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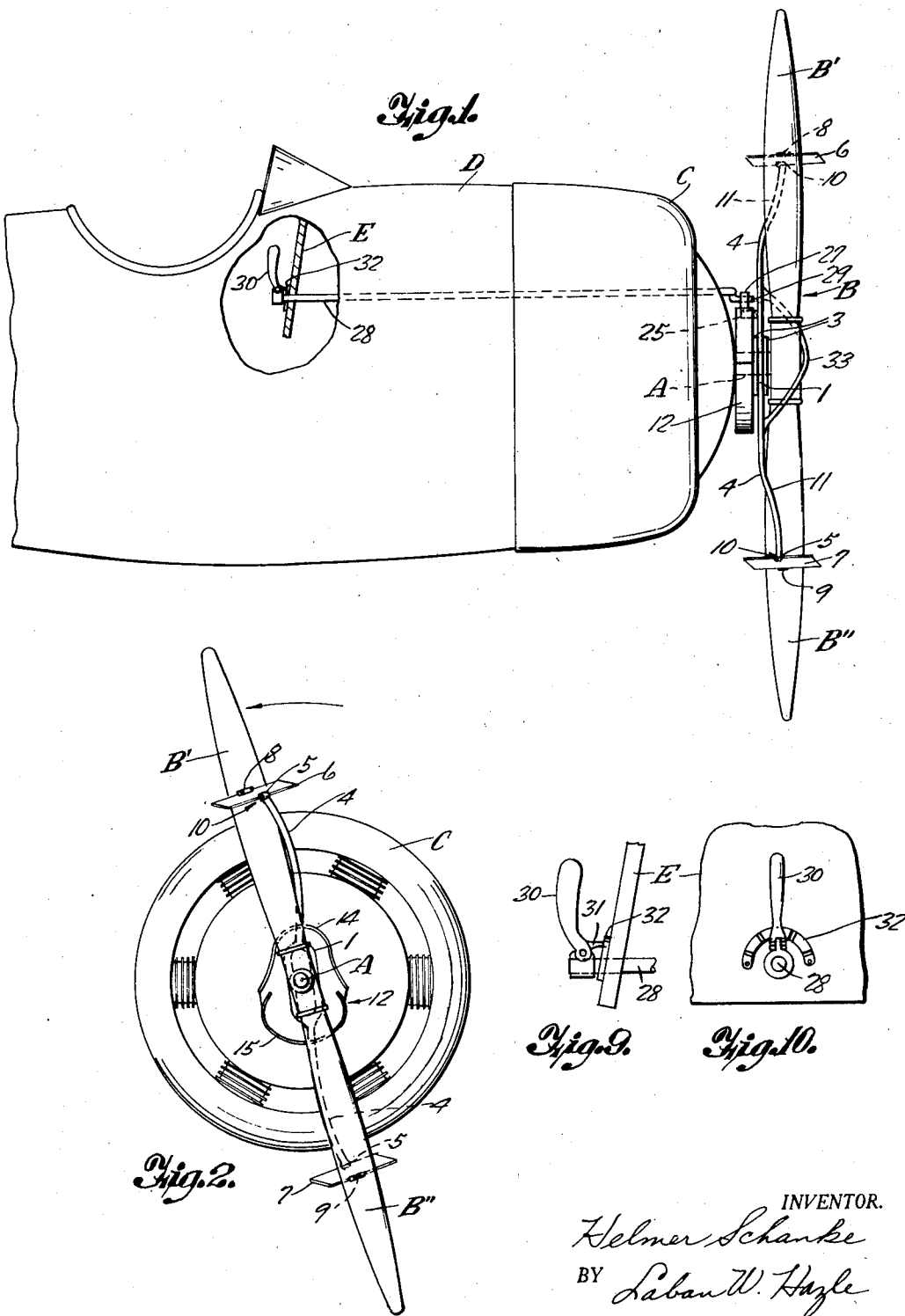
H. SCHANKE

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ATTACHMENT FOR AIRCRAFT PROPELLERS

