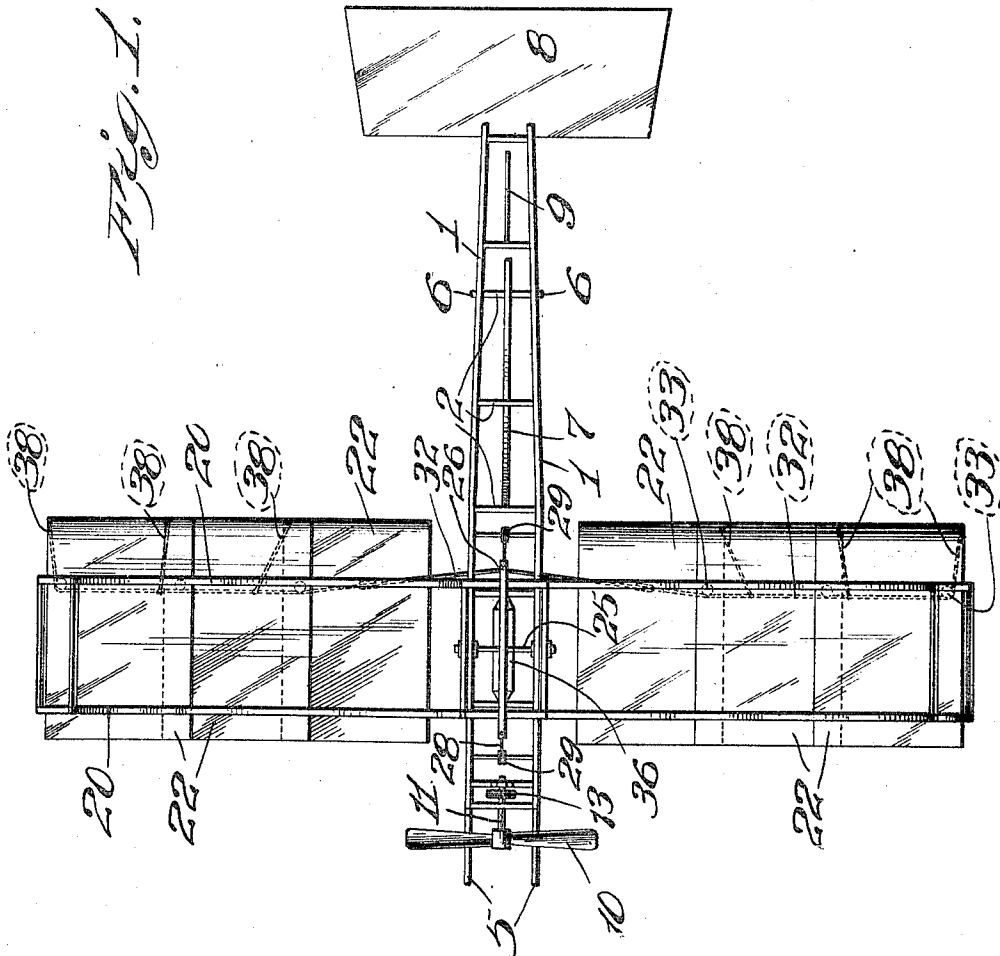


R. H. FROELICH.
FLYING MACHINE.
APPLICATION FILED MAR. 30, 1911.

1,039,115.

Patented Sept. 24, 1912.
3 SHEETS—SHEET 1.



