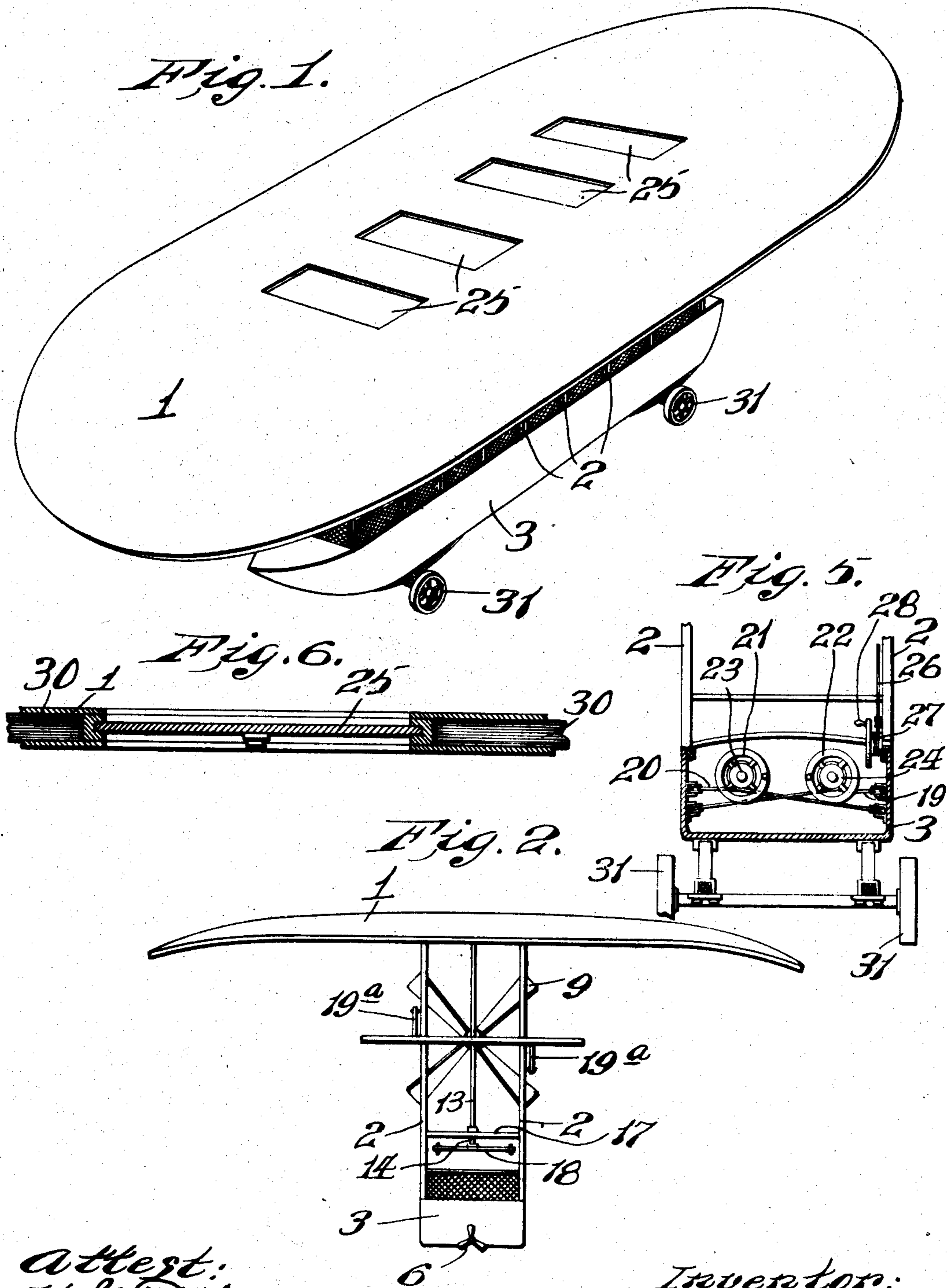


J. W. HARRISON.
FLYING MACHINE.
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993,987.

