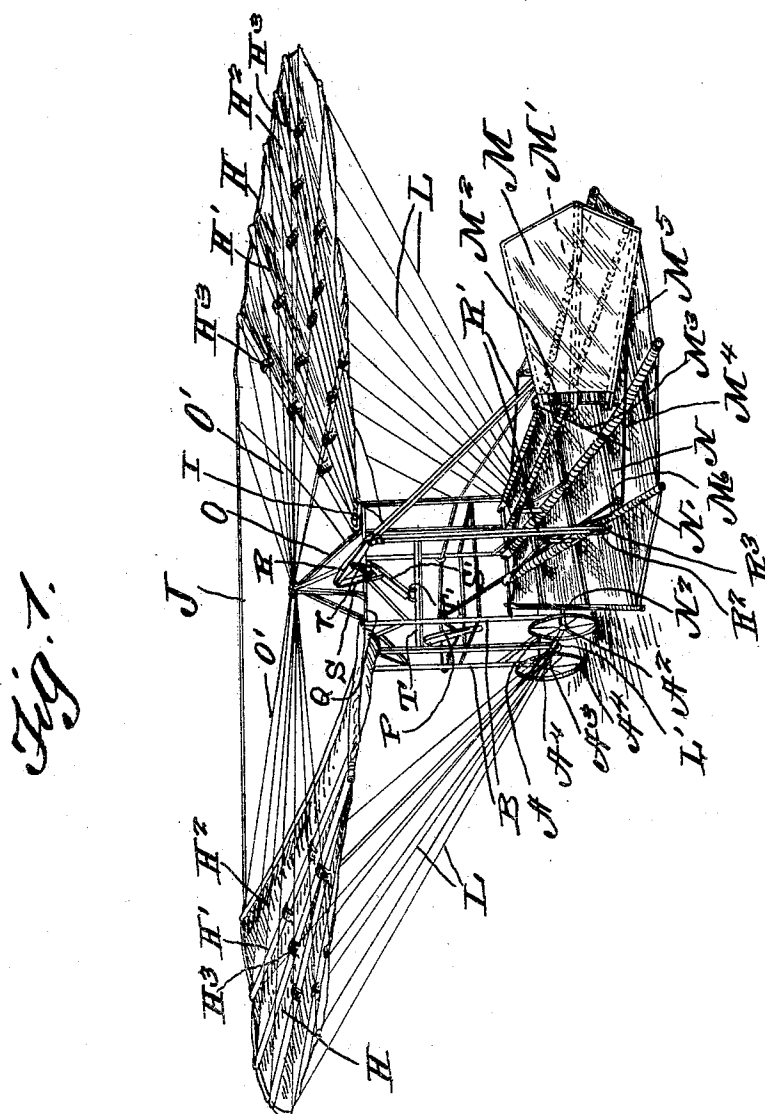


W. A. SUMAN & G. W. REICHARD.
AEROPLANE FLYING MACHINE.
APPLICATION FILED DEC. 24, 1909.

Patented Jan. 17, 1911.

8 SHEETS—SHEET 1.

981,714.



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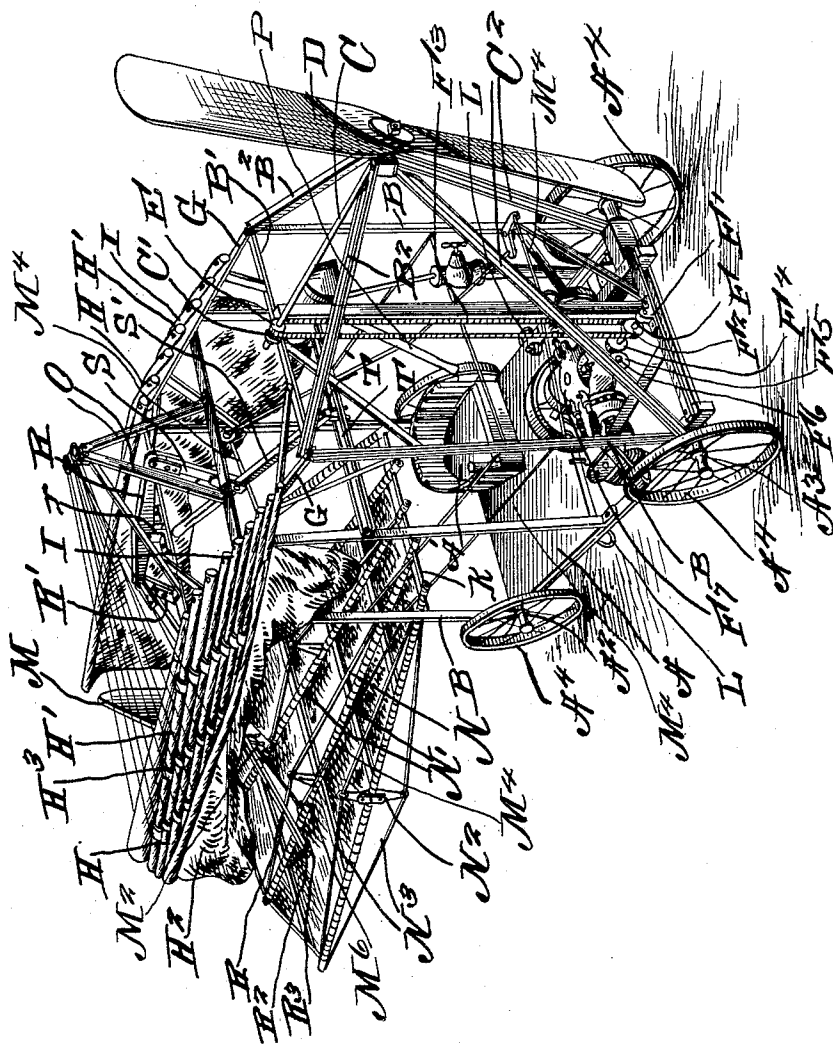
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8 SHEETS—SHEET 3.