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Fig. 2

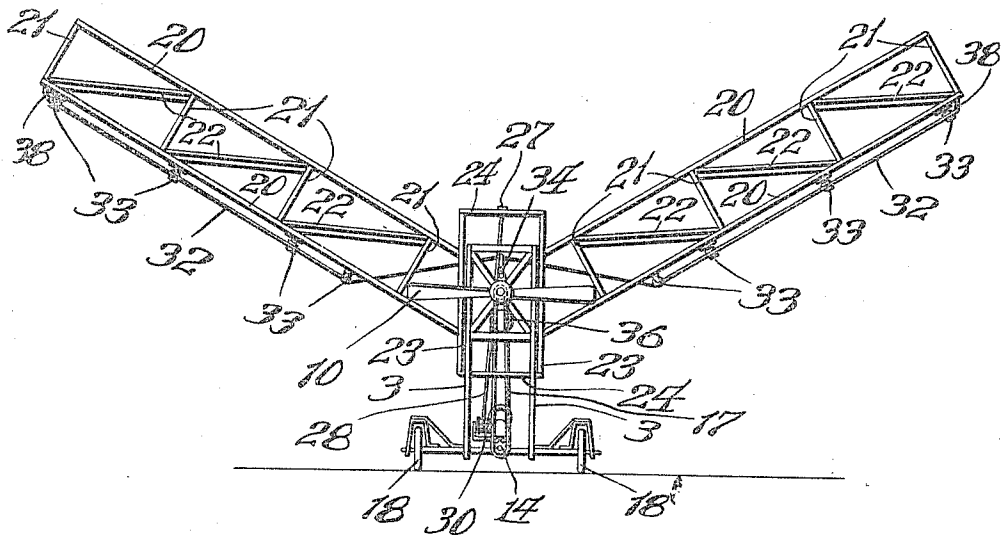
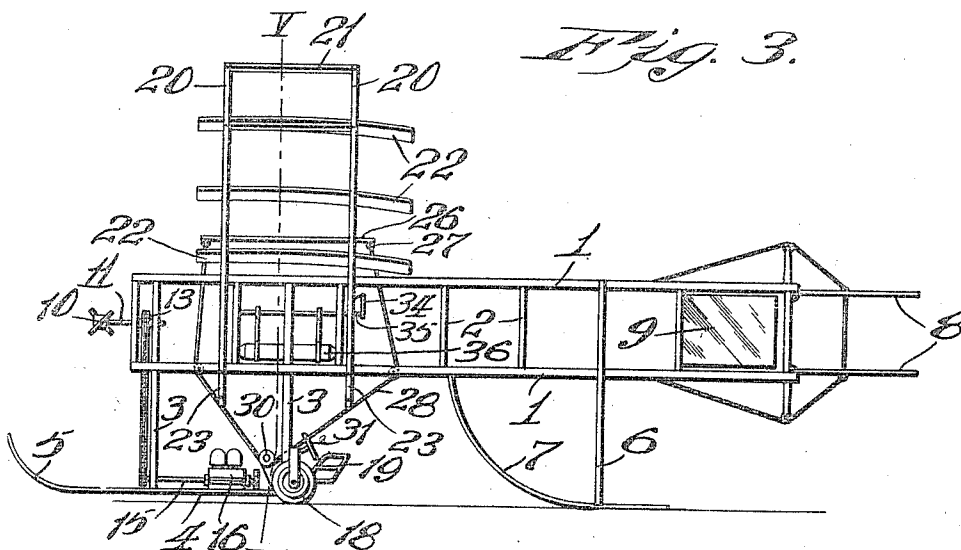


Fig. 3



attest:

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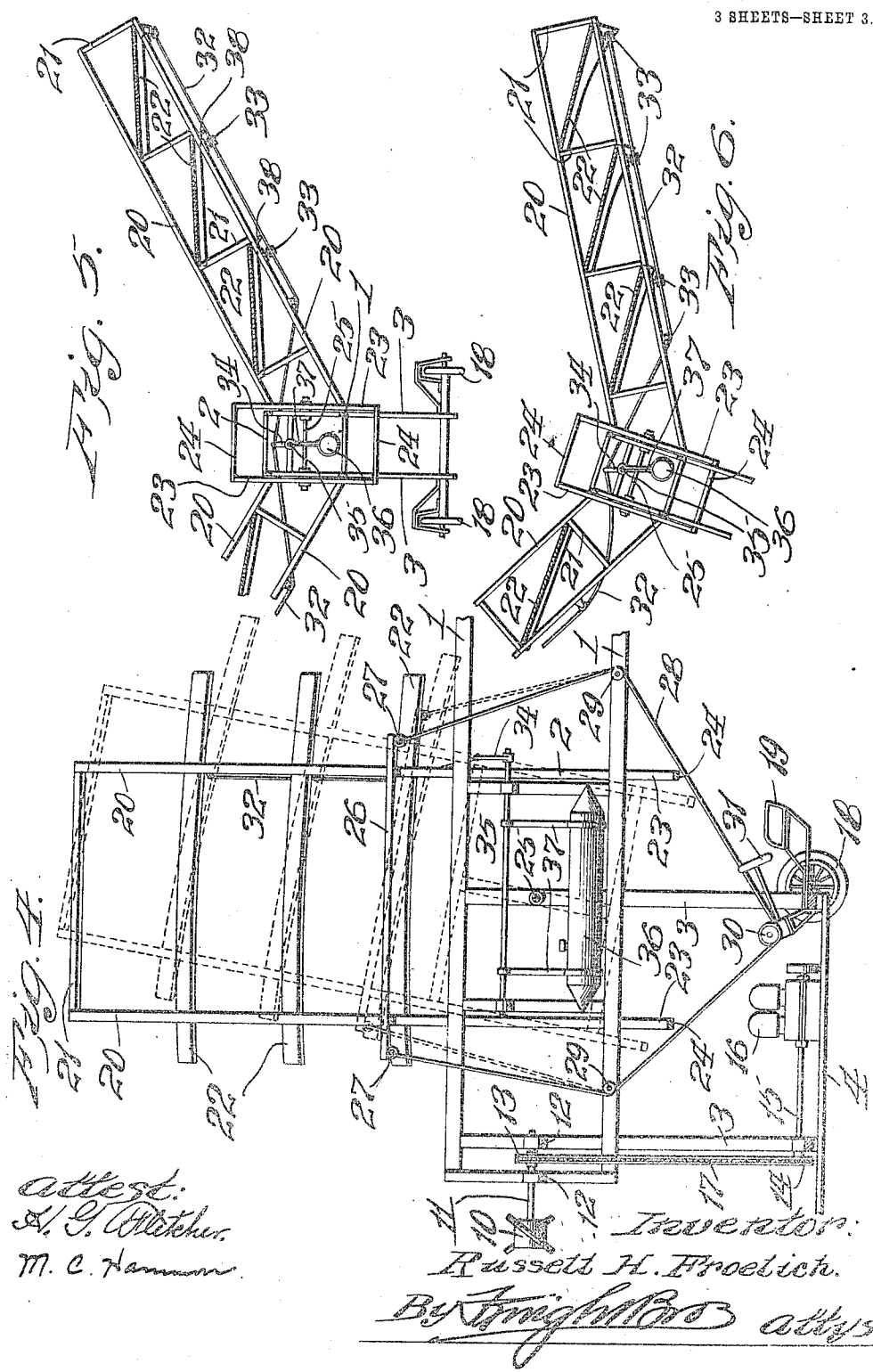
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

RUSSELL H. FROELICH, OF ST. LOUIS, MISSOURI.

FLYING-MACHINE.

1,039,115.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, RUSSELL H. FROELICH, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines, and has for its primary object to provide an improved construction, combination and arrangement of parts in devices of this character.

One of the objects of the present invention is to provide an improved wing construction and improved means whereby the angular disposition of said wings may be modified at will to adapt the machine to raise itself from the ground or to raise and lower its position in the air while in full flight.

Another object is to provide an improved wing construction whereby the disadvantageous effects of air currents from either side can be reduced to a minimum, said construction being further adapted to induce automatically a tendency to return to normal upright position when the machine is displaced therefrom by such air currents.

A still further object is to provide improved means whereby the pressure on the wing planes can be automatically varied to increase the tendency inherent in the machine to return to normal upright position after it has been displaced therefrom.

Other and further objects will appear in the specification and be specifically pointed out in the appended claims, reference being had to the accompanying drawings exemplifying the invention, and in which,

Figure 1 is a top plan view of a flying machine constructed in accordance with the principles of my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation of the same. Fig. 4 is an enlarged side elevation of a portion of Fig. 3. Fig. 5 is a transverse section on the line V-V, Fig. 3, parts being shown in section. Fig. 6 is a similar section on the same line showing the relative positions of certain parts when the machine is displaced from normal upright position.

Referring more particularly to the drawings and to the embodiment of the invention shown therein, the main body frame is

a skeletonized structure comprising a plurality of longitudinally arranged bars 1 rigidly connected at suitable intervals by struts or cross pieces 2. At the forward end of the body frame is a carrier comprising a plurality of side bars or supports 3 which project vertically downward and at their lower ends a platform 4, which, as shown in Fig. 3, is provided with an upwardly deflected portion 5 to adapt the machine to skin over the ground in the event of its descent at a forward inclination. In the rear, a pair of vertical members 6 serve to rigidly support at their lower ends a cross bar to which and the body frame is secured a bowed runner or skid 7. A pair of horizontal rudder planes 8 are mounted at the rear end of the machine and a vertical rudder plane 9 is mounted immediately in front of and across the open space between said rudder planes. In the present embodiment a propeller 10 is mounted at the forward end of the flying machine upon a shaft 11 which is journaled in a pair of cross members 12, a sprocket wheel 13 being keyed intermediately of the cross members 12 and in the same vertical plane as a sprocket wheel 14 keyed to the forward end of an engine shaft 15 driven by an engine 16, which may be of any suitable type. Connecting the sprocket wheels 13 and 14 is an endless chain 17 for transferring power from the engine shaft 15 to the propeller shaft 11. At the rear edge of the platform 4 and on either side thereof are a pair of land wheels 18. Intermediately of said land wheels and projecting rearwardly from the rear edge of the platform 4 is a seat 19 for the operator of the machine.

