

March 23, 1937.

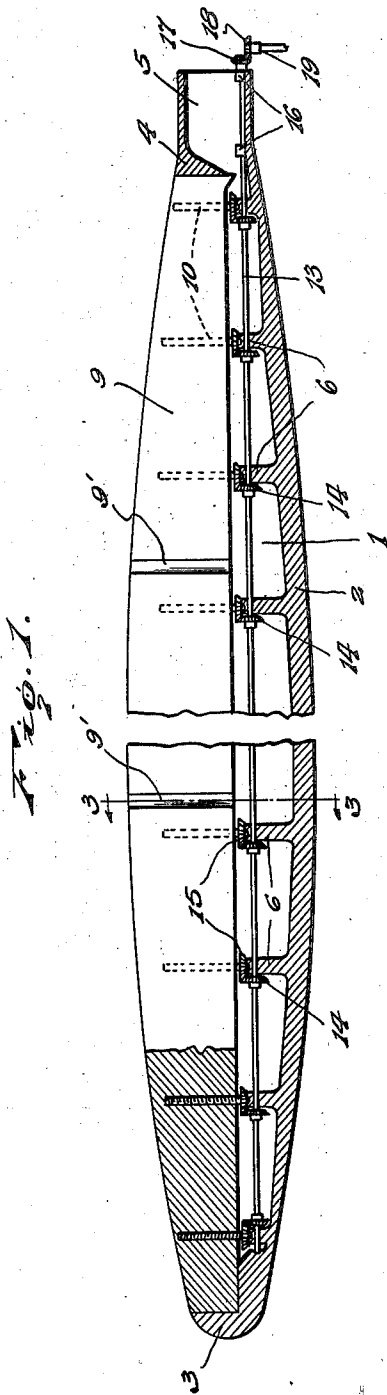
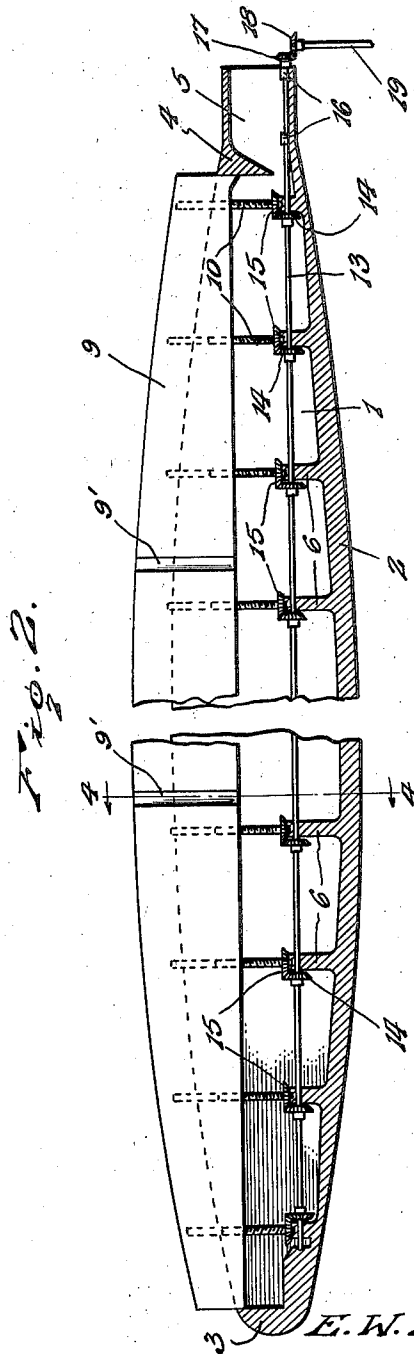
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2,074,807

ADJUSTABLE AREA PROPELLER BLADE

Filed Aug. 3, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3.

