

W. G. MURRAY.

ADJUSTABLE PROPELLER BLADE AND MEANS FOR CONTROLLING THE SAME.

APPLICATION FILED MAR. 11, 1910. RENEWED DEC. 18, 1912.

1,053,060.

Patented Feb. 11, 1913.

2 SHEETS—SHEET 1.

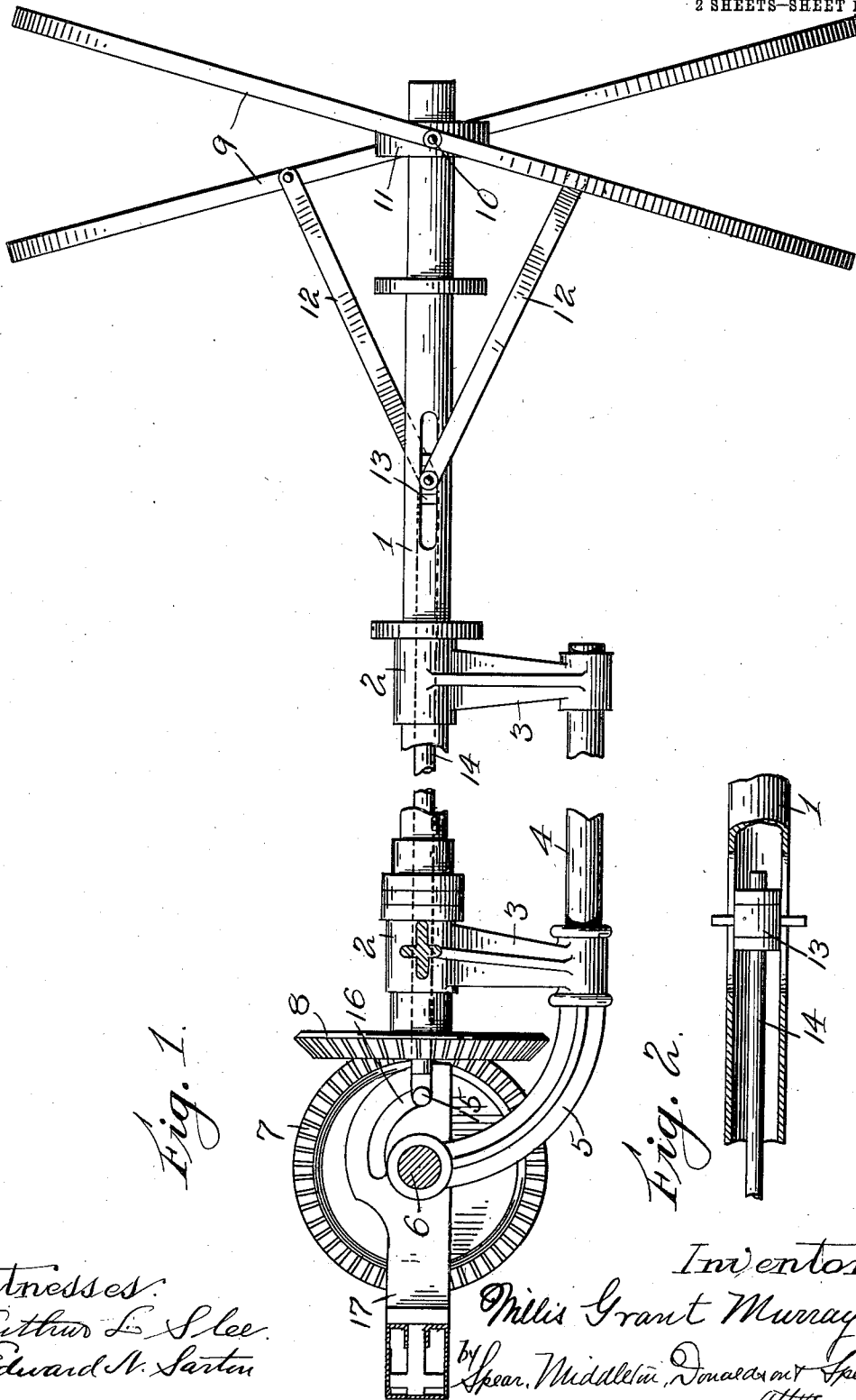


Fig. 1.

Fig. 2.

Witnesses:
Arthur L. Slee.
Edward N. Sartan

Inventor:
Willis Grant Murray
by Spear, Middleton, Donahue & Spear
Attys.

