Jan. 19, 1932. W. H. KEMPTON 1,842,178

PROPELLER

Filed Feb. 15, 1930

Fig. 1

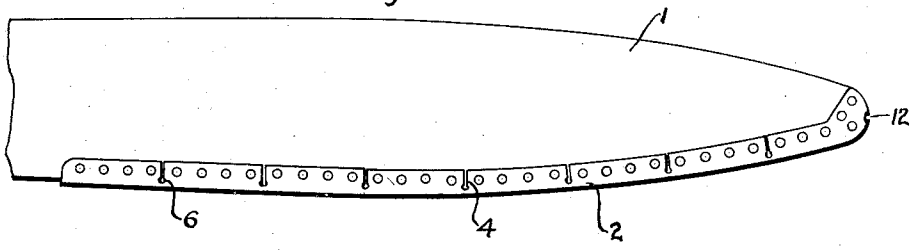


Fig. 2

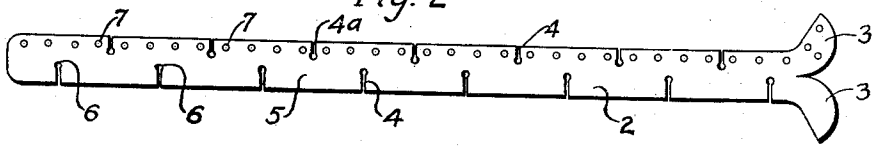


Fig. 3.

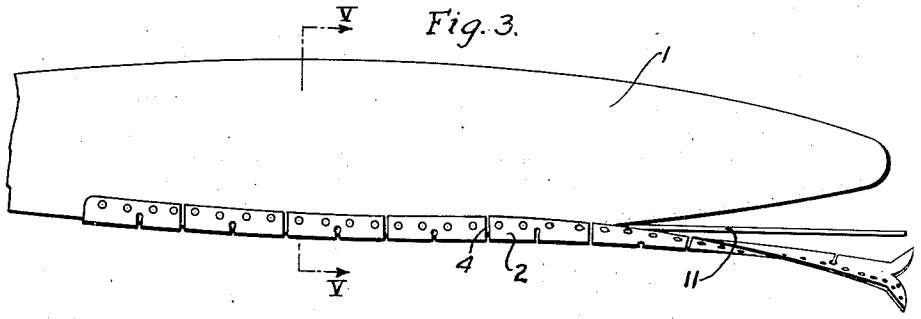


Fig. 4.

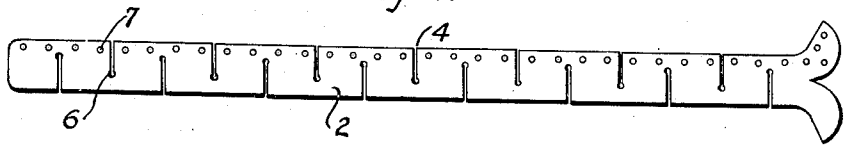
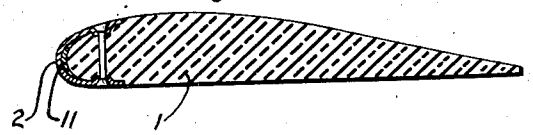


Fig. 5.



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1,842,178

UNITED STATES PATENT OFFICE

WILLARD H. KEMPTON, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

PROPELLER

Application filed February 15, 1930. Serial No. 428,636.

My invention relates to propellers and has particular relation to a tipping for the edges of such propellers.

I am aware that a tipping for propellers has been proposed which utilizes a strip of material embracing the leading edges of the blades in which oppositely disposed notches have been made along the edges of the strip, but such propellers have not proven entirely satisfactory because the oppositely disposed notches defined a region which is subjected to greater bending stresses than other points and the tipping cracks at the notches. Flexing of the blades and wear caused the edges of the cracks to curl so that ultimately one or more segments of the tipping were thrown off resulting in damage or destruction of the propeller.