Fig. 3.



Witnesses

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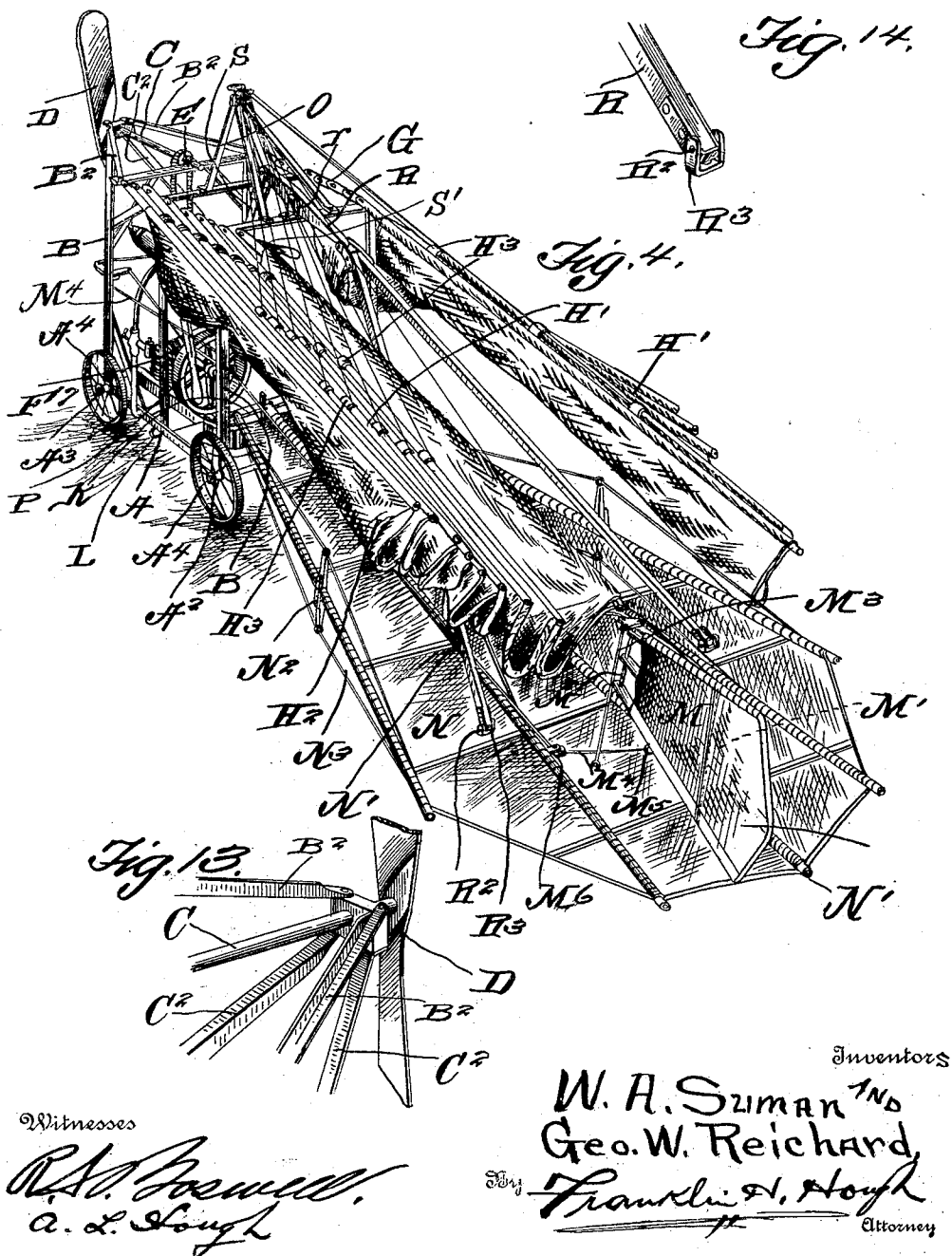
