Sept. 29, 1942. W. MULLER-KEUTH ET AL 2,297,226

SPINNER FOR THE HUBS OF AIRSCREWS

Filed Jan. 26, 1938 5 Sheets-Sheet 1

Fig. 1

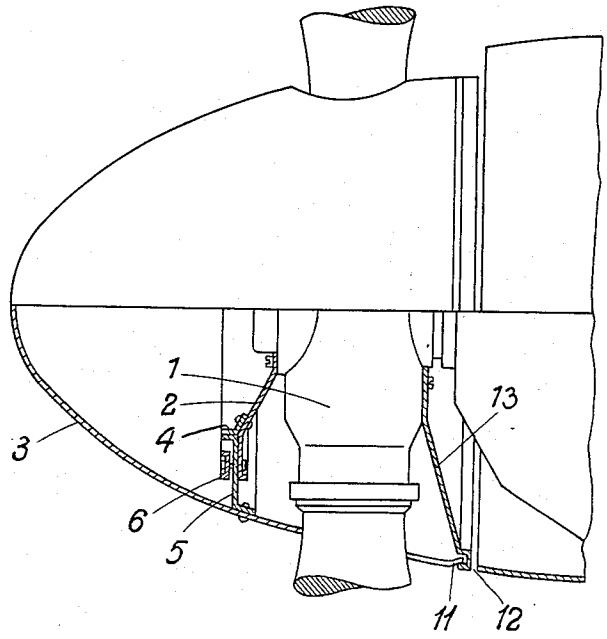


Fig. 2

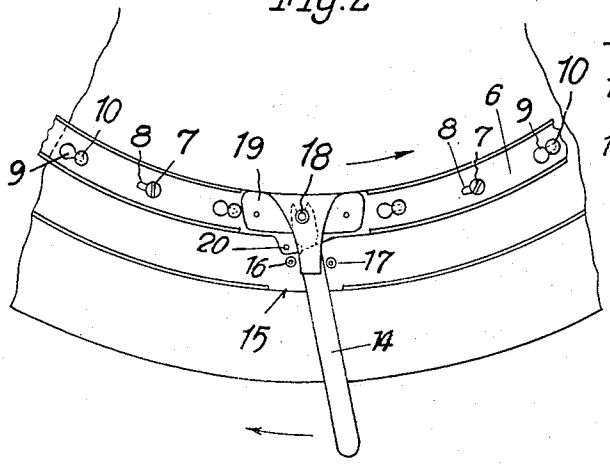
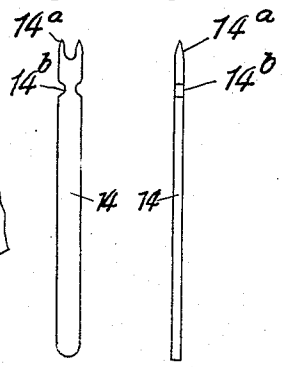


Fig. 3 Fig. 4



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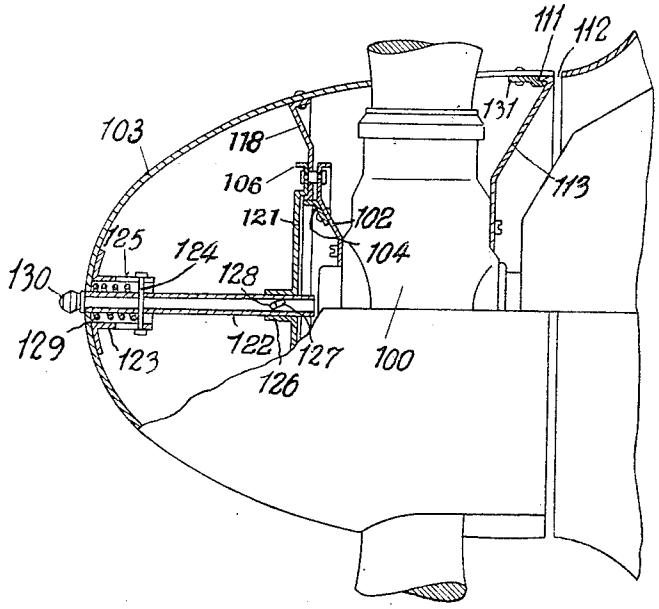
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SPINNER FOR THE HUBS OF AIRSCREWS

