M. GELDNER.

AIRSHIP.

APPLICATION FILED NOV. 10, 1909.

1,052,661.

Patented Feb. 11, 1913.

7 SHEETS—SHEET 1.

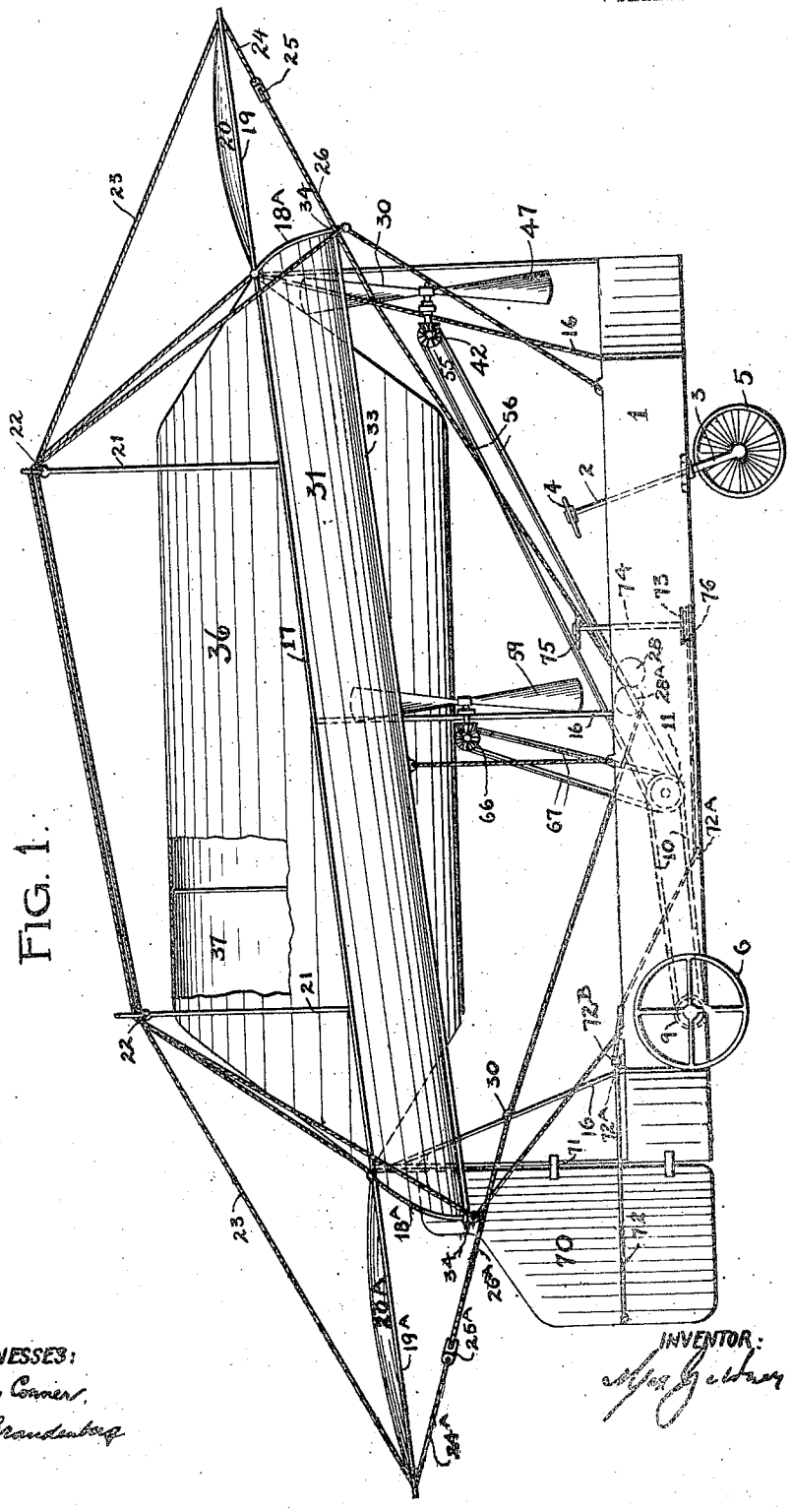

FIG. 1.

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F. W. Brandenburg.

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7 SHEETS—SHEET 2.