Patented May 30, 1911.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

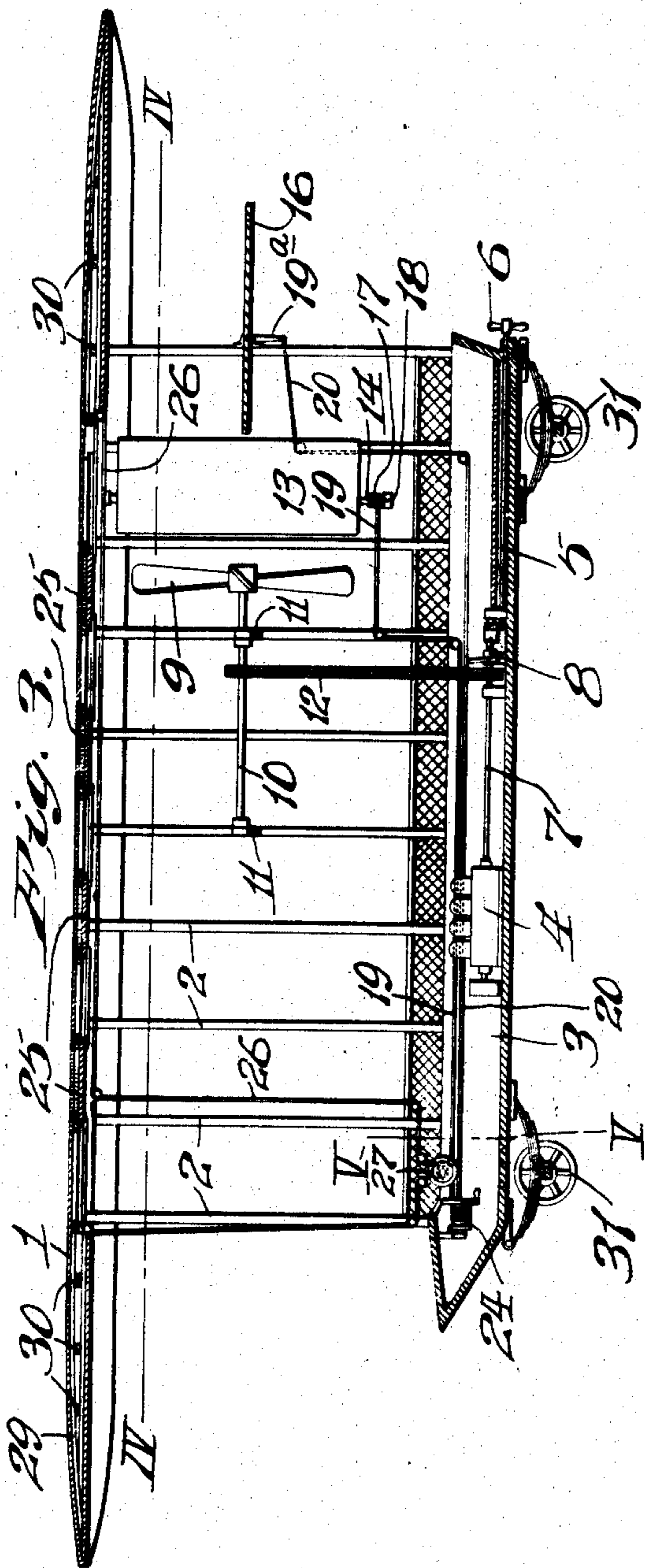
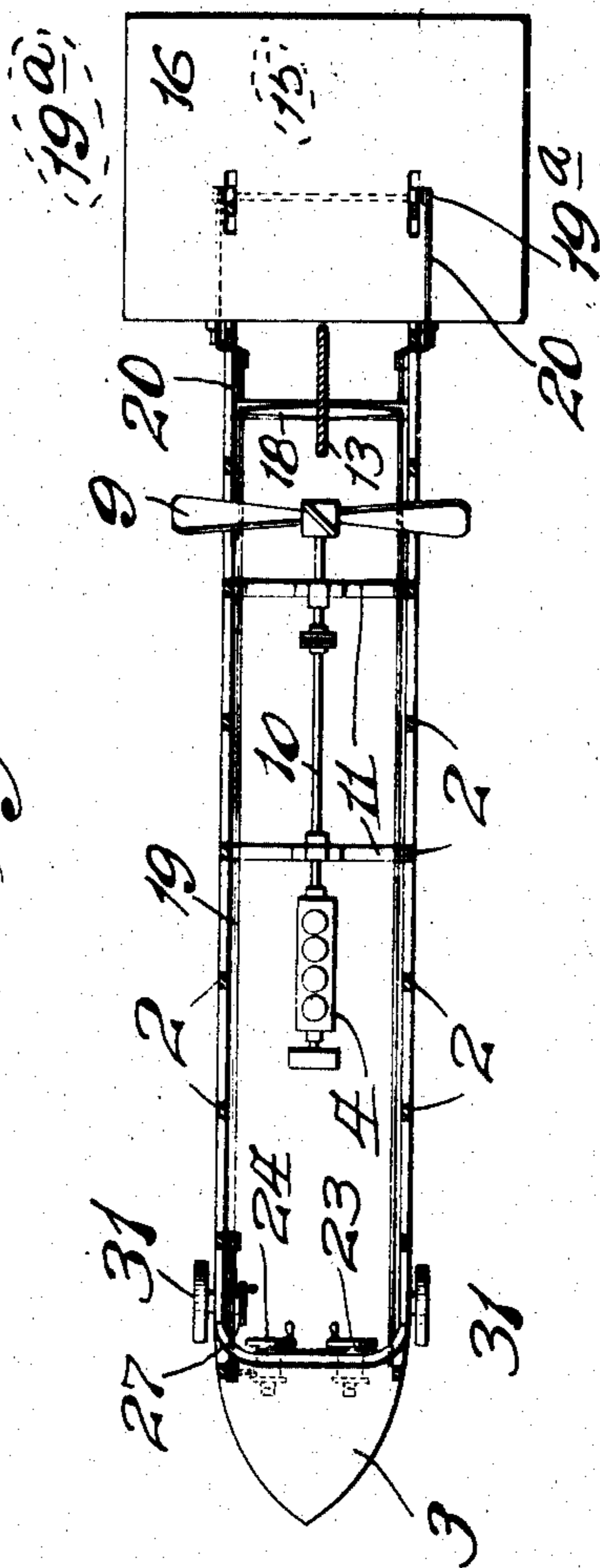


