

E. M. RALLS.

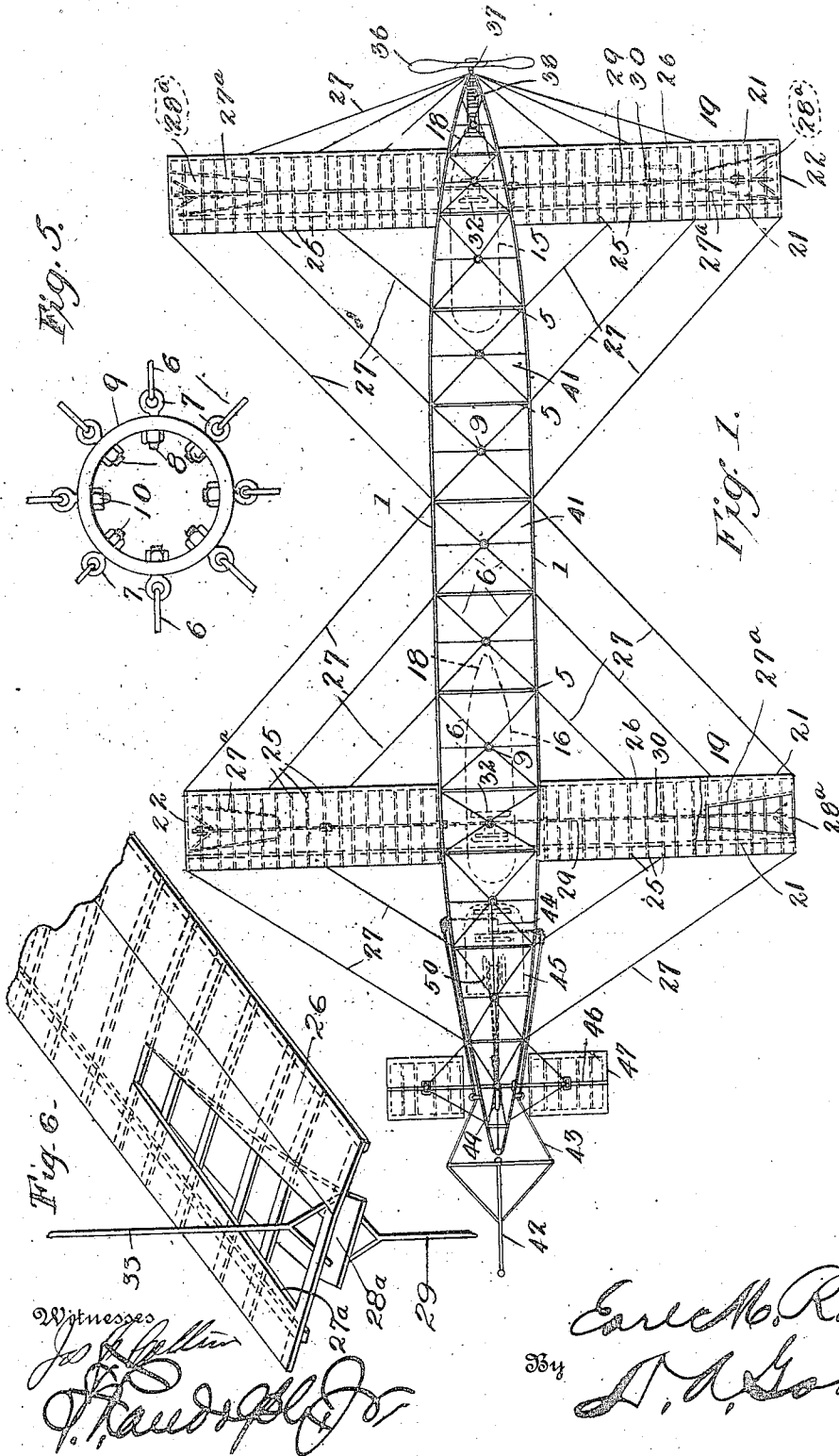
AIRSHIP.