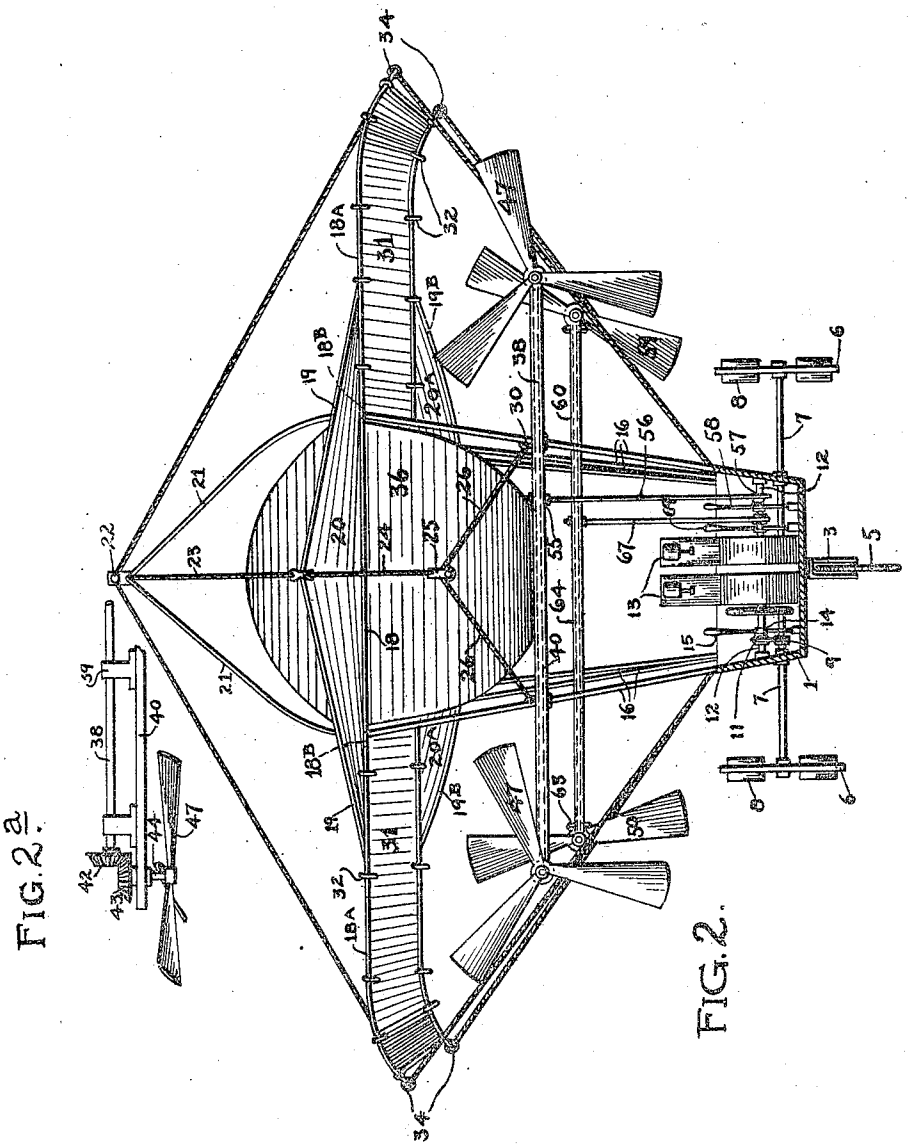

FIG. 2a.

FIG. 2.

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7 SHEETS—SHEET 3.

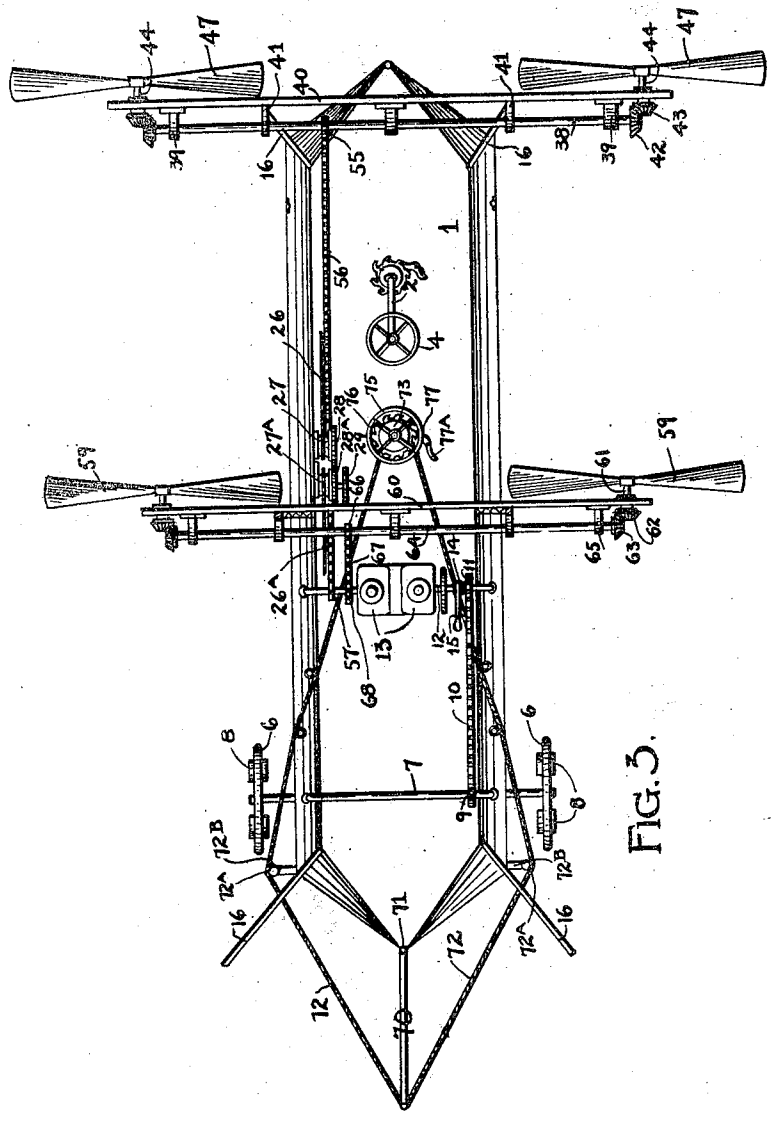

FIG. 3.

