March 12, 1929. G. BESS 1,704,719

AEROPLANE

Filed Feb. 11, 1928

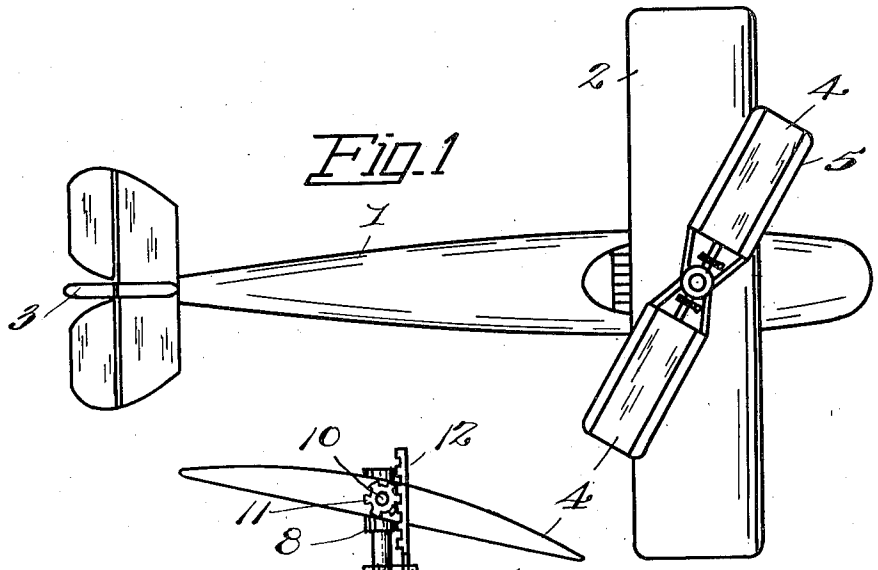


Fig. 1

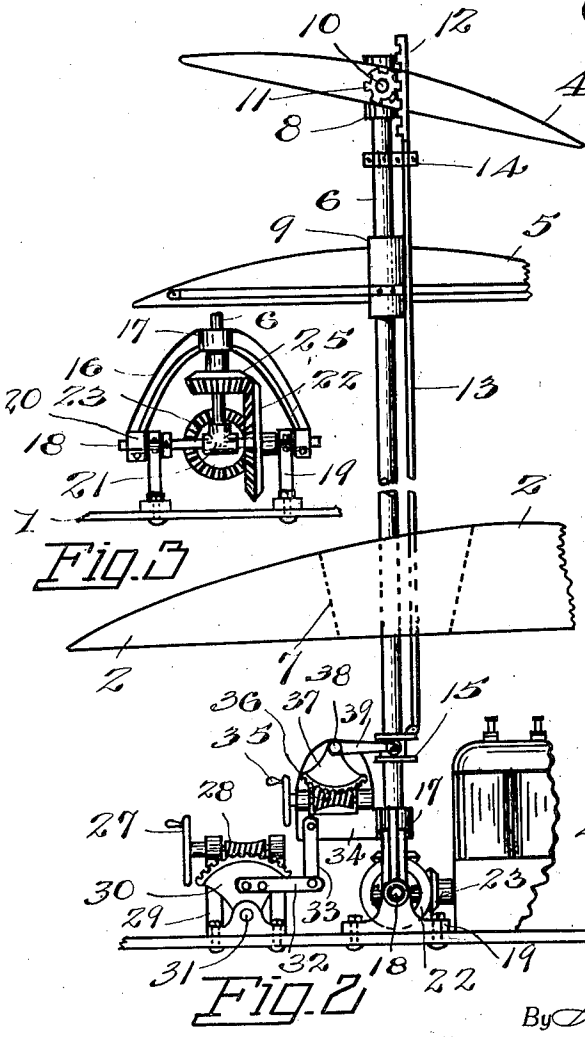


Fig. 3

Fig. 2

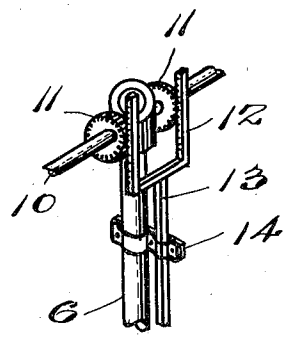


Fig. 4

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Patented Mar. 12, 1929. 1,704,719

UNITED STATES PATENT OFFICE.

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AEROPLANE.

Application filed February 11, 1928. Serial No. 253,657.

My present invention relates to improvements in aeroplanes and particularly of the helicopter type.

The primary object of the invention is the provision of an aeroplane or heavier-than-air flying machine which is propelled and maneuvered similar to the helicopter and while the invention may be embodied in various types of flying machines, I have herein shown a monoplane equipped with the appliance of my invention for propelling and controlling the flying machine.

The invention consists in certain novel combinations and arrangements of parts as will hereinafter be more fully set forth and claimed.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to the best mode I have so far devised for the practical application of the principles of my invention.

Figure 1 is a top plan view of an aeroplane equipped with the apparatus of my invention.

Fig. 2 is an enlarged detail elevation showing the propulsion and control mechanism.

