May 12, 1942. H. J. JOHNSON 2,283,068

PROPELLER

Filed Dec. 12, 1939 2 Sheets-Sheet 1

Fig. 1.

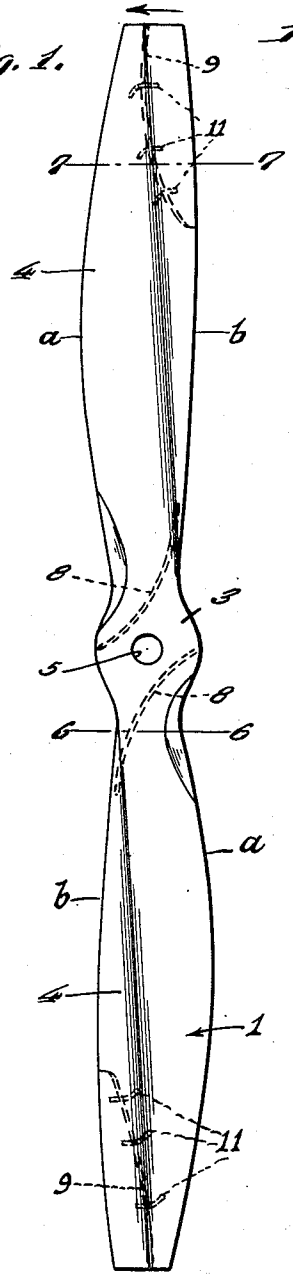


Fig. 2.

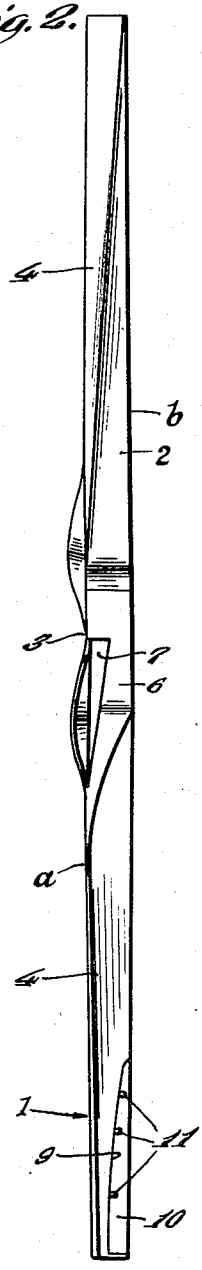
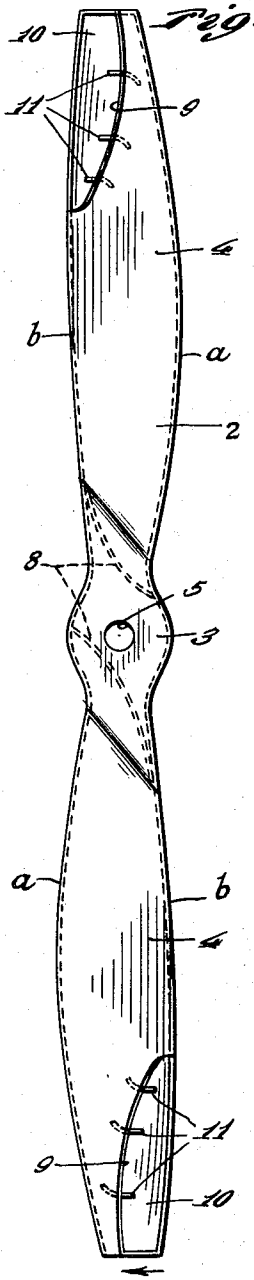


Fig. 3.



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Fig. 4.