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN W. HARRISON, OF ST. LOUIS, MISSOURI.

FLYING-MACHINE.

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Specification of Letters Patent.

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To all whom it may concern:

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

This invention relates to aeroplanes and has for its primary object to provide an
10 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 construction whereby a flying machine may be
15 adapted to maintain the sustaining plane horizontal.

Another object is to provide improved means whereby the flying machine is enabled to descend slowly and easily, in the
20 event of the power plant becoming disabled.

Another object is to provide a flying machine of improved construction according
25 to which said flying machine may be adapted to take its flight from a sheet of water or from land.

Another object is to provide improved propulsion means embodying separate and
30 distinct propellers for driving the machine over the water and through the air respectively.

Another object is to provide improved steering means and disposition of the same.

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

40 Figure 1 is a perspective view taken from above of a flying machine embodying my improvements. Fig. 2 is a rear elevation of the same. Fig. 3 is a longitudinal section through the flying machine, parts
45 being shown in elevation. Fig. 4 is a section on the line IV—IV of Fig. 3. Fig. 5 is a detail section on the line V—V of Fig. 3. Fig. 6 is a detail section of the slide-way for the aperture closures in the top or
50 sustaining plane.

Referring more particularly to the drawings and to the embodiment shown therein, the flying machine is provided above with
55 a large sustaining plane 1 which is perfectly flat from front to back and has its lateral edges curved downwardly slightly

as shown best in Figs. 1, 2 and 3. Suspended from the sustaining plane 1 by means of a plurality of lateral supports or bars 2 symmetrically disposed with respect to the
60 central longitudinal plane of the flying machine, is a carrier or car 3 which, in the present embodiment of the invention, is in the form of a boat or vessel adapted to travel through water. By an inspection of
65 Figs. 1, 2 and 3, it will be noted that the carrier or vessel 3 is of relatively small beam and length compared to the sustaining plane 1 and is suspended from the sustaining plane a considerable distance there-
70 below.