Filed Jan. 26, 1938 5 Sheets-Sheet 2

Fig. 5



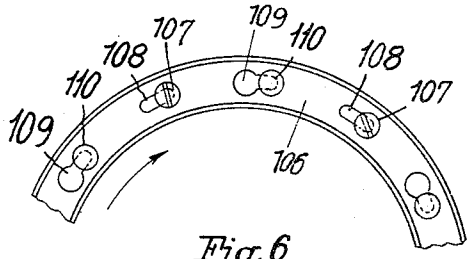


Fig. 6

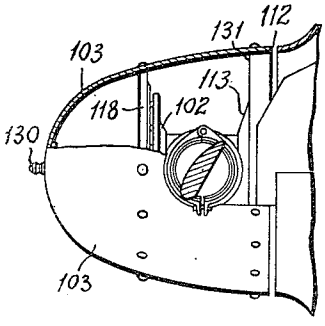


Fig. 5a

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SPINNER FOR THE HUBS OF AIRSCREWS

Filed Jan. 26, 1938 5 Sheets-Sheet 3

Fig. 7

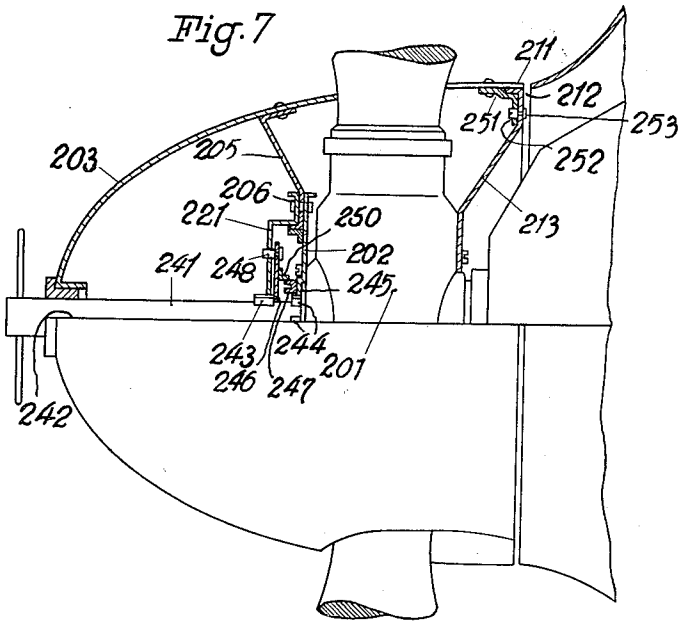


Fig. 9

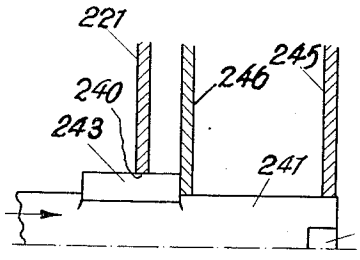


Fig. 8

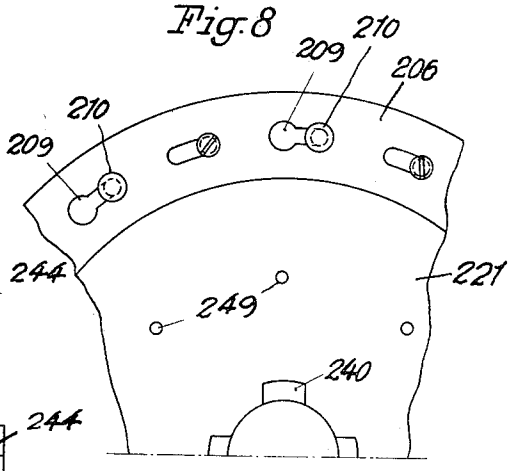
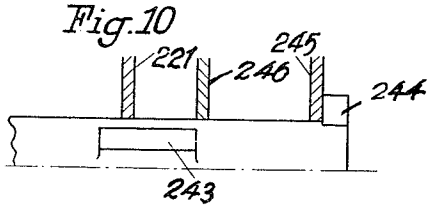