Filed March 17, 1932

3 Sheets-Sheet 1



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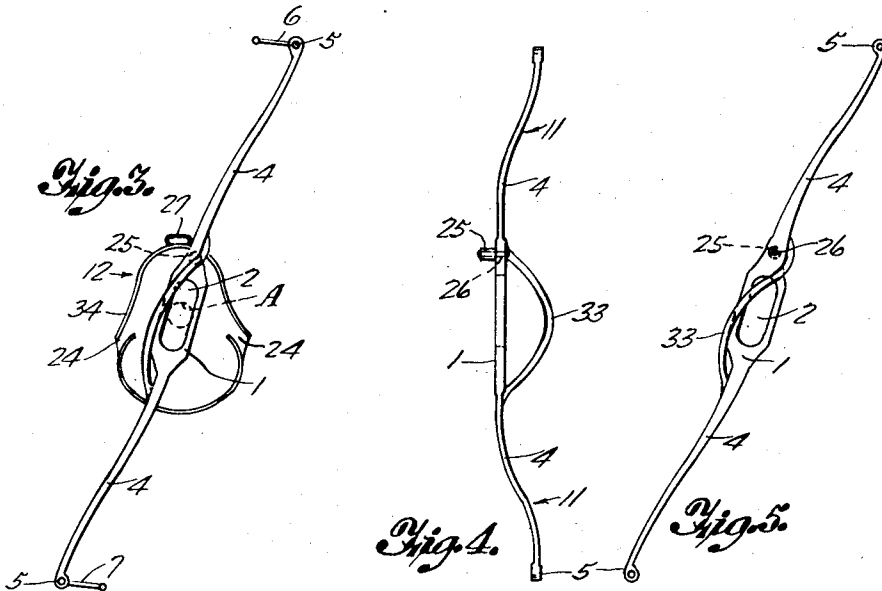
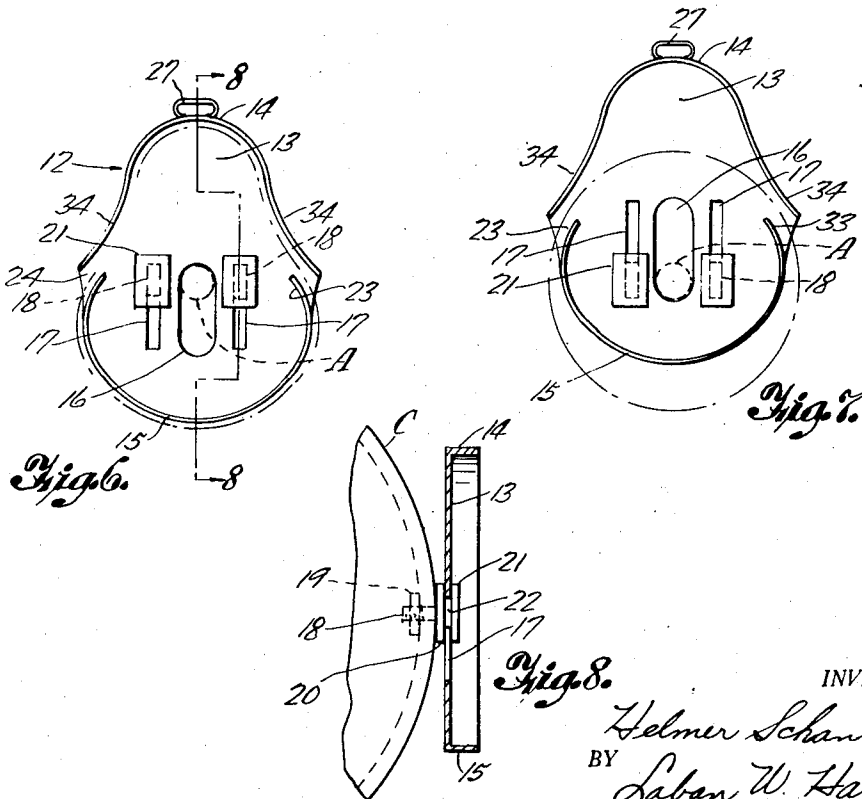
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3 Sheets-Sheet 2



