March 13, 1928. 1,662,406

E. H. THOMPSON

AIRPLANE

Filed Jan. 10, 1928

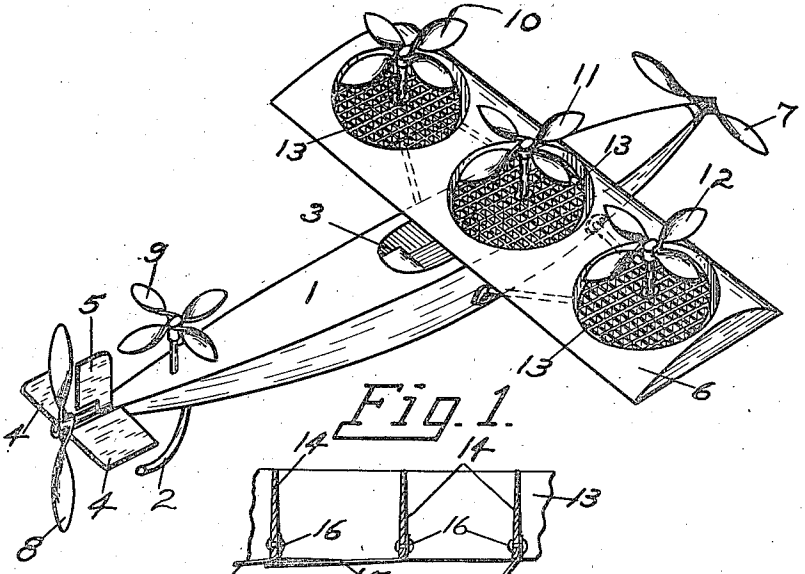


Fig. 1.

Fig. 5.

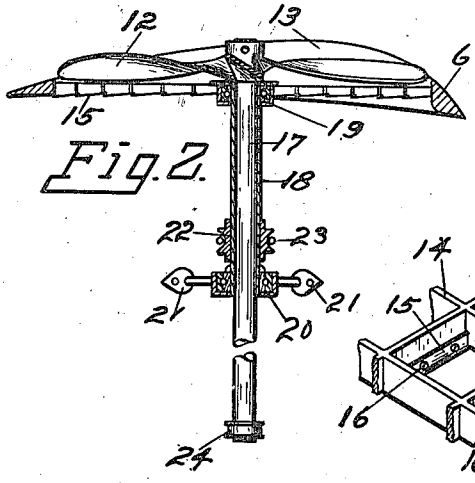


Fig. 2.

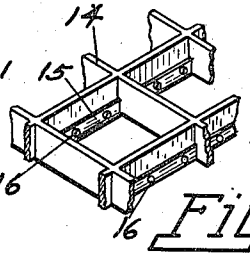


Fig. 4.

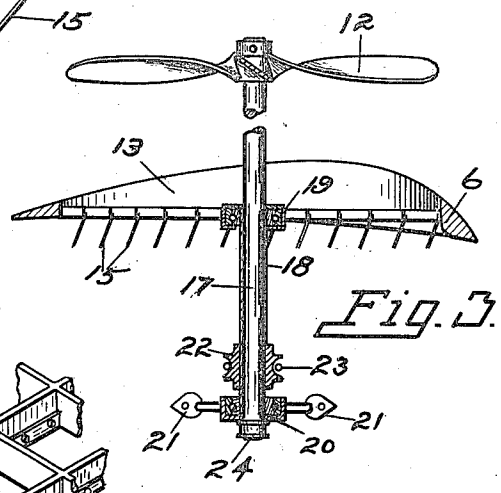


Fig. 3.

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UNITED STATES PATENT OFFICE.

ELMER H. THOMPSON, OF MEDIMONT, IDAHO.

AIRPLANE.

Application filed January 10, 1928. Serial No. 245,691.

My present invention relates to improvements in airplanes or heavier than air flying machines provided with auxiliary means for converting the airplane into an aircraft of the helicopter type. In carrying out my invention I utilize the usual type of heavier than air machine, here shown as a monoplane equipped with forward and aft propellers of usual construction, the former for forward drive of the ship and the latter for retarding the forward movement of the ship or for reversing its flying movement. In connection with these propellers the usual driving means are employed, and in addition to these propellers a plurality of horizontally arranged propellers are carried by the ship by means of which the ship may be lifted or lowered vertically during manœuvres or handling of the ship by the aviator. By the aid of the horizontally disposed propellers the take-off or launching of the ship may be simplified, and alighting of the ship may also be accomplished with facility and safety by the use of the helicopter propellers.

The invention consists in certain novel combinations and arrangements of parts of the airplane 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 in a monoplane, wherein the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention, and it will be understood that my invention is also applicable for use with other types of heavier than air flying machines.

Figure 1 is a perspective view of a monoplane equipped with the structures forming my invention and showing the normally retracted helicopter propellers extended and in position for use, as in launching or in landing the ship.

Figure 2 is an enlarged vertical sectional view transversely of the single plane of the heavier than air flying machine showing a helicopter propeller in its retracted position.