Fig. 10



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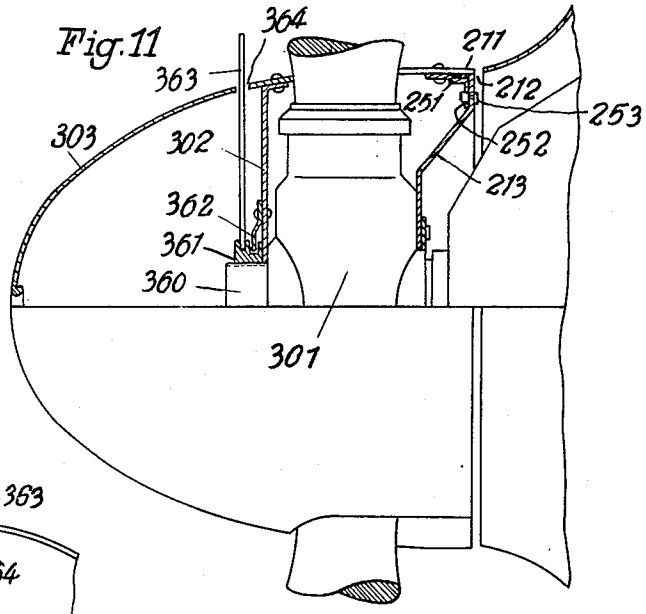
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SPINNER FOR THE HUBS OF AIRSCREWS

Filed Jan. 26, 1938 5 Sheets-Sheet 4

Fig. 11



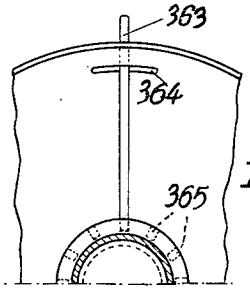


Fig. 12

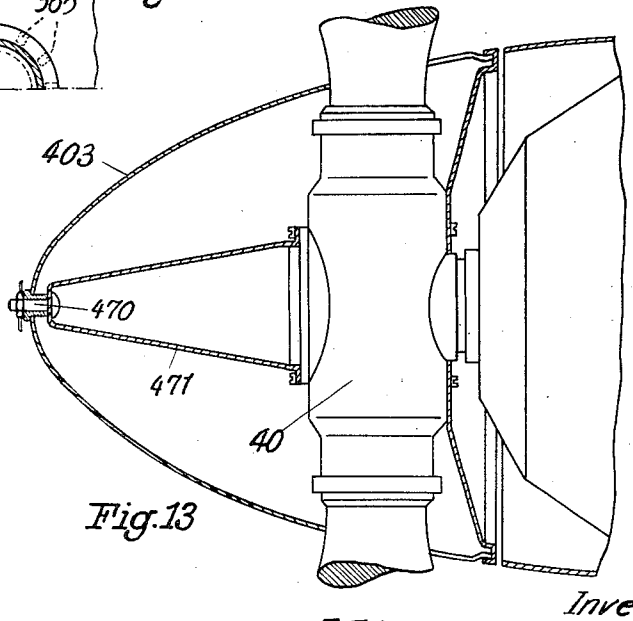


Fig. 13

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Sept. 29, 1942. W. MULLER-KEUTH ET AL 2,297,226

SPINNER FOR THE HUBS OF AIRSCREWS

Filed Jan. 26, 1938 5 Sheets-Sheet 5

Fig. 14

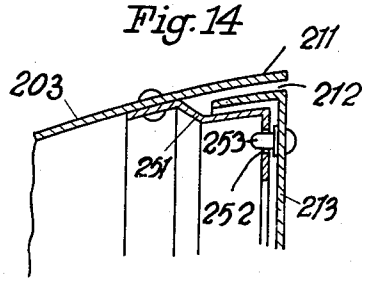


Fig. 15

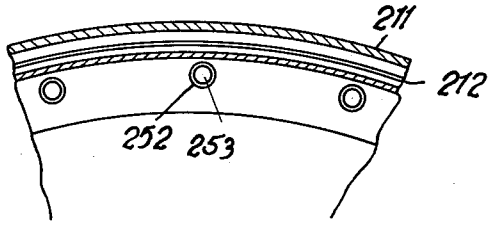


Fig. 16

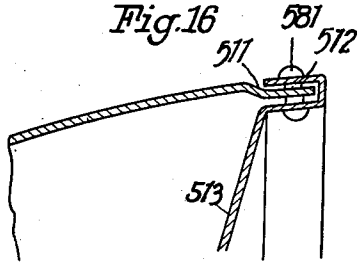
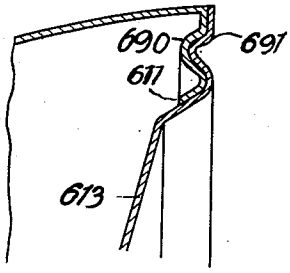