Fig. 3 is a detail view showing the gearing for driving the upright drive shaft of the propulsion mechanism.

Fig. 4 is a detail perspective view showing the means for adjusting the upper propeller of the helicopter.

In order that the general assembly and relation of parts may readily be understood I have shown a flying machine in Fig. 1 which includes the usual fuselage or body 1, having a monoplane 2 and usual vertically disposed rudder 3 that is controlled in customary manner for lateral turning of the flying machine.

For the propulsion of the machine and for varying the flight in ascending and descending I utilize a pair of propellers 4 and 5, the former having a pair of blades approximately the length of the latter, but preferably narrower than the blades of the propeller 5. These blades are fashioned with convex upper faces and flat lower faces and they are arranged at different altitudes above the monoplane 2 as indicated in Fig. 2. The blades are rotated by and with the vertical rotary shaft 6 which passes upwardly through an opening 7 in the monoplane 2 as shown by dotted lines in Fig. 2 of the drawing. The upper propeller has a hub 8 and the lower propeller has a hub 9 fixed to the rotary shaft 6. The upper propeller has a pair of trunnions 10 extending outwardly from the hub 8 and each trunnion has a pinion 11 for use in turning or oscillating the propeller 4 on its horizontal axis. The pinions 11 are turned through the medium of a two-arm yoke 12 on the end of a rack bar 13 which is adapted to slide in the bearing 14 secured to the rotary shaft 6. A slide spool 15 is located on the shaft 6 and it will be apparent that when this spool is slid upwardly the front edge of the propeller will be tilted upwardly and the lower edge tilted downwardly, and vice versa, for use in maneuvering the aeroplane either upwardly or downwardly. The rack yoke of course engages the pinions 11 and the rack connection holds the propeller in adjusted position.

The shaft 6 has a swivelled connection at its lower end so that the two propellers may be tilted forwardly and downwardly, or tilted rearwardly and downwardly as desired for maneuvering the ship. At the lower end of the shaft 6 is provided a yoke 16 having a bearing 17 for the shaft 6 and this yoke 16 is swivelled on the transversely disposed horizontal shaft 18 that is supported in bearings on the brackets 19 secured to a secure foundation or support in the fuselage of the ship. The yoke 16 has bearings 20 on the gear shaft 18 and at the center of this gear shaft a stop bearing 21 is provided for the lower end of the shaft 6, so that the shaft may readily rotate in this bearing as well as in the bearing 17 of the yoke. The gear shaft 18 is provided with a large gear 22 that is driven by a drive pinion 23 which is operated from the motor indicated as 24 in Fig. 2 and a second pinion 25 is carried by the shaft 6 and driven through the large gear 22, thus revolving the shaft 6 and with it the two propellers 4 and 5.

The upright position of the shaft 6 is controlled by the aviator through manipulation of a hand wheel 27 which is provided with a screw 28 that is journalled in bearing brackets 29 and this screw coacts with a complementary segmental rack plate 30 that is journaled at 31 in a suitable bracket for the purpose. The segmental rack plate 30 is provided with an arm 32 and this arm is connected by a second arm 33 to the bracket arm 34 rigid with the yoke 16 and extending upwardly therefrom. It will thus be apparent that as the hand wheel 27 is turned

the shaft 6 will be tilted to the front or to the rear and will swing through its bearings 20 on the shaft 18.

A hand wheel 35 is provided for controlling the tilting motion of the propeller 4 and this wheel has a worm screw 36 journalled in the yoke arm 34 and coacting with a segmental rack 37 which is pivoted at 38 in the yoke arm and the arm 39 of the segmental rack is forked as usual to engage the spool 15 on the shaft 6. Thus by turning the hand wheel 35 the propeller 4 may be tilted as desired for maneuvering purposes.

It will be apparent that the two control wheels 27 and 35 are arranged in position where they are readily accessible to the aviator and he may with facility manipulate these hand wheels for controlling the flight of the aeroplane.

Having thus fully described my invention, what I claim is new desire to secure by Letters Patent is:

1. The combination in a helicopter aeroplane with a tiltable driving shaft, of a pair of spaced propellers rotatable therewith, means for driving the shaft, means for tilting the shaft, a slide spool on the shaft and bearing means therefor, a rack bar connected to the spool, and a rack wheel on the tiltable propeller for coaction with the rack bar.

2. The combination with a swivelled helicopter shaft and means for revolving said shaft, of a pair of propellers rotatable with the shaft the upper propeller being tiltable, means for tilting the upper propeller, a hand wheel and a screw for controlling the tiltable shaft, a segmental rack for coaction with the screw, and linkage connecting said rack with the shaft.

3. The combination with a rotary shaft, a lower propeller rotatable therewith and an upper tiltable propeller rotatable with said shaft, of a slide spool on the shaft, a rack bar connected to the spool and rack wheels coacting with said bar for tilting the upper propeller, means for revolving the shaft, means for tilting the shaft, a hand wheel and screw, a segmental rack coacting with said screw, and an arm on the segmental rack coacting with the slide spool.

In testimony whereof I affix my signature.

GUSTAVUS BESS.