Oct. 13, 1931. J. SQUIRES 1,827,441

AIRPLANE

Filed March 8, 1929 2 Sheets-Sheet 1

Fig. 1.

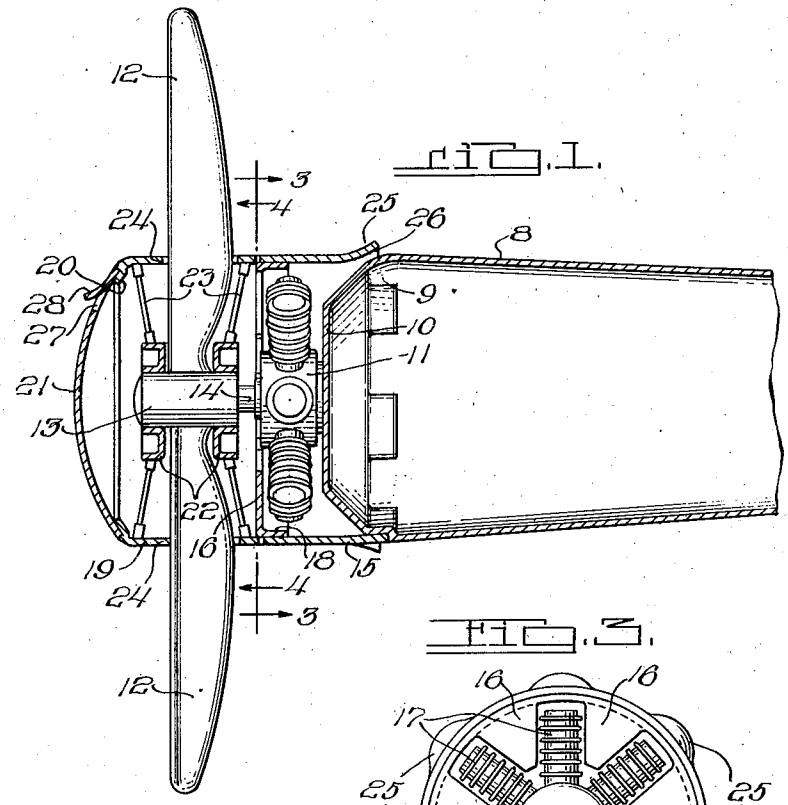


Fig. 3.

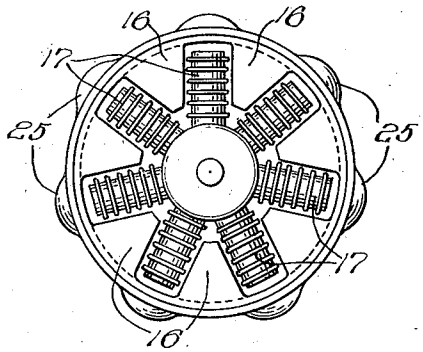


Fig. 2.

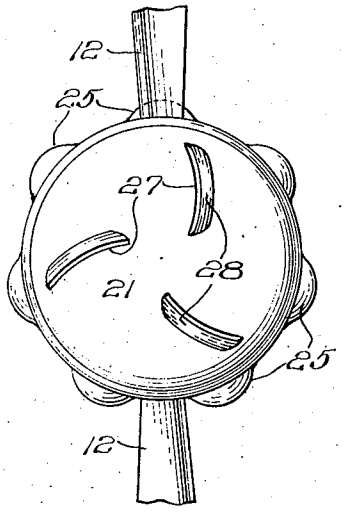
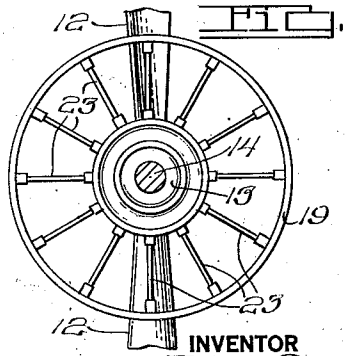


Fig. 4.



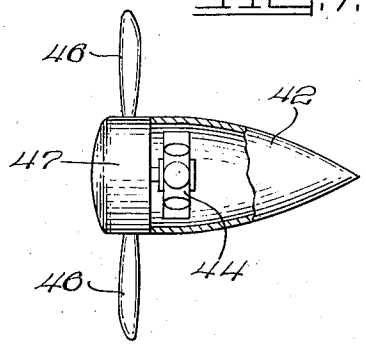
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Fig. 7.



