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M. M. MUNK
PROPELLER CONTAINING DIAGONALLY
DISPOSED FIBROUS MATERIAL
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2,484,308

Fig. 1.

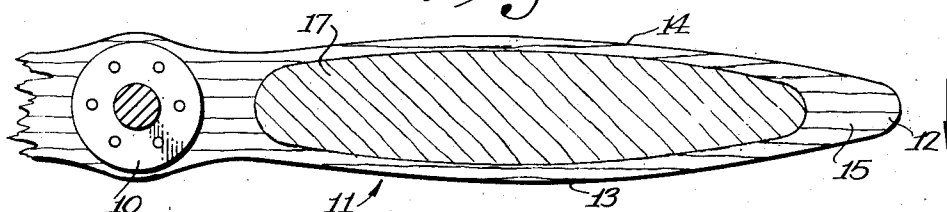


Fig. 2.

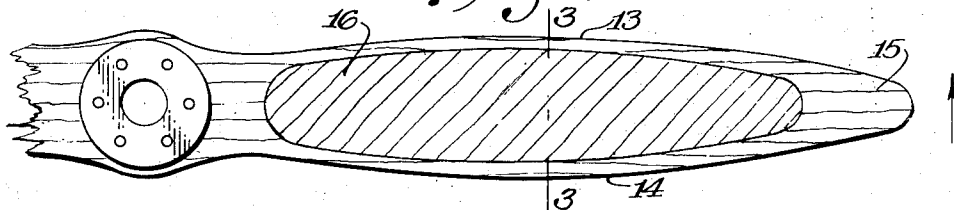
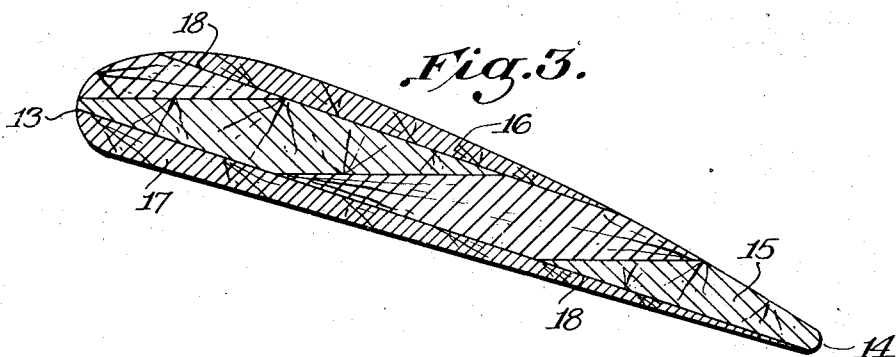


Fig. 3.



Inventor,
Max M. Munk

UNITED STATES PATENT OFFICE

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PROPELLER CONTAINING DIAGONALLY
DISPOSED FIBROUS MATERIAL

Max M. Munk, Cottage City, Md.

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3 Claims. (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 propellers. 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 claims.

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 same propeller in the same manner in front view or suction side view.

Fig. 3 represents the cross section through the same propeller taken on line 3—3 in Fig. 2.

In Figs. 1 and 2 only one blade is shown, the other blade is supposed to be cut off as not showing anything new. The propeller has in all two blades denoted broadly by 11, extending radially from hub 10 to 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.

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The intermediate or inner main portion of the blade, 15, is glued up of wood with the wood fibres extending substantially radially, as is common practice.

Two outer auxiliary blade portions, front portion 16 and rear portion 17, also of wood, are glued to the inner portion 15. The wood fibres of portions 16 and 17 are diagonally disposed, in that they form a substantial angle with the radial direction, preferably about 45 degrees. The fibres of 16 and of 17 extend outwardly and forwardly as these terms were before defined. The fibre direction of the several blade portions is indicated in Figs. 1 and 2. Note that the fibres of the auxiliary layers 16 and 17 run substantially parallel.

The relative disposition of blade portions 15, 16, and 17 is clearly shown in the cross section Fig. 3. In Fig. 3, upwardly and rightwardly hatching indicates a substantially radial fibre direction, and downwardly and rightwardly hatching indicates a diagonal fibre direction, all substantially the same diagonal direction, namely outwardly and forwardly as explained and drawn in Figs. 1 and 2.

All blade portions mentioned are securely glued together. The glue surfaces 18 in Fig. 3 appear as straight lines in this peripheral cross section. This is preferred for ease of manufacture.

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 preferred by way of a compromise, for the purpose of obtaining the twisting effect without impairing the strength excessively. The reality of the twisting effect is beyond doubt, it can easily be observed on small wood samples having its fibres diagonally disposed. The actual twisting obtained in the propeller blade is quite small, but even a fraction of a degree brings about noticeable improvements of the performance.

I claim:

1. In an aerial propeller a solid laminated radial wooden blade consisting of a main portion in which substantially all wood fibres are radially disposed, and of one or more auxiliary layers in which substantially all wood fibres are diagonally disposed, all said diagonally disposed fibres extending in forward and outward direction, the auxiliary layers being glued to the main portion to form a solid blade, whereby the blade will

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elastically decrease its pitch angle with increasing thrust.

2. In a fixed pitch aerial propeller a solid laminated radial wooden blade consisting of an inner portion in which substantially all the wood fibres are radially disposed, and of an upper and a lower portion in which substantially all of the wood fibres are diagonally disposed, the upper and the lower portions being glued to the inner portion to form a solid blade, and substantially all of the wood fibres of the upper and of the lower portions extending forwardly and outwardly.

3. In a fixed pitch aerial propeller a solid laminated radial wooden blade consisting of a main portion in which all wood fibres are radially disposed, and of one or more auxiliary layers in which all wood fibres are diagonally disposed, all said diagonally disposed fibres extending in forward and outward direction, the auxiliary layers being glued to the main portion to form a solid blade, and the glue interface between the main portion and the auxiliary layers being

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curved so as to contain a continuous succession of straight lines at right angle to the blade and a continuous succession of at least partially curved lines lengthwise of the blade, their curvature being concave in relation to the main portion.

MAX M. MUNK.

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