APPLICATION FILED AUG. 23, 1911.

1,045,746.

Patented Nov. 26, 1912.

3 SHEETS-SHEET 1.



Inventor

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3 SHEETS-SHEET 2.

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Fig. 2.

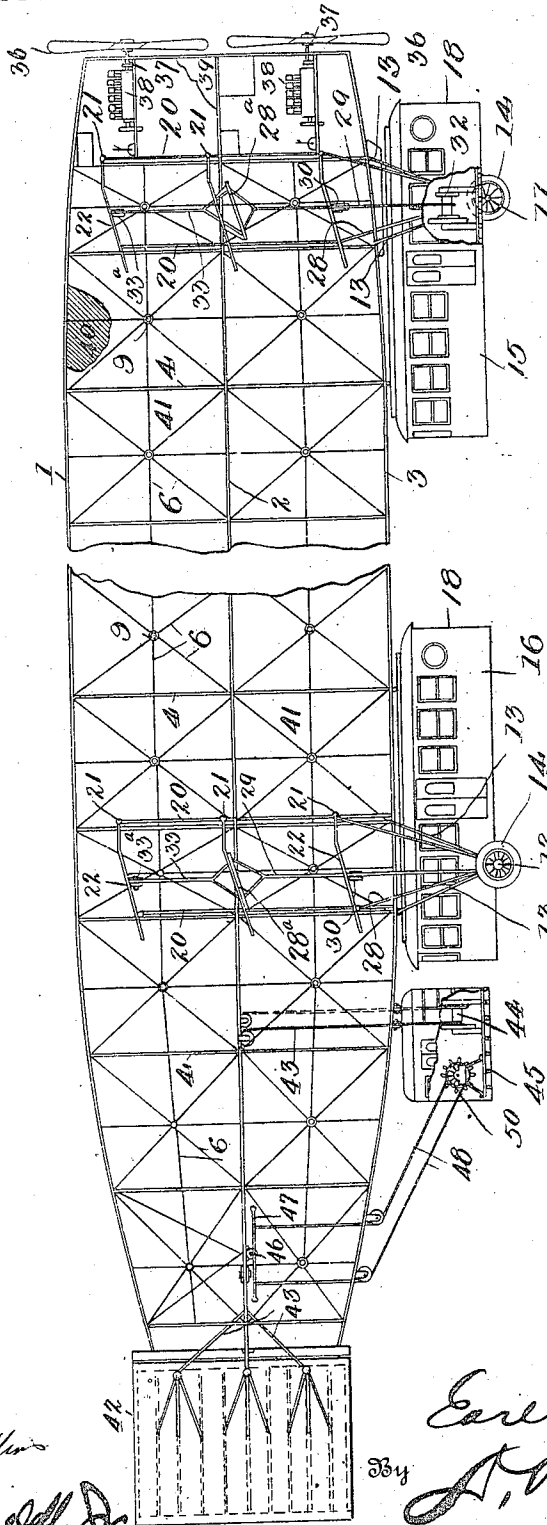
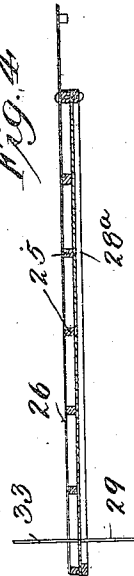


Fig. 4.