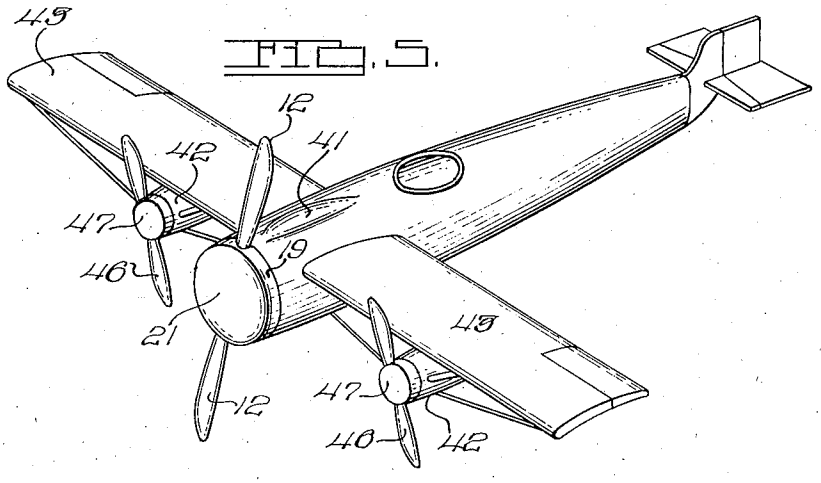


Fig. 5.

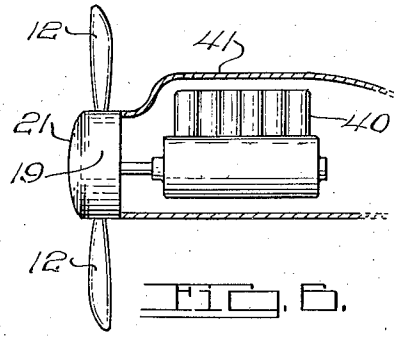


Fig. 6.

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AIRPLANE

Application filed March 8, 1929. Serial No. 345,302.

This invention relates to airplanes and particularly to a construction therefor that will result in a more efficient operation thereof.

Another object is to provide a novel construction for the power unit section of an airplane designed to offer minimum air resistance and maximum efficiency.

Another object is to provide an airplane of the tractor type provided with a propeller at the front of the fuselage and a hood at the center of the propeller substantially concentric with the axial line of the fuselage and of substantially the same frontal area as that of the fuselage.

Another object is to provide an airplane of the type described having an engine positioned at the front of the fuselage and enclosed by a hood or cowling of substantially the same frontal area as that of the fuselage, the engine driving a propeller having a central hood corresponding in size to that of the engine hood.

Another object is to provide a means for increasing the cooling efficiency of a hooded air-cooled motor.

Another object is to provide an airplane having a hooded motor at the front of the fuselage and a centrally hooded propeller, the propeller hood being provided with air intake openings for drawing air into the propeller hood, and means being provided for directing such air at the cylinders of the engine.

A further object is to provide certain novel features of construction that will be specifically pointed out, or will be obvious in the following specification.

The above being among the objects of the present invention, the same consists in certain novel features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawings, and then claimed, having the above and other objects in view.

In the accompanying drawings which illustrates a suitable embodiment of the present invention, and in which like numerals refer to like parts throughout the several different views,—

Fig. 1 is a more-or-less diagrammatic fragmentary vertical sectional view taken through the front end of an airplane fuselage and showing the engine and propelling means mounted thereon.

Fig. 2 is a front view of Fig. 1.

Fig. 3 is a view taken on the line 3—3 of Fig. 1.

Fig. 4 is a view taken on the line 4—4 of Fig. 1.

Fig. 5 is a perspective view of an airplane provided with a power plant of the aligned cylinder type at the front end of the fuselage, and pair of supplementary power plants supported in nacelles hung from the wings.

Fig. 6 is a fragmentary partially broken side view of the front end of the fuselage of the airplane shown in Fig. 5.

Fig. 7 is a partially broken side view of one of the nacelles shown in Fig. 5.