Fig. 18



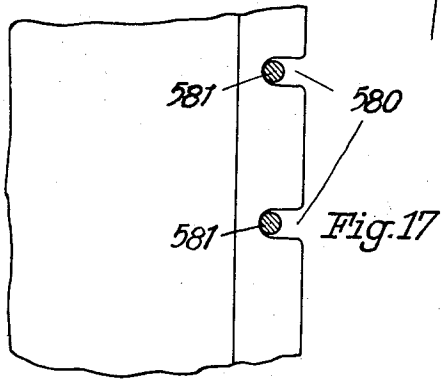


Fig. 17

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2,297,226

UNITED STATES PATENT OFFICE

2,297,226

SPINNER FOR THE HUBS OF AIRSCREWS

Wilhelm Müller-Keuth and Eugen Engert, Frankfort-on-the-Main, Germany; vested in the Alien Property Custodian

Application January 26, 1938, Serial No. 187,048
In Germany May 22, 1937

6 Claims. (Cl. 170—159)

This invention relates to spinners for the hubs of airplane propellers and the like. More particularly, it relates to improved means for securing the spinner to the hub of the propeller.

A spinner, as is known in the art, is a fairing or nosing preferably of approximately conical or paraboloidal form, which is fitted coaxially with the propeller boss or hub and revolves with the propeller.

At present it is the practice to mount the spinner on the hub of the propeller by means of front and rear supports. The arrangements now used are such that the spinner is detachably secured to the rear support at a plurality of points around the axis at or near the free or rearward edge of the spinner, that is, at approximately the maximum diameter thereof. The known arrangements, as described, present certain difficulties, particularly when the spinners have a comparatively large diameter, as it is found to be difficult to attach and detach them. The rear supporting arrangements used can also influence the weight of the spinner unfavorably. In airplanes this is a factor of some importance.

The present invention seeks to avoid these disadvantages. Its principal object resides in providing means through which spinners of any diameter may be easily attached and detached.

Another object of the invention resides in providing spinners with such means and still keeping down their comparative weight.

Still a further object of the invention is to provide an arrangement which is more accessible for operation and which at the same time actually reduces the weight of the spinner for the same diameter.

The invention has for still another object the provision of an arrangement in which the free or rear edge of the spinner is supported and guided by means of a rear support fixed to the back of the propeller hub, the spinner itself being prevented from turning about its axis by means preferably arranged at the front of the hub.

Other objects of the invention will be apparent from the following description and claims when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevation partially in longitudinal cross section of a propeller spinner mounted according to one embodiment of the invention.

Fig. 2 is an enlarged detail front view of the attachment means in the arrangement of Fig. 1.

Figs. 3 and 4 are detail front and side views, respectively, of the locking and releasing key for use in the embodiment of Figs. 1 and 2.

Fig. 5 is a side elevation partially in cross section of another embodiment of the invention.

Fig. 5a is a view similar to Fig. 5 of the structure therein shown partly in section as seen from the top of Fig. 5 looking downwardly.

Fig. 6 is an enlarged detail front view of part of the attachment means shown in Fig. 5.

Fig. 7 is a side elevation partially in section of another embodiment of the invention.

Fig. 8 is an enlarged detail view of part of the attachment means shown in Fig. 7.

Figs. 9 and 10 are enlarged detail views illustrating the two positions of the key shown in Fig. 7.

Fig. 11 is a side elevation partly in section showing a further embodiment of the invention.

Fig. 12 is a detail front view of part of the attachment means shown in Fig. 11.

Fig. 13 is a longitudinal sectional view of an air propeller spinner illustrating another embodiment of the invention.

Figs. 14 and 15 are sectional views at right angles to each other of part of the spinner showing one manner of preventing rotation of the spinner and for supporting the rear edge thereof.

Figs. 16 and 17 are detail sectional and plan views of part of a spinner showing an alternate method of guiding the edge of the spinner and preventing rotation thereof; and,

Fig. 18 is a detail sectional view showing an alternative method of guiding and supporting the free edge of the spinner.