WITNESSES:

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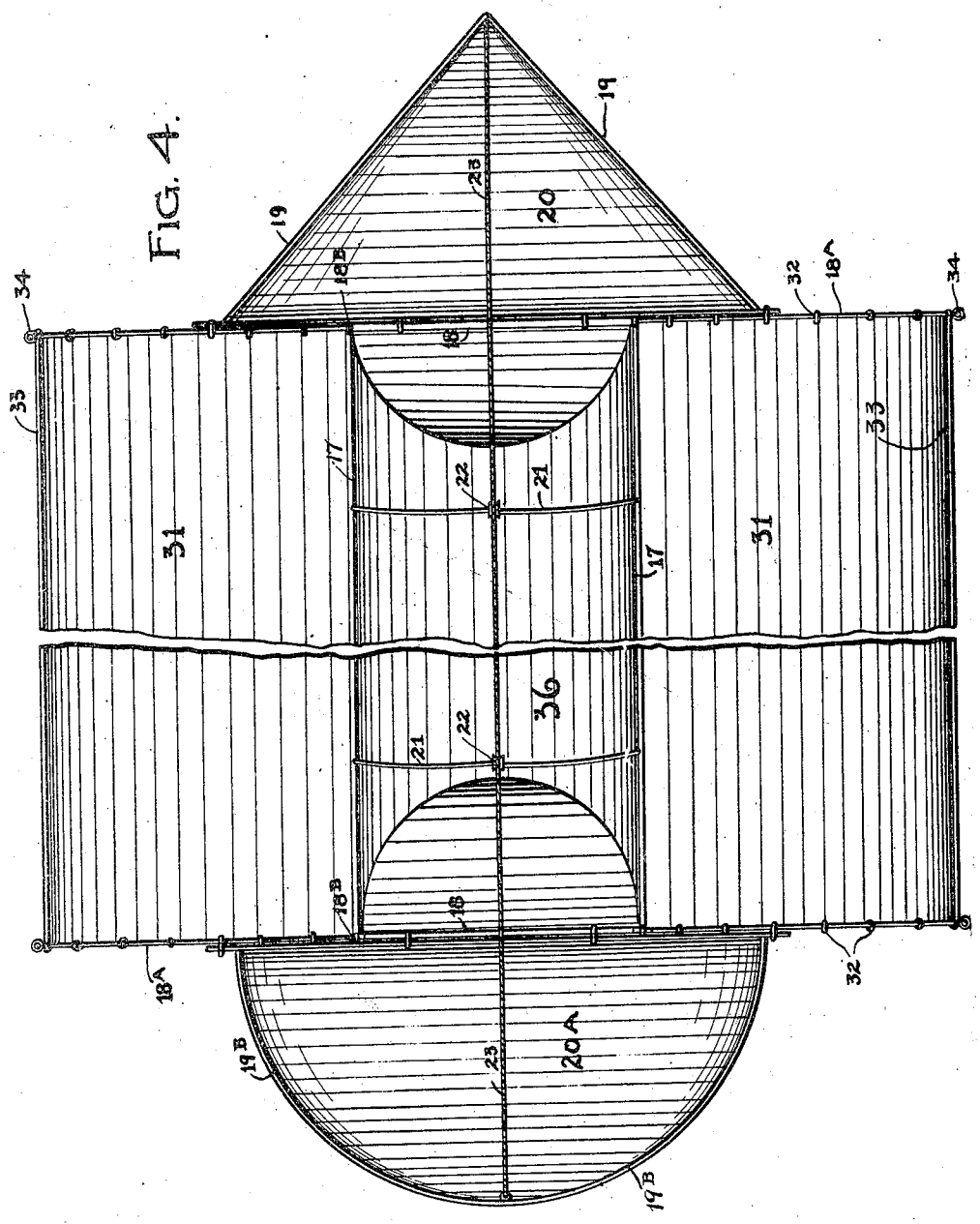
7 SHEETS—SHEET 4.

FIG. 4.



WITNESSES:

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7 SHEETS—SHEET 5.

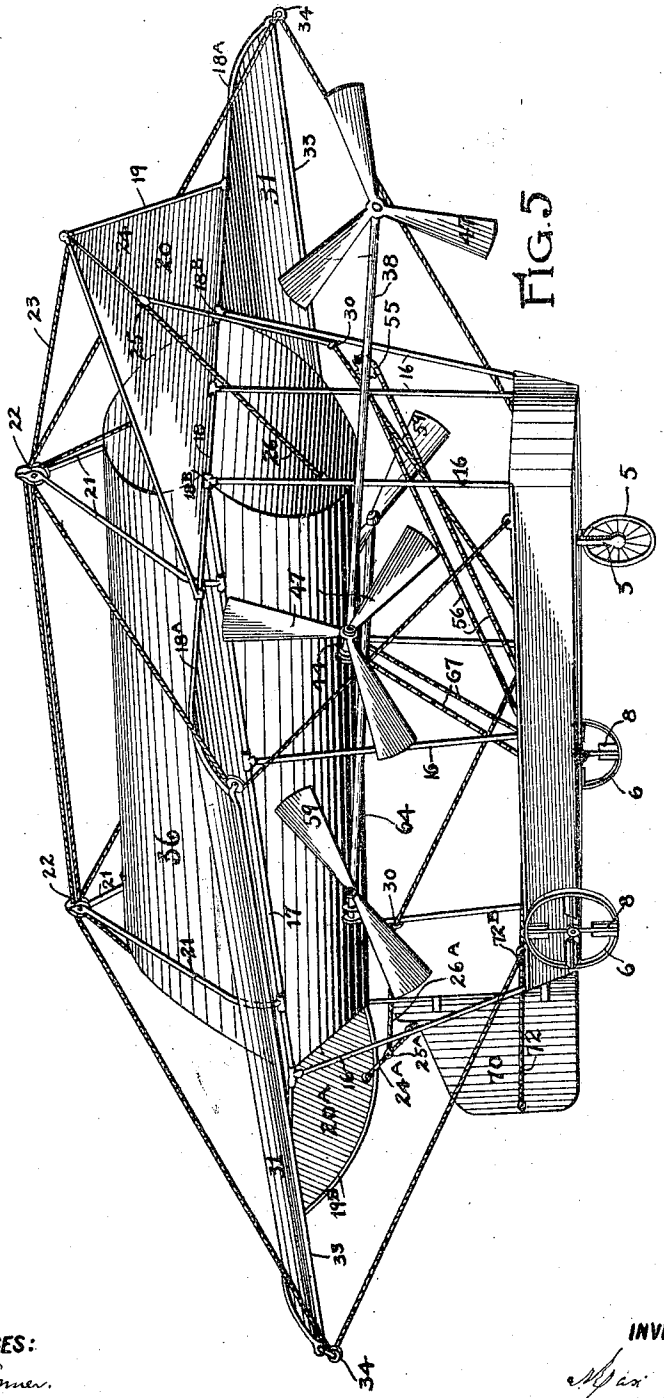

FIG. 5

WITNESSES:

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1,052,661.