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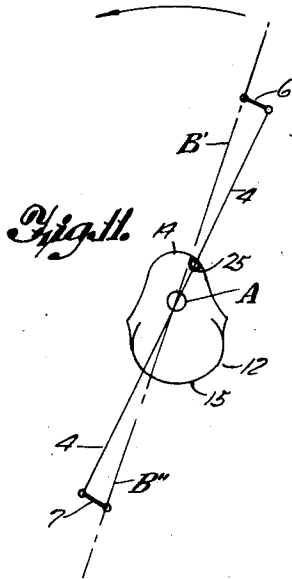
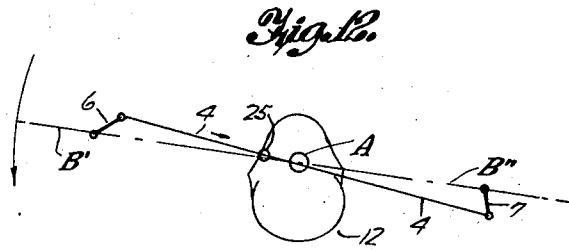
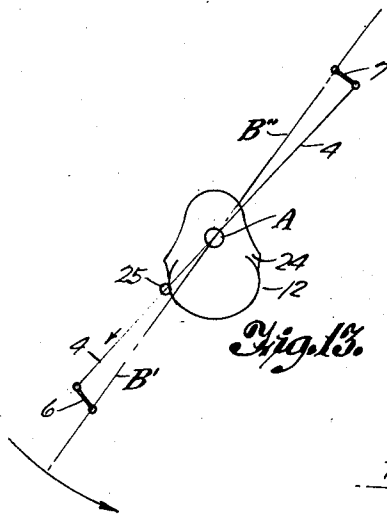
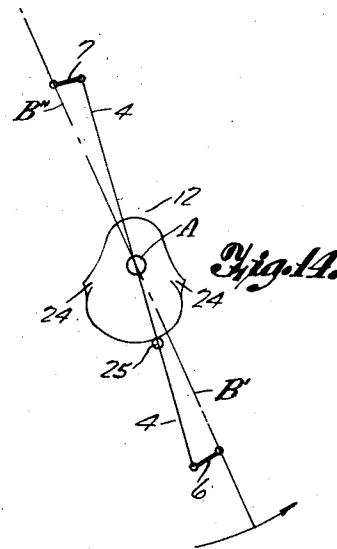
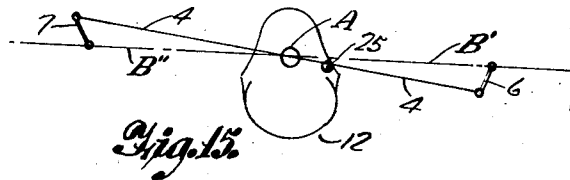
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ATTACHMENT FOR AIRCRAFT PROPELLERS

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3 Sheets-Sheet 3



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ATTACHMENT FOR AIRCRAFT PROPELLERS

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7 Claims. (Cl. 170—170)

My invention relates to attachments for aircraft propellers, and the main object is to provide a means whereby the propeller will exert a lifting force on the aircraft as well as the usual pulling or pushing force.

Another object is to provide an attachment for this purpose particularly adaptable for use on the propellers of aeroplanes wherein the propellers are mounted at the front or near the front thereof, the resulting lifting force of the propeller thus acting to lift and support the front of the plane and prevent its falling into a disastrous nose dive.

Another object is to provide an attachment of this kind which will increase the overall "lift" of the plane and so will enable an aeroplane to fly and land at slower speeds, and to take-off or alight with a shorter run or in a smaller space.

A further object is to provide an attachment of this kind comprising vanes or blades hinged to the propeller blades and means under the control of the pilot whereby these vanes will be automatically moved or swung to varying positions during each rotation of the propeller, this action being such that the vanes are moved to a position substantially crosswise to the circular path or orbit of the propeller blades as they move downward and are at all other times disposed edgewise to this path of the blades to reduce their wind resistance and drag.

A further object is to provide an attachment of this kind in a simple, durable, efficient and readily operated form.

The foregoing and other objects, together with means whereby the same may be carried into effect, will best be understood from the following description of a preferred embodiment of my invention, taken in connection with the accompanying drawings, wherein:

Figure 1 is a side elevation of my invention as applied to the propeller of an aeroplane, only the nose portion of the latter being shown and a part broken out to show the control mechanism.

Figure 2 is a frontal elevation of the structure shown in Figure 1.

Figure 3 is an enlarged front elevation of my invention alone.

Figure 4 is a side view of the fin or blade operating yoke and arms.

Figure 5 is a front view of the yoke and arms.

Figure 6 is a still further enlarged front elevation of the yoke guide mechanism.

Figure 7 is a view similar to Figure 6, but showing the guide moved to its inoperative position.

