A. PICK.

PROPELLER.

APPLICATION FILED AUG. 22, 1917.

1,372,086.

Patented Mar. 22, 1921.

Fig. 1,

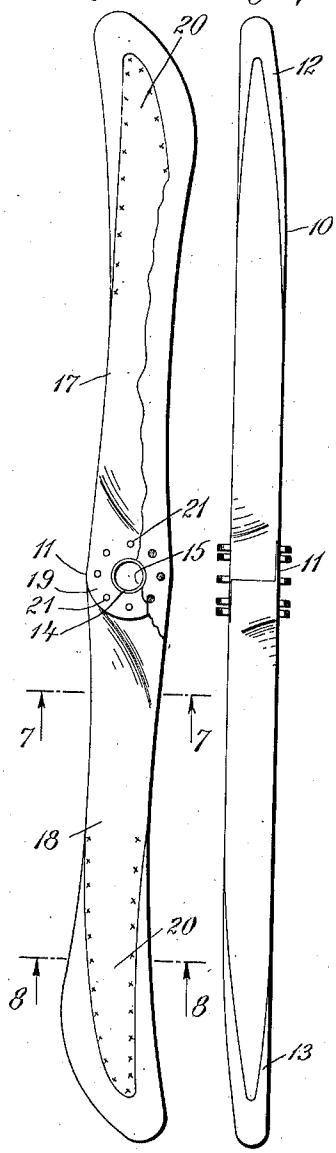


Fig. 2,

Fig. 3,

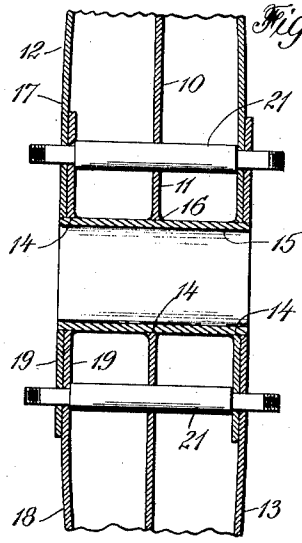


Fig. 5,

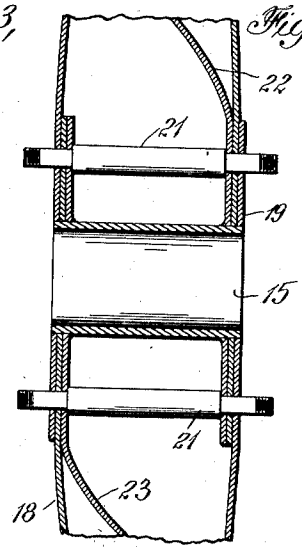


Fig. 4,

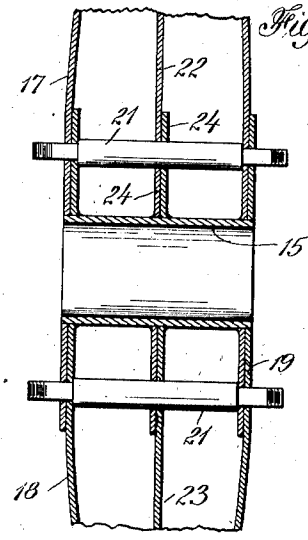


Fig. 6,

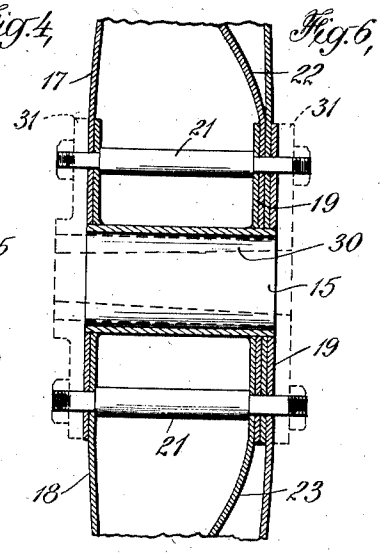
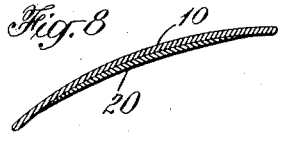


Fig. 7,



Fig. 8



INVENTOR.

Alfred Pick

BY Marshall & Dearborn

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALFRED PICK, OF NEW YORK, N. Y., ASSIGNOR TO EDWARD N. BREITUNG, OF MARQUETTE, MICHIGAN.

PROPELLER.

1,372,086. Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed August 22, 1917. Serial No. 187,518.

To all whom it may concern:

Be it known that I, ALFRED PICK, a subject of the Emperor of Austria, and a resident of New York, county and State of New York, United States of America, have invented certain new and useful Improvements in Propellers, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to propellers for airplanes and the like, and has special reference to metal propellers which are adapted to be operated at high speed and withstand moisture and other adverse climatic conditions.

One object of my invention is to provide a simple and durable sheet metal propeller that shall have blades preferably provided with thin edges, adapted to minimize the resistance in operation and having suitable reinforcing means near the hub.

Another object of my invention is to provide a sheet metal propeller having a blade member coextensive with the propeller and reinforcing surface members near the hub shaped to conform as far as possible to the stress surfaces in order to avoid tendency to either fly apart or collapse when the propeller is operated at high speeds.