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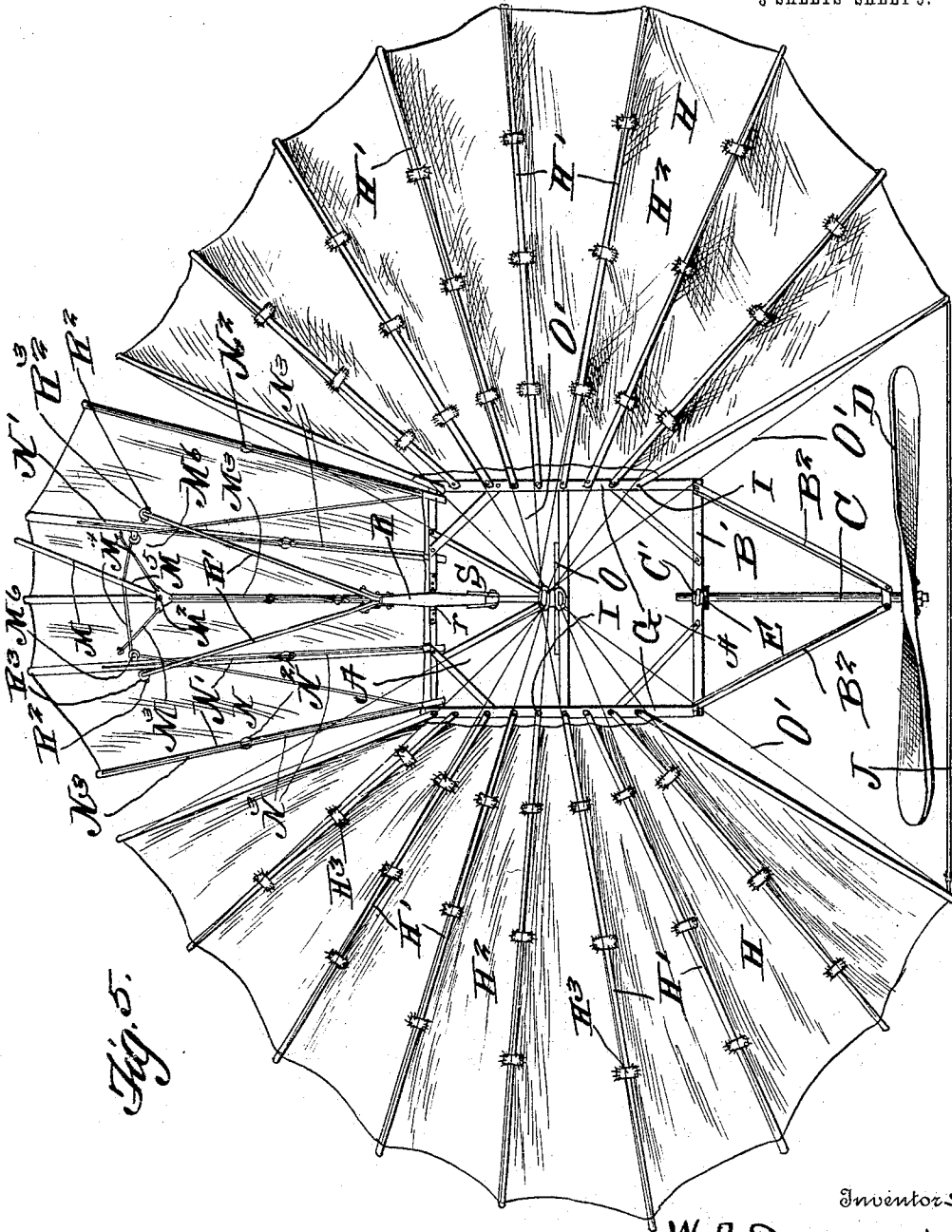


Fig. 5.

