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G. W. RILEY.
FLYING MACHINE.
APPLICATION FILED APR. 21, 1919.

1,398,393. Patented Nov. 29, 1921.

3 SHEETS—SHEET 1.

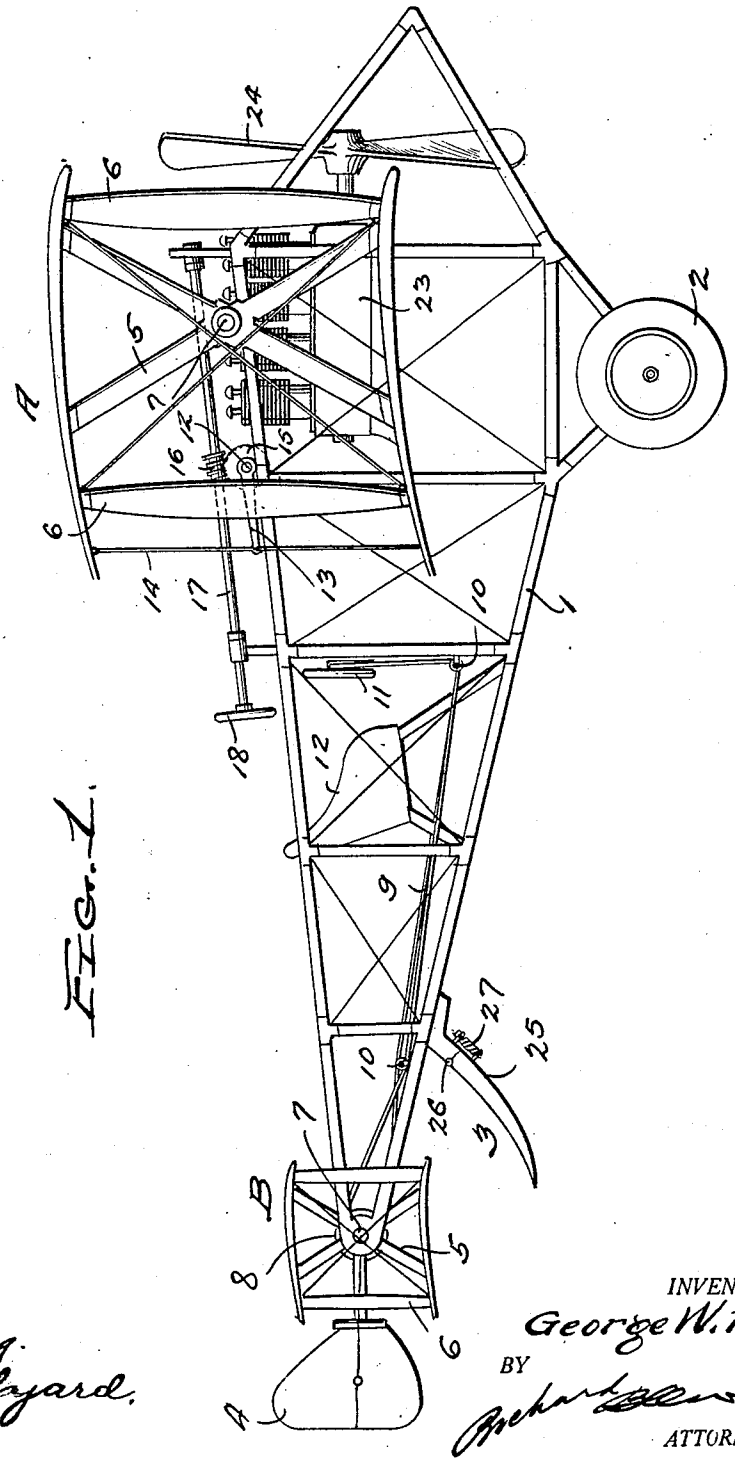


Fig. 1.

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3 SHEETS—SHEET 2.

