Dec. 11, 1934. H. SUKOHL 1,984,044

PROPELLER AND METHOD OF MANUFACTURING THE SAME

Filed June 13, 1930

Fig. 1.

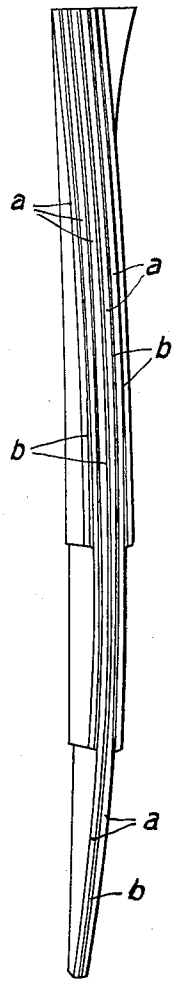


Fig. 2.

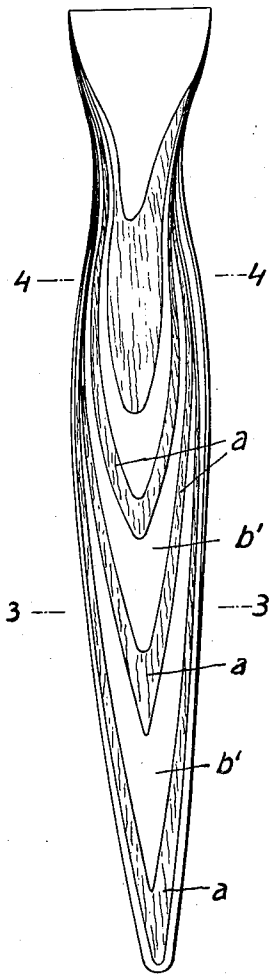


Fig. 3.

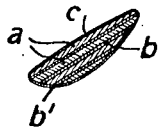


Fig. 4.

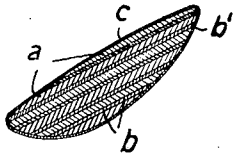
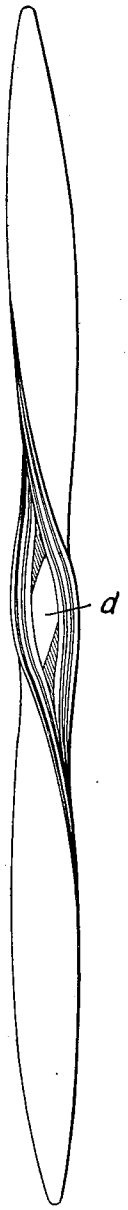


Fig. 5.



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PROPELLER AND METHOD OF MANUFACTURING THE SAME

Heinrich Sukohl, Berlin-Waidmannslust, Germany

Application June 13, 1930, Serial No. 460,902
In Germany June 15, 1929

9 Claims. (Cl. 170—159)

My invention relates to improvements in propellers and the method of manufacturing the same, and more particularly in propellers for aircraft, which are made from laminations of wood. The object of the improvements is to provide a propeller of this class which has high strength, and which is not destroyed by mechanical or atmospheric influences even after long use. With this object in view my invention consists in constructing the propeller from laminations of wood and laminations of a cellulose compound such as celluloid or cellon (cellulose nitrate or cellulose acetate), the said compound being intimately combined with the laminations of wood and providing a skeleton imparting high strength to the propeller and protecting the wood against atmospheric influences. In the preferred form of the invention the propeller is externally coated with a material adapted to combine with the laminations of cellulose compound, the said coating preferably consisting of the same cellulose compound or of a material similar in character to the said cellulose compound.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing

Fig. 1 is an elevation showing a blank composed of laminations of wood and cellulose compound,

Fig. 2 is an elevation showing a propeller blade made from the blanks illustrated in Fig. 1,

Figs. 3 and 4 are sectional views taken respectively on the lines 3—3 and 4—4 of Fig. 2, and

Fig. 5 is an elevation showing a propeller comprising two blades made from continuous lengths of wood.