Patented Feb. 11, 1913

7 SHEETS—SHEET 6.

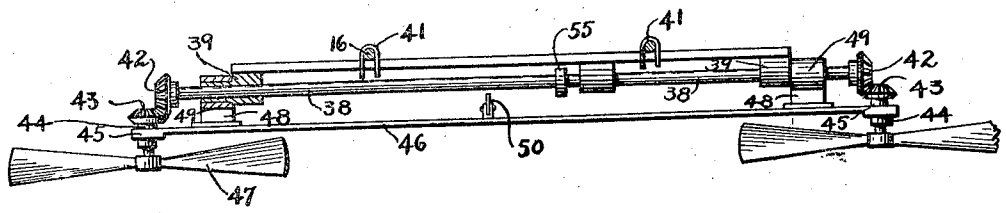

FIG. 6.

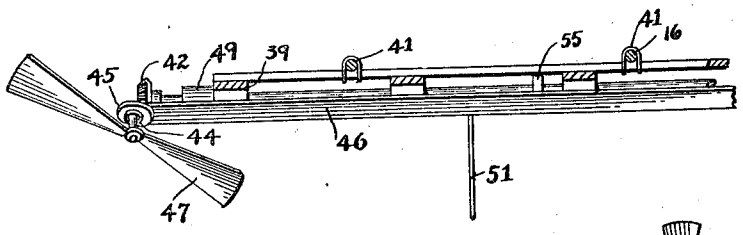

FIG. 6a.

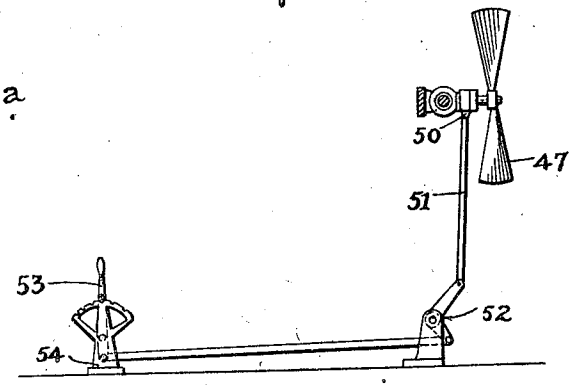

FIG. 6b.

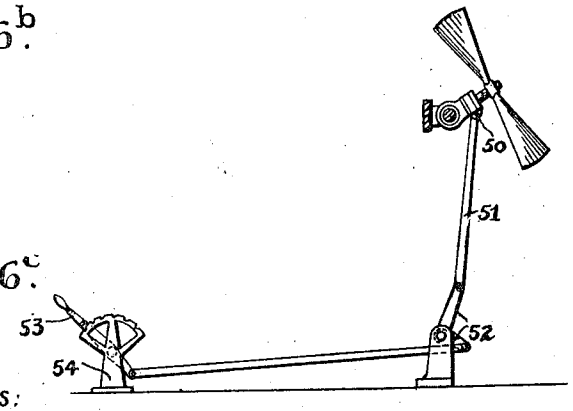

FIG. 6c.

WITNESSES:

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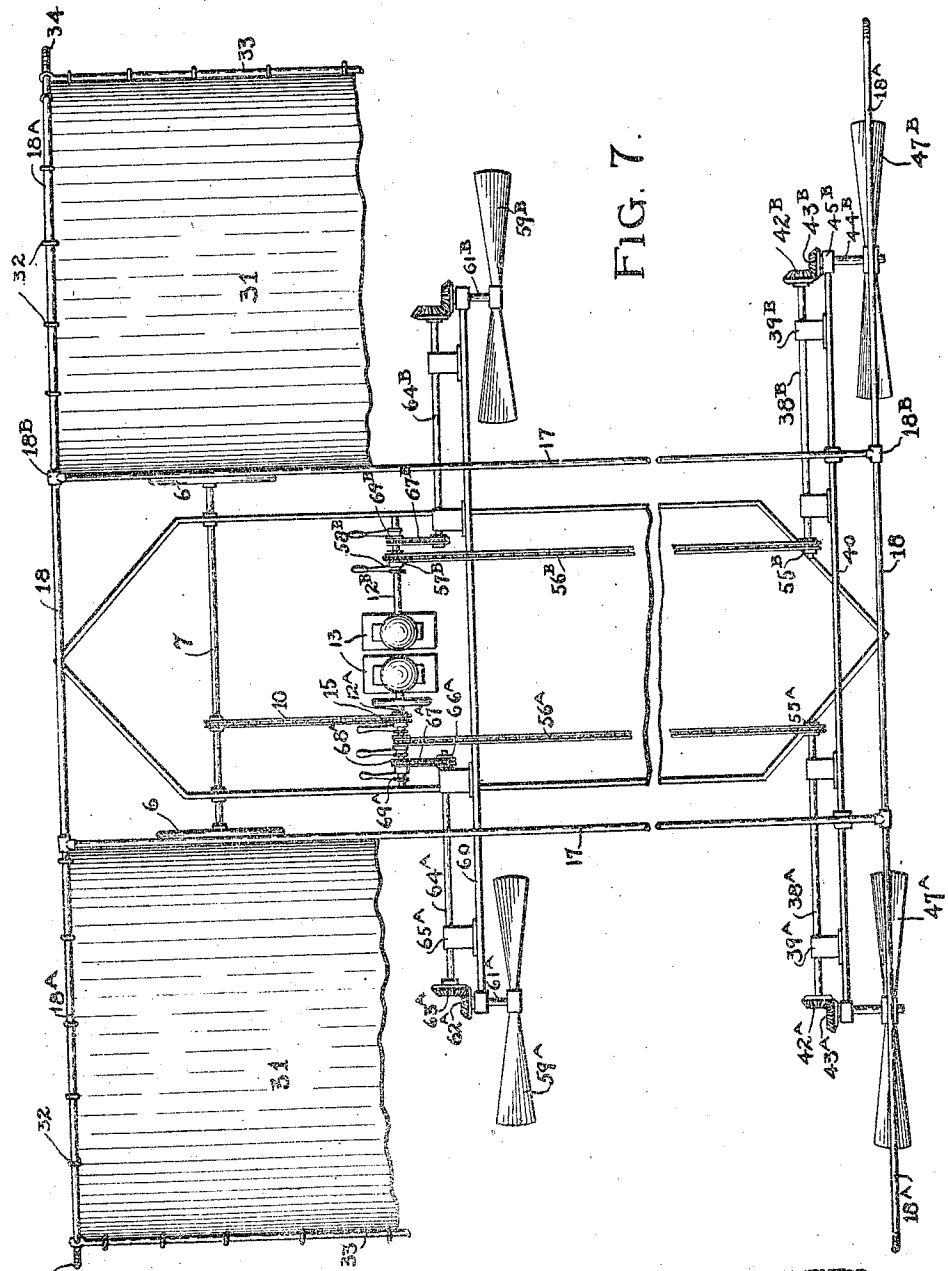
APPLICATION FILED NOV. 10, 1909.

1,052,661.

Patented Feb. 11, 1913.

7 SHEETS—SHEET 7.

FIG. 7.



WITNESSES:

W. Leslie Conner.

INVENTOR:

Max Geldner

UNITED STATES PATENT OFFICE.

MAX GELDNER, OF NEW DORP, NEW YORK.

AIRSHIP.

1,052,661. Specification of Letters Patent. Patented Feb. 11, 1913.

Application filed November 10, 1909. Serial No. 527,345.

To all whom it may concern:

Be it known that I, MAX GELDNER, a citizen of the United States, and resident of New Dorp, borough and county of Richmond, city and State of New York, have invented new and useful Improvements in Airships, of which the following is a specification.

My invention relates principally to airships, my object being to provide a vehicle, or vessel, capable to travel on land, in the water, or in the air; or in other words, a combined aeroplane, balloon, automobile, and boat, which is easily and positively controlled at all times, and which is simple and practical in construction and operation.

The fundamental principle in construction of my ship came to my mind by observing the movements of the birds, and for this reason I follow as much as possible the model which nature presents us in the natural flying machine, the birds. The body is represented in my machine by the long shaped balloon, the wings by the aeroplane on both sides, the neck and head by the triangular front sail, the tail by the semi-circular rear sail, the muscles by the motor and the propellers. If we watch the movements of the birds, especially the larger and heavier birds, we will observe that same are not able to fly directly from the ground, but are only able to accomplish this by making several jumps forward, at the same time spreading and working their wings for the purpose of catching and compressing the air under them, which will raise their body from the ground, and only then will commence the real flying movements of the wings. Taking these facts into consideration, I base the construction of my machine on the same principles—that is, by forward motion and the proper mechanism I, successively, throw masses of air under the sails or aeroplanes of the ship for the purpose of compressing same there to such an extent as to produce a carrying power. To accomplish this, I begin with a run of the machine, on its own wheels and set in motion by its own motor, over the ground. The upward turned front sail will catch the air, which will be driven by the forward motion under the wings, or aeroplanes, and, as the propellers are rotated at the same time, it will be thrown backward with great force under the sails, which, having a slight declination toward the rear, will be pressed with gradually increasing power upward. The work of the front propellers, in creating a vacuum or suction in front of the vessel, thereby steadily increasing the forward motion of same and thus furnishing a constantly increasing and abundant current of air, is made complete by the two rear propellers in keeping the current of air, increased by their rotating, centered under the planes, and, as the lowered rear sail will prevent an abrupt escape of the air, the same will be concentrated to such an extent as to cause the ship to be raised from the ground. This accomplished, the movement of the wheels will be discontinued, the front and rear sails will be set according to the intention of the pilot to sail, upward, in a horizontal direction, or downward. The propellers, now gaining the full power of the motor, will throw sufficient currents of air under the wings, not only to keep the ship floating, but, the resistance of the air being very trifling, move it forward with great speed and bring it under full control of the vertical rudder (front and rear sail) and the horizontal rudder attached to the rear end of the machine.

Referring to the landing, I again follow the birds' example; they cease, or minimize, their forward motion, and the wings, performing a fluttering movement, serve the same purpose as a parachute, but greatly assisted by this fluttering action, until the ground is reached. The operator will, therefore, reduce the motion of the propellers; the aeroplanes, or wings, will serve as a parachute and to further check the downward movement of the vessel and effect an easy landing, the propellers will be set upward at a slight angle, which operation, while throwing the air backward, yet at a moderate rate, creates a slight suction upward and reduces the downward motion of the machine to the desired requirements. Should it happen, for any reason, that a breakdown of the motor might occur, then the combined side aeroplanes, front and rear sail, assisted by the balloon, will serve as a parachute and prevent a probable disastrous accident.