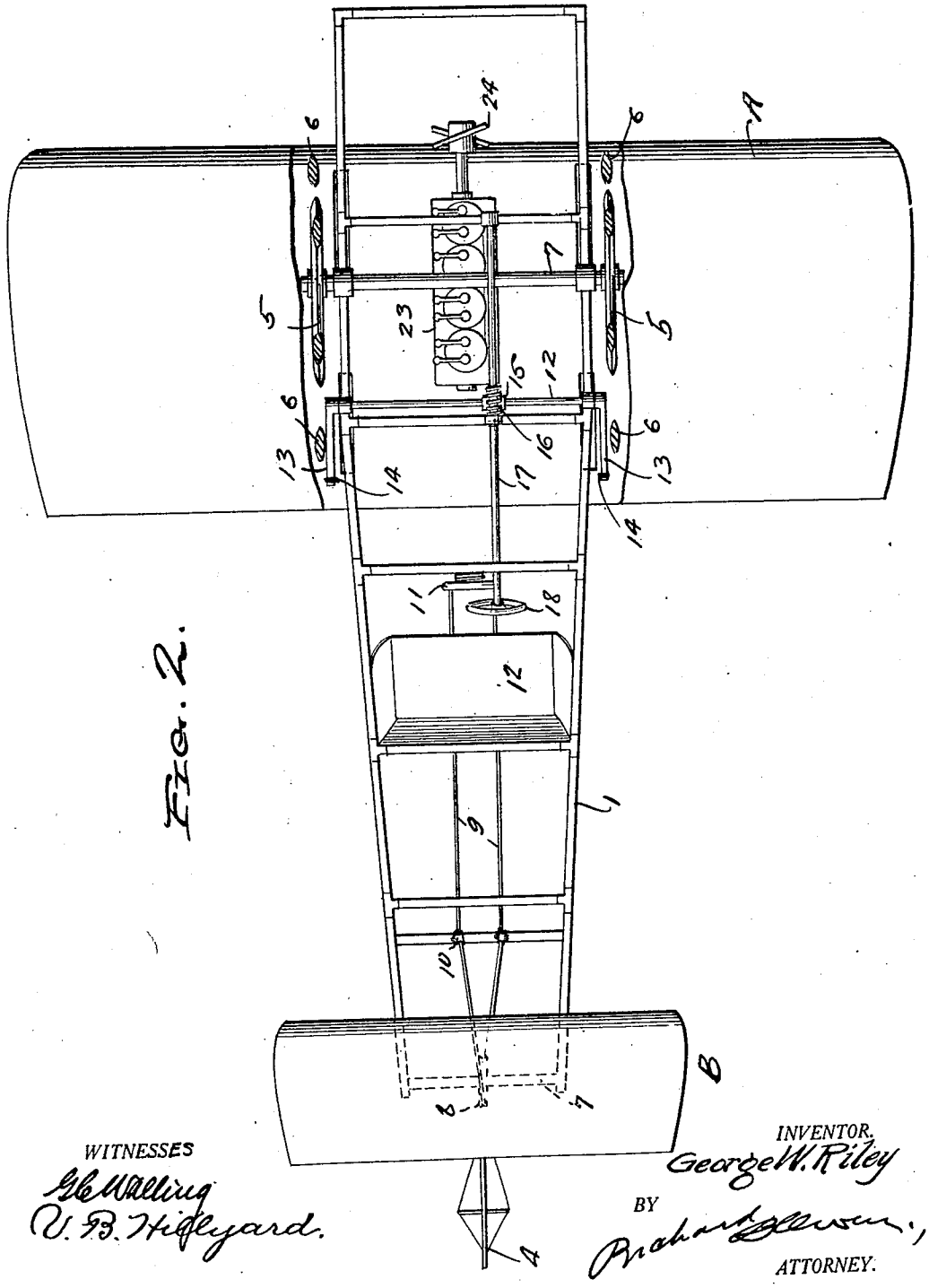


FIG. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

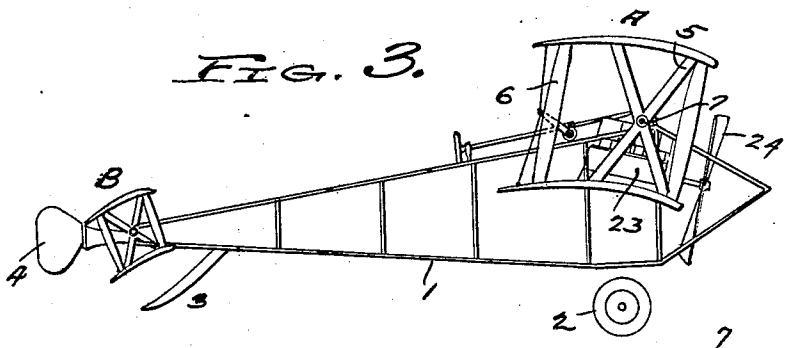


Fig. 4.

