Oct. 14, 1924. 1,511,691

W. E. VALK, JR

AIRPLANE RADIATOR

Filed Nov. 2, 1922

FIG. 1.

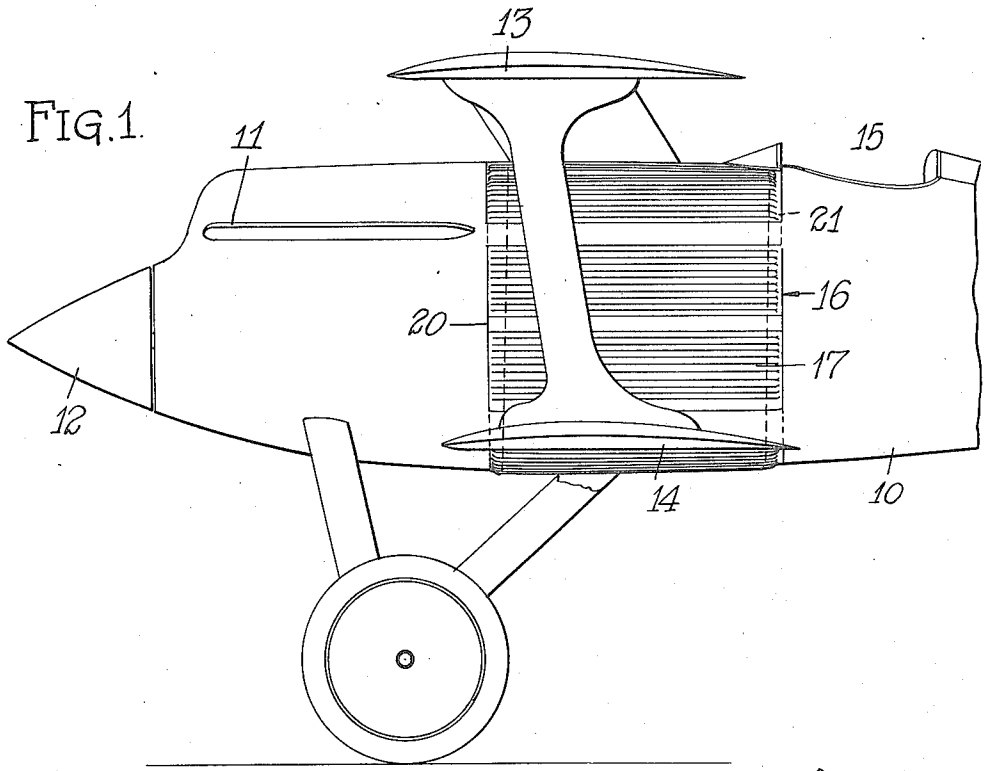


FIG. 2.

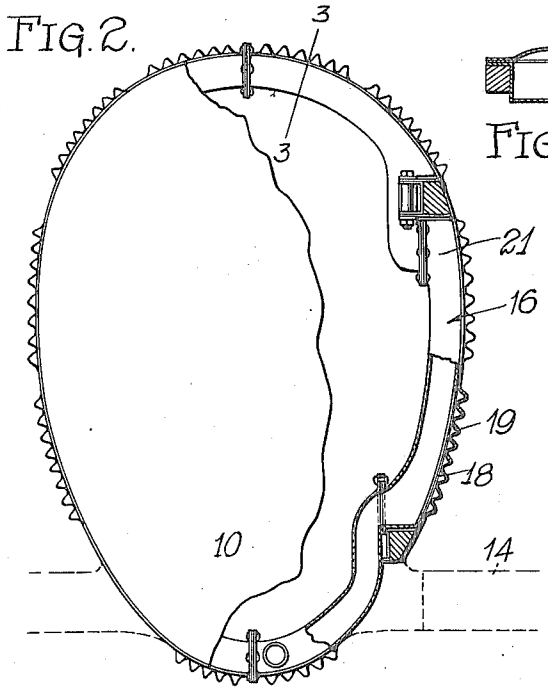


FIG. 3.

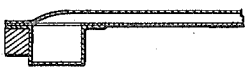
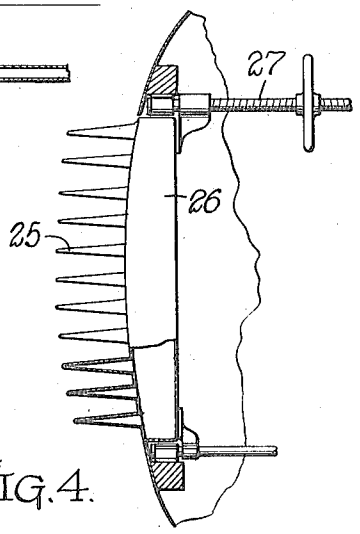


FIG. 4.