In the conventional design of airplanes of the tractor type, the engine is mounted at the front end of the fuselage and drives a propeller positioned forwardly thereof. Where such engines are of the radial air-cooled type such as are now favored in airplane use, the engine is usually smaller than or of approximately the same maximum diameter as the maximum cross sectional area of the fuselage. Some of these engines are partially hooded to reduce the resistance offered by the same to their passage through the air. In all cases, as far as I am aware, no means except the conventional and relatively small spinner is provided at the center of the propeller. The result is that that portion of the air having a relative flow toward the propeller and through which the central portion of the propeller moves is lost as far as propulsive efforts of the same are concerned. Furthermore, due to the shape of the forward end of the fuselage the bulk of the air having a relative flow toward the propeller is moving outwardly with respect to the axis of the propeller at the time it is engaged by the propeller blades, and this results in less efficient action of the propeller than would be possible were the air flowing toward it in a substantially parallel direction

with respect to its axis. Furthermore, when such motors are hooded to lessen their air resistance, the cooling efficiency of the motor is invariably reduced, thus resulting in an unsatisfactory condition. By the employment of the present invention I am enabled to provide a construction in which a minimum air resistance is offered at the forward end of the fuselage, in which the propeller is permitted to work at its greatest efficiency, and in which the engine is hooded to eliminate its resistance to the air without interfering with its cooling efficiency.

Referring to the accompanying drawings, 8 indicates in a more-or-less diagrammatic manner, the fuselage of an airplane preferably of circular section and of maximum diameter at its forward end and curved as at 9 into the front wall 10 to form a projectile like shoulder designed to offer a minimum resistance to the passage of air over it. An engine 11 of the radial air-cooled type is shown mounted on the forward wall 10 of the fuselage 8, the engine 11 being of slightly smaller maximum diameter than the diameter of the fuselage. A propeller having blades 12 and hub 13 is secured to the crank shaft 14 of the engine in the conventional manner. A hood or cowling 15 of substantially the same diameter as the fuselage 8 and carried by the fuselage extends over the engine 11 to a point slightly in advance of the cylinders thereof. A plurality of baffle members 16 carried by the hood 15 extend inwardly toward the axis of the engine 11 and are positioned between each pair of cylinders 17 of the engine. Each of the baffles 16 is shaped as viewed from the front of the engine as indicated in Fig. 3, so as to substantially block the space between the adjacent cylinders 17. The baffle members 16 may be formed separately from each other or all of the baffles may be formed as an integral part of a sheet metal ring member such as 18 suitably secured in place within the hood 15.

Another hood member 19 is carried by and rotates with the propeller. This member 19 is preferably of the same diameter as the hood 15, and is cylindrical in shape from the forward edge of the hood 15 to a point in advance of the leading edge of the propeller blades 12, and from the latter point it is turned inwardly as at 20 to form a projectile shaped shoulder to which is secured a curved nose piece 21. The hood 19 and nose piece 21 in being joined through the projectile-like shoulder 20 are formed to exert minimum resistance in passing through the air. The hood 19 may be supported in any suitable manner from the hub 13, the supporting means shown comprising rings 22 supported on opposite ends of the hub 13 and between which rings and the hood 19 a plurality of wire spokes 23 extend, thus supporting and maintaining the hood 19 in proper relative position. The hood 19 is, of course, provided with openings such as 24 through which the propeller blades 12 project. The hood 15 at its point of connection with the fuselage 10 is outwardly flared as at 25 in line with each of the cylinders 17 to provide a louvre such as 26 for the escape of air between the same and the shoulder 9. The nose piece 21 is provided with a plurality of louvres 27 shaped like a segment of a spiral for the entrance of air into the interior of the hoods 15 and 19, the metal at the edge of the louvres being preferably bent up as at 28 so as to act as a scoop when the propeller is rotating to force the air into the hood 19.

It will be noted that with this construction the maximum cross sectional area of the fuselage portion of the airplane and therefore the point of maximum air resistance is preferably present at a point in advance of the propeller, and that portion thereof in advance of the propeller is designed to offer a minimum resistance to its passage through the air. The central portion of the propeller which, because of its relatively low velocity and inefficient shape due to structural limitations is of little value in its propulsive efforts, is eliminated as far as propulsive efforts are concerned, and the air which would otherwise be lost through this portion of the propeller is directed outwardly so as to be acted upon by the outer portions of the propeller blades which are capable of exerting the most efficient action thereon. Furthermore, this outwardly displaced air has a relatively parallel flow with respect to the axis of the propeller due to the peculiarity of the attendant design. The air which is drawn into the interior of the hood 19 through the louvres 27 and which, of course, represents a relatively small portion of the air flow against the nose piece 21, is directed in its passage into the hood 18 directly against the cylinders 17 by the baffles 16, thus insuring against an escape of an appreciable volume of air between the cylinders 17 without acting to cool the cylinders, and then escapes through the louvres 26. The result is that with this construction a much higher efficiency is obtained in flight than is possible in any of the constructions that have heretofore been proposed, and this is due to the decreased head resistance and to the increased propeller efficiency.