Witnesses

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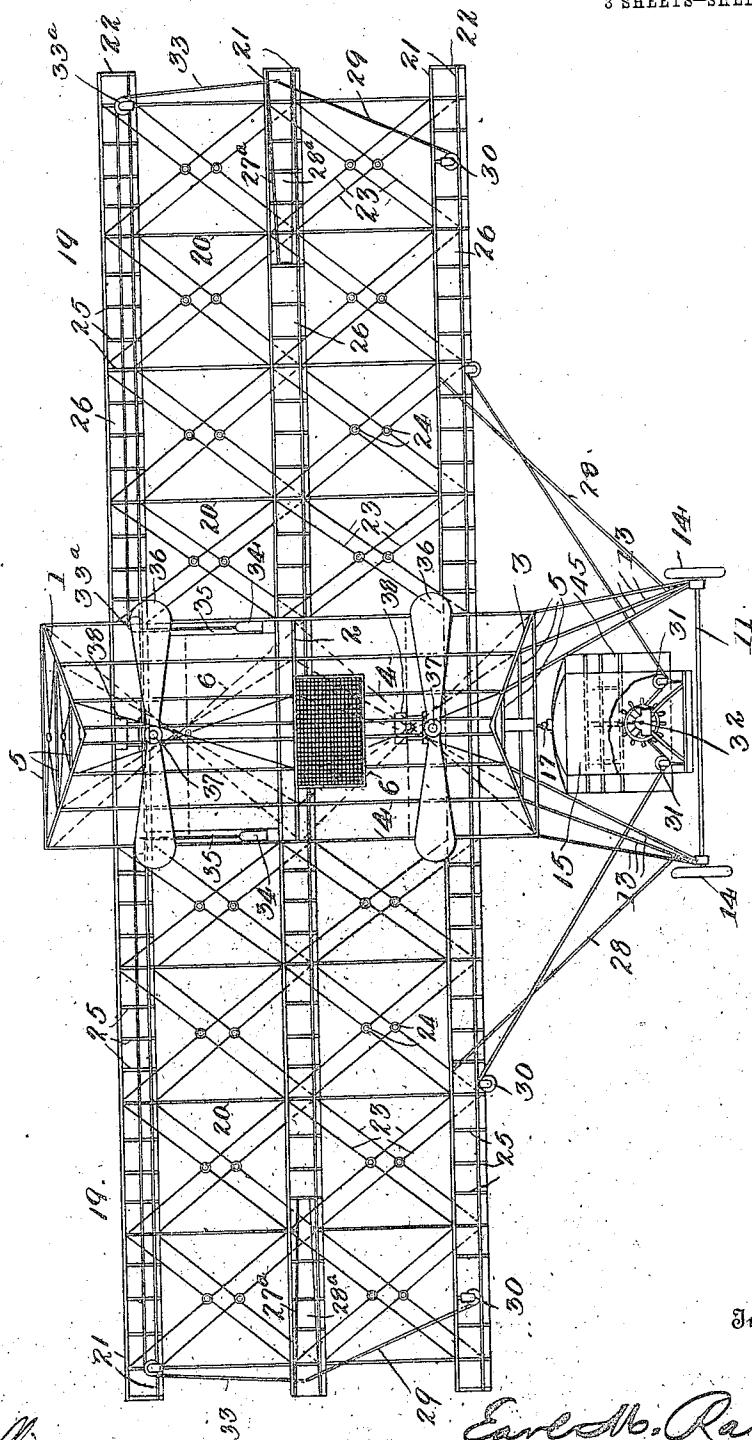
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Fig. 3.



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UNITED STATES PATENT OFFICE.

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AIRSHIP.

1,045,746.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Application filed August 23, 1911. Serial No. 645,511.

To all whom it may concern:

Be it known that I, EARE M. RALLS, a citizen of the United States, residing at Sacramento, in the county of Sacramento and State of California, have invented certain new and useful Improvements in Airships, of which the following is a specification.

My invention relates to air ships of the combined balloon and air plane class such as shown in my Patent No. 995,033, issued June 13, 1911, and has for its object the provision of an improved construction of balloon supports, improved construction of air planes, and means to automatically control the expanse of air plane surface to keep the ship at all times in equilibrium.

My invention will be described in detail hereinafter and illustrated in the accompanying drawings in which—

Figure 1 is a top plan view of my improved air ship showing one of the wings partly broken away, Fig. 2, a side view, Fig. 3, a front end view, Fig. 4, a longitudinal sectional view of one of the wings showing the movable tip in position, Fig. 5, a detail view of one of the brace rings, and Fig. 6 a perspective view of the end of the planes with the valve flexed open.