Referring now specifically to the embodiment of the invention illustrated in Figs. 1, 2, 3 and 4, the propeller hub 1 has a disc 2 secured to the front thereof to constitute a support for the spinner 3. The disc 2 is provided with an annular registering or centering rim 4 which may be secured to disc 2 in any suitable manner. The centering rim 4 has for its purpose the centering of an annular plate 5 secured to the inner surface of the spinner 3 within the front part thereof.

The locking or attachment means for the spinner consists of an annular ring 6 which may be channeled in cross section and which is secured to the plate 5 so as to permit a relative limited angular movement between them. To effect this the plate 5 is provided with screws 7 which pass through arcuate slots 8 in the ring 6 as clearly shown in Fig. 2.

The ring and the plate are also provided with keyhole slots 9 which register with one another.

The marginal portion of the disc 2 is provided with spaced studs 10 adapted to pass through the enlarged ends of the keyhole slots 9 and to engage the upper surfaces of the ring 6 when the plate 5 and ring 6 are shifted so that the studs enter the narrow ends of the keyhole slots 9.

It should be evident from the above that the arrangement is such that when the spinner 3 is placed in position on the hub 1, the enlarged ends of the keyhole slots in the ring and plate pass over the studs 10. The spinner can be locked in position by giving a rotary movement to the ring 6 relatively to the plate 5 sufficient to bring the narrow portions of the keyhole slots 9 in the ring 6 into engagement with the shaft of the studs 10.

The free or rear edge 11 of the spinner 3 is supported and guided by the outer flanged edge 12 of a support 13 fixed to the rear side of the hub 1.

In order to facilitate the operation of rotating the ring 6 slightly to lock the spinner in position, the invention contemplates the use of a key 14. This key and the manner in which it is used is illustrated in Figs. 2, 3 and 4. The arrangement is such that the spinner cannot be left in unlocked position.

The key 14 is adapted to be inserted through a slot 15 in the spinner 3 and between a pair of stops 16, 17. The key has a forked end 14*a* adapted to engage a peg 18 fixed to the ring 6. To prevent the key from being moved laterally, which in the drawing (Fig. 2) would be in a direction at an angle to the plane of the drawing sheet, a guide member 19 is provided which is secured to the ring 6 and through which the peg 18 passes.

By turning the key about one or the other of the two stops 16, 17 as a fulcrum the ring 6 may be moved in one or the other direction to lock or release the spinner 3 to or from the fixed disc or support 2.

The key 14 also functions as a safety device since it can only be inserted and withdrawn when the ring 6 is in its operative position in which the spinner is securely attached to the hub. For this purpose the key near its inner end is provided with a notch 14*b* which engages a fixed pin 20 when the locking ring 6 is in inoperative position. The key 14 thus cannot be withdrawn until the locking ring 6 has been shifted to its operative position in which the spinner is securely attached to the hub 1. For convenience in handling the key 14 may have a notch 14*b* in each side edge as shown in Fig. 3.

Another embodiment of the invention is that illustrated in Figs. 5 and 6. It is similar to that of Figs. 1, 2, 3 and 4 in that the hub 100 has a disc 102 secured thereto, the disc supporting a registering or centering rim 104. The locking ring 106 has guide slots 108 engaging screws 107 which are in this case fixed to the disc or support 102. The ring 106 has also keyhole slots 109 adapted to engage studs 110 extending from the disc 118. This disc 118 is provided with a marginal flange which is rigidly secured to the spinner 103. The disc is likewise provided with suitable keyhole slots similar to slots 108 for engaging the above-mentioned screws 107 which are secured to, and which extend forwardly from, the disc or support 102.

In this embodiment, however, the locking ring 106 is carried by or formed integrally with a disc 121 and is arranged to be turned to operative and inoperative locking position by means of a rod 122. This rod 122 passes axially through a hole in the front end of the spinner 103 where it is supported in a socket 123 fixed inside the front of the spinner. The rod 122 is prevented from rotation by means of a cross pin 124 sliding in longitudinal slots 125 in the socket 123. The inner end of the rod 122 slidably engages the hub 126 of the disc 121 and is formed with a helical slot 127 engaging a pin 128 passing transversely through the hub 126.