Witnesses

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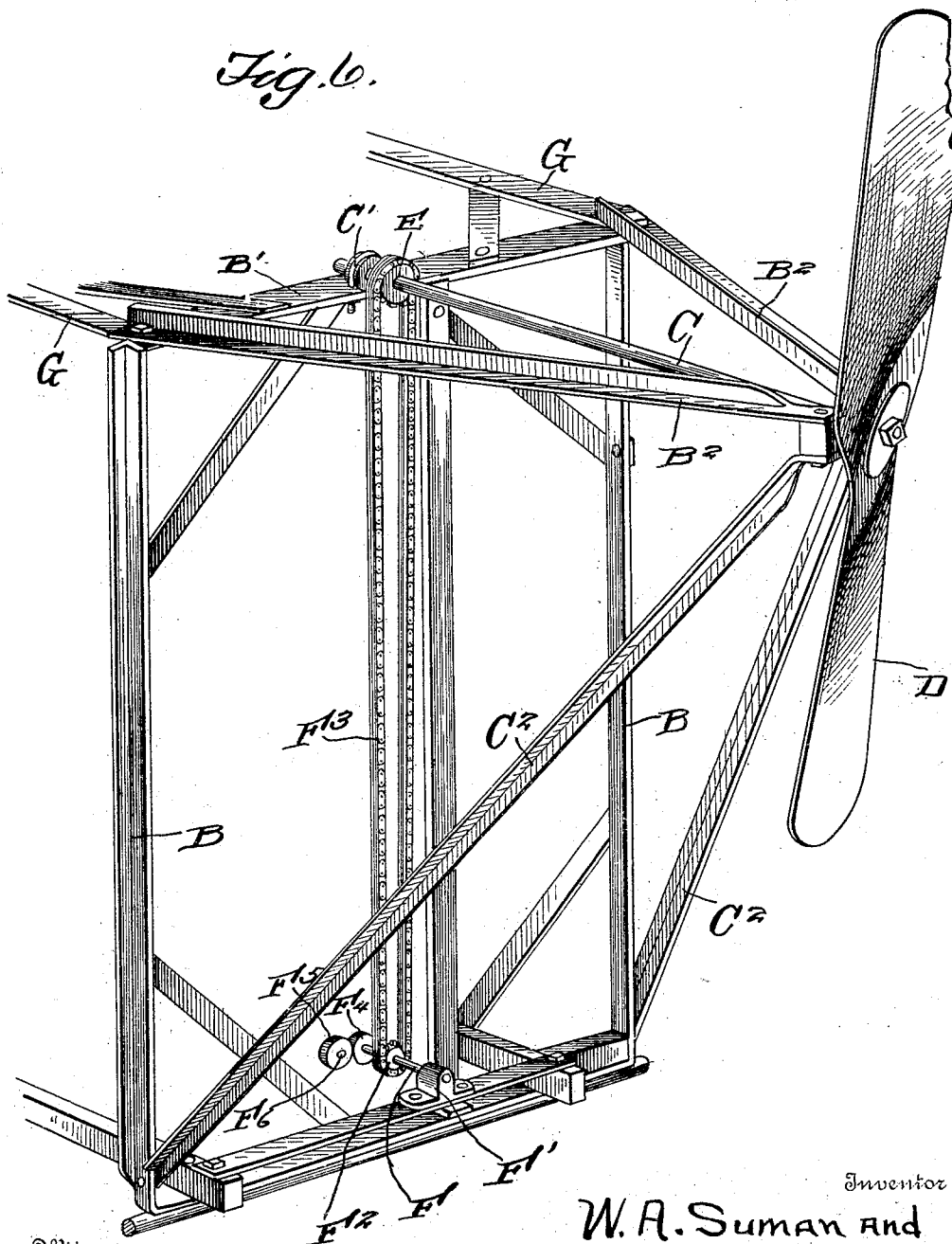
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8 SHEETS—SHEET 6.

Fig. 6.