The following is a description and specification of my airship, together with accompanying drawings for detailed explanation.

Figure 1 is a side elevation of my ship. Fig. 2 is a front elevation. Fig. 2ª is a plan view of one of the propellers and support

with driving mechanism, part of the same broken away. Fig. 3 is a plan view of the boat or gondola. Fig. 4 is a top view of balloon and aeroplanes. Fig. 5 is a perspective view of the machine. Fig. 6 is a sketch of the movable feature of the propellers. Fig. 6[a] is a view looking upwardly at Fig. 6 with part broken away. Fig. 6[b] is a side elevation with part broken away illustrating the mechanism for changing the thrust of the propeller. Fig. 6[c] is another view of Fig. 6[b] showing the position of the propeller after its line of thrust has been changed. Fig. 7 is a plan view of another form of my invention, with parts broken away and omitted for the sake of clearness.

My ship, or vehicle, comprises a body 1, Figs. 1, 2, 3, which may be in the shape of a boat, through the bottom of which, near the front or the bow thereof, extends the steering rod 2, which terminates in a fork 3, Fig. 5. The said rod 2 is provided at its upper end with a steering apparatus, or handwheel 4 for swinging the wheel which is journaled in the fork 3. A suitable watertight packing, or stuffing box, is provided in the bottom, through which the rod 2 passes. Near the stern, the body 1 is provided with wheels 6 secured to the opposite ends of shaft 7, which wheels may be provided with the usual spokes, and, if so desired, with removable blades 8 fastened to the spokes for driving the vessel through the water. The said shaft 7 passes through suitable watertight stuffing boxes located in each side of the body 1. It will be seen that when the vessel travels on land, the body 1 will be inclined upward toward the bow, the reason for which is more fully explained hereafter. A sprocket wheel 9 is secured to the shaft and is connected by means of a sprocket chain 10, with another sprocket wheel 11 loosely mounted on the driving shaft 12 of the motor 13. A clutch 14 is suitably mounted on said shaft 12 to rotate therewith; and is adapted for clutching engagement with the sprocket wheel 11. This clutch may be of any suitable and well-known construction, and is operated by means of a lever 15 pivoted to a stationary part of the vessel. Uprights, or standards, 16 are secured to the body 1 and support at their upper ends a frame in form of a parallelogram, comprising sidebars 17 and crossbars 18. This frame may be constructed in any length according to the size of the machine and the weight same is expected to carry; it stands about 5% of its length higher in front than in the rear and the standards 16 are, therefore, longer at the front end than at the rear end of the machine. To the said cross-bars 18 are secured sailyards 18[A], which extend outwardly beyond the sidebars 17 and have their ends curved downwardly as shown in Fig. 2. The sailyards 18[A] are removable and are secured to the bars 18, the ends of which extend a little over sidebars 17 and are provided with screwworms, by means of a coupling 18[B] of any suitable kind.

Movable frames 19 and 19[A] are hinged to the crossbars 18 and carry aeroplanes, or sails, 20 and 20[A]; the frame and aeroplane 19 and 20 at the front of the vessel being triangular in shape, while the frame 19[A], with its aeroplane 20[A] at the stern, is semicircular in shape.

Standards 21 project upwardly from the sidebars 17 and converge toward the top to a central point and are provided at their upper ends with pulleys 22 and eyelets to fasten on the latter, the several bracing ropes or wires of the sailyards carrying the aeroplanes 31 and their own bracing toward each other and to the crossbars 18. A cable 23 passes over said pulleys 22 from the point of the aeroplane frame 19 to the center of the outside edge of the frame 19[A], thus connecting said frames together, Fig. 1. Similar cables 24 and 24[A] have their one end secured to the lower side of said frames 19 and 19[A] and have the other ends fastened to pulleys 25 and 25[A]. Operating cables 26 and 26[A] are fastened at one end to the standard 16 and pass through the said pulleys 25 and 25[A], over the pulleys 30, secured to the opposite standards 16, to drums 27 and 27[A] of winches, Figs. 1, 3, which are geared together to rotate in opposite direction by means of cog-wheels 28 and 28[A]. One of the said winches is provided with an operating handle, or handwheel 29 for rotating said drums and thus winding one cable on the one drum, while, at the same time, unwinding the other cable from the other drum to raise one aeroplane 20 or 20[A], Figs. 1, 5, and lower the other one, as will be more clearly described hereinafter.

Aeroplanes, or sails 31 have their one edge secured to one of the sidebars 17, and are movably secured to the sailyards 18[A] by means of loops, or rings 32. The free edges of said aeroplanes 31 are secured to yards 33, having eyelets 34 at their ends through which the sailyards 18[A] extend, so that said yards 33 may be moved back and forth on said sailyards 18[A], and with them, at the same time, the aeroplanes 31 attached to them. The said yards 33, when the sails 31 are in their operating position, also serve to maintain the sailyards 18[A] in steady relation to each other and act as braces to prevent sailyards 18[A] from being bent toward each other as the air bulges the sail upwardly. Pulleys and tackles may be provided for folding and unfolding said aeroplanes 31 from the body 1 by sliding the said yards 33 on said sailyards 18[A] in one direction or the other.

36 is a balloon, or gas bag, which is lo-

cated between the bars 17 and 18. The balloon is preferably cylindrical in shape, though not quite regular, the reason for which will be shown hereafter, with beveled ends, and is divided into air tight sections 37 to prevent or minimize, the danger of total collapse. This partitioning of the balloon into sections also prevents the gas from gathering in the ends thereof, particularly when the airship ascends or descends.