Projecting upwardly and outwardly from the main body frame, are a pair of auxiliary frames or boxlike structures comprising side bars 20 rigidly connected by cross bars 21 arranged at suitable intervals. Disposed intermediately of the cross bars 21 and arranged approximately horizontal when the machine is in normal upright position, are a plurality of aeroplane sections 22 which are arranged spaced from each other vertically but with their lateral edges overreaching. This arrangement is preferably secured by having said plane sections disposed diagonally across the corners between the side members 20 and the cross members 21. By

means of this construction, the wings of the flying machine are enabled to afford a sufficient support to the air while at the same time presenting freely open passageways for wind from the sides, thus substantially doing away with the greater portion of the tilting effects of lateral gusts of wind.

As shown best in Fig. 4, each of the plane sections 22 is curved from front to rear to produce the necessary vertical lift while the machine is being propelled through the air. In order to provide simple and efficient means for adjusting the positions of the wing planes comprising sections 22, said wing planes are rigidly mounted adjacent the main body of the flying machine upon a boxlike structure comprising vertical members 23 and cross members 24, the intermediate member 23 on either side, in the present embodiment being journaled upon a cross shaft 25. This construction permits an angular swinging of the wing planes about the shaft 25, as shown in dotted lines in Fig. 4. For effecting this swinging movement, longitudinally arranged bars 26 may be provided on either end with eyelets 27 to which may be secured the ends of ropes or cables 28 which, after passing about guide pulleys 29, are wound about a drum 30 which may be rotated by a wheel 31 disposed adjacent the seat 19.

As shown in Figs. 3 and 4, the sectional planes 22 are arranged to overhang rearwardly, to adapt them to be warped, if so desired. To provide automatic means for producing this warping, forms one of the objects of this invention, said means being exemplified in the present embodiment by a main sheet or cable 32 which passes over the guide pulleys 33 and is secured at its inner end to a lever arm 34 keyed to a longitudinal shaft 35 from which is suspended a gasolene tank 36 by means of stirrups 37, such stirrups being rigidly secured to the shaft 35 so that as it swings from side to side as the machine is displaced from normal upright position, said shaft 35 will be oscillated in its bearings to produce a side to side movement of the lever arm 34.

Referring now to Figs. 1, 2, 5, and 6, it will be seen that each main sheet or cable 32 passes outwardly along one of the rear under side bars 20, a plurality of guide pulleys 33 being arranged at intervals therealong. Connected respectively to the rear outer corners of the sections 22, are a plurality of branches 38 of the main sheet 32. As shown best in Fig. 1, the outermost pulley 33 on each side is disposed slightly nearer the central plane of the machine than the point at which the branch 38 is attached to the outermost vane. The branch 38 which connects the intermediate section 22 with the main sheet 32 joins said main sheet at a point farther from the central plane of the machine than the point

at which said branch is secured to the vane. The branch 38 which is connected to each innermost section 22 on each side joins the main sheet at a point which is considerably farther from the central plane of the machine than the point of its attachment to the vane. It will be seen therefore, that when the main sheet 32 is taken up by a movement of the pendulum 36, the outermost section 22 is first warped and after the branch leading from the intermediate wing vane is drawn around its pulley 38, warping of the intermediate vane takes place. Finally, if the pendulum 36 moves sufficiently, the inner section 22 is warped by its branch 38 being drawn around its pulley 33. In consequence, there is a successive warping of the outside rear corners of the wing vanes from the outside toward the central vertical plane of the machine. As shown in Fig. 6, the outer section will always be warped the most and the amount of warping will be proportional to the distance of the wing from the central vertical plane of the machine. By this means, the effective resistance of the planes on the depressed side of the machine is increased proportionately to the angular displacement of the flying machine from normal upright position. As shown in Fig. 6, the main sheet or rope of the elevated side is relaxed. In this connection it is to be noted further that while the sections 22 are disposed approximately horizontal, they are inclined downwardly in some degree toward the center when the machine is in normal upright position, so that as the machine is displaced into some such position as shown in Fig. 6, the resistance of the planes 22 on the lowered side is diminished as regards side gusts of wind, while their resistance on the raised side is increased above so that there is thus produced a pressure from the side tending to right the machine. This effect in combination with the lifting effects due to warping the planes on the lowered wing, will provide means for effecting the righting of the machine in a rapid manner. Means for supporting the wing plane sections of vertically spaced series and at successively increased distances from the central vertical longitudinal plane of the machine are preferably provided by arranging the wing frames as shown in Fig. 2, in which the angle between the wing frames above the body frame is substantially equal to the angle between each wing frame and the central vertical longitudinal plane of the machine below the body.

