

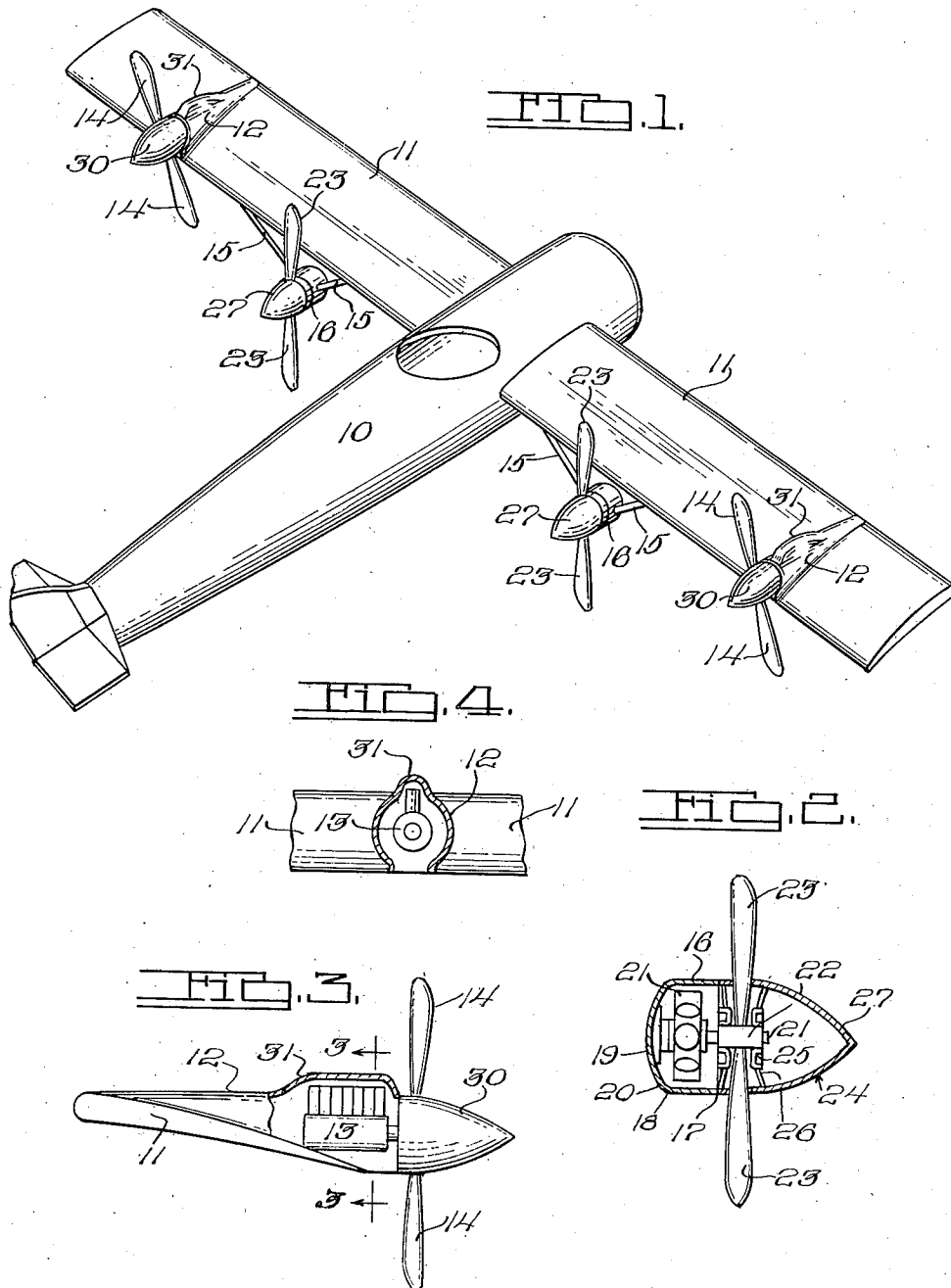
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AIRPLANE

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AIRPLANE

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

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

10 Another object is to provide an airplane of the pusher type provided with an enclosed power plant, a propeller being mounted at the rear of the power plant enclosure and being formed to cooperate therewith
15 whereby to offer a minimum amount of resistance to the passage of the enclosure through the air.