An object of my invention is to provide a propeller tipping which will protect the edges of the blades, particularly the leading edge and which will permit any water which may collect under the tipping to escape.

Another object of my invention, therefore, is to provide a propeller tipping which is extremely flexible and which will not crack.

Another object of my invention is to provide a tipping which does not interfere in any way with the flexing of the propeller blade, which is highly resistant to wear and which will not loosen from the propeller.

In practicing my invention, I provide a strip of material preferably of metal such as chromium steel, alloy termed "stainless" steel, a nickel alloy termed "Monel" metal, or the like, and cut slots into the strip from opposite sides in alternate relation.

My invention may be better understood by reference to the accompanaying drawings in which like numerals indicate like parts.

Figure 1 is a view of the tipping strip attached to a propeller blade.

Figure 2 is a view of the tipping strip.

Figure 3 is a view of the tipping strip with the secondary strip.

Figure 4 is a view of a modification of Figure 2.

Figure 5 is a cross section of a blade with strip attached.

Referring to the drawings, my tipping may be applied to propeller blades 1 made of any of the well-known materials, such as aluminum alloy, wood, or molded, laminated material. The tipping comprises a strip of material 2 which may be of any suitable composition, but which is preferably of "stainless" steel or "Monel" metal, as beforementioned. The strip is preferably provided with two bifurcated end pieces 3 for embracing the tip of the blade. One of these tipping pieces may be omitted and supplied as a separate piece later, if so desired, the separate piece being soldered or welded to the strip after the strip has been applied to the propeller blade.

Elongated openings 4 which preferably are made by saw-cutting or slotting the strip are made in the edges of the strip perpendicular to the edge with the slots 4 cut alternately from both sides or edges of the strip in staggered relation so that any two adjacent slots on one side of the strip define a segment 5 of material with a slot 4*a* projecting into the segment from the opposite side substantially at the midpoint of the segment.

It may be seen that any two adjacent segments are connected to each other by a segment along the opposite edge of the strip.

The slots 4 may project inwardly only part way to the center line of the strip to constitute a segment of shallow U-shape (Fig. 2) or may project beyond the center line to constitute a segment of U-shape with a deeper central opening (Fig. 4), so that the connected segments of the strip itself constitute a sort of S-shaped structure.

The slots preferably end in a slightly enlarged circular opening 6 to minimize the formation of cracks, inasmuch as a square or sharply defined opening at the end of the slot would tend to localize the stresses to start cracking of the tipping.

In order to fasten the tipping to the propeller, counter-sunk openings 7 are preferably provided in each segment along one edge of the blade (see Figs. 2 and 4) in order to inidcate the points at which the blade should be drilled after the strip has been applied for riveting the strip to the blade. Of course, all of the drilling of both edges of

the blade may be done with the strip in place on the blade or the strip may be fastened to the blade in any other suitable manner.

Fastening of the strip to the blade is preferably accomplished by fastening the segments at either the outside end or the inner end by folding the segments over the blade, drilling the blade at the openings 7 and riveting the segments to the blade (Fig. 3). Adjacent segments are successively bent to conform to the propeller contour and fastened to the blade by riveting. After the entire strip has been riveted to the blade, the tipping and rivets are dressed down, as by filing, and the recesses at the rivets filled in by means of solder, or the like.

It may readily be seen that, if shallow slots are employed, the slots do not project over the edge of the blade (Figs. 1 and 2), but if deep slots are employed, the slots do project over the edge of the blade (Figs. 3 and 4). The first named arrangement is very flexible, by reason of the staggered relation of the slots, and the second arrangement is even more flexible, than the first, because bending occurs only in a flat portion of the strip which is fastened securely to the blade.