Figure 3 is a similar view to Figure 2 but showing the helicopter propeller extended or lifted to elevating position.

Figure 4 is a perspective view showing a portion of the grid or open frame provided in each of the wells in which the helicopter propellers are normally retracted.

Figure 5 is an enlarged detail sectional view showing the different positions of the hinged gates or partitions of the grid in the wells.

In order that the general arrangement and relation of parts may readily be understood I have illustrated in Figure 1 a monoplane of usual type comprising the body or fuselage 1 of the ship which is equipped with the necessary accessories as the landing gear 2 and cockpit 3. At the rear of the fuselage the usual elevators or horizontal rudders 4, and vertical rudder 5, are located and controlled in suitable manner, and the ship is provided with a single plane 6 extending transversely of the fuselage as usual.

A forward propeller 7 is utilized to drive the ship forward, and an aft propeller 8 is employed for retarding the forward movement of the ship during maneuvers or for backing the ship if desired when the forward propeller is not operating. The usual driving machinery or motors may be employed for operating these propellers for driving the ship in horizontal planes, and of course other accessories are used, although not here illustrated.

In addition to the two propellers for forward and rear driving of the ship I utilize a plurality, here shown as four, of helicopter propellers, as 9, 10, 11, and 12, located in horizontal planes and designed to lift or elevate the ship or permit lowering of the ship for launching and landing respectively. These helicopter propellers are driven independently of the two propellers 7 and 8 and are normally inactive, being used primarily in maneuvering the ship for launching or taking off and for landing the ship.

Normally, or when not in use, the three propellers 10, 11 and 12 are situated in wells or openings 13 provided therefor in the plane, and these wells are located at the center of the plane and at points equidistant at the sides of the center to accommodate the propellers. When the ship is flying the wells are closed to prevent adverse currents of air passing therethrough, but when the ship is rising or being lowered through operation of the helicopter propellers, these wells are open to vertical currents of air. Across the circular area of the wells extends an open frame or grid 14, located below the

helicopter propeller when the latter is housed in the well, and this grid or open frame is provided at its underside with swinging gates or partitions 15 that are hinged to the grid at 16. These gates stand in vertical planes transversely of the ship under action of gravity when the ship is not moving forwardly or rearwardly, but when the ship is flying forward, the impingement of air currents against the transversely extending swinging gates swings the latter up to horizontal position, as in Figure 2, to close the well against passage of air currents therethrough. When the helicopter propellers are in position, Figure 3, to lift the ship, or to lower it, these gates are held open for passage of air currents through the well as in Figure 3.

In order that the helicopter propellers may be projected from retracted position of Figure 2 to operative position of Figure 3 they are provided with telescoping, vertically arranged driving shafts comprising an inner shaft 17 and an outer tubular shaft 18, with the inner shaft keyed to slide in the tubular shaft and to revolve with it. The tubular shaft is journaled in the upper bearing 19, located in a well and supported from the grid or open frame of the well, and a lower bearing 20 supported from the fuselage or body of the ship by braces or brackets 21.

A grooved pulley 22 is rigidly fixed on the tubular shaft and a drive cable or belt 23 passes around the pulley and is driven by a suitable motor for revolving the tubular shaft, the inner shaft section and the helicopter propeller.

When the tubular shafts of the helicopter propellers are operated or driven, the first function of the revolving propellers is to extend the inner shafts 17 with relation to their tubular shafts, and the rotary movement of the propeller causes down currents of air through the wells that open, and hold open, the gates 16. The relative movement of the shaft 17 is limited by a collar 24 fixed on the end of the shaft that encounters the lower bearing 20, and thereafter, as the propellers revolve, the pull or lifting movement of these propellers elevates the ship. Should the ship lose its power for any reason while under way, the helicopter propellers may be brought into use to lower the ship on an even keel and the landing accomplished under conditions similar to the use of a parachute. The helicopter propellers may thus be manipulated and the ship maneuvered by the expert aviator in the accomplishment of many feats that would be difficult or impossible under other conditions.

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

1. The combination with an airplane having a plurality of wells and open frame work therein, of swinging gates supported on the frame-work adapted to close when the airplane is under way, helicopter propellers normally housed within said wells, means for operating said propellers, and means whereby the propellers are initially projected for operation.

2. The combination with an airplane having a plurality of open wells and closing means for said wells actuated when the airplane is under way, of a plurality of helicopter propellers normally housed in the wells, means for operating the propellers, and means whereby the propellers are initially projected for operation.

3. The combination in an airplane having a well and closing means for the well actuated when the airplane is under way, of a tubular drive shaft, a supporting frame for the drive shaft, an inner shaft section telescoping the tubular shaft and rotatable therewith, means for driving the tubular shaft, and a helicopter propeller on the end of the inner shaft.

4. The combination in an airplane having a well, a grid frame in the well and hinged gates on the grid adapted to be closed when the airplane is under way, a helicopter propeller normally housed in the well, a telescoping shaft for the propeller, means for limiting the extending movement of the telescoping shaft, and means for operating the telescoping shaft.

In testimony whereof I affix my signature.

ELMER H. THOMPSON.