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2,599,718

LAMINATED PROPELLER

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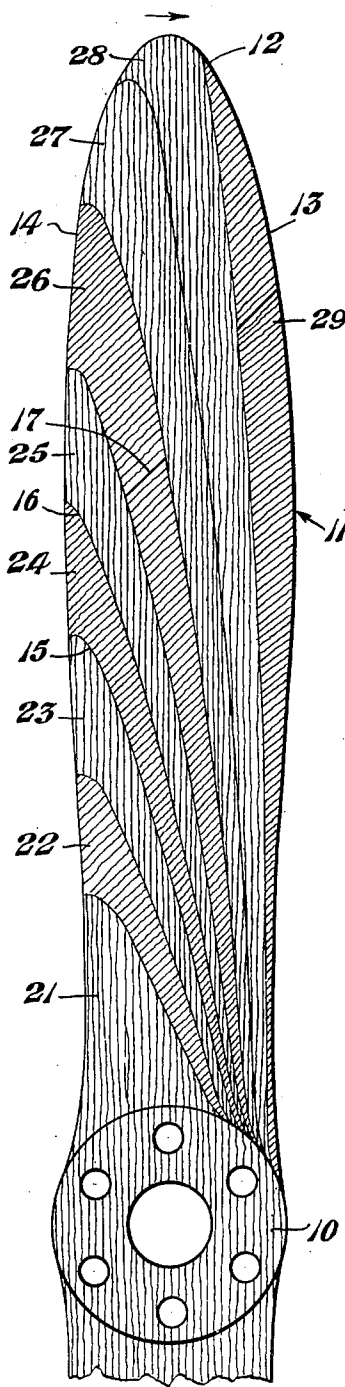


Fig. 1.

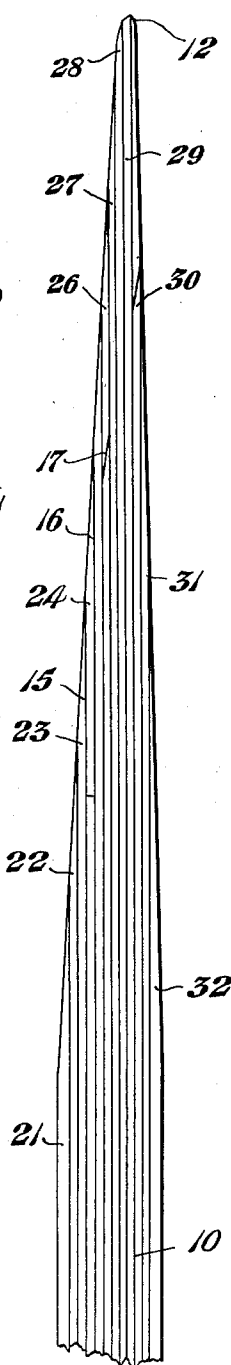


Fig. 2.

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LAMINATED PROPELLER

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1 Claim. (Cl. 170—159)

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This invention relates to aerial propellers having fixed pitch blades, said blades containing at least in part fibrous material such as wood distinguished by greater stiffness in the direction of the fibres than in direction at right angles to the fibres.

Ordinary fixed pitch propellers tend to increase their pitch elastically as the thrust increases, or at least they do not diminish their pitch as the thrust increases. The contrary elastic behaviour, namely a tendency to diminish the pitch angle elastically as the thrust increases is desirable for reason of performance, and relatively small favorable elastic twist angles noticeably improve the performance of the propeller. This is well understood from the action and operation of variable pitch propellers.

It is the purpose of the present invention to provide a fixed pitch propeller the blades of which twist elastically and favorably as the thrust changes.

This is accomplished by making at least a portion of the blade of fibrous material, preferably wood, so disposed that the fibres are disposed diagonally and not radially.

This will now be illustrated in the accompanying drawing and described in the specification, a certain preferred embodiment being disclosed by way of illustration only, for, since the underlying principle may be incorporated in other propellers it is not intended to be limited to the propeller shown except as such limitations are clearly imposed by the appended claim.

In the drawing like numerals refer to similar parts throughout the several views, of which

Fig. 1 represents the rear or pressure side fractional view of a right hand turning wood propeller incorporating the invention.

Fig. 2 represents the side or elevational view of the same propeller.

In Figs. 1 and 2 only one blade is shown, the other blade is cut off as not showing anything new. The two blades are exactly alike. The propeller has in all two blades denoted broadly by 11, extending radially from hub 10 to the tip 12. The hub 10 is considered "inward," the tip 12 is considered "outward." The blades have a leading edge 13 and a trailing edge 14. They rotate from 14 to 13, which direction of motion is designated as "forwardly." In Figs. 1 and 2 the usual tip guards of brass or other material are omitted so as not to obscure the view, but it is contemplated to provide the propeller with the usual tip guards.

The propeller blade 11 is carved out of a blank

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glued up of 12 laminations designated consecutively by 21 to 32. These laminations are firmly glued to each other in pairs along lamination glue interfaces separating a pair of laminations. Thus, for instance, lamination 24 is glued to lamination 23 along the glue interface 15 and to lamination 25 along the glue interface 16. This gluing together of laminations 21 to 32 produces a stratified wood block or blank, the individual laminations constituting the strata. All lamination interfaces such as 15 and 16 are spaced, that is to say they do not run together or intersect. Fig. 1 shows a butt joint 17 within lamination 26. Such glue joints, either butt joints or scarf joints, are sometimes resorted to to make large laminations of small pieces of wood. Any glue joint such as 17 within any individual lamination is not termed a glue interface in this specification, the term "glue interface" being intended to designate only interfaces separating a pair of individual laminations.

The novelty of the propeller resides entirely in the grain or fibre direction of the several laminations. This grain direction is shown in Fig. 1. Laminations 21, 23, 25, 27, 28, 30, and 32 have their grain disposed in substantially radial direction, that is in the direction from hub 10 to tip 12. All remaining laminations, 22, 24, 26, 29, and 31 have their grain disposed in diagonal direction, forming approximately an angle of 45 degrees with said radial direction. The direction of the grain of all these last enumerated laminations is disposed outwardly and forwardly relative to the blade, as shown in Fig. 1. Such diagonally disposed grain is essential for obtaining the beneficial result wanted. Laminations having the grain diagonal but in the opposite direction are therefore altogether avoided, and not used.

The peculiar elastic twisting effect obtained is caused entirely by the specified diagonal direction of the fibres, and not by the combination of diagonal fibres with radial fibres. This combination is required by way of a compromise, for the purpose of obtaining the twisting effect without impairing the strength. The reality of the twisting effect is beyond doubt, it can easily be observed with the propeller clamped in position. The actual twisting obtained in the propeller blade is quite small, but even a fraction of one degree brings about a very noticeable improvement of the performance, and this improvement has been consistently observed.

I claim:

In an aerial fixed pitch propeller a radial wooden blade composed of radially grained lami-

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nations and of diagonally grained laminations, all laminations being disposed substantially at right angles to the propeller axis and being glued firmly together along spaced substantially plane and parallel interfaces so as to form a stratified block, substantially all diagonally grained laminations having their grain disposed in forward and outward direction, whereby the blade will elastically diminish its pitch in response to an increase of the thrust load.

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REFERENCES CITED

The following references are of record in the file of this patent:

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