thereof the frictional resistance within the channels of the radiator, through which the air passes. To this end I have arranged the radiator within a pipe-shaped enclosure whose cross-section changes in the direction of the flow of air, the radiator being disposed at the point of largest cross-sectional area, while the inlet and outlet openings of the enclosure have a smaller cross-section, so that the quantity of air, entering the radiator, while the vehicle is moving, is less than with a radiator arranged after the old fashion.

By arranging the radiator as described the proportion between buoyancy and resistance of the flying machine as a whole is improved on account of the reduction of resistance obtained as compared with the old radiator arrangements. The greater this proportion, the better the flying efficiency of a flying machine.

It is an object of my present invention to further improve the proportion between buoyancy and resistance by arranging the radiator and its resistance reducing enclosure in such a manner, that the air flowing through and along the enclosure does not only encounter less resistance than in a radiator arranged on the old lines, but also increases the buoyancy of the machine, the pressure exerted by the air flowing through the enclosure while the flying machine is moving horizontally, having a vertical component. To this end an enclosure of symmetrical construction may be given a slight inclination with regard to the direction of travel, the front end being for instance disposed somewhat higher than the rear end. The buoyancy can be still further increased by means of an enclosure in which the line bisecting its vertical longitudinal section is curved upwards about in the same manner as in the profile of the usual supporting surfaces.

According to the present invention the envelope or enclosure surrounding the radiator and constructed to increase the buoyancy of the flying machine may either be independent of other parts of the machine, or it may consist, in part at least, of portions of the flying machine proper, as shown for inst. in the prior patent application hereinbefore mentioned.

In the drawings affixed to this specification and forming part thereof diagrams of different arrangements embodying the present invention are shown. In the drawings

Figs. 1 to 5 are vertical sections, extending in the direction of travel, of buoyancy producing enclosures with the radiator arranged within.

Fig. 6 is a front elevation of a flying machine, having radiators arranged within its supporting surfaces according to Fig. 5.

Referring to the drawings, 1 is the radiator, 2 is the enclosure, 3 the air inlet and 4 the air outlet. The winged arrows indicate the direction of travel of the flying machine, while the plain arrows indicate the air current arising during the flight.

As shown in Fig. 1, the cross-section of the enclosure is such that its (dotted) center line is curved upwards. At the flying machine travelling along not only the air flowing through the enclosure and through the radiator is deflected downwards, but at the same time the air flowing externally along the enclosure is influenced in a manner similar to that of the air flowing along a supporting wing, in such a manner as to exert on the enclosure a strong buoyancy effect.

As shown in Figs. 2 and 3, respectively, either portion of the enclosure may be replaced by a supporting surface.

Other surfaces existing in flying machines may replace the enclosure in a similar manner. Thus Fig. 4 shows an enclosure whose lower portion is formed by the upper covering wall of the body. In all these cases it is essential that the air can flow along the enclosure or along the wall or surface forming part thereof in such a manner, that the current pressure has an upwardly directed component. Experience has shown that

with comparatively thick supporting surfaces this is the case especially where the center line bisecting the enclosure is curved upwards.

An especially favorable effect is obtained by arranging the radiator within the supporting surface itself, this latter being provided with air channels as shown by way of example in Figs. 5 and 6. The supporting surface 5 has an air channel formed in its interior, said channel first expanding gradually from the air inlet 3 at the front edge and then again contracting towards the outlet 4 at the rear edge of the supporting surface. At the point of largest cross-sectional area of this channel the radiator 1 is arranged. In this arrangement the resistance reducing enclosure is utilized in the very best manner for the simultaneous increase of buoyancy.

Arrangements for changing the cooling efficiency of the radiator, such as disclosed in [redacted] ing formed so that the line bisecting its vertical longitudinal section is inclined towards the direction of flight.

4. The combination, with the radiator of a flying machine, of an open end casing surrounding said radiator, said casing being shaped so as to produce, on moving through the air, an upwardly directed component and being formed, partly at least, by an appropriate portion of the flying machine proper.

5. The combination, with the radiator of a flying machine, of an open end casing surrounding said radiator, said casing being shaped so as to produce, on moving through the air, an upwardly directed component and being formed in part by the flying machine body.

6. The combination, with the radiator of a flying machine, of an open end casing surrounding said radiator, said casing being shaped so as to produce, on moving through [redacted]