Another object is to provide, in combination with an airplane of the pusher type, a
20 power plant enclosure of substantially circular section at its rear end, a propeller driven by the power plant being positioned rearwardly of the enclosure and being provided with a central hood of substantially the same
25 diameter, in the neighborhood of the propeller blades, as the rear end of the enclosure and being reduced rearwardly therefrom in a manner to avoid the formation of undesirable air currents due to its passage through the
30 air.

Another object is to provide, in combination with an airplane of the pusher type, an enclosure for a power plant including a generally cylindrical housing having a projectile-like shoulder at its forward end and provided with a propeller positioned rearwardly to the housing, the propeller being provided with a central hood of maximum diameter in the plane of the blades, which corresponds to
40 the diameter of the housing, the hood terminating in a streamlined tail portion.

A further object is to provide certain novel features of construction that will be specifically pointed out, or will be obvious in the
45 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
50 with reference to the accompanying draw-

ing, and then claimed, having the above and other objects in view.

In the accompanying drawing which shows a suitable embodiment of the present invention, and in which like numerals refer to like
55 parts throughout the several different views;

Fig. 1 is a more-or-less diagrammatic perspective view of an airplane of the pusher type.

Fig. 2 is a vertical sectional view taken
60 through the axis of one of the power units shown suspended from the wings of the airplane shown in Fig. 1.

Fig. 3 is a more-or-less diagrammatic partially broken end view of one of the wings
65 of the airplane shown in Fig. 1, showing the mounting of a power plant upon the same.

Fig. 4 is a sectional view taken on the line 3—3 of Fig. 2.

In the conventional design of airplanes of
70 the pusher type, the engines are generally mounted either on the wings or suspended from them. In some constructions no enclosure of any type is provided for the engines, and in other types the engines are enclosed and the propeller is positioned rearwardly of such enclosure. Where the engine is not enclosed the resistance offered by the
75 passage of the same through air is relatively great, and in the constructions heretofore employed where the engine is enclosed it has been attempted to so design the enclosure at its rear end as to offer a minimum amount of resistance to its passage through the air, and so as to result in as small a disturbance
80 to the air as is possible. Inasmuch as the propeller in the last described constructions is positioned rearwardly of the housing, and because of the impossibility of supporting the propeller at too great a distance from the power plant, limitations have been present preventing an efficient housing construction. Furthermore, the propeller is so positioned relative to the housing that it works
85 in the air disturbed by the housing and has therefore resulted in less efficient use of the propeller than is desired.

In accordance with the present invention, I provide a construction in which the same efficiency may be realized from the propeller
100

in a pusher type of airplane having an enclosed power plant, as can be realized from the tractor type of airplane.

Referring to the accompanying drawing, I show more-or-less diagrammatically in Fig. 1, an airplane of the pusher type having a fuselage 10 and oppositely extending wings 11. A housing 12 is formed upon the upper face of each wing 11 adjacent the ends thereof and in each housing 12 is positioned a power plant such as 13 shown in Fig. 3, which is adapted to drive a propeller such as 14. Suspended below each wing 11 closer to the fuselage 10 than the housings 12, by suitable supports such as 15, is a housing of the nacelle type 16.

As indicated in Fig. 2, this last housing may be generally circular in section and of a cylindrical form from its rear edge 17 to its forward edge 18, the forward edge blending into the nose 17 through a projectile-like shoulder 20. A power plant 21 is suitably supported within the housing 16 and is provided with a shaft 22 projecting rearwardly past the rear edge 17 of the housing 16. A propeller having a hub 22 and blades 23 is carried by the shaft 21. Mounted concentrically with the hub 22 and turning therewith is a hood or shell 24 which may be supported from the hub 22 by rings such as 25 carried by the hub and spokes such as 26. The shell or hood 24 extends into relatively close relationship with respect to the rear edge 17 of the housing 16 and at that point is of substantially the same diameter as the housing 16. From this point the hood 24 extends rearwardly, preferably at full diameter to a point rearwardly of the trailing edges of the blades 23 from which point it is gradually reduced in section to form a tail portion 27 designed to offer a minimum resistance and to set up a minimum amount of eddies during its passage through the air.

With this construction the housing 16, because of its cylindrical formation and projectile-like shoulder 20, offers a minimum resistance in being thrust through the air, and because of its cylindrical formation, the air has a tendency to be maintained along its side surfaces without setting up eddies. In carrying the full diameter of the housing 16 to a point rearwardly of the propeller blades 23, the normally inefficient center portion of the propeller is eliminated, as far as propulsion and air resistance is concerned, and the air that the effective portions of the blades 23 work in is flowing in a true axial direction and is free of detrimental eddies. Inasmuch as the hood 24 does not transmit any driving or other strains, its construction may be relatively light, and it may be extended to any reasonable distance rearwardly of the propeller that is desired to obtain the streamlined construction thought necessary for optimum results.