In order to impart a maximum degree of stability to the flying machine under all conditions, the disposition and arrangement of all the parts of the flying machine
75 have been so planned as to bring the center of gravity of the entire machine as low as possible and in a vertical line through the center of the sustaining plane. The power plant represented in the present em-
80 bodiment by an internal combustion motor 4, is disposed a little forward of the center of the vessel or carrier 3 to counterbalance the operating parts in the rear. It will be seen therefore that the carrier 3
85 with its burden provides a species of pendulum which constantly exerts a tendency to return the flying machine to upright position when it is displaced therefrom.

Extending rearwardly from the engine
90 4 is a propeller shaft 5 to the rear end of which is secured a propeller 6 for propelling the vessel 3 through water. Said shaft 5 is connected to the engine shaft 7 of the motor by means of a clutch 8 of any suit-
95 able description, whereby said propeller 6 may be made operative or inoperative at pleasure. Disposed centrally with respect to the sustaining plane 1 and between it and the vessel 3, is a large air propeller 9 dis-
100 posed between the vessel 3 and the sustaining plane 1 and which preferably covers the greater portion of the distance therebetween. Said propeller 9 is mounted upon a longitudinal shaft 10 journaled in suitable
105 transverse supports 11 carried by the upright bars 2. Power may be transmitted from the engine shaft 7 to the propeller shaft 10 by means of an endless drive 12
110 running over pulleys carried by said shafts 7 and 10, respectively. Disposed immediately to the rear of the propeller 9, is a

vertical rudder plane 13 which is carried by a vertical shaft 14 journaled in contiguous rigid parts on the machine frame. Said plane 13 is mounted to have the larger portion of its width in the rear of the shaft 14 so as to make it easier to swing the same against the resistance of the wind. The plane is arranged to receive the full force of the wind from the propeller 9. Carried by a horizontal shaft 15 disposed to the rear of the plane 13 and intersecting the axis of the propeller shaft 10, is a horizontal rudder plane 16 whereby the flying machine is raised or lowered through space. Immediately below a horizontal strut 17 which connects two of the uprights 2 and within which the vertical shaft 14 is journaled, is a tiller bar 18 from opposite ends of which, as shown best in Figs. 3 and 4, extend tiller ropes or cables 19. As shown best in Figs. 2 and 3, the horizontal shaft 15 is provided on opposite ends with lever arms 19^a from which lead the tiller ropes or cables 20.

Referring now to Fig. 5, a pair of tiller wheels 21, 22 are disposed in the forward end of the vessel 3, said tiller wheels being rigidly secured to winding drums 23, 24, respectively. In the present embodiment, the winding drum 23 has wound thereon the tiller rope 20 leading to and from the lever arms 19 on the horizontal rudder shaft 15. The winding drum 24, on the other hand, has wound thereon the tiller ropes 19 which lead to and from the tiller bar 18 carried by the upright shaft 14. It will thus be seen that the aviator is enabled to control the vertical movement with his right hand and the lateral movement of the aeroplane with his left hand.

As shown in Fig. 1 of the drawings, the sustaining plane 1 is provided with a series of apertures which may be opened and closed by means of shutters 25 slidably mounted in the runways formed in the framework of the top plane 1. Said shutters or closures 25 are connected to move in unison by suitable connecting means and the end closures or shutters 25 have secured thereto an operating rope or cable 26 which passes over a series of guide pulleys to and from the drum 27 (see Fig. 5) mounted on the right side of the carrier or vessel 3. A crank lever 28 carried by the drum 27 enables the operating rope 26 to be moved backwardly and forwardly to open and close the apertures in the top plane 1 to any desired extent.

As details of construction, the sustaining plane 1 is constructed of a plurality of structural sections 29 extending longitudinally of the machine, said longitudinal sections being connected at suitable intervals by transverse sections 30 of any suitable material. By this means, the sustaining plane may be strengthened to such a degree as to avoid the employment of guy lines from the

carrier suspending framework to the outer edges of the sustaining plane.

To adapt the machine to begin its flight from the ground and to alight again on the ground land wheels 31 of any suitable construction are mounted on the body of the boat in any suitable manner.

