July 11, 1944. F. G. MARSHALL 2,353,578

SPINNER FOR AIRSCREWS

Filed June 9, 1941 4 Sheets-Sheet 1

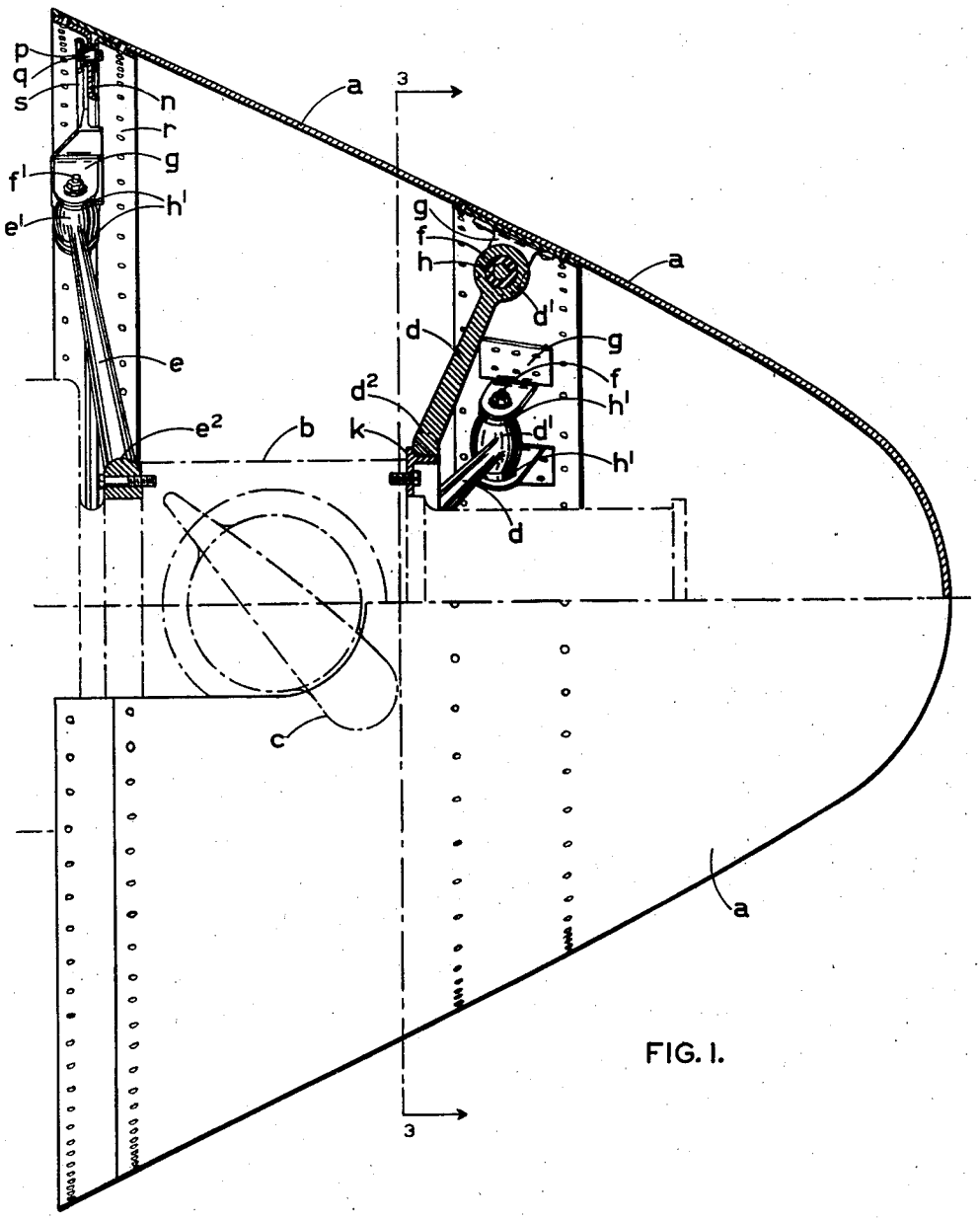


FIG. I.