Another object of my invention is to avoid the necessity of depending upon any means of attachment between the blades and the hub by forming at least a portion of the hub structure integral with the blade member.

Another object is to provide means for shaping the surfaces of the blades to avoid vacuum pockets without weakening the propeller blades near the hub or materially increasing the air resistance of the blades.

In order that my invention may be thoroughly understood I will now proceed to describe the same in the following specification, and then point out the novel features thereof in appended claims.

Referring to the drawings:

Figure 1 is a front elevation.

Fig. 2 is a side elevation of a propeller arranged and constructed in accordance with my invention.

Fig. 3 is a sectional elevation of the hub portion of the propeller drawn to a larger scale.

Figs. 4, 5 and 6 are views corresponding to Fig. 3, of modified structures which also constitute embodiments of my invention.

Figs. 7 and 8 are transverse sectional views taken on the lines 7—7, 8—8 of Fig. 1.

Special reference may first be had to Figs. 1, 2, 3, 7 and 8 in which 10 designates the blade member of the structure. This is preferably formed of pressed steel and is shaped to provide a hub member 11 and blades 12 and 13. The hub member has a hole 14 through which a tube or sleeve 15 extends, the propeller hub 30 extending through the sleeve as shown in broken lines in Fig. 6.

In the arrangement of the figures under discussion, the blade member 10 is coextensive with the propeller and is welded to the tube or sleeve 15 near its middle point as indicated at 16 in Fig. 3. The blade member is shaped to provide the proper pitch of the propeller. Since the blade member is formed to include an integral hub and since it is mounted on the hub sleeve or tube, it is clearly independent of any attachment such as spokes, screws, rivets, or welds to hold it in opposition to the centrifugal forces to which it is subjected when in operation.

In addition to the blade member the propeller comprises reinforcing surface members 17 and 18 which are formed with circular hubs 19. There are a pair of the members 17 and 18 on each side of the propeller and the hub members 19 of each pair are overlapped and preferably welded together and to the sleeve or tube 15 as shown in Fig. 3. The two pairs of surface members are welded together at their edges and to the edges of the blade member 10 although they are relatively short and are only disposed near the hub of the propeller.

The surface members 17 and 18 serve to support and reinforce the blade member 10 but they are preferably not secured to the blade member except at the edges although at their outer ends which are designated 20, they are smaller than the blades and are bent into close contact with them.

The arrangement is such that the outer ends of the surface members serve to shape one surface of the blade and give it the proper form to avoid vacuum pockets.

The two pairs of hub members 19 are preferably connected and spaced by a plu-

rality of tie bolts 21 which are substantially parallel to the tube or sleeve 15 and are distributed as shown in Fig. 1. The ends of the tie bolts serve as a means of attachment for the propeller hub 30, which has perforated flanges 31, and the enlarged bodies of the bolts prevent the collapse of the hollow propeller structure at the hub.

Instead of making the blade member 10 of one piece it may be made of two pieces such as 22 and 23 of Fig. 4. Each of the members has a hub 24, the two being overlapped and welded together and to the sleeve 15.

This arrangement has the advantage of requiring smaller pieces of sheet steel and of having a reinforced hub by reason of the double thickness of metal at this place.

The blade members may be separated from each other and assembled with the hub members of the surface pieces 17 and 18. This arrangement is shown in Fig. 5.

The single piece blade member may also be assembled with one of the hub groups 19 of the surface members as shown in Fig. 6 instead of located at an intermediate point in the sleeve.

Attention is directed to the fact that the blades being formed of pressed steel may have relatively thin edges as shown in Fig. 8 so that the air resistance is very low. Nevertheless the surface members reinforce and support the blade members and prevent them from collapsing when the propeller is in operation. The twisting of the plate from the plane of the hub members to form the pitch of the propeller is an important factor in rendering the blades relatively stiff, independently of the reinforcing surface members.

Other modifications may be effected within the spirit and scope of my invention and I intend only such limitations as are indicated in the appended claims.

The novel relation of the hub members and the reinforcing tension plates is particularly claimed in claim 1 in my companion application #187,517.

What I claim is:

1. A sheet metal propeller comprising a blade member coextensive with the propeller, surface members reinforcing the blade member near the hub, and united to the blade member near their outer ends.

2. A sheet metal propeller comprising a blade member having an integral hub member bent to give a suitable pitch to the propeller, and surface members forming a hollow structure near the hub and united with the blade members near their outer ends.

3. A sheet metal propeller comprising a plurality of shaped blade members following a unitary structure extending throughout the length of the propeller, and shaped surface members joined at their edges to the blade members to form a hollow metal portion near the hub and united to the blade members to form a solid portion near their outer ends.

4. A sheet metal propeller comprising a blade member coextensive with the propeller, surface members united to the blade member at their edges to form a hollow structure near the hub, and closely united to the blade member near its outer ends.

5. A sheet metal propeller comprising a blade member having an integral hub member bent to give a suitable pitch to the propeller, and surface members forming a hollow structure near the hub and united with the blade members near their outer ends, said blade member constituting a tension element throughout the hollow structure of the propeller.

In witness whereof, I have hereunto set my hand this 20 day of August, 1917.

ALFRED PICK.