A propeller blade made according to the second arrangement may wear slightly at points adjacent the slots where they pass over the leading edge of the propeller, but it has been found in practice that the slots may be made so narrow that such wearing of the blade in use is negligible, probably because the shock of striking rain drops, sand and the like is absorbed by the edges of the slots. If desired, however, a second strip of material 11 may be placed underneath the tipping to protect the blade at the slots. This strip, if desired, may be fastened to the blade or to the tipping, but preferably is held only by placing it on the edge of the blade beneath the tipping and fastening the tipping over the strip to prevent it from becoming disengaged from the blade.

If desired, the secondary strip 11 may be located on the outside of the tipping strip.

The edges of the bifurcated members may be soldered or welded together to form a cover for the tip of the blade, and, if desired, holes 12 may be drilled radially into the tip to permit the escape of water which may collect under the tipping.

Water may also escape at any point along the edge of the tipping through the slots.

My propeller tipping is extremely flexible and does not readily crack. The tipping constitutes an excellent protection for the blade and does not interfere with the natural flexing of the propeller.

Although I have described specific embodiments of my invention, modifications may be made by those skilled in the art without departing from the spirit and scope of my invention as defined by the appended claims.

I claim as my invention:

1. The combination with a propeller blade, of tipping therefor, comprising a continuous strip embracing an edge of the blade, and spaced segments extending alternately from opposite sides of said strip adapted to be secured to said blade.

2. The combination with a propeller blade, of tipping therefor, comprising a strip embracing an edge of the blade, the strip being provided with staggered slots extending from opposite sides of the blade.

3. The combination with a propeller blade, of tipping therefor, comprising a continuous sheet of material, having a series of staggered notches therein, forming a plurality of alternately laterally projecting spaced segments.

4. The combination with a propeller blade, of tipping therefor, comprising a sheet of material having an end piece adapted to be applied to the tip of the blade, a strip extending from said end piece adapted to embrace an edge of the blade, and spaced segments projecting in staggered relation from said strip bendable to conform to the contour of the faces of said blade.

5. A tipping for propeller blades comprising a sheet of material having a plurality of series of notches cut therein, in alternate relation, from opposite sides to constitute a row of spaced segments.

6. A tipping for propeller blades comprising a sheet of material having a continuous strip and a plurality of spaced segments projecting in staggered relation laterally therefrom.

7. A tipping for propeller blades comprising a sheet of material having a continuous strip, a plurality of spaced segments projecting in staggered relation laterally from said strip and a bifurcated end piece integral with said strip adapted to engage both faces of the tip of the propeller blade.

8. A tipping for propeller blades comprising a strip of material having saw cuts extending from both sides alternately toward the center of the strip.

9. The combination with a propeller blade, of tipping therefor, comprising a sheet of material, provided with indentations on both sides arranged in such a manner that connected segments are formed between adjacent indentations on each side of the strip and an indentation extends from the opposite side of the strip into each of the segments so formed.

10. The combination with a propeller blade, of tipping therefor, comprising a strip of material embracing an edge of the blade and having elongated openings extending into the strip over the edge of the blade.

11. The combination with a propeller blade, of tipping therefor, comprising a strip of material embracing an edge of the blade

and having saw-cuts with an enlarged circular opening at the top thereof extending in the strip over the edge of the blade.

12. A tipping for propeller blades comprising a strip of material disposed in segments connected at the edges of the strip and laterally spaced from one another at the central portion of the strip.

13. The combination of a propeller blade with a tipping therefor, comprisng a unitary strip of segments embracing an edge of the blade and another strip of material disposed along the edge of the blade beneath the strip of segments.

14. A tipping for propeller blades comprising a strip of material for embracing the edge of a blade having slots extending alternately from the opposite sides, and past the center line of the strip.

15. A tipping for propeller blades comprising a strip of material for embracing the edge of a blade having slots extending alternately from the opposite sides, and past the center line of the strip, each slot ending in an enlarged opening in the strip.

16. A tipping for propeller blades having elongated openings therein enlarged at their inner ends to minimize cracking.

In testimony whereof, I have hereunto subscribed my name this 6th day of February, 1930.

WILLARD H. KEMPTON.