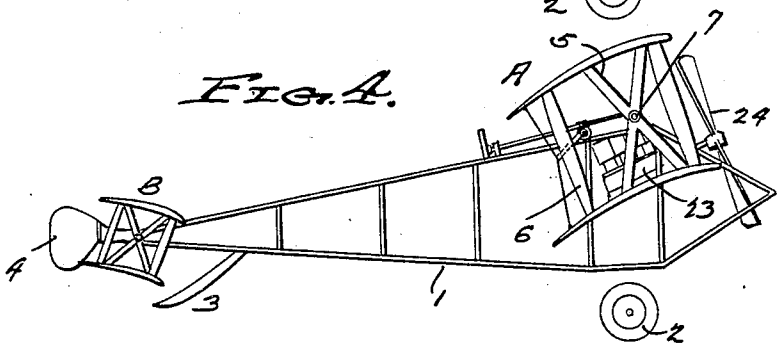
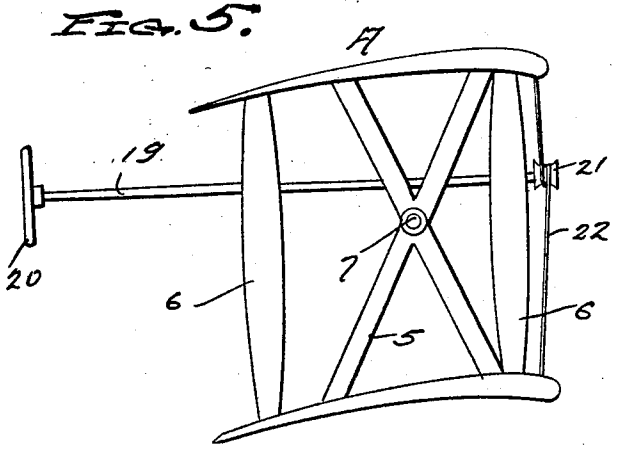


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FLYING-MACHINE.

1,398,393. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed April 21, 1919. Serial No. 291,440.

To all whom it may concern:

Be it known that I, GEORGE W. RILEY, a citizen of the United States, residing at Fouke, in the county of Miller and State of Arkansas, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

The invention relates to air craft of the type embodying sustaining surfaces such as planes or wings which are adjustable to facilitate stabilizing, steering and the flight both in an upward and downward direction.

The invention relates more particularly to the sustaining surfaces, their mountings and operating means whereby the machine is rendered more responsive to the controlled devices, thereby enabling it to travel at relatively low altitudes with a reasonable degree of safety because of the quick response to the change of angle of the sustaining surfaces which are disposed at the front end of the machine rather than at the rear thereof.

The drawings illustrate a preferred embodiment of the invention. However, it is to be understood that in adapting the same to meet different conditions, various changes in the form, proportion, and minor details of construction may be resorted to without departing from the nature of the invention as claimed hereinafter.

In the drawings hereto attached,

Figure 1 is a side view of an aeroplane embodying the invention.

Fig. 2 is a top plan view thereof, the intermediate portion of the upper forward sustaining surface being broken away and parts of the braces being in section.

Figs. 3 and 4 are detail views in elevation of the aeroplane showing the parts on a reduced scale, and indicating different adjusted positions of the front and rear sustaining surfaces.

Fig. 5 is a detail view of a modification.

Corresponding and like parts are referred to in the following description and indicated in the several views of the drawings by like reference characters.

The frame work 1 of the aeroplane is of skeleton formation and suitably trussed and braced and tapers forwardly and rearwardly from an intermediate point. The frame work is provided upon its underside with wheels 2 and a drag 3, the wheels being disposed beneath the main portion of the frame and the drag 3 being located near the rear. These parts 2 and 3 facilitate the landing of the machine and also assists materially in the launching when the machine is initially propelled on the ground to attain sufficient momentum to rise. The sustaining surfaces are provided in two groups A and B and each group may comprise any number of planes depending upon the style or type of machine. A rudder 4 is located at the rear and is disposed vertically and is adapted to be swung laterally in order to control the lateral flight of the machine. The vertical flight, that is, the ascent and descent of the machine is controlled by the sustaining surfaces which as indicated are mounted to tilt about a transverse axis so that the sustaining surfaces may be inclined at the desired angle according to the result to be attained. Each group of sustaining surfaces comprises upper and lower planes which are connected by cross braces 5 and struts or posts 6. The sustaining surfaces are mounted so as to tilt about a transverse axis whereby their inclination to the horizontal may be varied to suit conditions and enable the desired result to be attained both in the ascent and descent of the machine. The manner of tiltingly mounting the sustaining surfaces is immaterial and the relative location of the axis is unimportant so long as the sustaining surfaces are mounted to tilt about a transverse axis. As indicated in the different views the axis 7 is located at the point of crossing of the elements comprising the cross braces 5, this disposition of the axis being found most advantageous from a point of durability.