INVENTOR.

William E. Valk Jr.

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UNITED STATES PATENT OFFICE.

WILLIAM E. VALK, JR., OF HEMPSTEAD, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CURTISS AEROPLANE & MOTOR COMPANY, INC., OF GARDEN CITY, LONG ISLAND, NEW YORK, A CORPORATION OF NEW YORK.

AIRPLANE RADIATOR.

Application filed November 2, 1922. Serial No. 598,587.

To all whom it may concern:

Be it known that I, WILLIAM E. VALK, Jr., a citizen of the United States, residing at Hempstead, in the county of Nassau and State of New York, have invented certain new and useful Improvements in Airplane Radiators, of which the following is a specification.

My invention relates to aeroplanes and more particularly to aeroplanes in which the propelling power is derived through the use of a water cooled internal combustion motor driving an aerial propeller or screw.

Aeroplanes thus characterized usually employ a radiator for cooling the motor, and in the vast majority of instances utilize what is known as the cellular type radiator, due to the efficiency derived through the use of this particular type. The ordinary practice is to mount the radiator in the nose of the fuselage or body, or in some other equally exposed position; the result being that the radiator, in and of itself, is an item of enormous resistance during flight. To reduce such resistance various schemes and various types of radiators have been heretofore proposed, the nearest approach to the present invention being what is usually designated "a wing type radiator"; i. e., a radiator directly carried by the wing or wings of the aeroplane and of a construction such that the air acting on the lifting surface is also utilized as the cooling medium whereby the water or other cooling agent in circulation is at all times constantly cooled. This particular type of radiator, while efficient and practical in many respects, and especially as a solution of the problem of head resistance, is nevertheless objectionable in military craft due to the necessarily large wing area required to be covered in order that the modern high power aeronautical motor may be properly cooled. Moreover, when the size of the radiator is such that portions of its area extend beyond and without the slip-stream of the propeller, obviously its cooling efficiency is materially reduced—especially when the machine is standing at rest with the motor in operation either before or after aerial flight. Still another objection to the wing type radiator is the danger occasioned by leaks or over-flow, either of which is likely to occur, and which, if occurring during flight, cause the ofttimes extremely hot water in circulation to drip and blow directly upon the occupant or occupants seated in the cockpit usually located behind and below the supporting surface or wings. Such radiators, however, as hereinbefore intimated, are extremely advantageous in view of the lack of head resistance which they offer when constructed and assembled as an outer covering for the wings.

The object of the present invention is to reduce head resistance to an extent equal to, if not greater than, the reduction occasioned through the use of the wing type radiator, and at the same time to so dispose the radiator in its relation to the occupants of the craft, the propeller, and the fuselage or body within which the occupants are seated, as to overcome the objectionable features above pointed out. The radiator per se, in construction, is somewhat similar to the construction illustrated and described in application Serial No. 470,186, filed May 16th, 1921. Instead, however, of being mounted directly upon the supporting surfaces or wings, it is directly fastened to the fuselage or body, behind the propeller, and in such relation to the occupant or occupants of the craft as to avoid the possibility of scalding either or both occupants should the radiator, for any reason, leak. Furthermore, by constructing the radiator in the form of a hollow shell, the shell being in sections, any or all of the sections may be separately removed and one or more sections substituted without dismantling either the fuselage or the wings.

The constructional features of the radiator will be hereinafter more fully pointed out.

In the drawings, wherein like reference characters denote like or corresponding parts:—

Figure 1 is a side elevation of an aeroplane showing the radiator mounting and its relation to the various parts thereof;

Figure 2 is a transverse vertical section of the aeroplane fuselage or body with the radiator sections in place thereon in the form of a hollow shell;

Figure 3 is a fragmentary section of the radiator taken on the line 3—3 of Figure 2; and

Figure 4 is a sectional view of a modified radiator construction.