As shown in Fig. 1 the blank from which the propeller is made is composed of superposed laminations *a* of wood and laminations *b* of a cellulose compound such as celluloid or cellon, ethyl or bezyl cellulose, the said laminations of cellulose compound and wood being intimately combined with each other. The laminations of wood have a thickness of from 10 to 25 millimeters and the laminations of cellulose compound have a thickness of from ½ to 2 millimeters. Thus the laminations of cellulose compound assist the laminations of wood in taking up the forces exerted on the propeller.

The blank shown in Fig. 1 is manufactured by first moistening or imbuing the wood laminations with a suitable solvent for the cellulose compound, such as acetone or ethyl acetate, alternately superposing the laminations of wood and cellulose compound, and pressing the same together at ordinary temperature. Thereby the laminations of cellulose compound are superficially dissolved, so that they provide the binding medium combining the wood laminations and the solid inner parts of the cellulose compound laminations, the dissolved cellulose compound passing into the pores of the wood. By the action of the solvent the cellulose compound is made to swell and the pressure produced thereby forces the softened and dissolved parts of the cellulose compound into the pores of the wood, so that the laminations are intimately combined with each other into a solid blank.

By applying the cellulose compound to the wood in solid form comparatively thick layers of cellulose compound are provided between the wood laminations, because the solid cellulose compound is not forced outwardly by the pressure exerted on the blank.

In lieu of a pure solvent a solvent may be used in which a certain amount of the cellulose compound or a material similar in character is dissolved. A suitable composition is the aforesaid acetone or ethyl acetate having cellulose dissolved therein.

While pressing the blank it is preferably twisted about its longitudinal axis in order to produce a propeller in which the laminations are disposed substantially parallel to the surface of the propeller.

After manufacturing the blank in the manner described above the final shape of the propeller is cut therefrom by planing, fraising or the like, and a coating *c* of the cellulose compound or a material similar in character is applied thereto. By dressing the propeller into tapering shape the intermediate layers *b* of cellulose compound are laid free with large surface areas *b'* particularly at the suction side of the propeller blade and therefore the coating of cellulose compound applied to the surface of the propeller combines with the said large surface areas of the laminations, so that it is securely combined therewith.

The coating is preferably applied in several layers until the desired thickness is obtained.

As appears from Figs. 3 and 4 the laminations of the cellulose compound and the coating provide a skeleton enclosing the wood laminations and preventing the access of moisture thereto by reason of the weather proof character of the said material. Further, the laminations of the cellulose compound have a high strength and therefore they increase the strength of the propeller.

The coating may be applied to the propeller by means of a brush, by squirting, or by immersing the propeller blade into a solution of the coating material. When applying the coating by immersing the propeller into the solution and allowing the same to dry with the point or outer end thereof directed downwardly the coating material flows downwardly and towards the said outer end of the propeller blade thus increasing the strength of the surface coating at the said point.

In a modification of the method of manufacturing the propeller I apply the coating in solid form, and I bind the same by means of a dissolved binding medium having a character similar to the material of the laminations and the coating. If a binding medium is used which combines with different materials the laminations and the coating may be made from such materials which are different in character.

In Fig. 5 I have shown a propeller having two blades made from continuous laminations, the said laminations being twisted at opposite sides of the axis of the propeller. The propeller is formed with an opening *d* receiving the propeller shaft.

By thus embedding the wood laminations in a skeleton of a material proof against the action of moisture deformation of the propeller by atmospheric influences is avoided.

I claim:

1. The herein described method of manufacturing propellers, which consists in assembling a plurality of solid laminations of a soluble cellulose compound and a plurality of laminations of wood moistened with a solvent for said cellulose compound, said laminations of cellulose compound and wood being alternately superimposed upon one another, combining said laminations by pressure and at a temperature which is not obnoxious to wood while allowing superficial dissolution of said cellulose compound, and coating the said propeller with a medium adapted to combine with said cellulose compound.