The arrangement is such that normally the rod 122 is forced inwardly by a spring 129 to hold the disc 121 and hence the locking ring 106 in its operative position to retain secure the spinner 103 to the hub 100. When it is desired to detach the spinner, the rod 122 is pulled outwardly against the pressure of the spring 129. (For convenience a knob handle 130 is provided at the outer end of the rod 122.) The resulting co-action between the helical slot 127 and the pin 128 rotates the disc 121 and the locking ring 106 in a direction and to an extent which brings the enlarged ends of the keyhole slots 109 of the locking ring 106 in register with the studs 110 which are rigid on the disc 102. This releases the spinner which can then be removed.

The rear or free end 111 of the spinner 103 may be guided by the flanged outer edge 112 of the rear support 113, the inside of the spinner being fitted with a flanged ring 131.

Another means for operating the locking ring is shown in the embodiment of the invention illustrated by Figs. 7 to 10. In this embodiment the locking ring 206 has keyholes 209 which engage studs 210 on a disc support 202 secured to the hub 201. As in the embodiment of Fig. 1 the plate 205 secured to the spinner 203 also has keyholes through which the studs 210 pass.

In this embodiment the ring 206 is preferably integral with a disc 221 having a castellated bore or central opening 240. For locking and releasing the spinner 203 a key 241 is provided which is adapted to be inserted through a central hole 242 in the front of the spinner 203. The inner end of the key 241 is provided with lug 243 adapted to engage the castellations in the opening 240 of the disc 221 so that by turning the key the disc 221 and hence the locking ring 206 is rotated to release the spinner.

The key 241 is provided with lugs 244 at its end, which lugs are staggered around the key with respect to the lugs 243. The lugs 244 are adapted to move behind an extension 245 on the support 202 when the ring 206 is in unlocked position, thereby preventing withdrawal of the key. The key can, therefore, only be withdrawn after turning it in the reverse direction so as to lock the spinner 203 on the hub 201.

A safety device may also be provided to prevent rotation of the disc 221 and the locking ring 206 from operative position after the key has been removed. This safety device is comprised of a plate 246 slidably mounted on a ring 247 attached to the front disc or support 202. The plates 246 carries pins 248 adapted to engage holes 249 in the disc 221. The pins 248 are normally held in engagement in the holes in the disc by means of a tensioning element 250 disposed between the plate 246 and the ring 247.

When the key 241 is inserted to unlock the spinner the lugs 243 thereon engage the plate 246 and force it backwards against the pressure of the tension element 250 to disengage the pins 248 from the holes in the disc 221.

The rear or free edge 211 of the spinner 203 is guided by means of a flanged ring 251 secured to the inside of said edge to form an annular

centering slot for engagement with the flanged outer edge 212 of the rear support 213. One flange of the ring 251 may be formed with a series of holes 252 to receive pins 253 on the support 213 for the purpose of preventing rotation of the spinner. This arrangement is shown more clearly in Figs. 14 and 15.

In all of the embodiments described above the spinner is locked at several places by means of a locking ring and studs. It is within the scope of the invention, however, to employ other means for locking the spinner at the front side of the hub of the propeller.

For example, as shown in Figs. 11 and 12 the spinner 303 is secured to an externally screw-threaded central boss 360 at the front of the hub 301 by means of a ring nut 361 which is held to the front disc or support 302 by means of the plate 362. The nut 361 may be rotated to lock or release the spinner by means of a drift 363 inserted through a slot 364 in the spinner as shown in Fig. 12, and is adapted to engage in peripheral recesses 365 in the ring nut 361 so that the latter may be rotated.

In this embodiment of the invention the rear or free edge of the spinner is shown as guided in the same manner as in Fig. 7 and as more clearly shown in Figs. 14 and 15.

Another form of central attachment for the spinner is shown in Fig. 13, in which the nose of the spinner 403 is bolted as at 470 to the free end of a central bracket 471 fixed to and projecting forwardly from the front of the hub 401 of the propeller.

Figs. 16 and 17, inclusive, illustrate alternative means for preventing rotation of the spinner and for guiding the free or rear edge thereof. The rear edge 511 is formed with a series of open-ended slots 580 and is centered in the returned marginal edge 512 of the rear support 513, the slots 580 engaging pins 581 passing transversely across the groove formed by the returned edge 512 of the rear support 513.

