July 12, 1927. 1,635,966

H. G. STANTON

PROPELLER

Filed Aug. 14, 1926 2 Sheets-Sheet 1

Fig. 1.

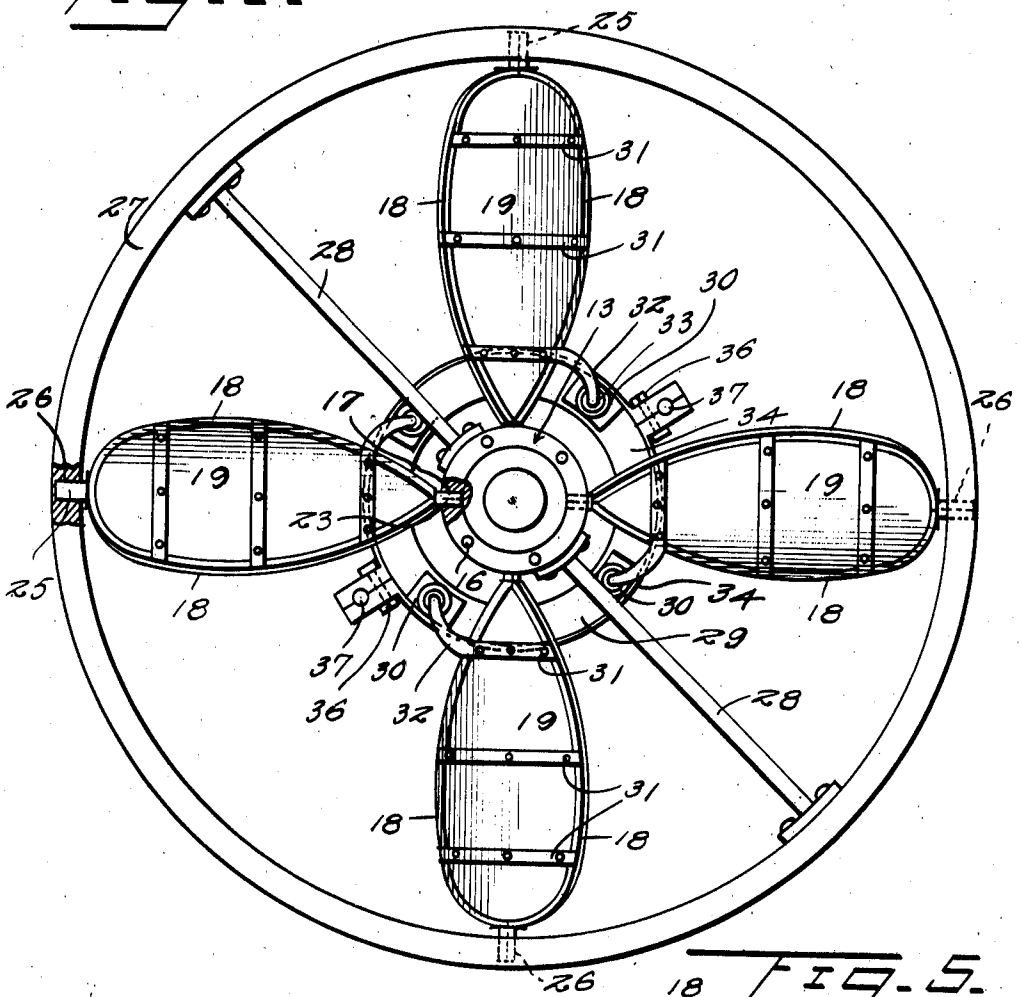


Fig. 3.

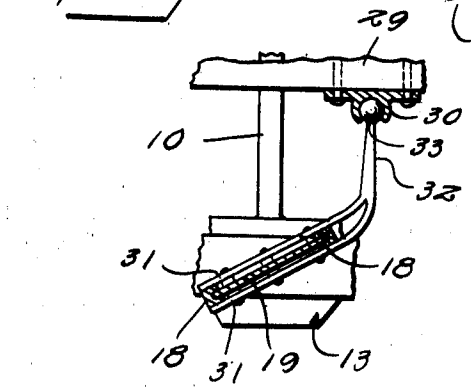
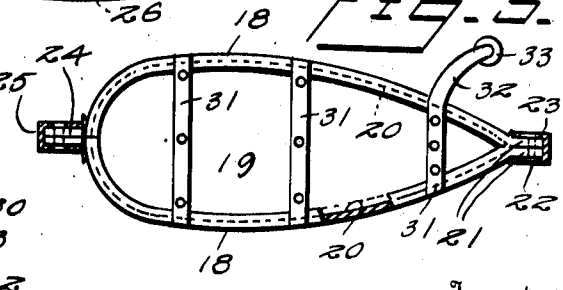


Fig. 5.