2. The herein described method of manufacturing propellers, which consists in assembling a plurality of solid laminations of a soluble cellulose compound and a plurality of laminations of wood moistened with a solvent for said cellulose compound, said laminations of cellulose compound and wood being alternately superimposed upon one another, combining said laminations by pressure and at a temperature which is not obnoxious to wood while allowing superficial dissolution of said cellulose compound, and coating the said propeller with a medium similar in character to and adapted to combine with said cellulose compound.

3. The herein described method of manufacturing propellers, which consists in assembling a plurality of solid laminations of a soluble cellulose compound and a plurality of laminations of wood moistened with a solvent for said cellulose compound having matter similar in character to said cellulose compound dissolved therein, said laminations of cellulose compound and wood being alternately superimposed upon one another, and combining said laminations by pressure and at a temperature which is not obnoxious to wood while allowing superficial dissolution of said cellulose compound.

4. The herein described method of manufacturing propeller blades, which consists in assembling a plurality of solid laminations of a soluble cellulose compound adapted when dissolved to act as a binding medium for wood and a plurality of laminations of wood moistened with a suitable solvent for said cellulose compound, said laminations of cellulose compound and wood being alternately superimposed upon one another, and combining said laminations by pressure and at a temperature which is not obnoxious to wood while allowing superficial dissolution of said cellulose compound.

5. The herein described propeller blade, comprising laminations of wood, and a skeleton provided by water-proof laminations adapted to be softened into a binding medium at a temperature which is not obnoxious to wood and having a thickness permitting the same to take up a substantial proportion of the strain exerted on said propeller blade and to prevent the transmission of humidity therethrough, said laminations of wood and water-proof laminations being alternately superimposed and being securely held together by the surface material of said water-proof laminations acting as a binding medium.

6. The herein described propeller blade, comprising laminations of wood and a skeleton provided by laminations of a cellulose compound adapted to be softened into a binding medium at a temperature which is not obnoxious to wood and having a thickness permitting said laminations of cellulose compound to take up a substantial proportion of the strain exerted on said propeller blade and to prevent the transmission of humidity therethrough, said laminations of wood and said laminations of cellulose compound being alternately superimposed and being securely held together by the surface material of said cellulose compound acting as a binding medium.

7. The herein described propeller blade, comprising laminations of wood and a skeleton provided by laminations of a cellulose compound adapted to be softened into a binding medium at a temperature which is not obnoxious to wood and having a thickness permitting said laminations of a cellulose compound to take up a substantial proportion of the strain exerted on said propeller blade and to prevent the transmission of humidity therethrough, and a coating of a material similar in character to the material of the laminations of cellulose compound, said laminations of wood and said laminations of cellulose compound being alternately superimposed and being securely held together by the surface material of said cellulose compound acting as a binding medium.

8. The herein described propeller blade, comprising laminations of wood and a skeleton provided by water-proof laminations adapted to be softened into a binding medium at a temperature which is not obnoxious to wood and having a thickness permitting the same to take up a substantial proportion of the strain exerted on said propeller blade and to prevent the transmission of humidity therethrough, the thickness of said wood laminations being a multiple of that of said water-proof laminations, and said wood laminations and water-proof laminations being securely held together by the surface material of said water-proof laminations acting as a binding medium.

9. The herein described propeller blade, comprising laminations of wood and a skeleton provided by water-proof laminations adapted to be softened into a binding medium at a temperature which is not obnoxious to wood and having a thickness permitting the same to take up a substantial proportion of the strain exerted on said propeller blade and to prevent the transmission of humidity therethrough, said water-proof laminations having a thickness or from ½ to 2 mm. and said laminations of wood having a thickness of from 10 to 25 mm. and said laminations of wood and said water-proof laminations being alternately superimposed and being securely held together by the surface material of said water-proof laminations acting as a binding medium.

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