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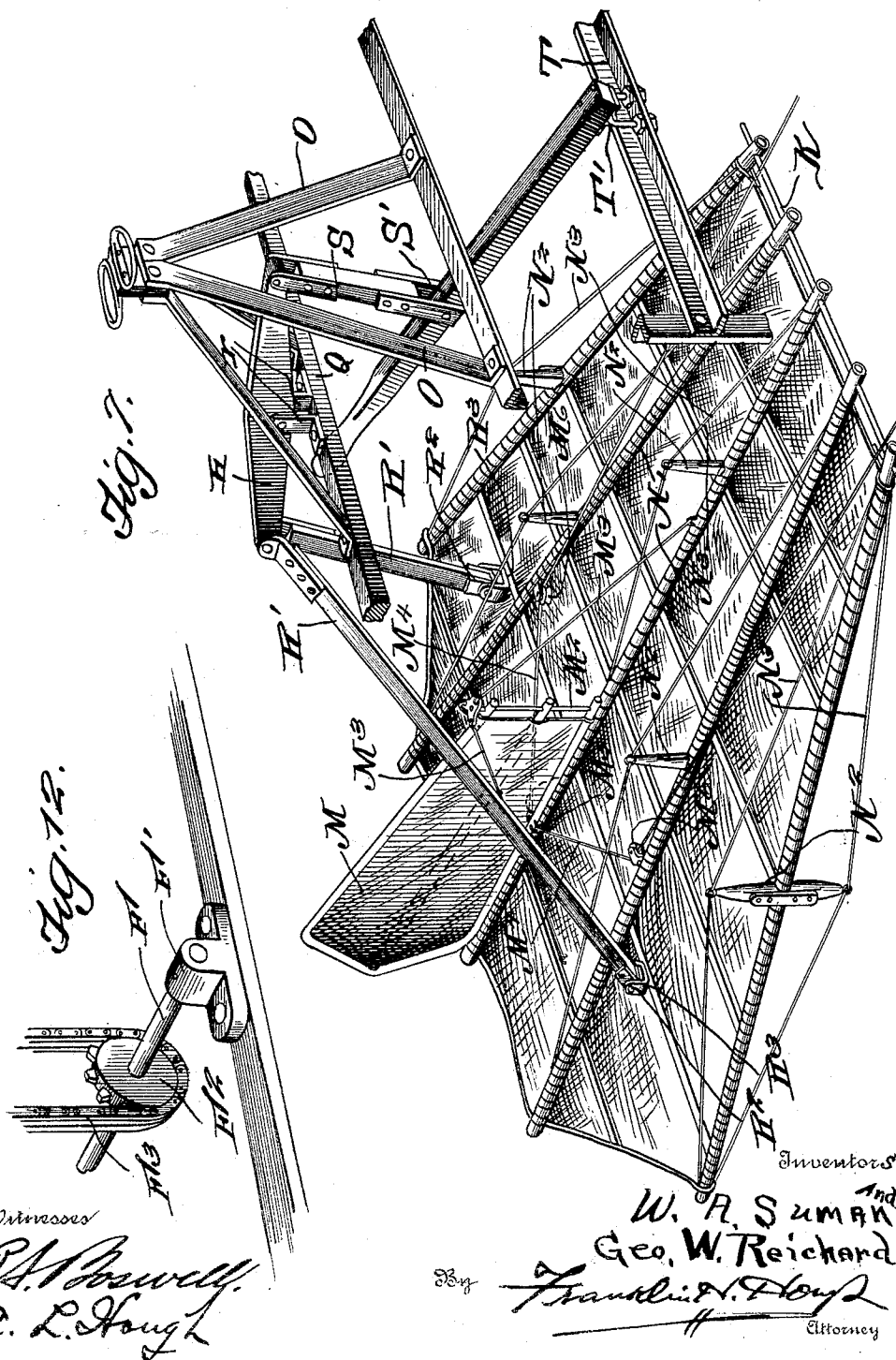
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8 SHEETS—SHEET 7.