The operation of the flying machine will now be readily understood and briefly stated is as follows: When it is desired to have the machine rise into the air from the surface of a sheet of water upon which the vessel 3 is floating, the engine 4 having been set in operation, the clutch 8 is thrown into position to drive the propeller shaft 5 which propels the vessel 3 through the water. Simultaneously with the operation of the water propeller 6, the air propeller 9 is operated to give an added impetus forward and by manipulating the horizontal rudder plane 16 in a well known manner, the machine is gradually lifted into the air, after which it may be conducted upon its course by successively manipulating the vertical rudder plane 13 and the horizontal rudder plane 16 according to the desires of the aviator. A flight from the land takes place in an exactly similar manner except that the water propeller is not made use of. During the progress of the flying machine, it is maintained in upright position by reason of the relatively low disposition of the heavier portions of the machine and the arrangement of the center of gravity of the entire mass at a point approximately vertically beneath the center of the sustaining plane 1. In the event of a mishap, such as a disability of the power plant or propeller mechanism, the entire flying machine may be transformed into a parachute, during which the closures 25 in the top plane are open to any degree corresponding to the desired rate of descent to permit the passage of the air upwardly through the center of the sustaining plane.

What I claim is:

1. In a flying machine, the combination with a top plane, of a carrier suspended therefrom, a power plant mounted on said carrier, a propeller between said top plane and carrier, a vertical rudder plane, and a horizontal rudder plane, said rudder planes being mounted with the center lines of their mid-lengths coinciding and passing through the axis of said propeller.

2. In a flying machine, the combination with a top plane, of a carrier suspended therefrom, a motor mounted in said carrier forward of the center of said top plane, a propeller driven by said motor, said propeller being disposed between the top plane and said carrier to the rear of the center of said top plane, a vertical rudder plane, and a horizontal rudder plane, said rudder planes being disposed between the propeller

and the rear end of the top plane and having their turning axes respectively bisected by the axis of said propeller.

3. In a flying machine, the combination
5 with a top plane, of a carrier suspended from said top plane, a power plant mounted on said carrier, a propeller driven by said power plant, a vertical rudder plane extending approximately across the space be-
10 tween said top plane and carrier and behind said propeller, a horizontal rudder plane extending beyond the sides of said carrier, said rudder planes being mounted so that the center lines of their midlengths
15 coincide and pass through the axis of said propeller.

4. In a flying machine, the combination with a sustaining plane, of a carrier, a power plant mounted on said carrier, a propeller
20 driven by said power plant, said propeller being disposed adjacent the center of said sustaining plane and the carrier, a vertical rudder plane disposed in the rear of and adjacent to said propeller, and a
25 horizontal rudder plane disposed in the rear of and adjacent to said vertical rudder plane, both of said rudder planes being centrally disposed with respect to the axis of said propeller.

5. In a flying machine, the combination
30 with a sustaining plane, of a carrier suspended from said plane, a power plant mounted on said carrier approximately central with respect to said sustaining plane, a
35 propeller driven by said power plant, said propeller being disposed adjacent the center

of said sustaining plane and the carrier, a vertical rudder plane disposed in the rear of and adjacent to said propeller, a horizontal rudder plane disposed in the rear of
40 and adjacent said vertical rudder plane, and means disposed at the forward end of said carrier for operating each of said rudder planes, said means being operatably connected to said rudder planes. 45

6. In a flying machine, the combination with an aeroplane, of a water displacing carrier suspended from said aeroplane, a power plant mounted in said carrier, the center of gravity of said carrier and power
50 plant being approximately under the center of pressure of said aeroplane and carrier, a propeller operatively connected to said power plant, a vertical rudder plane adjacent to said propeller, said rudder plane
55 reaching approximately across the space between said aeroplane and carrier, a horizontal rudder plane oscillatably mounted upon an axis in the same horizontal plane with the axis of said propeller, said horizontal plane being extended beyond the
60 sides of said carrier, a tiller mounted in the forward end of the carrier and operatably connected to said vertical rudder plane, and an independent tiller mounted in the forward
65 end of said carrier adjacent to the first said tiller and operatably connected to said horizontal rudder plane.

JOHN W. HARRISON.

In the presence of—

MARIE C. HAMMON,
J. B. MEGOWN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."