The balloon contains in its interior a light aluminum or wooden frame, portions of which project through the bag and are secured to the bars 17 and 18. Contrary to the declining state of the bars 17, the balloon has a horizontal position, Fig. 1; the two beveled ends are, therefore, not shaped alike; while the upper part in the front is smaller and shorter and the lower part larger and extending farther toward the body of the balloon, the rear end has the opposite construction, as seen best in Fig. 1, and this is the reason of the variation from a regular cylindrical form of the balloon, as the same has its greatest width on its both beveled ends at the bars 18, Fig. 2, and throughout its whole length alongside and between the declining side bars 17 for the purpose of filling out, as nearly as possible, without injuring the bag by rubbing on said bars 17, the whole space between the bars 17 and 18. The said balloon is not absolutely necessary and may be dispensed with, if desired, and is, therefore, only of relatively small capacity. The said balloon, by reducing the total weight of the machine in a certain sense, allows the use of a more powerful and consequently heavier motor; will aid in raising the vessel and further insures a better balancing thereof when in the air, and in view of the fact that the center of gravity is below it, the gas bag will prevent capsizing should the operator make the slightest mistake in handling the machinery, as is likely to occur to the most experienced aeroists.

38 is a shaft extending crosswise of the vessel and is journaled in bearings 39 secured to the rear side of cross-bar 40 fastened on the outside (front) of the two foremost standards 16 by means of clamps 41 at a point about halfway between the boat 1 and the crossbar 17. The said shaft 38 carries at its both ends bevel pinions 42, Fig. 3, each of which meshes with a similar bevel pinion 43 secured to short horizontal shafts 44 extending in the same plane as the shaft 38 but at right angles thereto toward the bow of the vessel. These short shafts 44 are mounted in suitable stationary bearings 45 attached to both ends of crossbar 40 and carry on their forward ends two or better three winged propellers 47, as shown in Figs. 2, 3 and 5.

This herebefore described construction may be greatly improved and thereby the motive power and flying condition of the ship, by applying propellers with changeable action. In this case, the bearings 39, in which shaft 38 is journaled, are secured to the front side of bar 40; the shaft 38 carries on its both ends bevel pinions 42, as seen in Fig. 6, each of which meshes with similar bevel pinions 43 secured to short horizontal propeller shafts 44 mounted in stationary bearings 45 attached to both ends of crossbar 46. This said beam 46 is supplied with bearings 48, which swivel on extensions 49 of bearings 39 of shaft 38; these extensions 49, therefore, serve as pivots or hinges for said beam 46 and same may be turned together with the propellers 47, journaled in the bearings 45 attached thereto, in an upward or downward direction without interfering with the meshing of short shafts 44, bevel pinions 43 and bevel pinions on shaft 38, and without causing any unnecessary friction to shaft 38. For this purpose, that is, to change the position of this beam 46 and thereby the action of the propellers 47 connected therewith from a horizontal to a partly vertical direction, and to hold said beam in the desired position, same is connected by a link 50 with a rod 51 turned downward to the boat, and said rod 51 is further connected by a combination of lever guides 52, with a hand lever 53 pivoted to stationary part 54 of the vessel, Fig. 6. If desired, this arrangement may be doubled to acquire a stronger and steadier support of beam 46 in any of its various positions; in this case, there will be two links 50 attached to same, two rods 51 and two combinations of guides 52 connected therewith, but both may be governed by the one hand-lever 53 at the same time. In both cases of construction, a sprocket wheel 55 is secured to shaft 38 and is connected by means of a sprocket chain 56 with a similar sprocket wheel 57 located on the motor shaft 12. This wheel 57 is loosely mounted on shaft 12, suitable clutch mechanism 58 with lever being provided for throwing it into and out of driving engagement. To assist the work done by this pair of main propellers 47, I place an additional pair 59 backward of them at a distance of half the length of side bars 17 of the balloon. These and the machinery connected therewith are constructed about in the same manner and shape as those in front described herebefore.

A crossbar 60 is secured crosswise of the vessel, directly under the balloon to the front side of the middle standards 16 by clamps; at both ends of this bar 60 are mounted in stationary bearings short horizontal shafts 61 at right angles thereto, carrying at the front ends toward the bow of the vessel propellers 59 as shown in Figs. 1,

2, 3, and 5 and at the rear ends bevel pinions 62. These bevel pinions 62 mesh with similar bevel pinions 63 mounted on both ends of a shaft 64 extending crosswise of the vessel and journaled in bearings 65 secured to the rear side of crossbar 60. The said shaft 64 carries a sprocket wheel 66, which is connected by means of a sprocket chain 67, with a sprocket wheel 68 loosely mounted on the motor shaft 12, suitable clutch mechanism 69 with lever being provided for throwing said wheel into and out of driving engagement with the motor 13. Should it be preferred to have this bar and the propellers 59 attached thereto supplied with the movable or hinged beam 46, then the arrangement and description will be exactly the same as described herebefore in regard to propellers 47. Both pairs of propellers 47 and 49 are left and right handed respectively, which work in opposite direction, preferably toward inside to produce the best results and prevent the ship from turning around its own vertical axis.