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SPINNER FOR AIRSCREWS

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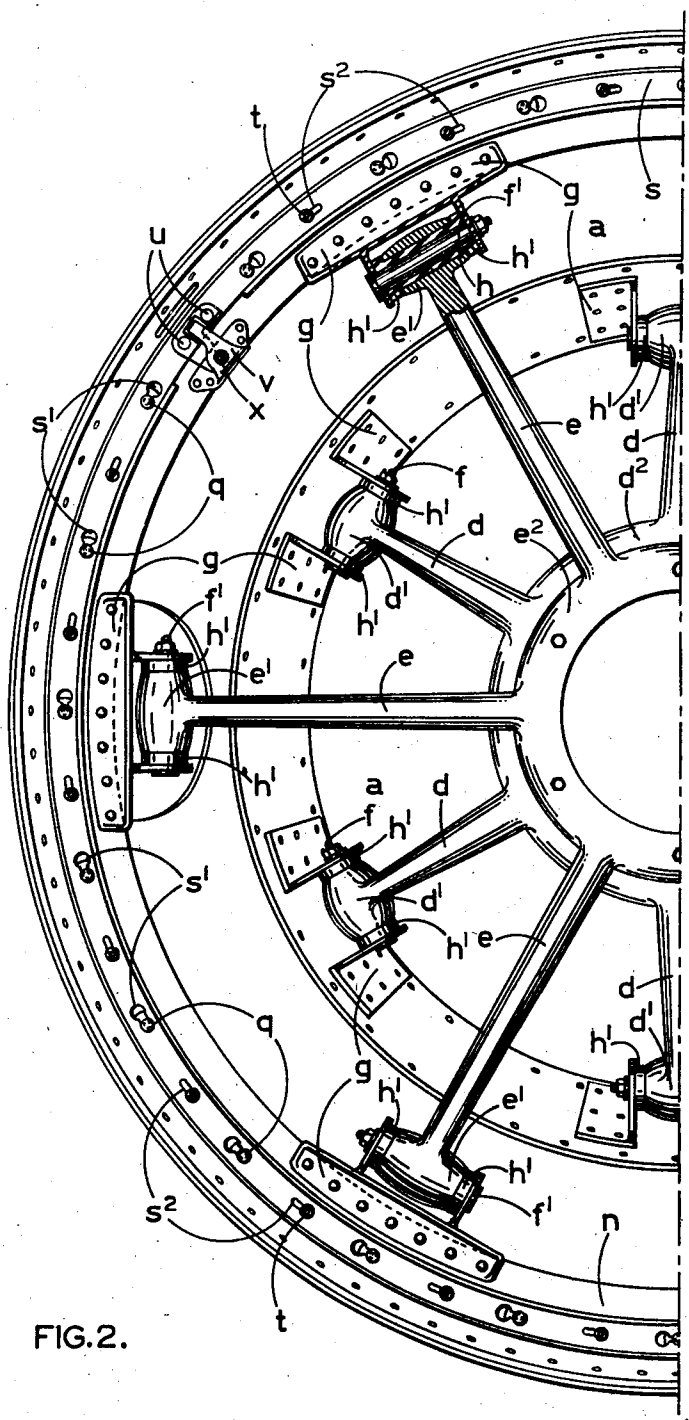


FIG. 2.

