

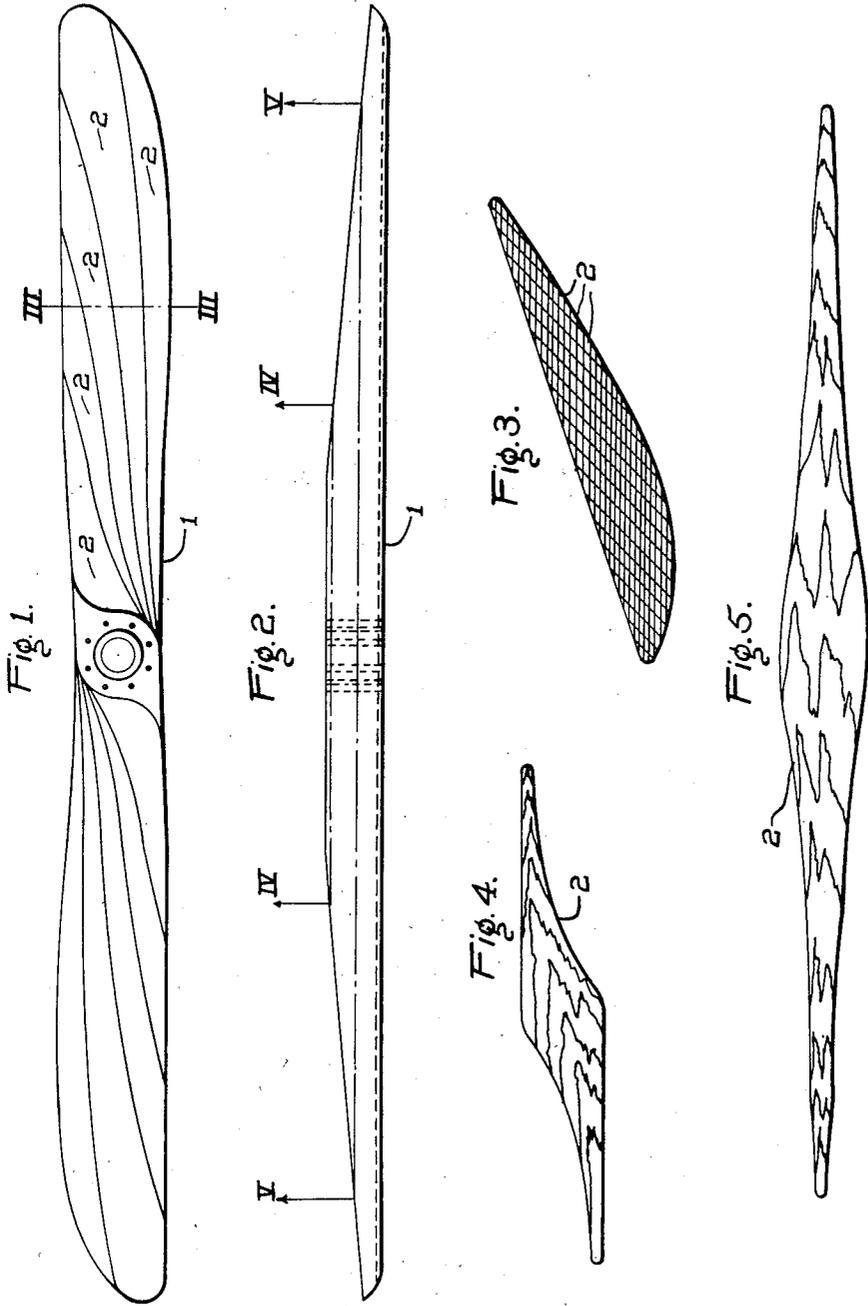
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WOOD VENEER PROPELLER

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UNITED STATES PATENT OFFICE.

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WOOD-VENEER PROPELLER.

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My invention relates to propellers and more particularly to propellers for aircraft.

It is well known to those familiar with the art that the construction of propellers built up of a few sections of wood glued together, or wood reinforced with metal, entails a considerable cost of production, owing to the length of time necessary to produce a single propeller, the high cost of materials, and the necessity for employing expert or skilled workmen. Also, such propellers lack the necessary strength to withstand the centrifugal force, bending and thrust moments and vibrations incident to use. Wood propellers have a tendency to check and split and are not resistant to the erosive effect of rain, snow and the like.

It is among the objects of my invention to overcome the defects and weaknesses of wooden propellers as heretofore constructed, and to provide a structure which shall be strong, homogeneous, tough and capable of withstanding rough handling.

A further object of my invention is to provide a propeller in which is employed laminations of impregnated wood veneer and a phenolic condensation product or other binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

In practicing my invention, I employ thin laminations of preformed wood veneer and impregnate the same with a phenolic condensation product or other binder which hardens and becomes substantially insoluble and infusible upon the application of heat. The impregnated laminations are assembled in a mold and are subjected to heat and pressure to consolidate and compress the material and to harden the binder.