W. G. MURRAY.

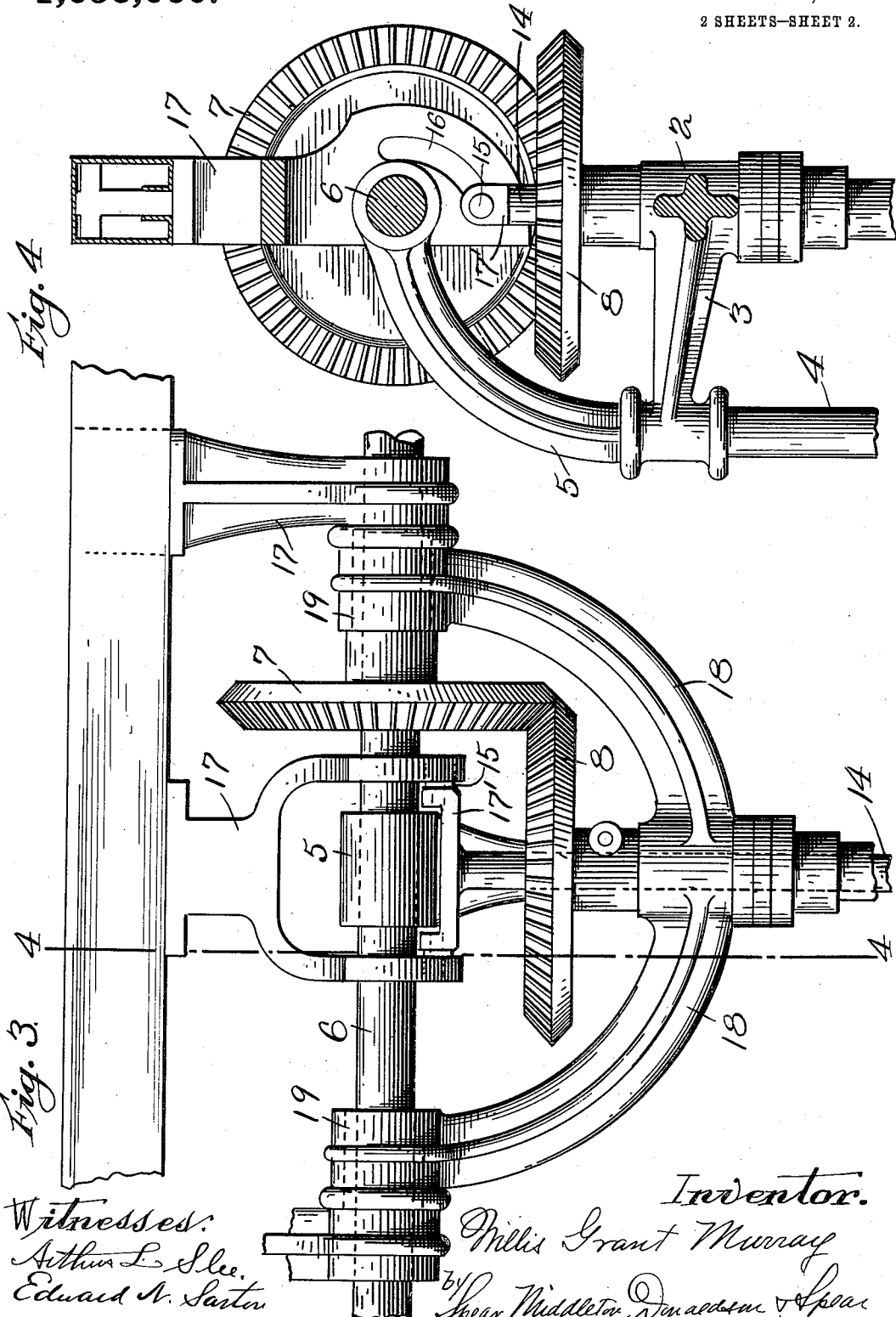
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Willis Grant Murray
by Spear, Middleton, Demarest & Spear
Attys.

UNITED STATES PATENT OFFICE.

WILLIS GRANT MURRAY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO MURRAY AIRSHIP COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF ARIZONA.

ADJUSTABLE PROPELLER-BLADE AND MEANS FOR CONTROLLING THE SAME.

1,053,060.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed March 11, 1910, Serial No. 548,584. Renewed December 18, 1912. Serial No. 737,570.

To all whom it may concern:

Be it known that I, WILLIS GRANT MURRAY, citizen of the United States, residing at San Francisco, California, have invented certain new and useful Improvements in Adjustable Propeller-Blades and Means for Controlling the Same, of which the following is a specification.

My invention relates to propelling mechanism for aeroplanes, dirigibles and the like, and it concerns particularly means for adjusting the propeller blades to different angles, and to means of adjustment of the propeller into a position for driving forward or into a position for lifting the airship, in the former case the propeller blades being adjusted at one angle in relation to the axis of the propeller, and in the second case said blades being adjusted at a lower angle in relation to the said axis.

The invention consists in the features of construction and combination and arrangement of parts hereinafter described and particularly set forth in the claims.

In the accompanying drawings Figure 1 is a side elevation partly in section of the propeller and associated mechanism in the position adapted for lifting the aeroplane or airship; Fig. 2 is a detail view; Fig. 3 is a detail view of the driving gears for the propeller shaft and the supporting connection; Fig. 4 is a detail view substantially along the line 4-4 of Fig. 3.

In these drawings, the propeller shaft 1 is mounted in bearings 2 at separated points, the said bearings being connected by hangers 3 with a torsion rod 4, the forward end of said rod being connected by a curved bracket or steady rest 5 with the drive shaft 6 upon which said bracket is pivotally hung. The shaft 6 carries a driving gear 7 meshing with the gear 8 on the propeller shaft.