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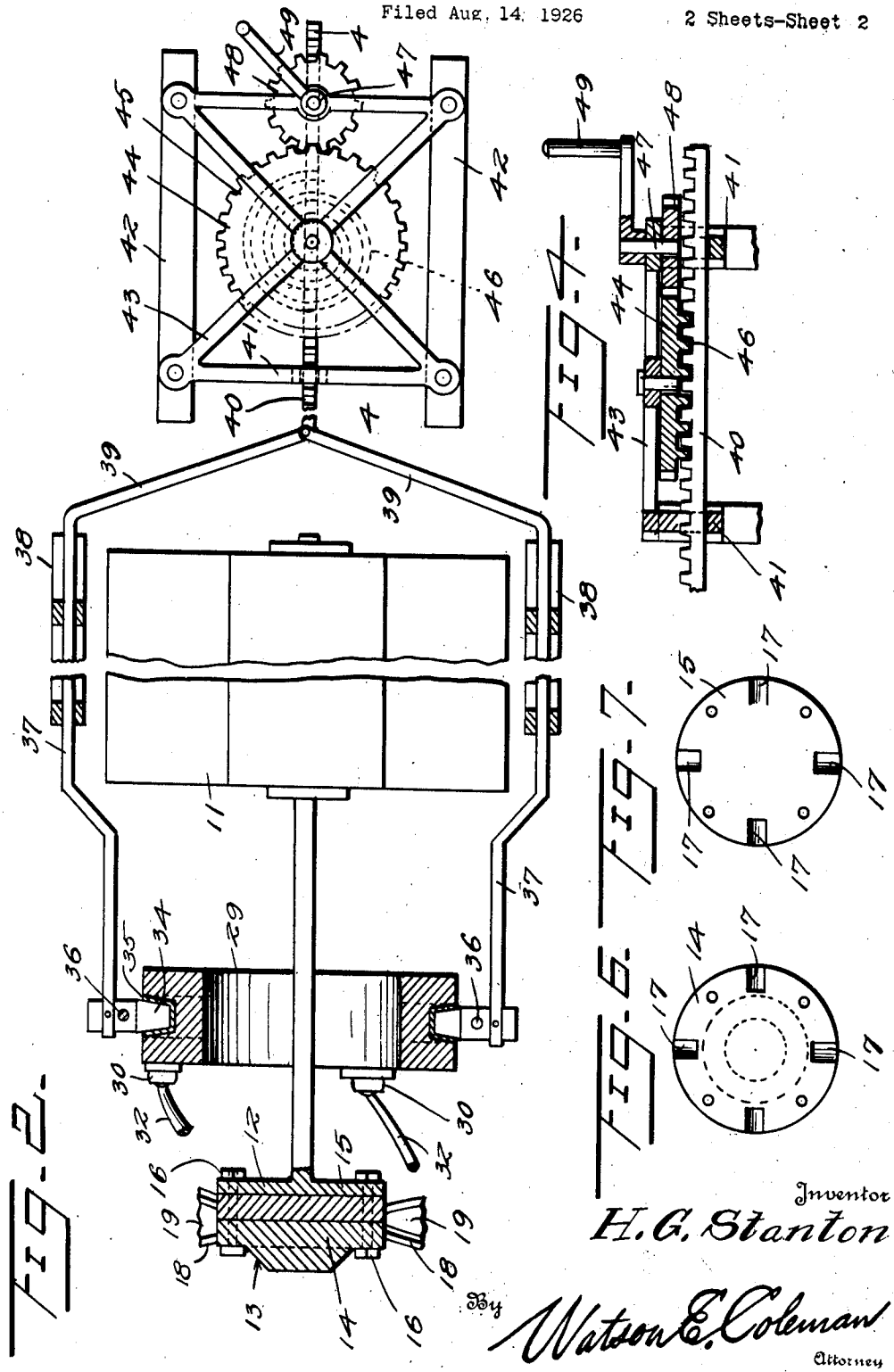


Fig. 2.

Fig. 4.

Fig. 7.

Fig. 6.

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Patented July 12, 1927. 1,635,966

UNITED STATES PATENT OFFICE.

HARMON G. STANTON, OF GRAND RAPIDS, MICHIGAN.

PROPELLER.

Application filed August 14, 1926. Serial No. 129,214.

This invention relates to propellers and more particularly to the construction of a propeller in which the pitch of the blades is adjustable.

An important object of the invention is to produce a device of this character of such construction that the pitch of the blades may be readily varied during operation of the propeller to increase the thrust thereof.

A further object of the invention is to improve the construction of the propeller so as to render the blades rigid while at the same time permitting such adjustment.

A still further object is to provide a novel and improved adjusting means for the blades of the propeller.

These and other objects I attain by the construction shown in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a front elevation partially in section showing a propeller constructed in accordance with my invention;

Figure 2 is a longitudinal sectional view showing the manner of connecting the propeller with the control mechanism;

Figure 3 is a transverse sectional view through one of the blades of the propeller;

Figure 4 is a longitudinal sectional view through the control mechanism;

Figure 5 is a side elevation of one of the blades of the propeller partially shown in section;

Figures 6 and 7 are views of the coacting faces of the sections of the propeller hub.

Referring now more particularly to the drawings, the numeral 10 generally designates a propeller shaft of an engine 11. At its forward end, this propeller shaft is provided with the usual flange 12 for securing thereto the hub 13 of the aeroplane propeller. In accordance with my invention, the hub 13 is formed in two sections 14 and 15 which are held in assembled relation by the bolts 16 employed for attaching the hub to the flange 12. These sections have grooves in their coacting faces which, in the assembled relation of the sections, produce radially directed sockets 17, the purpose of which will presently appear.