Referring to Figs. 1 and 2 the rear axis 7 is provided with a groove pulley 8 around which passes an operating cord or cable 9, the runs of which engage suitable guide pulleys 10 and are connected with the hub of a steering wheel 11 located within convenient reach of the operator's seat 12ª. By proper manipulation of the steering wheel 11 the sustaining surfaces of the rear group B are adapted to be adjusted to any angle within certain limits. Fig. 3 shows the sustaining surfaces B inclined upwardly and forwardly whereas Fig. 4 indicates such surfaces inclined forwardly and downwardly.

A transverse shaft 12 is mounted upon the frame 1 and is provided with rearwardly extending arms 13 which are connected at

their ends to vertically disposed elements 14 which connect the rear portions of the sustaining surfaces or planes of the group A. The elements 14 may consist of wires, cables or other suitable connecting means. A worm gear 15 secured to the transverse shaft 12 is in mesh with a worm 16 on a longitudinal shaft 17 mounted on the frame 1 and provided at its rear end with a steering wheel 18 within convenient reach of the operator's seat 12^a. Rotation of the shaft 17 to one direction or the other effects a change in the longitudinal inclination of the sustaining surfaces, as indicated most clearly in Figs. 1, 3 and 4. The worm gearing between the two shafts 12 and 17 is preferred since it maintains the parts in adjusted position, thereby enabling the operator to release his grip upon the steering wheel 18 so that other parts requiring attention may be adjusted or the operator enabled to rest as when making a sustained flight in a given course.

In the modification shown in Fig. 5 a longitudinal shaft 19 is provided at its rear end with a steering wheel 20 and at its forward end with a pulley or drum 21 around which passes a cord or cable 22, the ends of which are secured to the forward ends of the upper and lower sustaining planes. Rotation of the shaft 19 will effect a change in the inclination of the planes in substantially the same manner as corresponding rotation of the shaft 17.

The engine 23 is mounted upon the lower plane of the forward group A and is disposed between the upper and lower surfaces or planes. The propeller 24 is connected to the shaft of the engine and moves therewith. It will thus be understood that any change in the inclination of the sustaining surfaces instantly results in a corresponding change in the inclination of the propeller whereby the latter exerts a direct pulling force in the desired direction of movement with the result that the machine responds quickly to any change in the inclination of the sustaining planes whether in an upward or a downward direction. This enables the aeronaut to fly at a relatively low altitude with perfect safety as compared with the operation of aeroplanes having fixed sustaining surfaces or having such surfaces disposed at the rear. A quick movement is obtainable by a combined adjustment of the front and rear sustaining surfaces which are adapted to be independently adjusted and which adjustments may be simultaneously effected by manipulating both steering wheels 11 and 18 at the same time.

As indicated most clearly in Fig. 1 the rear drag 3 comprises a lower portion 25 which is hinged to the upper portion as 26, a yieldable connection 27 extending across the joint and being connected at its ends to each of the parts. The drag inclines rearwardly to facilitate its riding over the ground when the machine is starting on its flight or when landing.

The foregoing description and the drawings have reference to what may be considered the preferred, or approved form of my invention. It is to be understood that I may make such changes in construction and arrangement and combination of parts, materials, dimensions, et cetera, as may prove expedient and fall within the scope of the appended claim.

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

A flying machine comprising a fuselage, a group of upper and lower horizontal sustaining planes at each end of the fuselage, said groups mounted to tilt about transverse horizontal axes relatively offset in a vertical plane whereby the upper surfaces of the front group swing in an arc above the fuselage and the lower surfaces of the rear group swing in an arc below the fuselage, propelling means supported between the planes of the front group and movable therewith, and tilting means connected to each group and operable for effecting a change in the longitudinal inclination of the sustaining surfaces and a corresponding change in the inclination of the propeller, whereby the latter exerts a direct pulling force in the desired direction of movement.

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

GEORGE W. RILEY.

Witnesses:

JAMES B. PAULK,

ELTON A. REYNOLDS.