In the accompanying drawing, constituting a part hereof and in which like reference characters indicate like parts,

Figure 1 is a plan view of a propeller constructed in accordance with my invention;

Fig. 2 is a side elevational view thereof;

Fig. 3 is an enlarged sectional view taken along the line III—III of Fig. 1 and shows the built-up laminated structure of the finished propeller;

Fig. 4 is a view taken along the line IV—IV of Fig. 2, showing a plan of one of the laminations, and

Fig. 5 is a view taken along the line V—V

of Fig. 2, showing a plan of another of the laminations.

The propeller 1 is preferably formed of a series of long and short pre-cut and preformed impregnated layers or laminations 2, as generally shown in Figs. 1 and 3. The layers or laminations 2 are preferably made of wood veneer, two forms of which are shown in Figs. 4 and 5, respectively, and preferably of a lesser thickness than the depth to which the binder will penetrate in order to provide completely impregnated laminations.

The laminations, having been pre-cut and preformed and impregnated with a phenolic condensation product or other binder which hardens and becomes substantially insoluble and infusible upon the application of heat, are superposed in a suitable mold, the grain of said laminations being preferably parallel to the longitudinal axis of the propeller. Staggering of the grain of alternate laminations at an angle with the longitudinal axis of the propeller, however, may be resorted to. Suitable heat and pressure may then be applied to compress the laminations and to bind the same firmly together. I generally employ laminations of about $\frac{1}{16}$ " thick and compress the same to about one-half the original thickness in molding.

A propeller or other similar member embodying laminations of wood veneer of substantially the type herein described and a phenolic condensation product or other binder which hardens and becomes substantially insoluble and infusible upon the application of heat is markedly superior to the ordinary built-up propeller of glued sections, as known theretofore. A propeller or other member which is to be subjected to immense strains and stresses in one direction with only minor stresses transversely to these main stresses, if constructed in accordance with my invention will be dependable, have long operative life, and may be constructed just as economically, if not more so, than previous structures. The structure is not affected by moisture.

Obviously, various changes in construction may be made within the scope of my invention. For instance, different thicknesses of laminations or other binders other than specified may be employed in lieu thereof. Although I prefer to use this con-

struction in propellers, it is obvious that it is equally well adapted to other applications.

I claim as my invention:

1. A propeller comprising impregnated laminations of wood veneer, said laminations being of less thickness than the depth to which the impregnating material penetrates, and a binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

2. A propeller comprising impregnated laminations of wood veneer, said laminations being of less thickness than the depth to which the impregnating material penetrates, and a phenolic condensation product as a binder.

3. A propeller comprising laminations of wood, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

4. A propeller comprising laminations of wood, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a phenolic condensation product as a binder.

5. A propeller comprising laminations of wood, veneer, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

6. A propeller comprising laminations of wood veneer, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a phenolic condensation product as a binder.

7. A propeller comprising impregnated laminations of wood veneer, molded to the finished form of the propeller the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

8. A propeller comprising impregnated laminations of wood veneer, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller

and a phenolic condensation product as a binder.

9. A propeller comprising preformed impregnated laminations of wood veneer, molded to the finished form of the propeller, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a phenolic condensation product as a binder.

10. A propeller comprising impregnated laminations of wood veneer, said laminations being of less thickness than the depth to which the impregnating material penetrates, the grain of said laminations being substantially parallel to the longitudinal axis of the propeller and a phenolic condensation product as a binder.

11. A propeller comprising superposed laminations of wood veneer, each of which constitutes an entire longitudinal section of said propeller, said laminations being impregnated with a phenolic condensation product and so arranged that the grain of alternate laminations is staggered at an angle to the longitudinal axis of the propeller, and a binder which hardens and becomes substantially insoluble and infusible upon the application of heat.

12. A propeller comprising superposed laminations of wood veneer, each of which constitutes an entire longitudinal section of said propeller, said laminations being impregnated with a phenolic condensation product and so arranged that the grain of alternate laminations is staggered at an angle to the longitudinal axis of the propeller, and a phenolic condensation product as a binder.

13. A propeller comprising compressed laminations of wood veneer, treated with a phenolic condensation product, said laminations being compressed to about one-half of their original thickness, and a binder which hardens and becomes substantially insoluble upon the application of heat.

14. A propeller comprising compressed laminations of wood veneer impregnated with a phenolic condensation product, said laminations being compressed to about one-half of their original thickness, and a phenolic condensation product as a binder.

In testimony whereof, I have hereunto subscribed my name this 13th day of September 1923.

NOBLE S. CLAY.