Witnesses
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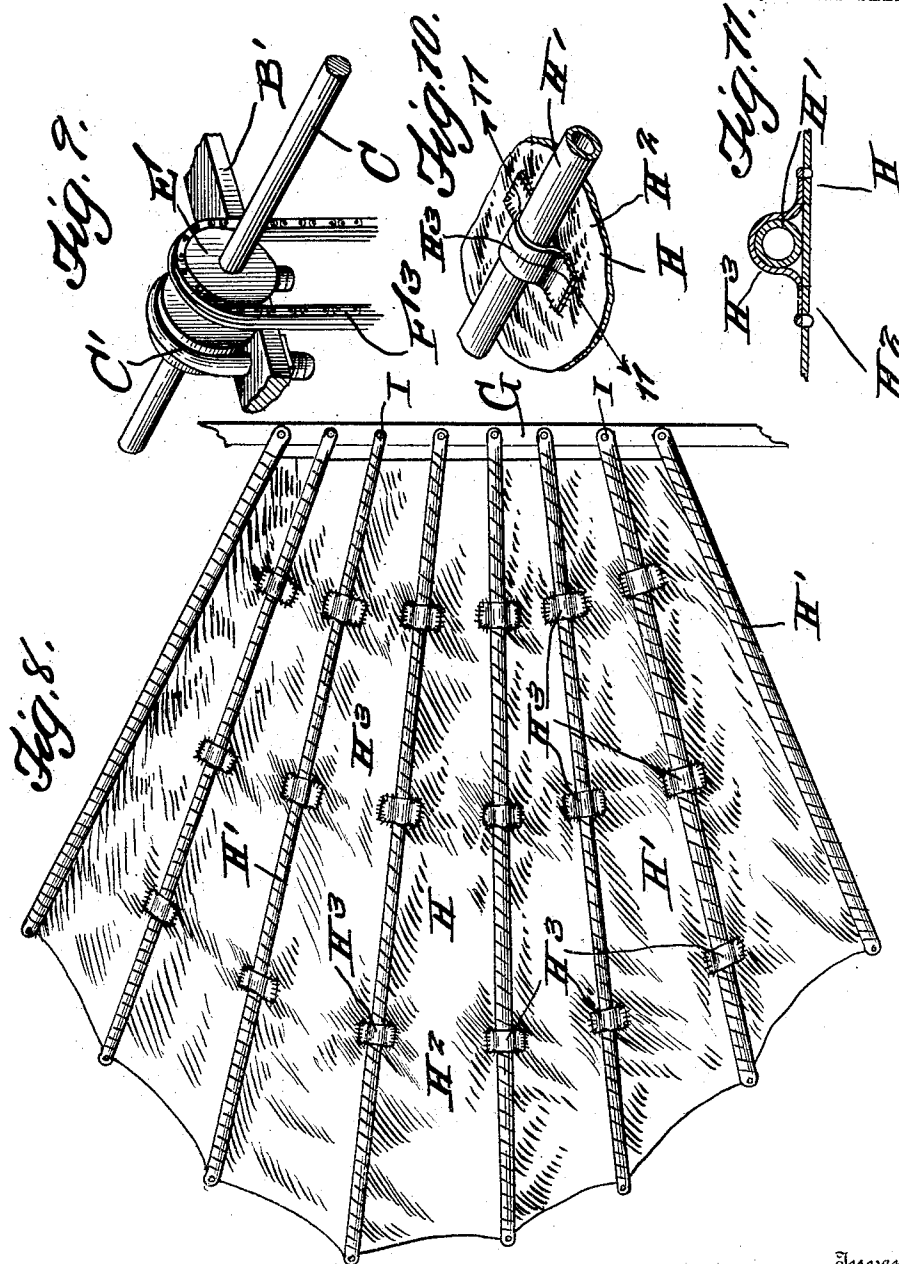
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8 SHEETS—SHEET 8.



Witnesses

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UNITED STATES PATENT OFFICE.

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OF ONE-THIRD TO WILLIAM F. MILLIGAN, OF PORTLAND, INDIANA.

AEROPLANE FLYING-MACHINE.

981,714.

Specification of Letters Patent.

Patented Jan. 17, 1911.

Application filed December 24, 1909. Serial No. 534,885.

To all whom it may concern:

Be it known that we, WALTER A. SUMAN and GEORGE W. REICHARD, citizens of the United States, residing at Portland, in the county of Jay and State of Indiana, have invented certain new and useful Improvements in Aeroplane Flying-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marks thereon, which form a part of this specification.

This invention relates to new and useful improvements in aerial navigation machines and comprises an apparatus combining for safety the principle of parachute as well as aeroplane and so arranged that the planes, when not in use, may be folded to reduce the apparatus to a compact form for storage and other purposes.

The invention comprises various details of construction, combinations and arrangements of parts which will be hereinafter fully described and then specifically defined in the appended claims.

We illustrate our invention in the accompanying drawings which form a part of this application and in which:—

Figure 1 is a perspective view from the rear of an aeroplane made in accordance with our invention. Fig. 2 is a perspective view showing the front and one side of the apparatus. Fig. 3 is a front perspective view showing the aeroplane wings folded. Fig. 4 is an enlarged perspective view of the top of the apparatus showing the wings or aeroplane folded. Fig. 5 is a top plan view showing the wings extended. Fig. 6 is an enlarged detail perspective view of the forward part of the frame of the apparatus showing the propeller and shaft for driving the same. Fig. 7 is an enlarged detail perspective view of the vertically movable plane and mechanism for operating the same. Fig. 8 is a top plan view of one of the folding aeroplanes or wings. Fig. 9 is a detail perspective view showing the manner of holding the shaft bearing upon the frame of the apparatus. Fig. 10 is a detail perspective view showing the manner of holding the canvas to the ribs of the plane.