Figure 8 is a cross section along the line 8—8

in Figure 6, showing also a portion of the nose of the aeroplane.

Figure 9 is an enlarged side elevation of the control handle.

Figure 10 is a front elevation of the control handle.

Figures 11 to 15 inclusive are diagrammatic views of the invention, showing the positions assumed by the vanes or blades in progressive stages of one revolution of the propeller.

Referring now more particularly to the drawings, my invention comprises a yoke 1 having an elongated slot 2 adapted to receive and slidably engage the propeller shaft A, the yoke being mounted on this shaft between the propeller B and nose cowl C of the aeroplane D as shown in Figure 1. Elongated, rectangular collars or stops 3 (Figure 1) are secured rigidly on the propeller shaft A forwardly and rearwardly of the yoke 1 to prevent axial displacement of the yoke along the shaft. Adjacent the ends of the slot 2, the yoke is reduced and extended longitudinally in the form of vanes or blade operating arms 4, which terminate at their ends in knuckles 5. A guide roller 25 is journaled by the pin 26 on the yoke 1 adjacent one end of the slot 2 and extends rearwardly from said yoke for a purpose to be described. Flat rectangular vanes or blades 6 and 7 are provided and the vane 6 is hinged by one longitudinal margin at 8 to one propeller blade as B', while the other vane 7 is likewise hinged at 9 to the blade B'', the hinges 8 and 9 being disposed outwardly along the blades a considerable distance from the propeller hub. The operating arms 4 are pivotally attached by means of the knuckles 5 to the vanes 6 and 7 as designated at 10, the said arms being suitably bent near their ends as at 11 in order to extend forwardly and meet the vanes at a medial point thereof and in order to compensate for the angular position at which the vanes are set relative to the axis of the propeller shaft due to the angularity or pitch of the propeller blades B' and B''. The arms 4 are braced by the bar 33 extending forwardly and around the propeller hub as shown.

The foregoing arrangement is such that the vanes or blades 6 and 7 may be swung to varying angles relative to the circular orbit or path of the propeller blades by sliding the yoke 1 to and fro on the propeller shaft A as will be understood. The yoke 1, of course, rotates with the propeller. It will be noted that the vanes are mounted on the blade backs or rear faces of the propeller blades B' and B'', so that the vanes are in trailing position as the propeller rotates.

In order to bring about the above movement of the yoke 1 to swing the vanes 6 and 7 to the proper positions as the propeller rotates, I provide a yoke guide designated generally at 12 and comprising 5 a back or back plate 13 with upper and lower marginal guide ribs or flanges 14 and 15 directed or turned forwardly from the edges of this back. Like the yoke 1, the back 13 of the guide 12, has a centrally located elongated slot 16 through 10 which the propeller shaft A passes loosely, and in addition has two other slots 17 disposed alongside and in parallelism with the slot 16. The guide is mounted on the shaft A rearwardly of the yoke 1 and just forward of the nose cowling C, as shown in Figure 1, and lock studs 18 are 15 secured in this cowling by nuts or similar fasteners 19 and extend forwardly therefrom through the slots 17 in the back 13. The studs 18 have the enlarged shoulders 20 and heads 21 spaced 20 apart to provide clefts 22 to slidably receive said back 13 of the guide which is thus arranged to slide vertically on the nose cowling C but is restrained against rotation or axial displacement on the propeller shaft A. The shoulders 20 and heads 25 21 of the lock studs 18 overlie the margins of the slots 17 a substantial distance or amount in order to obtain a good bearing, and these elements, together with that portion of the studs passing through the slots, are preferably square, as shown.

The upper guide rib 14 is arcuate or curved at its top and then flares outwardly at its lower ends, as at 34, and terminates at about the level of the center of the guide 12. The lower guide rib 15 is likewise arcuate or curved at its lower part or 35 portion, but its upper ends 23 are turned inwardly and extend past the lower ends 22 of the upper rib 14 providing a passageway 24 between these ends at each side of the guide. The curvature of the lower guide rib 15 is considerably larger or 40 less abrupt than that of the upper rib 14 as shown and for a purpose to be described.