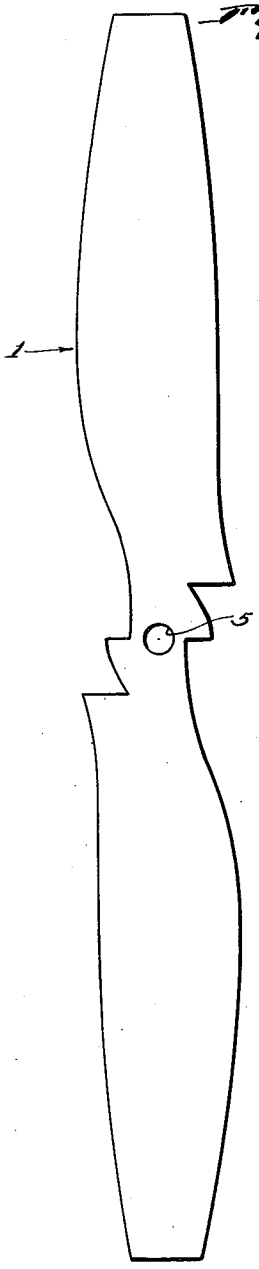


Fig. 5.

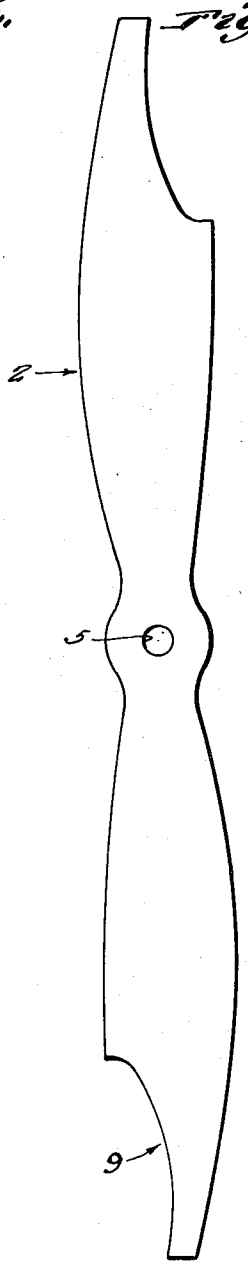


Fig. 6.

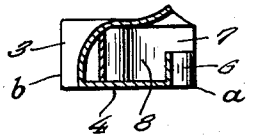


Fig. 7.



Fig. 8.



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UNITED STATES PATENT OFFICE

2,283,068

PROPELLER

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Application December 12, 1939, Serial No. 308,853

2 Claims. (Cl. 170—172)

The present invention relates to new and useful improvements in propellers of the screw type particularly for aircraft and has for its primary object to provide, in a manner as hereinafter set forth, a device of this character embodying a novel construction and arrangement whereby the usual air pressure or resistance at the central or hub portion will be substantially eliminated and at the same time materially increase the atmospheric pressure or density at the outer portions of the blades in the region of the greatest load on said blades.

Other objects of the invention are to provide a propeller of the aforementioned character which will be comparatively simple in construction, strong, durable, highly efficient and reliable in use, light in weight and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:

Figure 1 is a view in front elevation of a propeller constructed in accordance with the present invention.

Figure 2 is a view in side elevation thereof.

Figure 3 is a rear elevational view.

Figure 4 is a view of the blank from which the front of the propeller is formed.

Figure 5 is a view of the blank from which the rear of the propeller is formed.

Figure 6 is a sectional view, taken substantially on the line 6—6 of Figure 1.

Figure 7 is a sectional view, taken substantially on the line 7—7 of Figure 1.

Figure 8 is a detail view of one of the side plates.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention which has been illustrated comprises front and back plates 1 and 2, respectively, of metal or any other suitable material. The plates 1 and 2 are formed and secured together in a manner to provide a hollow propeller comprising a hub structure 3 from which blades 4 project. The hub 3 is provided with an eye 5 for receiving the usual shaft. Of course the front plate 1 forms the suction faces of the blades and the back or rear plate 2 the pressure faces of the blades. The leading edge of each blade is shown at *a* and the trailing edge at *b*.