Fig. 18 shows another way of centering the spinner, the free edge 611 being flanged and formed with annular corrugations 690 adapted to engage corresponding corrugations 691 in the rear support 613. It is also possible with such means to employ pins similar to those number 581 in Figs. 16, 17 to prevent rotation of the spinner.

Obviously any of the means described and shown for guiding the rear edge of the spinner and preventing rotation can be employed with any of the means for securing the spinner to the front of the propeller hub. Moreover, various modifications of the structures shown may be varied without departing from the inventive concept.

Having now particularly described the invention, what is desired to be protected by Letters Patent is set forth in the following claims.

We claim:

1. A spinner for the hub of an airplane propeller or the like, comprising, a body portion, a supporting member fixed to the front of the hub, an annular plate fixed to the inside of the body portion and adapted to register with said support, a locking ring carried by said plate and mounted for relative rotary movement with respect to said plate, and cooperating means on said ring and said plate to lock detachably said body portion with respect to said hub when a limited rotary movement is imparted to the locking ring, and means adapted to be inserted or withdrawn from an opening in the body portion disposed forwardly of said hub for imparting said rotary movement to said locking ring.

2. A spinner for the hub of an airplane propeller or the like, comprising, a body portion, a supporting member fixed to the front of the hub, an annular plate fixed to the inside of the body portion and adapted to register with said support, a locking ring carried by said plate and mounted for relative rotary movement with respect to said plate, and cooperating means on said ring and said plate to lock detachably said body portion with respect to said hub when a limited rotary movement is imparted to the locking ring, means adapted for insertion through an opening in the body portion for imparting said rotary movement to said locking ring, and means blocking insertion or withdrawal of said last named means when the locking nut is not in locking position.

3. Means for detachably securing a spinner to the hub of an airplane propeller or the like, comprising a supporting member fixed to the front of the hub, an annular plate fixed to the inside of the spinner and adapted to register with said support, a locking ring carried by said plate and mounted for relative rotary movement with respect to said plate, said locking ring having a series of keyhole shaped slots, a corresponding series of elements fixed on said plate for engagement with said slots and having head portions thereon of sufficient width to engage the upper surfaces of the ring adjacent the edges of the narrower ends of said slots, a loose key adapted to be inserted and withdrawn from an opening in the spinner for rotatably shifting the locking ring to attach or detach the spinner, and means for blocking withdrawal of the key when the spinner is in detachable position.

4. Means for detachably securing a spinner to the hub of an airplane propeller or the like, comprising a supporting member fixed to the front of the hub, an annular plate fixed to the inside of the spinner and adapted to register with said supporting member, a locking ring carried by said plate and mounted for relative rotary movement with respect to said plate, said locking ring having a series of keyhole shaped slots, a corresponding series of elements fixed on said plate for engagement with said slots and having head portions thereon of sufficient width to engage the upper surfaces of the ring adjacent the edges of the narrower ends of said slots, and tension means operatively connected to the spinner and locking ring for normally holding the locking ring in operative position to lock the spinner on the hub.

5. A spinner for the hub of an airplane propeller or the like, comprising, a body portion, a supporting member fixed to the front of the hub, an annular plate fixed to the inside of the body portion and adapted to register with said support, a locking ring carried by said plate and mounted for relative rotary movement with respect to said plate, and cooperating means on said ring and said plate to lock detachably said body portion with respect to said hub when a limited rotary movement is imparted to the locking ring, a loose key adapted to be inserted and withdrawn from an opening in the spinner disposed forwardly of the hub for rotatably shifting the locking ring to attach or detach the spinner, and a second supporting member fixed to the rear side of the hub and adapted detachably to support the rear edge of said spinner.

6. A spinner for the hub of an airplane propeller or the like, comprising, an integral one

piece nose cap, means disposed within the cap and forwardly of the hub for detachably connecting said cap to said hub, said means comprising a portion rigid with the hub and a cooperating portion rigid with the cap, locking means on said portions adapted to lock or release said portions to or from each other upon relative rotary movement of said portions, key means passing through an opening in said cap forwardly of said hub and operable from outside said cap for effecting said relative rotary movement to lock or release said portions, and means for guiding the rear edge of said nose cap to the rear of said hub, said last named means comprising a support fixed to the rear face of said hub, said support having a flange for engaging the rear edge of said nose cap.

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