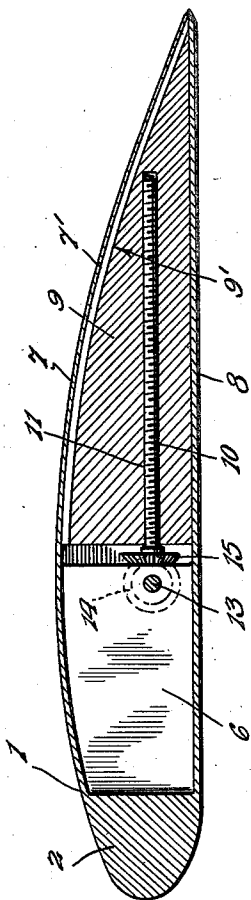
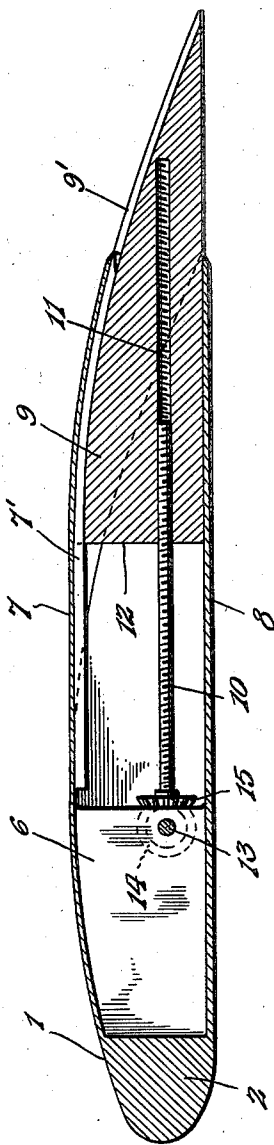


Fig. 4.



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ADJUSTABLE AREA PROPELLER BLADE

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4 Claims. (Cl. 170—159)

This invention relates to propeller blades and more particularly to a propeller blade of the type used upon airplanes.

One object of the invention is the provision of a propeller blade of such construction that a portion of the blade may be shifted from a retracted position to an extended position in which it projects from the trailing edge of the body of the blade and thus increases the effective area of the blade.

Another object of the invention is to so construct the main body portion of the blade that the extensible section may be easily shifted from a retracted position to an extended position and walls of the main blade remain in close contacting engagement with the extensible section. It will thus be seen that the propeller will at all times have a substantially smooth air engaging surface and undesired wind resistance will be eliminated.

Another object of the invention is to provide adjusting means for the extensible section of such construction that this section will be evenly adjusted throughout its length and the adjusting means serve not only as means for adjusting the adjustable section but also as means for maintaining this section in proper relation to the main section of the propeller.

The invention is illustrated in the accompanying drawings, wherein

Figure 1 is a sectional view taken longitudinally through a propeller blade of the improved construction with the adjustable section in the retracted position.

Figure 2 is a view similar to Figure 1 showing the adjustable section shifted to an extended position.

Figure 3 is a sectional view taken transversely through the propeller along the line 3—3 of Figure 1.

Figure 4 is a similar view taken along the line 4—4 of Figure 2.

The improved propeller blade has a main section or body 1 which is of the desired length and width and normally of the cross sectional area and configuration shown in Figure 3. The entering edge portion 2 of the blade is of solid construction and so is the outer end portion or tip 3. The inner end portion or shank 4 of the propeller is formed with a socket 5 by means of which the blade may be fitted upon a hub. Ribs 6 extend from the solid entering edge portion of the body and extend for approximately one-third the width of the blade and it is to be understood that these ribs may be of any length

desired and it will also be understood that any desired number may be used. The walls 7 and 8 are resilient so that while they normally converge and intersect at the trailing edge of the blade, as shown in Figure 3, the wall 7 may be shifted away from the wall 8 when the adjustable section 9 is shifted from the retracted position shown in Figures 1 and 3 to an extended position, as shown in Figures 2 and 4. The main section or casing may be of unitary construction or may be of sectional formation in order that it may be assembled and properly balanced.

The filler or extensible section 9 conforms to the dimensions and contour of the space between ends of the ribs 6 and the trailing edge of the blade where the walls 7 and 8 intersect and when the extensible section is in the retracted position, these blades will have a solid entering edge portion and a substantially solid portion from the ends of the ribs to the trailing edge. When the adjustable section is extended, as shown in Figures 2 and 4, there will be space between the ribs and the inner edge face of the adjustable section but the reestablished trailing edge portion of the blade will be solid. It will thus be seen that in both instances a strong and durable blade will be provided having a solid entering edge and also a solid trailing edge portion. Guides 7' which fit into grooves 9' are provided between the casing and filler to guide the filler during adjustment thereof and brace the filler against strain caused by centrifugal force.