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SPINNER FOR AIRSCREWS

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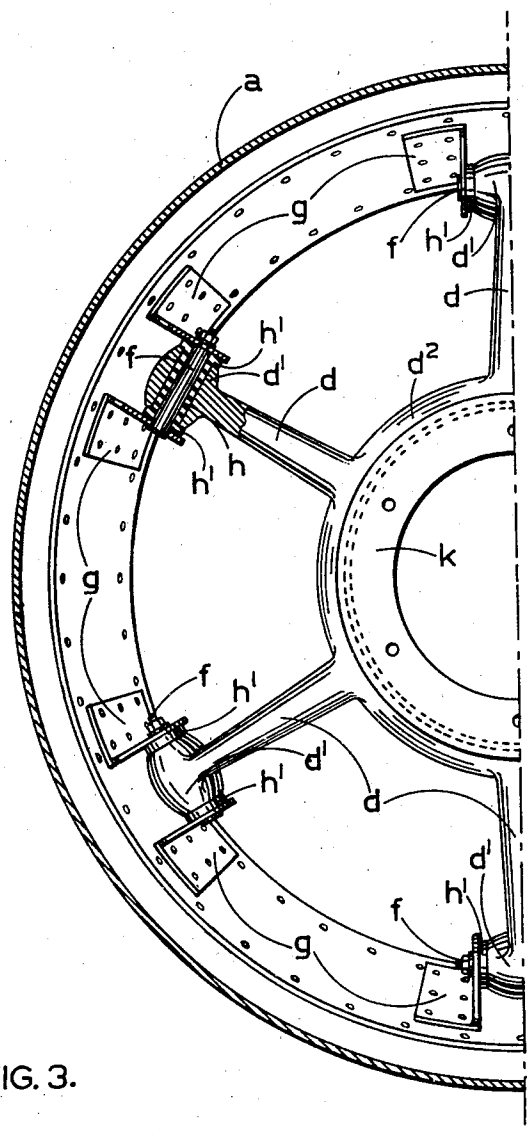


FIG. 3.

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July 11, 1944. F. G. MARSHALL 2,353,578

SPINNER FOR AIRSCREWS

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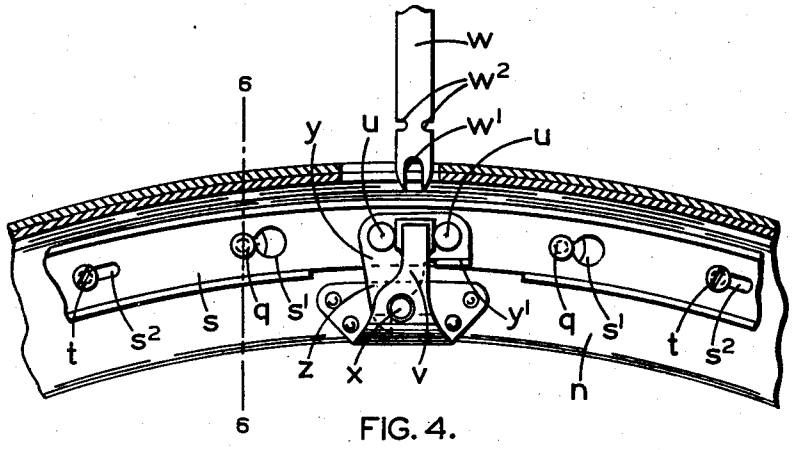


FIG. 4.

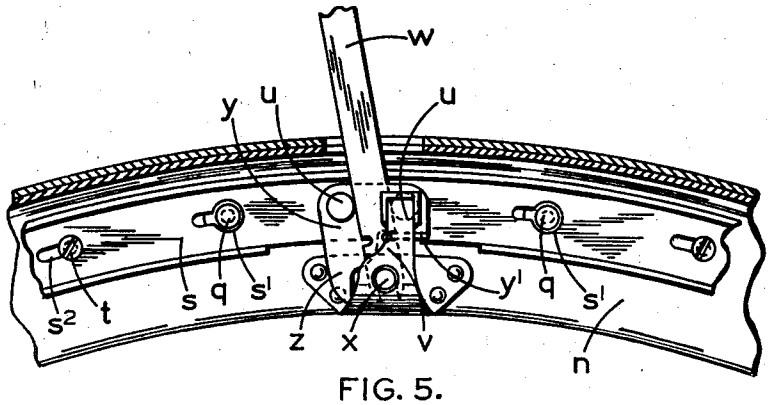


FIG. 5.

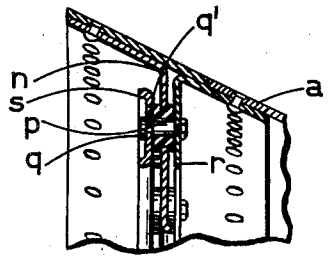


FIG. 6.