In the drawings similar reference characters will be used to designate corresponding parts in the several views.

The balloon frame of my improved air ship consists of the horizontal side rods 1, 2 and 3, the vertical side rods 4, and the cross rods 5. Horizontal rods 1, 2 and 3 have their front and rear ends shaped to meet in pairs and the ends of rods 1 and 3 bent downwardly and upwardly, respectively, as shown in Fig. 2.

The frame is braced by means of wires 6 secured at one of their ends to the sides or corners of the rectangles formed by the horizontal rods and the vertical or cross rods, while their other ends are secured to eye loops 7 having threaded stems 8 mounted in rings 9 and held therein by means of nuts 10, this construction providing for regulating the tension of the brace wires.

11 and 12 indicate truck axles secured under the balloon frame near its front and rear ends respectively by means of supporting rods 13, and 14 indicates wheels journaled on said axles 11 and 12.

15 and 16 indicate cars swingingly sup-

ported as shown at 17, under the balloon frame, and having their frame ends tapered to a point as shown at 18 to offer as little resistance as possible to the air while the vessel is in motion.

Secured at each side of the balloon frame, above the trucks 11 and 12 are frames 19 consisting of vertical rods 20, horizontal rods 21 and cross rods 22 braced by means of wires 23 secured to tension rings 24 in the same manner as brace wires 6.

25 indicates ribs secured to horizontal rods 21, and 26 planes secured to the ribs 25, said planes having their front edges higher than their rear edges as shown. I have shown three planes 26 on each frame 19 but it will be apparent that this number may be increased or diminished as desired for the most efficient operation of the machine.

Frames 19 are braced by means of wires 27 secured thereto and to the sides of the balloon frame and also by means of rods 28 secured to the bottoms of the frames and to supporting rods 13.

In the form shown in the drawings the middle plane 26 on each frame 19 has its outer end formed with a truncated V-shaped cut away portion indicated at 27^a, and 28^a indicates a supplemental plane or tip that is of the same shape as the incision but slightly larger in area, and rigidly secured at its narrower end to the underside of plane 26 adjacent to the cut away portion 27^a. The planes or tips 28^a are made of flexible material and have ropes 29 secured to their undersides that are run over guide pulleys 30 secured to the lower portion of each frame 19 and pulleys 31 secured to the floors of the cars 15 and 16, and have their free ends secured to windlasses 32 in said cars.

33 indicates other ropes secured to the upper sides of planes or tips 28^a that are run over guide pulleys 33^a on the top of the frames 19 and have their free ends secured to weights 34 slidably mounted in boxes 35.

As the cars 15 and 16 are mounted to swing laterally on the supports 17 it will be apparent that when the windlasses 32 are secured from rotation that oscillations of the cars 15 and 16 caused by dipping of the planes 26 to either side will cause the planes or tips on the higher side to be flexed downwardly thus lessening the resistance surface of the planes on that side, and, as the planes

or tips 28^a on the low side are in engagement with the undersides of the planes 26 to which they are secured, the surface area of resistance to the air of the planes on the low side is greater than the surface area of resistance of the planes on the high side, the machine will right itself, the flexed planes being returned to their normal positions by means of the weights 34 when the planes are again horizontal.

Planes or tips 28^a are also used to guide the air ship upwardly and downwardly. By flexing the planes or tips on the frames 19 at the front of the vessel the lifting power of the front planes relatively to the rear planes is lessened and the ship will incline downwardly, while should the planes or tips 28^a on the frames 19 toward rear of the vessel be flexed downwardly the lifting power of the rear planes 26 will be lessened relatively to the lifting power of the front planes 26 and the vessel will incline upwardly.

For the purpose of propelling the ship I provide two propellers 36 each of which is mounted on the shaft 37 of a suitable motor 38, said motors being identical in structure and either is alone sufficient to give the planes a maximum lifting capacity commensurate with safety in operation, and removes the danger of disaster from breaking down of one of the motors.