In the embodiment of the invention selected for illustration the fuselage or body of the aeroplane is designated as 10. Within the forward end of the body a motor 11 is enclosed, said motor being suitably connected with a tractor propeller or screw 12. The supporting surfaces or wings, designated respectively as 13 and 14, extend intermediately across the body 10 near its forward end, and just behind the supporting surfaces and within the body 10 a cockpit 15, for the occupant or occupants of the machine, is formed.

The radiator, designated in its entirety as 16, is preferably constructed in the form of a hollow shell. In cross section (see Fig. 2) it is similar in size and shape to that portion of the fuselage or body 10 upon and over which it is disposed. Preferably the hollow radiator shell comprises a plurality of radiator sections 17, each of which in turn comprises an inner and outer metal plate, between which plates the cooling medium in circulation is adapted to be circulated to keep the motor cool. The inner plate, designated as 18, is flat and is adapted to lie flat against the outer covering of the body. The outer plate, designated as 19, instead of being flat, is crimped or corrugated to provide the necessary water passages or cells. The water passages or cells are in each instance open ended, the cells at the forward end being open to an annular header 20, and at their opposite ends being opened to an annular header 21. The headers 20 and 21 are also of sectional construction and are wholly disposed on the inside of the fuselage or body 10.

The radiator sections 17 are in each instance made removable, and the radiator in its entirety is adapted to be assembled upon the fuselage or body after the body itself is made complete. In other words, the radiator and the body are distinctly separate units, the latter merely serving as the radiator support. Preferably the radiator is located behind the propeller 12 and slightly in advance of the cockpit 15 with a view to subjecting the radiator at all times, and under all operating conditions, to the full air blast of the propeller, and with a further view to removing the occupants of the cockpit from flying spray should the radiator for any cause spring a leak. It will be further noted that the location of the wings with respect to the radiator is such that, in a military craft, the former offers a certain amount of protection since it is clearly apparent that a supporting surface may be repeatedly punctured without danger, whereas a puncture of the radiator will very soon require that a forced landing be made.

In the construction of the radiator, any number of sections may be employed, and the length of the radiator, in a fore and aft direction may be readily extended beyond the limits indicated in Figure 1. Regardless of location, a radiator thus constructed is at all times subjected to the full cooling influence of the surrounding air, and since the water passages or cells extend in a fore and aft direction, obviously there is no interference and there are no "dead spots" in the exposed radiator surface.

In the modification of Figure 4, instead of constructing the radiator in the form of a hollow shell, the radiator is let into the body at diametrically opposite points. Cooling flanges 25 are provided, each flange being extended in a fore and aft direction and parallel. The headers 26 are enclosed in the body and the two sections which comprise the radiator are cross-connected by threaded rods 27 of a construction such that the opposite sections may be simultaneously withdrawn or extended to vary the extent to which the cooling flanges 25 are exposed. In the modified form of radiator it is necessary that openings be provided in the sides of the fuselage or body 10, whereas in the preferred form such openings are not required, since the radiator constitutes in effect an outer covering through which the fuselage or body extends.

While I have described my invention in detail in its present preferred embodiment, it will be obvious to those skilled in the art after understanding my invention, that various changes and modifications may be made therein without departing from the spirit or scope thereof. I aim in the appended claims to cover all such modifications and changes.

What I claim is:—

1. The combination in an aeroplane, of a body, a motor, and a radiator for cooling the motor comprising a plurality of water passages arranged to project outwardly radially from said body, said water passages being longitudinally elongated and so disposed on the exterior of said body as to provide therefor an outer skin-like covering, headers for the radiator enclosed within said body respectively at the opposite ends of said water passages and connections respectively between said headers and said motor.

2. The combination in an aeroplane, of a body, a motor, and a radiator for cooling the motor comprising juxtaposed plates, one of said plates being substantially flat and fastened to and against the outer surface of said body to provide therefor an outer skin-like covering and the other of said plates being corrugated and fastened to and

against said first mentioned plate to form therewith a plurality of longitudinally elongated water passages arranged to project radially out from said body, headers for the radiator enclosed within said body respectively at the opposite ends of said water passages, and connections respectively between said headers and said motor.

3. A radiator for motors of aircraft comprising a plurality of spaced substantially tubular water passages arranged radially about and close up against the outer surface of the body of the craft to provide therefor an outer skin-like covering impervious to air, and a forward and a rear header, each enclosed within said body and each so formed as to conform generally to the cross-sectional shape thereof, said headers being in open communication with said water passages.

In testimony whereof I hereunto affix my signature.

WILLIAM E. VALK, JR.