Fig. 11 is a cross sectional view on line 55 11—11 of Fig. 10. Fig. 12 is a detail perspective view of the driving shaft, sprocket wheel and chain. Fig. 13 is a detail view of a portion of the propeller shaft and bearing therefor, and Fig. 14 is a detail perspective 60 showing the connection between the tail rudder and lever for actuating the same.

Reference now being had to the details of the drawings by letter, A designates the platform of the car which may be of any 65 shape or size. In the present instance a flat platform is illustrated having a seat A' for the operator and rear and forward axles A² and A³ respectively upon which the wheels A⁴ are journaled. Rising from the platform 70 are the upright bars B which are connected at their upper ends with the cross bars B' and which are suitably braced and form the framework of the apparatus for supporting the aeroplanes and 75 other operative parts of the machine. Projecting forward and inclining toward each other in advance of the car are the bars B² which support a suitable bearing for one end of the propeller shaft C, the other 80 end of said shaft being mounted in a bearing C' upon the upper cross-piece of the frame, suitable brace rods C² being provided which are fastened at their lower ends to the forward end of the platform and their up- 85 per ends adjacent to the bearing in which the forward end of the propeller shaft is journaled. Fixed to said propeller shaft is a propeller D of a well known and approved type commonly employed in aero navigation, 90 and E designates a sprocket wheel which is keyed to the shaft C.

F designates a shaft journaled in bearings F' adjacent to the forward end of the platform and having a sprocket wheel F² keyed thereto about which and said sprocket wheel 95 E the driving chain F³ passes. At the inner end of the shaft F is a gear wheel F⁴ which meshes with a gear wheel F⁵ fixed to the end of the motor shaft F⁶ driven by any 100 suitable type of motor, designated by letter F⁷, and which latter is shown in the drawings as mounted upon the forward part of the platform and within convenient reach of the seat thereon where the operator is adapted 105 to sit for manipulating the apparatus in flight.

Upon the opposite side bars G of the

frame are mounted the two folding wings, each designated by letter H, and each wing is made up of a series of ribs H' which in practice should be made preferably of hollow tubular metal for strength and lightness and the canvas H² of the wings or aeroplanes is provided with loops H³ at intervals and through which the ribs pass, a slight play being allowed between each rib at the ends of said straps to allow the wings to fold readily without interference or binding. The inner ends of the ribs are pivoted at I to the bars G of the frame and spaced apart and the outer ends of the ribs are securely fastened to the marginal edge of the canvas, as shown.

When the wings are opened out for flight, as shown in Figs. 1 and 2 of the drawings, a rope J holds the outer ends of the planes in the positions shown plainly in Figs. 1 and 2 of the drawings, in which position the wings are inclined upwardly, thus making it impossible for the wings to fold when thus connected together. In order to reinforce and distribute the strain coming upon the wings, wires, designated by letter L, are fastened to each rib of the wings or aeroplanes at distances spaced apart and the lower ends of the wires fastened to the loops L' which are fastened to the opposite edges of the car, said wires forming guy ropes and so arranged that the strain will be equally distributed and brought to the opposite sides of the platform and the bottom of the car and, where it is desired to concentrate the heavy portions of the apparatus so that by gravity the apparatus will normally be held right side up, the bulk of the weight of the apparatus will be compressed in the motor and the operator, the seat for the operator and the motor being so positioned that, when the operator is sitting in place to operate the machine, the center of gravity will be about at the positions opposite the fastenings of the guy ropes to the platform.

Pivotally mounted upon a rod or bar K fastened between the rear upright bars of the frame is a vertically swinging aeroplane or tail rudder N made up preferably of hollow tubular ribs N' which are fastened at their forward ends to the rod or bar K and their outer ends to the end of said tail rudder. Midway the length of said ribs N' are fastened the fingers N² to which the brace or guy wires N³ are fastened, the outer ends of said wires being secured to the ends of said ribs, thus forming reinforcing means for said tail rudder. Mounted upon the cross-pieces at the top of the frame of the apparatus are the inclined bars O to which guy wires O' are fastened and the outer ends of which are fastened to the ribs of the folding wings in the manner shown clearly in Figs. 3 and 4 of the draw-

ings and which support the wings or aeroplanes when the same are spread.