The motors and propellers are mounted in vertical relationship as shown in Figs. 2 and 3 and the front of the vessel is inclosed with sheet aluminum 39 or any other suitable material to protect the space where the motors are stationed. The sides, top and bottom of the frame at the rear of the motor room are covered with any suitable fabric 40 such as balloon cloth and the sections formed by the rods 1, 2 and 3, 4 and 5 and braces 6 have bags 41 of balloon cloth or other suitable fabric that are inflated with gas and operate to lift the vessel unloaded so that the lifting power of the planes 26 is exerted in lifting the cargo carried by the cars.

42 indicates the rudder that is pivotally mounted at the rear of the vessel and operated by ropes 43 secured thereto and wound on a windlass 44 in car 45 secured under the rear of the vessel, said car 45 being wider than cars 15 and 16 to enable the operator to see ahead in shaping the course of the vessel.

46 indicates a shaft journaled in front of the rudder 42 on which are secured planes 47 that may be used to regulate the upward and downward inclination of the vessel in addition to the mechanism heretofore described including the planes or tips 28^a, or may be used independently thereof as desired. Shaft 46 is actuated by means of ropes 48 secured to a cross bar 49 and mounted on a windlass 50 stationed in car 45.

In operation in addition to the automatic balancing effect of the cars 15, 16, herein-after described, it will be apparent that should the vessel continue to tip to one side the cars will eventually contact with the rods 13 supporting shafts 11 and 12 and be prevented from swinging any farther, so that continued tipping of the vessel being against the weight of the cars and their contents will be prevented.

Having thus described my invention what I claim is—

1. In an air-ship, planes secured thereto having cut-out portions in their outer ends, a flexible plane secured along one of its edges under each cut-out portion, said flexible plane being larger than the cut-out portion, means to hold the flexible planes in engagement with the first-mentioned plane, and means to move the flexible plane from engagement therewith.

2. In an air-ship, a frame, planes secured thereto having cut-out portions in their outer ends, a flexible plane secured along one of its edges under each cut-out portion, said flexible plane being larger than the cut-out portion, cars swingingly secured to the frame, and operative connections between said flexible planes and the swinging cars to flex the planes on the high side of the ship when it lists.

3. In an air-ship, a frame, planes secured thereto having cut-out portions in their outer ends, a flexible plane secured along one of its edges under each cut-out portion, said flexible plane being larger than the cut-out portion and overlapping its edges, cars swingingly secured to the frame, ropes connecting the undersides of said flexible planes and the cars to flex the planes downwardly, and means to normally hold the flexible planes in engagement with the first-mentioned planes.

4. In an air-ship, a frame, planes secured thereto having V-shaped cut-out portions in their outer ends, a V-shaped flexible plane secured along its narrow edge to the underside of each first-mentioned plane along the narrow edge of its cut-out portion, said V-shaped plane being wider than the cut-out portion and overlapping its edges, cars mounted on said frame and adapted to swing laterally thereof, ropes connecting the undersides of said V-shaped planes and the cars to flex the planes downwardly, and means to normally hold the V-shaped planes in engagement with the first-mentioned planes.

5. In an air-ship, a frame, planes secured thereto and having V-shaped cut-out portions in their outer ends, a flexible V-shaped plane secured along its narrow edge to the underside of each first-mentioned plane along the narrow edge of its cut-out portion, said V-shaped plane being wider than the

cut-out portion and overlapping its edges,
cars mounted on said frame and adapted to
swing laterally thereof, windlasses mounted
in the cars, ropes connecting said windlasses
with the undersides of said V-shaped planes,
5 weights slidably mounted on the frame, and
ropes connecting said weights and the upper
sides of said V-shaped planes to hold them

normally in engagement with the first-men-
tioned planes.

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

EARL M. RALLS.

Witnesses:

T. L. DE ARMOND,

C. U. FONTENEAU.