The housings 12 on the wings 11 are carried out with the same end in view as the construction described in Fig. 2. In this case it may be found preferable to extend the housing 12 as far as the leading edge of the wing 11 and preferably form it to a generally circular section, as indicated in Fig. 4, the axis of the section being parallel to the direction of normal travel. The housing 12 will thus generally increase in size from the leading edge of the wing to the power plant 13, at which point it will be of maximum diameter. The power plant 13 drives the propeller 14, which is provided with a hood 30 bearing the same relation with respect to the housing 12 as the hood 24 previously described bears to the housing 16. Where the power plant is of that type having aligned cylinders it may be desirable, in some cases, to form a projecting portion such as 31 on the upper surface of the housing 12 in order to accommodate the outer ends of the engine cylinders, as is conventional practice in connection with some engine cowling constructions. Inasmuch as such projections 31 are of limited area as respects the entire area of the cowling or housing, I prefer to disregard them in designing an airplane in accordance with the present invention. In other words, in considering the section through the housing as indicated in Fig. 4, in designing the hood 30 the maximum diameter of the hood 30 may be constructed in accordance with the normal maximum diameter of the housing 12.

It will be noted that by this construction it is possible to mount the propeller in closely adjacent relationship with respect to the power plant and still provide a streamlined construction which will offer a minimum resistance and set up a minimum disturbance in passing through the air.

Formal changes may be made in the specific embodiment of the invention described 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 airplane, in combination, an engine, a propeller positioned rearwardly of said engine and driven therefrom, an enclosure for said engine, a central hood carried by said propeller having parallel side walls extending from in advance of said propeller rearwardly thereof, the rear end of said enclosure being of generally circular shape and the forward end of said hood being of substantially the same size as the rear end of said enclosure and extending into closely adjacent relationship with respect thereto, said hood having a streamlined tail integrally formed therewith.

2. In an airplane, in combination, an engine, a propeller positioned rearwardly of

said engine and driven therefrom, an enclosure for said engine, a central hood carried by said propeller, the rear end of said enclosure being of generally circular shape and the forward end of said hood being of substantially the same size as the rear end of said enclosure and extending into closely adjacent relationship with respect thereto, the forward end of said enclosure being provided with a projectile-like shoulder.

3. In an airplane, in combination, an engine, a propeller positioned rearwardly of said engine, an enclosure for said engine of substantially maximum cross sectional area at its rear end, and a central hood carried by said propeller, said hood being cylindrical in shape within the axial limits of said propeller and acting to continue the stream-lining of said enclosure to a point rearwardly of said propeller.

4. In an aircraft, in combination, a nacelle of generally cylindrical formation supported upon converging outrigger braces, an engine carried thereby, a propeller positioned rearwardly of the rear edge of said nacelle, and a central hood rotatable with said propeller, said hood being of substantially the same diameter at its forward edge as said nacelle at its rear edge and lying in closely adjacent relationship with respect thereto.

5. In an aircraft, in combination, a nacelle of generally cylindrical formation supported upon converging outrigger braces having a projectile-like shoulder at its forward end, an engine carried by said nacelle, a propeller positioned rearwardly of said nacelle driven by said engine, and a hood rotatable with said propeller acting to continue the cylindrical formation of said nacelle to a point rearwardly of said propeller.

6. In an aircraft, in combination, a nacelle of generally cylindrical formation supported upon converging outrigger braces having a projectile-like shoulder at its forward end, an engine carried by said nacelle, a propeller positioned rearwardly of said nacelle driven by said engine, and a hood rotatable with said propeller acting to continue the cylindrical formation of said nacelle to a point rearwardly of said propeller and extending rearwardly therefrom in a streamlined tail.

7. In an aircraft, in combination, a nacelle of generally cylindrical formation supported upon converging outrigger braces and of maximum diameter at its rear edge, an engine carried thereby, a propeller positioned rearwardly of the rear edge of said nacelle, and a central hood rotatable with said propeller, said hood being cylindrical from its forward edge to a point rearwardly of said propeller and being of substantially the same diameter at its forward edge as said nacelle at its rear edge and lying in closely adjacent relationship with respect thereto.

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