Pivotally mounted upon the bracket members r upon the cross bar Q of the frame is a lever R which has pivotally connected thereto the bars R', each of said bars being pivotally connected at R² to a socket member R³, a detail of which latter is shown in Fig. 14 of the drawings, and said socket member is fastened to a rib upon the tail rudder. Pivoted to the forward end of said lever R is a link S, shown clearly in Fig. 2 of the drawings, which in turn is pivotally connected to the angle bar T at T', as shown clearly in Fig. 7 of the drawings, said lever R forming means within convenient reach of the seat to cause the tail rudder to be raised or lowered. Pivotally mounted upon said tail rudder is a laterally swinging rudder, designated in the drawings by letter M, the ribs M' of which are pivotally mounted upon a rod M² which projects at right angles from the rib to which it is fastened and is suitably braced by wires M³. Cords M⁴ are fastened at M⁵ to the opposite sides of the rudder M and pass about pulleys M⁶ fastened to the ribs of the tail rudder and extend thence to the car where they pass about pulleys and are connected to the operating lever P which is pivotally connected at one end to the angle bar T. As both sides of the laterally swinging rudder N are connected by ropes to the lever P, it will be understood that, when said lever is swung in one direction or the other, the rudder M may be thrown to one side or the other accordingly as it may be desired in steering the craft, the vertical movements of the craft being determined by the tail rudder. By having the two levers mounted as shown and within convenient reach of the operator upon the seat, the steering of the craft may be readily accomplished and also the motor conveniently attended to by the operator.

When our improved aerial navigating apparatus is adjusted for flight with the wings spread and held securely, it will be noted, upon reference to the top plan view Fig. 5, that the tail rudder which also acts as an aeroplane substantially fills the space intermediate the rear ends of the side wings or aeroplane, thus affording a large surface to be offered to the air in the event of the machine descending rapidly and, owing to the fact that the bulk of the weight of the apparatus is positioned at the bottom of the car, naturally by gravity the apparatus will be held right side up and would glide by gravity gradually to the earth in the event of the motor stopping, the descent of the apparatus being made gradual and similar to the action of a parachute, thus reducing the danger by accident to a minimum.

When it is desired to fold the aeroplane

wings, it may be done by first loosening the rope J which, when the wings are adjusted for flight, is taut and holds the wings distended and the wings may be swung back to assume the positions shown in Figs. 3 and 4 of the drawings similar to the natural folding of the wings of a bird. When the aeroplane wings are folded, it will be noted that the apparatus will be reduced to a compact shape not requiring commodious room for storage or shipment. By the construction shown, the wings may be readily spread to adjust the apparatus for flight.

What we claim to be new is:—

1. An aeroplane flying machine comprising a car having an upright frame, a motor, folding aeroplane wings made up of fabric having straps fastened thereto, ribs having a loose play through said straps and fastened at their outer ends to the outer marginal edge of the fabric and their inner ends pivotally mounted upon the upright portion of the frame of the car at positions spaced apart, a vertically movable aeroplane tail pivoted at its inner end to the frame of the car, means for moving said aeroplane tail, a laterally swinging rudder upon the latter, means for operating the rudder, a propeller, and connections between the latter and said motor.

2. An aeroplane flying machine comprising a car having an upright frame, a motor, folding aeroplane wings made up of fabric having straps fastened thereto, ribs having a loose play through said straps and fastened at their outer ends to the outer marginal edge of the fabric and their inner ends pivotally mounted upon the upright portion of the frame of the car at positions

spaced apart, guy ropes connecting the opposite sides of the wings to portions of the frame above and below the pivotal ends of said ribs, a vertically movable aeroplane tail pivoted at its inner end to the frame of the car, means for moving said aeroplane tail, a laterally swinging rudder upon the latter, means for operating the rudder, a propeller, and connections between the latter and said motor.

3. An aeroplane flying machine comprising a car having an upright frame, a motor, folding aeroplane wings made up of fabric having straps fastened thereto, ribs having a loose play through said straps and fastened at their outer ends to the outer marginal edge of the fabric and their inner ends pivotally mounted upon the upright portion of the frame of the car at positions spaced apart, guy ropes connecting the opposite sides of the wings to portions of the frame above and below the pivotal ends of said ribs, a rope adapted to connect the forward ends of the aeroplane wings to hold the same spread, a vertically movable aeroplane tail pivoted at its inner end to the frame of the car, means for moving said aeroplane tail, a laterally swinging rudder upon the latter, means for operating the rudder, a propeller, and connections between the latter and said motor.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

WALTER A. SUMAN.
GEORGE W. REICHARD.

Witnesses:

GEO. W. HALL,
INA DENNEY.