An elongated, oval eye or loop 27 is formed on the upper end of the yoke guide 12, and an operating shaft 28 is extended through the nose of the 45 aeroplane from the pilot's cockpit or compartment out through the nose cowling C to a point adjacent this eye, where it is bent to form an eccentrically disposed crank finger 29 which engages said eye. At the rear end of the shaft 28, a handle 50 30 is rigidly mounted and carries a pawl 31 adapted to engage a notched quadrant 32 secured to the instrument panel E as shown. By turning or swinging this handle 30, the shaft 28 may be rotated and the yoke guide 12 raised or lowered by 55 the crank finger 29, as will be understood. Obviously, the operating shaft 28 could be extended from adjacent the lower side of the guide 12 and engaged with an eye (not shown) formed on this lower side of the guide, if so desired. In multi- 60 motored planes, similar operating mechanisms may be provided for the device on each propeller, or they may all be operated by a single handle 30.

In operation, the pilot moves the handle 30 65 and lowers the yoke guide 12 until the ends of the slots 16 and 17 are reached, as shown in Figure 6, at which point the device is in its operative position. Assuming that the propeller B is in the position shown in Figure 11, the roller 25 on the yoke 1 is within the upper guide rib 14 and 70 the vanes or blades 6 and 7 are held by this yoke in positions substantially in line with the path traveled by the propeller blades and so offer very little resistance to the air. As the propeller rotates to the position shown in Figure 12 and in the direction shown by the arrow, the end of the

yoke 1 bearing the roller 25 is pulled inward toward the propeller shaft A due to the fact that the end portion 22 of the upper guide rib 14 is 80 disposed nearer this shaft than is the upper rounded portion, as will be evident from the drawings. The vanes or blades 6 and 7 are thus moved to a position in which the vane 6 is disposed at almost a right angle to the path of the blade B', which is at this time moving downward and this 85 vane or blade striking the air, will exert a lifting or upward force on the propeller and the nose of the plane, as will be understood. The other vane or blade 7, though moved through an arc in the same manner and equal to the vane 6, still is disposed substantially in line with the path 90 of the blade B'', and offers no resistance to the air.

As the propeller moves still further to the position shown in Figure 13, the roller passes through the passageway 24 between the ends 22 and 23 of 95 the upper and lower guide ribs 14 and 15, and travels along the outer face of the lower rib 15. As this rib 15 is at a greater distance from the shaft A than the end of the upper rib 14, the roller pulls the end of the yoke 1 outward and returns the vane or blade 6 to a trailing position in line 100 with the travel of the blade B', this action taking place after the blade has passed through the downwardly moving portion of its travel and begins to move inward as shown. The other vane 7 is likewise moved, but still maintains its trailing 105 position. During the travel of the propeller to and somewhat beyond the position shown in Figure 14, the vanes or blades 6 and 7 remain in substantially the same relative trailing positions, but 110 as the roller passes through the passageway 24, (Figure 5) that end of the yoke is pulled inward and the vane 7 is swung to substantially a right angle to the path of the blade B'' as it moves downward and the aforesaid lifting action is repeated. In this position, the vane 6 still main- 115 tains a trailing position as shown. The path of the roller 25 is shown in the broken line in Figure 6.

The foregoing actions take place during each 120 revolution of the propeller and it will be understood that the shape and position of the guide ribs 14 and 15 is such that the transition from one position to another is gradual and smooth, so that no shocks are caused to the mechanism 125 or the aeroplane.

By moving the control handle 30, the pilot may raise the guide 12 to the position shown in Figure 7, at which point the roller 25 will pass through 130 the passageways 24 and will clear both the upper and lower ribs 14 and 15, as indicated by the circumscribed broken line. It is understood that the wind pressure on the vanes 6 and 7 as the propeller revolves will cause them to normally assume a trailing position, except as the roller 135 engages the guide ribs, as set forth above. The curvature of the guide ribs 14 and 15, and the distance of the passageways 24 from the center of the propeller shaft A when the guide 12 is raised, is such that the roller when held in its normal 140 position under this influence of the air on the fins, will pass freely through the passageways and describe an orbit clear of both the upper and lower guides as set forth. The pilot may thus 145 bring the vanes into play to exert their lifting force or disengage them at will and as needed.

The upward lift of the vanes on the nose of the aeroplane increases both the safety and the ma- 150 neuverability of the plane in that it prevents the plane from falling forward into a nose dive and permits the plane to be straightened out from a

dive or spin more readily. In addition, the increased lift allows the plane to take off, fly and land at slower speeds and to arise or alight in a smaller space. Other advantages and further details of the utility of the device will be apparent to those skilled in the art.