The propeller blades are shown at 9, these being shown in the drawings as two in number, but not limited to any particular number, and they are pivoted at 10 to a block 11 fixed on the propeller shaft. The blades are connected by links 12 with a sliding block 13 within the hollow propeller shaft, the said block being connected by a rod 14 with a pin or roller 15 located in a cam groove 16 formed in the hanger or bracket 17, which also serves as a support for the shaft 6. With the parts in the position

shown in Fig. 1, the propeller shaft is vertically disposed, and in this position the revolution of the propeller will have a lifting effect on the aeroplane or airship. The propeller blades in this position are practically at the limit of their approach to each other, and each is at a comparatively low angle to the general horizontal plane in which they are working. In order to adjust the propeller mechanism for driving the airship forward, the propeller shaft, together with the steady rest and torsion rod, is adjusted about the shaft 6 as a pivot, so that the said shaft will lie at right angles to the position shown in Fig. 1, and extending to the right of said figure. In the movement of adjusting the propeller shaft from the vertical position shown to the horizontal position just stated, the pin or roller 15 will move in the cam groove 16, which is of such form as to draw the roller 15 inwardly, toward the shaft 6, and the rod 14 being thus drawn upon, will, through the links 12, turn the propeller blades about their pivots 10, and separate them at a greater distance from each other than shown in Fig. 1, so that they will be presented at greater angles to the air for driving the ship forward with the greatest efficiency. The pins or rollers 15 are carried by a forked or yoke member 17' connected with the rod 14, and the pins engage the grooves formed in the inner faces of the cam member, which, as shown in Fig. 3, is of fork or yoke form, and by this yoked or forked construction of the parts space is left for the pivoting of the steady rest or bracket 5 on the shaft 6. One of the bearings of the propeller shaft is connected by a yoke 18 with bosses 19 extending from the brackets 17 of the frame, the said yoke turning on the said bosses in the adjustment of the propeller shaft from one position to another.

It will be seen from the above that the propeller blades are automatically adjusted to suit the necessary conditions of work. When the propeller shaft is adjusted from one position to another, such, for instance, as from a horizontal position for driving to a vertical position for lifting, the adjustment of the blades takes place as a result of the adjustment of the propeller shaft as a whole, and requires no separate attention on the part of the navigator.

I do not limit myself to the detail features of construction above described, as these may be varied without departing from the spirit of my invention.

5 It will be understood that while I show an arrangement in which the propeller blades are adjusted as a result of swinging the propeller shaft from one position to another, I do not limit myself in this respect,
10 as hand operated connections may be employed by which the propeller blades may be adjusted whatever the position of the shaft may be, this adjustment for the propeller blades being thus independent of the
15 adjustment of the shaft so that the navigator, with the shaft remaining in one position, may adjust the blades as may be desired.

Some of the features herein shown relating to the means for operating the propeller are made the subject matter of another application filed by me March 11, 1910, #548,583, for adjustable and reversible propellers.

25 I claim as my invention:—

1. In combination in apparatus of the class described, a propeller shaft carrying a propeller blade, means for driving the propeller shaft, said propeller shaft being
30 adjustable to different angular positions, and means for automatically changing the angular relation of the propeller blade in accordance with the adjustment of the propeller shaft, substantially as described.

35 2. In combination a propeller shaft, a plurality of blades pivotally mounted thereon, a pivotal support for the propeller shaft, driving means for the propeller shaft, a connection to the pivoted blades, and means for
40 automatically operating the said connection as the propeller shaft is turned to different angular positions for adjusting the angular

relation of the propeller blades, substantially as described.

3. In combination a propeller, a shaft 45 pivotally mounted, a stationary cam, and a connection from said cam to the propeller blade for changing the angular relation thereof as the propeller shaft is turned in the different positions, substantially as de- 50 scribed.

4. In combination with a propeller blade, a shaft pivotally mounted, a driven gear on the shaft, a driving gear meshing therewith, a shaft at right angles to the propeller shaft 55 and carrying the driving gear, a bracket for pivotally mounting the propeller shaft on the said driving shaft, a stationary cam adjacent the drive shaft, and a rod extending from said cam through the center of the propeller blade shifting the same into different 60 angular positions, substantially as described.

5. In combination a propeller shaft, a drive shaft at right angles thereto, bevel gearing between the said shafts, bearings 65 for the propeller shaft, a bracket or steady rest pivotally mounted on the drive shaft and connected with the bearing of the propeller shaft, a forked member embracing the end of the steady rest and having cam 70 grooves on its inner faces, a rod extending axially of the propeller shaft and connected with the propeller blade, said rod having a head with pins engaging the cam grooves of the forked member, and a yoke connected 75 with one of the bearings of the propeller shaft and mounted to turn about the axis of the drive shaft, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIS GRANT MURRAY.

Witnesses:

BENNETT S. JONES,
EDWARD N. SARTON.