What I claim is:

1. In an aeroplane, the combination with a body frame, of wing plane sections arranged in series extending upwardly and outwardly from said body frame, said sections being spaced vertically and offset from each other in a direction transverse to the

line of flight with the outside lateral edge of each section approximately beneath the inside lateral edge of the section next above it.

2. In an aeroplane, the combination with
5 a body frame, of wing frames projecting upwardly and outwardly from said body frame, the angle between said wing frames above said body frame being substantially equal to the angle between each wing frame
10 and the central vertical longitudinal plane of said body frame below said wings, and aeroplane sections mounted in said frames, said sections being inclined upwardly and outwardly from said longitudinal plane of the
15 body frame.

3. In an aeroplane, the combination with a body frame, of wing frames projecting upwardly and outwardly from said body frame, the angle between said wing frames
20 above said body frame being substantially equal to the angle between each wing frame and the central vertical longitudinal plane of the body frame below said wings, and aeroplane sections mounted in said frames,
25 said sections being inclined upwardly and outwardly from said central longitudinal plane of the body frame, and having the outer edge of one plane approximately beneath the inner edge of the next plane farther out.
30

4. In a flying machine, the combination with a main body frame, of a plurality of plane sections spaced vertically and at different distances from said body frame, and
35 means for warping said plane sections on one side only and successively toward the central vertical plane of the machine.

5. In a flying machine, the combination with a main body frame, of a pair of wing frames projecting upwardly and outwardly from said body frame, said wing frames having their inner ends oscillatable in a vertical plane extending longitudinally of the machine, a plurality of plane sections spaced
45 vertically in each wing frame, and means for warping said wing plane sections on one side only.

6. In a flying machine, the combination with a main body, of a plurality of wing
50 plane sections arranged at different distances from said body on either side of said body, a pendulum swingingly suspended from said body, and means for connecting said pendulum with a flexible portion of
55 each of said wing sections, said means being

adapted to warp said sections successively during the displacement of the machine from normal upright position.

7. In a flying machine, the combination with a main body, of a pendulum swingingly supported thereby, said pendulum being provided with a lever arm, a plurality of wing plane sections mounted on either side of said body, said sections being spaced vertically and offset laterally one from the
65 other, and means connecting said lever arm with each of said sections, said means being adapted to warp the sections on one side successively from the outermost section toward the center.
70

8. In a flying machine, the combination with a main body, of a plurality of wing plane sections on either side of said body, said sections being spaced vertically and offset laterally with respect to each other,
75 means for varying the angular dispositions of said sections with respect to a horizontal longitudinal plane through the machine, and means for automatically warping the sections on one side successively.
80

9. In a flying machine, the combination with a main body frame, of a pair of wing frames projecting upwardly and outwardly therefrom, said wing frames being pivotally mounted at their inner ends on said body
85 frame, a plurality of plane sections carried by each of said wing frames, a fuel tank swingingly suspended from said body frame, means for connecting said suspension with each of said wing plane sections to vary the
90 action of said plane sections, a carrier platform suspended below said body frame, an engine mounted on said platform, and means mounted on said platform for adjusting the angular positions of the wing
95 frames, said means being operatably connected to said wing frames.

10. In a flying machine, the combination with a body frame, of a plurality of aeroplane sections spaced vertically from each
100 other and at different distances from said body frame and means for automatically warping the outer rear corners of said plane sections in succession to correspond to displacement of the flying machine from
105 normal upright position.

RUSSELL H. FROELICH.

In the presence of—

GEO. J. PFLUEGER,
J. B. MEGOWN.