In order to move the adjustable section from the retracted position shown in Figure 3 to an extended position in which it projects from the main section, there have been provided a plurality of threaded shafts or stems 10 which extend transversely of the blade and are rotatably carried by the ribs 6. These threaded shafts or stems extend into threaded bores 11 formed transversely of the adjustable section 9 and leading from the inner side edge face 12 thereof. Therefore, when the stems or shafts are rotated in one direction, the adjustable section will be shifted from a retracted position to an extended position and when the shafts are rotated in the opposite direction, the adjustable section will be withdrawn and moved from the extended position to the retracted position. The stems or shafts 10 should all be simultaneously rotated and at the same rate of speed. In order to do so, there has been provided a shaft 13 which extends longitudinally of the main propeller section and is journaled through the ribs 6. Beveled gears or pinions 14 are carried by this shaft

and these gears mesh with companion gears or pinions 15 carried by the shaft 10. The end portion of the shaft 13 which extends through the shank 4 of the blade and is mounted in bearings 16 projects slightly from the shank and carries a beveled gear or pinion 17 meshing with a companion gear 18 carried by a shaft 19 and from an inspection of Figures 1 and 2 it will be readily seen that when this shaft 19 is turned, rotary motion will be transmitted from it to the shaft 13 and all of the shafts or stems 10 will be simultaneously rotated at the same speed. Therefore, the adjustable section will be evenly shifted to an extended or retracted position. In view of the threaded engagement between the shafts 19 and the adjustable section, this adjustable section will be maintained in an adjusted position and prevented from accidentally shifting out of a set position. The walls 7 and 8 of the main section at all times have flat contacting engagement with walls of the adjustable section and, therefore, when the adjustable section is moved to an extended position, obstructions which would create wind resistance will be eliminated. It will thus be seen that when an aviator finds that the propeller of his airplane does not have sufficient area to properly propel the airplane when flying at high altitude, he can rotate the shaft 19 to extend the adjustable section and thus impart greater working area to the propeller blade. Upon descending, he can retract the extensible section when necessary. Therefore, the blades of the propeller may be adjusted according to atmospheric conditions.

Having thus described the invention, what is claimed as new is:

1. A propeller blade comprising a hollow main section open along its trailing edge, and an auxiliary section shiftable from a retracted position in which it is housed within the main section to an extended position in which a portion of the auxiliary section projects through the open trailing edge of the main section and increases the effective area of the blade.

2. A propeller blade comprising a main section hollow throughout the major portion of its length and having resilient walls converging towards and normally intersecting at the trailing edge of the main section, an auxiliary section normally housed within the main section and conforming to the contour of the resilient walls, and means for shifting the auxiliary section

from a retracted position in which it is housed in the main section to an extended position in which it projects from the trailing edge of the main section and provide the blade with an extended trailing edge portion increasing the effective area of the blade.

3. A propeller blade comprising a main section having a solid entering edge portion and walls extending therefrom in converging relation towards the trailing edge and intersecting at the trailing edge of the main section, one wall being shiftable away from the other to provide a passage along the trailing edge of the main section, ribs extending from the entering edge portion towards the trailing edge, an auxiliary section housed in the main section between the ribs and the trailing edge thereof, and means for adjusting the auxiliary section and shifting the same to a projected position in which it extends from the main section through the trailing edge thereof, said adjusting means having an actuating element extending longitudinally of the main section and projecting from the inner end thereof.

4. A propeller blade comprising a hollow main section having a hollow shank at its inner end and formed with an entering edge portion and walls extending from the entering edge portion to the trailing edge of the main section, said walls converging at the trailing edge and one wall being shiftable away from the other to provide a passage along the trailing edge, ribs extending from the entering edge portion within the main section, an auxiliary section normally housed in the main section between the ribs and the trailing edge, threaded stems rotatably carried by said ribs and extending therefrom towards the trailing edge of the main section, said threaded stems being engaged in threaded bores formed in the auxiliary section, a shaft extending longitudinally of the main section and rotatably carried by said ribs with one end portion of the shaft extending through the shank, means carried by the projecting end portion of said shaft adapted to cause rotary motion to be imparted to the shaft, and gears carried by the shaft and stems for transmitting rotary motion to the stems and shifting the auxiliary section to an extended position through the trailing edge of the main section when the stems and shaft are rotated in one direction.

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