Extending from the hub portion 3 into the inner portions of the blades 4 on the leading edges *a* of said blades are plates 6. The plates 6, in conjunction with the front plate 1 of the propeller, define elongated air intake openings 7 in the forward edges *a* of the blades. This is illustrated to advantage in Figures 2 and 6 of the drawings. Curved deflectors 8 are provided for directing the air which enters from the atmosphere through the openings 7 toward the outer ends of the hollow blades 4. The deflectors 8 are of a construction and arrangement to accomplish this with a minimum of turmoil and resistance, said deflectors extending from the comparatively wide inner ends of the openings 7 in the hub structure 3 to the trailing edges *b* of the blades 4.

Referring now to Figures 3, 5 and 7 of the drawings, it will be observed that the outer rear portions of the back plate 2 of the blades 4 are cut away, as at 9, in a manner to provide air outlet openings 10 from said blades to the atmosphere. Mounted in the outer portions of the blades 4 is a plurality of deflectors 11 which are arranged to uniformly distribute the outgoing air as it passes through the discharge openings 10 to the atmosphere. As will be seen these deflectors 11 are spaced different distances apart with the inner ones placed closer together than the outer ones which causes the air to be equally distributed through the opening 10 and, of course, these deflectors change the course of the air and they prevent the air from passing freely through the space 10 so that this air will build up atmospheric pressure or density at the rear of the blades and at the outer portions thereof.

It is thought that the manner in which the propeller functions will be readily apparent from a consideration of the foregoing. The construction and arrangement is such as to substantially eliminate the building up of air pressure or resistance at the central or hub portion of the propeller. Instead of this occurring as with propellers in widespread use at present the air in front of the central or hub portion of the propeller is drawn into the inlet openings 7 and thrown by centrifugal force through the hollow blades 4 to the outer ends thereof from which it is discharged to the atmosphere through the openings 10 in a manner to build up atmospheric pressure or density immediately to the suction faces of the blades and at the outer end portions thereof in the area of the greatest load. Thus, the efficiency of the propeller is greatly increased.

It is believed that the many advantages of a propeller constructed in accordance with the

present invention will be readily understood and although a preferred embodiment of the device is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:

1. A propeller of the class described comprising a hollow hub and hollow blades radiating from said hub, the front edge of each blade having an opening therein which extends from the central portion of the front edge of the hub to a point at the front edge of each blade an appreciable distance from the hub, a pair of deflector plates in the propeller in rear of each opening and each plate extending from a point at the center of the front and side edge of the hub to the trailing edge of a blade and each plate curving rearwardly and outwardly and deflecting the air entering an opening to the outer end of a blade, the outer end of each blade having an opening therein which passes through the trailing edge and through the pressure face of the blade, the front wall of the opening, in the pressure face of the blade, curving from the trailing edge forwardly and outwardly to the outer end of the blade, a longitudinal row of spaced deflector plates having their rear ends extending into the last-mentioned opening and said ends being substantially at right angles to the length of the blade with the forward ends of these plates located between the suction and pressure faces of the blade and slightly curving toward the hub and said plates acting to deflect air passing through each blade toward the trailing edge of the blade said plates being unequally spaced apart with the plates at the inner end of the row placed closer together than the other plates.

2. A propeller of the class described comprising a hollow hub and hollow blades radiating from said hub, the front edge of each blade having an opening therein which extends from the central portion of the front edge of the hub to a point at the front edge of each blade an appreciable distance from the hub, deflector means in the propeller in rear of each opening for deflecting the air entering an opening to the outer end of a blade, the outer end of each blade having an opening therein which passes through the trailing edge and through the pressure face of the blade, the front wall of the last mentioned opening, in the pressure face of the blade, curving from the trailing edge forwardly and outwardly to the outer end of the blade, a longitudinal row of spaced deflector plates having their rear ends extending into the last-mentioned opening and said ends being substantially at right angles to the length of the blade with the forward ends of these plates located between the suction and pressure faces of the blade and curving toward the hub and said plates acting to deflect air passing through each blade toward the trailing edge of the blade, the deflector plates being placed closer together at the inner end of a row than are the other plates in the row to provide even distribution of the flow of air into the opening, the suction face of the blade, at each first mentioned opening, curving upwardly and forwardly over the first mentioned opening.

HARRY J. JOHNSON.