Each vane or blade of the propeller is formed with two complementary rim sections 18 forming a frame for the blade proper, as indicated at 19, the edges of the blade fitting into the grooves 20 formed in the inner faces of the rim sections. At the inner ends of each rim section an extension 21 is provided, these extensions 21 combining to produce a circular or shaft-like section and being secured together by bolts 22, both the heads and nuts of which are flush-seated in the surfaces of the sections. The shaft-like section thus produced is then covered by a bearing 23 which fits into the socket 17 of the hub.

At their outer ends, the rim sections are provided with similar extensions 24 which are likewise surrounded by a bearing 25. These bearings fit into radial sockets 26 formed in the inner face of a rim 27. This rim 27 is rigidly secured to the hub 13 by means of spokes 28 which may be employed in any desired number, two being illustrated in the present instance. These spokes are preferably shaped in cross section, after the manner of shaping a propeller blade, in order that instead of interfering during operation of the propeller, they will, in fact, increase the thrust produced thereby.

About the shaft 10, rearwardly of the flange 12, a ring 29 is disposed. The forward face of this ring is provided with ball sockets 30 corresponding in number to the propeller blades. Each propeller blade is further attached to its rim portion by a plurality of transversely extending bands 31 arranged in pairs at opposite faces of the blade and bolted together through the blade. One of these pairs of bands of each blade is provided with an extension 32 projecting rearwardly toward the collar 29 and having at its rear end a ball 33 for engagement in the corresponding socket 30 of the ring. It will be obvious that as the ring 29 is shifted toward or away from the hub 13, the propeller blades will be rotated about their pivots to change the pitch thereof and accordingly to increase or decrease the thrust of the propeller.

The periphery of the ring 29 is provided with a substantially V-shaped groove for the reception of a shifting ring 34, the face of the groove, due to the high speed of operation of aeroplane engines, being preferably sheathed with bearing material, as indicated at 35. The ring 34 is formed in two sections and the bolts 36 employed for connecting these sections provide means for attaching to the ring the forward ends of shifting rods 37. These rods are supported in guides 38 secured to the engine base and rearward-

ly of the engine converge, as at 39, and are there secured to the forward end of a rack 40. This rack 40 is longitudinally shiftable in guides 41 carried by a suitable supporting frame 42. This supporting frame likewise provides a mounting for a spider 43 upon which is rotatably mounted a disk 44, the periphery of which is provided with gear teeth 45 and the face of which operates against the toothed face of the rack 40 and is formed with a spiral rib 46 for coaction with the teeth of the rack. The spider 43 likewise provides a mounting for a trunnion 47 of a pinion 48, the teeth of which mesh with the teeth 45 upon the periphery of the disk 44. This trunnion is provided with a suitable operating crank 49 or may be rotated in any desired manner.

It will be obvious that upon rotation of the pinion 48, the disk will be rotated and the rack 40 shifted longitudinally in a direction, depending upon the direction of rotation of the pinion 48. The connections between the rack 40 and ring 34 will cause the ring 29 to be shifted toward or away from the propeller and will accordingly change the pitch of the blades. It will be obvious that the connection between the disk 44 and the rack will hold the rack locked against longitudinal movement in any position thereof and thus provide a means for resisting the tendency of the propeller blades to assume a position in which there is no thrust thereon.

Since the construction hereinbefore set forth is obviously capable of a certain range of change and modification without materially departing from the spirit of the invention, I do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. In a propeller, the combination with a driven shaft, a hub secured thereto a rim surrounding the hub in spaced relation thereto and rigidly connected therewith, radially directed blades having their inner ends rotatably mounted in the hub and their outer ends rotatably mounted in the rim, means longitudinally adjustable upon and rotatable with relation to the shaft and connected with said blades for rotating the blades about the pivots thereof, said means comprising a ring surrounding the shaft and having in its periphery a groove, a second ring slidably engaged in the groove and held against rotation with relation to the first named ring, a rack connected with the sec ond ring, a disk confronting the toothed fac of the rack and having a spiral rib for coaction with the teeth of the rack and means for rotating said disk.

2. In combination with a propeller including radially extending blades mounted for rotation about the axes thereof, a shaft upon which the propeller is mounted, a ring loosely surrounding said shaft and means for longitudinally shifting said ring upon the shaft including a rack having connection with the ring permitting rotation of the ring, a disk confronting the toothed face of the rack and having a spiral rib for coaction with the teeth of the rack and means for rotating said disk.

3. In a propeller, the combination with a driven shaft, a hub secured thereto and radially projecting blades carried by the hub and rotatable about their axes upon the hub and means for rotating said blades comprising arms rigidly secured to said blades and provided at their free ends with spherical heads, a ring loosely surrounding the shaft and having sockets for the reception of the heads and means for shifting the ring longitudinally of the shaft permitting rotation of the ring.

In testimony whereof I hereunto affix my signature.

HARMON G. STANTON.