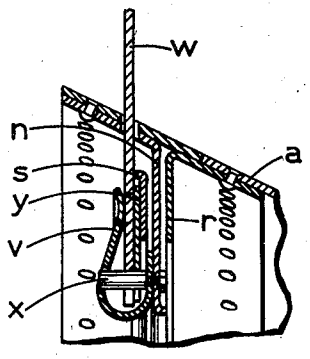


FIG. 7.

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Patented July 11, 1944 2,353,578

UNITED STATES PATENT OFFICE

2,353,578

SPINNER FOR AIRSCREWS

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Application June 9, 1941, Serial No. 397,347
In Great Britain April 5, 1940

6 Claims. (Cl. 170—159)

This invention relates to certain improvements in or in connection with spinners for airscrews and has for its object to provide improved means for mounting and supporting the spinner in its position of use about the hub of the airscrew.

I am aware that it has already been proposed to insert a resilient annular packing between the periphery of a mounting diaphragm and the wall of the spinner and also to provide cushioning means between the spinner and diaphragm as a whole and the airscrew or shaft part which is to support it.

According to the present invention the improved mounting is distinguished from those previously employed in that the spinner is supported at the front and/or rear of the hub from the outer ends of spokes or arms mounted on or secured directly or indirectly to the airscrew hub or shaft part.

The employment, as supporting means for the spinner, of spokes or arms instead of diaphragms has a number of important advantages including accessibility to the parts enclosed by the spinner and reduced weight and consequent reduction in inertia forces set up during acceleration and deceleration of the rotating spinner as a whole.

The connections between the spinner and the outer ends of the supporting spokes or arms may be of a resilient nature of any suitable kind that will cushion the effect of the various loads acting on the spinner and its mounting when in service, and that will absorb and damp out vibrations.

In the accompanying drawings,

Figure 1 is a part sectional view of a spinner for the hub of an airscrew, mounted in accordance with the present invention.

Figure 2 is an end view of the same as seen from the left-hand.

Figure 3 is a transverse sectional view on the line 3—3 of Figure 1.

Figure 4 is a detail view on a larger scale illustrating the means employed for operating and locking the locking ring.

Figure 5 is a similar view illustrating the locking ring in the unlocked position.

Figure 6 is a detail cross-sectional view on the line 6—6 of Figure 4.

Figure 7 is a detail cross-sectional view through the locking device for the locking ring.

Referring to the drawings, *a* represents a spinner shell of the orthodox aerodynamical shape, and *b* indicates the hub of the airscrew, one of the blades *c* of which is seen in end view in Figure 1.

The spinner shell is mounted on the hub, according to the present invention, by means of spoked members *d*, *e* at the front and rear. In the specific arrangement shown the outer ends of the arms or spokes of these members each have a pin and socket connection with the spinner, the socket d^1, e^1 being formed transversely in the end of the arm and the pin *f*, f^1 carried by brackets *g* secured directly or indirectly to the spinner shell, or vice versa.

The loads set up by acceleration and deceleration of the spinner and by the air resistance and centrifugal and centripetal forces acting on the spinner and its connections with the hub are cushioned by the introduction between each pin and its socket of resilient means, such as the rubber bushes *h* which also cushion the drive between the hub and one or other or both of the spoked members. The pin and socket connections aforesaid are arranged with their axes at right angles to the spokes. The rubber bushes are preferably formed at each end with outwardly directed flanges h^1 which occupy positions between the ends of the sockets d^1, e^1 and the inside faces of the brackets *g* by which the pins are attached to the spinner shell.

The spokes or arms radiate from a central ring d^2, e^2 which in the case of the rear spoked member *e* can be bolted direct to the hub *b*, or shaft part. In the case of the front spoked member *d* the central ring d^2 is adapted to slide axially onto a flanged ring *k* which is fixed to the front of the hub and prevented from rotation relatively thereto by means of a key which may be of wedge shape.