It is also apparent that the decreased head resistance is obtained without decrease in the cooling efficiency of the engine.

It is, of course, to be understood that altho I have described it as being preferable that the fuselage be of maximum cross sectional area at the point where the propeller hood or cowling joins the same, in practice the maximum cross sectional area may be somewhat removed therefrom as long as the area at the

forward end is not sharply reduced from such maximum area. It will also be understood that when power plants of the aligned cylinder type are employed, as the engine 40 in Fig. 6, the provision of the usual protuberance 41 in the engine cowling for reception of the outer ends of the cylinders, as indicated in Figures 5 and 6, is not of sufficient moment to interfere with the desirable results obtained by the use of the present invention, the cross sectional area of the protuberance 41 being disregarded in such cases.

It is further obvious that altho the above description has been limited to the relation of the propeller hood with respect to the engine cowling and/or fuselage, the construction is equally applicable for use in connection with nacelles such as 42 in Figures 5 and 7 which, as in conventional practice, are suitably suspended from the wings 43 of an airplane and carry power plants such as 44. The power plants 44, in such case, drive propellers 46 having a central hood or cowling 47 bearing the same relation to the nacelle 42 as the hood 19, previously described, bears to the engine cowling 15 or fuselage 8. In this connection, in the following claims it is to be understood that in using the word "fuselage" its meaning is not to be limited to the body portion only of an airplane but is to be read broadly enough to include not only such body portion but also a body structure such as that of a nacelle, or other similar structure.

While I have described the fuselage as being preferably of circular section and of maximum dimensions at the forward end thereof, it will be apparent that these dimensions may be varied within reasonable limits without departing from the teachings of the present invention, and these and other formal changes may be made in the specific embodiment of the present invention without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In an aircraft, in combination, a fuselage, an engine mounted at the front end of said fuselage, a propeller in advance of said engine driven by said engine, a hood enclosing said engine and merging into said fuselage, and a second hood of substantially the same diameter as the first mentioned hood cooperating with said propeller to render that portion of said propeller within the bounds thereof inactive for the purpose of propulsion, said second hood having substantially the same frontal area as the first mentioned hood and merging into said first mentioned hood, and being formed with a projectile-shaped shoulder at its forward end.

2. In an aircraft, in combination, a fuselage, an engine supported at the forward end thereof, a propeller in advance of said engine driven therefrom, a hood encircling said engine, a hood encircling the central portion of said propeller and merging into the first mentioned hood, the last mentioned hood being rotatable with said propeller and being provided with a nose, and means comprising scoops secured to and rotatable with said nose for inducing a flow of air through said hoods upon rotation of said propeller.

3. In an aircraft, in combination, a fuselage, an engine supported at the forward end thereof, a propeller in advance of said engine driven therefrom, a hood extending forwardly from said fuselage about said engine, said hood being spaced from said fuselage in line with the cylinders of said engine, a second hood of substantially equal diameter to the first mentioned hood carried by said propeller in advance of the first mentioned hood and being streamlined therewith, and means in the nose of the second mentioned hood for inducing a flow of air through said hoods upon rotation of said propeller.

4. In an aircraft, in combination, a fuselage, an engine of the radial cylinder type supported at the forward end thereof, a hood carried by said fuselage extending forwardly thereof to a point forward of said engine, said hood being spaced from said fuselage in longitudinal alignment with each of the cylinders of said engine, a propeller in advance of said engine, a centrally disposed deflecting hood rotatable with said propeller, said hood being streamlined with the first mentioned hood, means for inducing a flow of air through said hoods, and baffle means carried by the first mentioned hood disposed to direct substantially all of said air flow directly against said cylinders.

5. In an aircraft, in combination, a fuselage having the forward end thereof provided with a marginal shoulder of projectile-like shape, an engine of the radial cylinder type supported in advance of said end, a propeller in advance of said engine driven thereby, a hood carried by said fuselage extending forwardly thereof to a point substantially in advance of the cylinder of said engine, said hood being spaced from said shoulder in longitudinal alignment with each of said cylinders, a deflecting hood disposed about the central portion of said propeller streamlined into the first mentioned hood, means in the second mentioned hood permitting the entrance of air thereinto, and baffles carried by the first mentioned hood for deflecting said air into direct contact with said cylinders.

JOHN SQUIRES.