While I have herein set forth a certain preferred embodiment of my invention, it is understood that I may vary from the same in minor details, not departing from the spirit of my invention, so as best to construct a practical device for the purpose intended, as defined in the appended claims.

I claim:

1. In a device of the kind described, in combination with a propeller and propeller shaft, a yoke slidably mounted on the shaft, vanes hinged to the blades of the propeller, arms extended from the yoke and pivotally connected to the said vanes, and means for reciprocating the said yoke to swing the vanes to various angles relative to the path traveled by the propeller blades or to fix the blades at a trailing angle relative to the blades.

2. In a device of the kind described, in combination with a propeller and propeller shaft as mounted on the nose portion of an aircraft, rectangular vanes hinged to the blades of the propeller, a yoke mounted on the propeller shaft and connected to the said vanes, the said yoke being slidable on the propeller shaft in a plane perpendicular to the axis thereof, a guide comprising a back plate slidably but not rotatably mounted on the nose of the aircraft and slidable in a plane also perpendicular to the axis of the propeller shaft, and upper and lower arcuate guide ribs extended from the said back plate and having their ends turned inward alongside each other, and a roller journaled on the yoke and adapted to engage the said guide ribs.

3. In a device of the kind described, in combination with a propeller and propeller shaft as mounted on the nose portion of an aircraft, rectangular vanes hinged to the blades of the propeller, a yoke mounted on the propeller shaft and connected to the said vanes, the said yoke being slidable on the propeller shaft in a plane perpendicular to the axis thereof, a guide comprising a back plate slidably but not rotatably mounted on the nose of the aircraft and slidable in a plane also perpendicular to the axis of the propeller shaft, upper and lower arcuate guide ribs extended from the said back plate and having their ends turned inward alongside each other, a roller journaled on the yoke and adapted to engage the said guide ribs, the upper guide rib being of a sharper curvature than the lower and having its ends turned outwardly whereby a passageway is formed between the ends of the ribs through which the roller may pass as it travels within the upper rib and along the outer side of the lower rib.

4. In a device of the kind described, in combination with a propeller and shaft, a pair of vanes hinged to the blades of the propeller, a yoke slidably mounted across the shaft and connected to the vanes, a guide comprising a back plate slidably mounted across the shaft, a lower arcuate guide rib extended from the back plate and having its ends turned inwardly, an upper arcuate guide rib extended from the back plate and having its ends turned outwardly and spaced from the ends of the lower rib, the curvature of the upper guide rib being sharper than that of the lower rib, a roller journaled on the said yoke and adapted normally to travel along the inner side of the upper rib and the outer side of the lower rib, and means whereby the said guide may be moved to such position that the roller travels free of both the upper and lower ribs.

5. In a device of the kind described, in combination with a propeller including a plurality of blades, a vane hinged to each blade, means operable by the rotation of the propeller to cause the vanes to swing crosswise to the path of the blades as they move downward and to swing parallel with the path of the blades as they move upward, and means whereby the said blades may be released to lie parallel with the path of the propeller blades at all times.

6. In a device of the kind described, in combination with a propeller as mounted on the nose of an aircraft, a yoke slidably associated with the propeller for longitudinal movement thereon, vanes hinged to the propeller blades, arms connecting the said yoke and vanes, a roller on the yoke, a guide comprising a back plate slidably mounted on the nose of the aircraft, arcuate upper and lower guide ribs on the said back plate for engagement with the roller on the yoke, the adjacent margins of the guide ribs being spaced apart to pass the said roller, and means for adjusting the said guide to vary the position of the said guide ribs relative to the axis of the propeller.

7. In a device of the kind described, in combination with a propeller as mounted on the nose of an aircraft, a yoke slidably associated with the propeller for movement at right angles to the axis on which the propeller rotates, vanes hinged on the blades of the propeller, arms connecting the yoke and vanes, a roller mounted on the yoke, a guide comprising a back plate slidably mounted on the nose of the aircraft for movement at right angles to the axis on which the propeller rotates, and arcuate upper and lower guide ribs on the back plate for engagement with the roller, the ends of the lower guide rib being turned inwardly within the lower ends of the upper rib and terminating short thereof to provide a passageway between these ends, and means for moving the guide to a position at which the lower guide rib will lie substantially concentric with the axis on which the propeller rotates.

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