There may be associated with either or both of the spoked members means whereby the spinner can be secured thereto at a number of points either individually, or simultaneously in any of the ways described in British Patents Nos. 451,553 and 485,903. For example, in the specific example shown, the arms of the rear spoked member *e* are not secured directly to the spinner but to an annular plate *n* provided with an annular series of holes *p* to receive a corresponding number of pins *q* fixed to an annular plate *r* secured to the spinner shell *a*. Each pin where it protrudes through its hole in the plate is formed with an annular groove q^1 and all the pins are simultaneously locked in engagement with their holes by means of a locking ring *s* formed with a series of key-holes slots s^1 corresponding in number and spacing with the pins *q* with which they are adapted to engage. The arrangement is such that when the spinner is pushed onto the hub *b* the pins *q* engage with and protrude through

their respective holes p in the plate n and are secured in engagement therewith by turning the locking ring in a direction to bring the edges of the narrow portions of the key-hole slots s^1 into engagement with the grooves q^1 in the ends of the pins, thereby locking the spinner in position at a number of points simultaneously. The spinner can be detached in an equally quick and simple manner by turning the locking ring in the reverse direction to a position in which the large ends of the key-hole slots register with the pins when the spinner can be instantly removed.

In the example shown the locking ring s is loosely attached to the plate n by means of screws t passing through parallel slots s^2 in the ring, the lengths of these slots being such as to allow for the movement of the locking ring into and out of its operative position.

Provision is preferably made for preventing accidental displacement of the locking ring from its operative position. For this purpose the ring may be provided with a pair of stops u, u between which the free end of a blade spring v attached to the plate n, is adapted normally to engage.

The locking ring may be operated in any suitable manner as by means of a key w having a forked end w^1 adapted for pivotal engagement with a pin x on the plate n. When the key is introduced into position it passes between the two stops u, u on the ring and raises the blade spring v out of engagement therewith thereby leaving the ring free to be turned in either direction by the key.

The key also functions as a safety device in that it can only be inserted and withdrawn when the locking ring is in its operative or locking position. For this purpose the key is formed with a notch w^2 which when the key is moved to turn the ring into its inoperative position engages a flange y^1 on a plate y attached to the locking ring s thereby preventing withdrawal of the key. If necessary, the plate y may be formed with a stop z to limit the effective movement of the locking ring.

I claim:

1. In a spinner for the hub of an airscrew, a spinner shell, spoked supports therefor adapted for attachment to said hub, means for detachably connecting at least one of said supports to said spinner shell and resilient pin and socket connections between the outer ends of the spokes and said means, the axes of said pin and socket connections being arranged tangential to a circle concentric with the rotational axis of said spinner shell.

2. In a spinner for the hub of an airscrew, a spinner shell, spoked supports therefor adapted for attachment to said hub, an annular member adapted for detachable connection with said spinner shell, a plurality of brackets fixed around said member, pivot pins carried by said brackets with their axes arranged tangential to a circle concentric with the rotational axis of said spinner shell, open-ended sockets at the ends of the spokes of said supports adapted for engagement with said pins, and rubber bushes arranged between said pins and sockets with their ends bearing against said brackets.

3. In a spinner for the hub of an airscrew, a spinner shell, spoked supports therefor adapted for attachment to said hub, means for detachably connecting at least one of said supports to said spinner shell, said means comprising an annular member fixed to the inside of said shell and having an annular series of pins projecting laterally from one side thereof, a detachable annular plate provided with an annular series of holes to receive said pins, and a rotatable locking ring for retaining said pins in releasable engagement with said detachable plate, and resilient pin and socket connections between the outer ends of the spokes of said support and said detachable annular plate.

4. In a spinner for the hub of an airscrew, a spinner shell, spoked supports therefor adapted for attachment to said hub, means for detachably connecting at least one of said supports to said spinner shell, and resilient pin and socket connections between the outer ends of the spokes of said support and said means, the axes of said pin and socket connections being substantially at right angles to said spokes.

5. In a spinner for the hub of an airscrew, a spinner shell, spoked supports therefor adapted for attachment to said hub, an annular member adapted for detachable connection with said spinner shell, pins on said member and sockets on the spokes of said supports for engagement therewith.

6. In a spinner for the hub of an airscrew, a spinner shell, an annular member adapted for detachable connection therewith, spoked supports adapted for attachment to said hub, and pin and socket connections between said annular member and the outer ends of the spokes of at least one of said supports, the axes of said pin and socket connections being substantially at right angles to said spokes.

FREDERICK GEORGE MARSHALL.