A rudder 70 is pivotally mounted on a support 71 at the rear of the vessel to swing in a horizontal plane, and is connected by means of cables 72 with a drum 73 in such a manner that when the drum 73 is rotated in one direction, one cable will be unwound while the other is wound on said drum 73. The cables 72 pass over pulleys 72^A, secured to outwardly extending lugs 72^B arranged at convenient points on stationary portions of the vessel. The said lugs 72^B extend out far enough from the sides of the boat to avoid any possibility of the rudder 70 reaching a dead point as it is manipulated. The drum 73 is secured to a rod 74 mounted to rotate and is provided with an operating handwheel 75. A ratchet 76 is also secured to the rod 74 adjacent to the bottom of the boat and coöperates with a pawl 77 to prevent accidental movements of the drum 73 in either direction. The pawl 77 is pivoted to the bottom of the vessel and is provided with an extension 77^A, adapted to be engaged by the foot of the operator for releasing the pawl 77 from engagement with the ratchet 76. Thus, as the handwheel 75 is turned in one direction or the other, the rudder will be correspondingly swung to one side or the other to steer the vessel in the air or in the water.

Ropes, or wires, also other supports, such as sticks, rods, beams, etc., may be provided for steadying the frame work of the machine. As before stated, when the machine is at rest on the ground the bow is standing considerably higher than the stern; the object of this arrangement is to expose the aeroplane from the very beginning as much as possible to the action of the wind or air; for this reason, should an ascension be intended, it will be attempted, whenever possible, against the direction of the wind. In case the machine should accidentally land in the water, or for any other reason it is desired to travel in water, the rear wheels 6 will be connected by lever 15 with the motor shaft, and will, through the medium of the blades attached to these wheels and acting as paddles, drive the ship through the water. The remainder of the machinery might be disconnected from the motor shaft, or might be used, just as may be found practicable.

When traveling on land, the front wheel 5 serves as a rudder, or steering wheel; when traveling in water, either the said wheel 5 or the rudder 70 may be used to guide the vessel. For traveling purposes, on land or water, the sailyards 18^A and their connected parts may be disconnected from the crossbars 18 and stored in the gondola or boat 1 while under way. The remounting of the machine after arrival at the place of ascension may be done easily and without much loss of time.

It is to be understood that each pair of propellers may be worked from one shaft as described, or each of the propellers may be revolved by its own separate shaft connected by separate sprocket and clutch mechanism for such case, with the two motor driving shafts 12 and 12^A as shown in Fig. 7. In this case, the separate shafts 38^A and 38^B are mounted in stationary bearings 39^A and 39^B, secured to a crossbar 40, which is supported on the front standards 16, each shaft being connected by separate sprocket wheels 55^A and 55^B by means of sprocket chains 56^A and 56^B, with sprocket wheels 57^A and 57^B attached to motor shafts. Separate clutches and levers 58^A and 58^B are provided for throwing either or both chains and sprocket mechanisms into or out of driving connection with the motors. Each shaft 38^A and 38^B carries a bevel pinion 42^A and 42^B respectively in engagement with similar pinions 43^A and 43^B mounted on short shafts 44^A and 44^B, to which the propellers 47^A and 47^B are secured. The bearings in which the short shafts 44^A and 44^B are journaled are carried by the crossbar 40 hereinbefore mentioned. Similar separate shafts 64^A and 64^B are journaled in stationary bearings 65^A and 65^B mounted on a crossbar 60, secured to the middle standards 16, similar to the bar 40, and are connected by separate sprocket wheels 66^A and 66^B attached thereto, by means of chains 67^A and 67^B with separate sprocket wheels 68^A and 68^B carried by motor shafts. Clutches and levers 69^A and 69^B are provided for connecting or disconnecting the sprocket mechanisms 69^A and 69^B from the driving motor shafts. Each shaft 64^A and 64^B carries at the end a bevel pinion 63^A and 63^B, respectively, in engagement with similar pinions 62^A and 62^B mounted on short shafts 61^A

and 61^B journaled in stationary bearings carried by crossbar 60. Propellers 59^A and 59^B, respectively, are secured to the bow ends of the short shafts to rotate therewith.

In other respects, this form of my machine may be the same as that shown in Figs. 1, 2, 3, 4, 5 and 6, it being understood that in Fig. 7 the sails 20 and 20^A, their connected parts as well as the two steering mechanisms and the turnable beam 46 in Fig. 6 and the propellers 47 attached thereto, have been omitted for the sake of clearness. In this last form, it is thus possible to actuate each propeller separately or at different speeds, or in different directions. The steering of the ship may thus be greatly assisted by revolving one propeller faster than the other, or, if a heavy side wind should prevail, to revolve only the propeller 59 on the off side of the wind; this will greatly assist in keeping the ship in a stable position, as well in the air, as also in case it has to travel a considerable distance on land or in the water.

The preceding description of my machine is referring to such with full equipment only, that is to one qualified for use on land, in the water, or in the air. Should the machine be intended to be used in the air, combined with use on land only, it may be constructed far lighter and, therefore, be more adapted to show its qualifications to fly in the air. In such case, the frame of the boat will be constructed of light wood work, preferably ash, the sides of same covered with canvas or aluminum sheathing, or may consist of plain wicker work; the whole main frame built out of ash; the balloon, in case such is chosen for safety's sake, of smaller capacity and the second pair of propellers may be dispensed with altogether, thereby increasing considerably the power for the rotation of the remaining pair of propellers in front. The span of wings and sails, respectively, will remain to the discretion of the constructor and will be regulated by the grade of speed the machine is supposed to attain. The machine is suitable for sporting as well as for military and naval purposes.

I claim as my invention:

1. In an aeronautical apparatus, a central longitudinally extending balloon, supporting planes extending laterally therefrom and declining to the rear of said balloon, a triangular elevating surface hinged to the front edges of said supporting surfaces with its point forward, a semi-circular tail surface hinged to the rear edges of said supporting surfaces with its curved side rearward, and propellers at the front and center on opposite sides of said apparatus.

2. In an aeronautical apparatus, a central longitudinally extending balloon, supporting planes extending laterally therefrom and declining to the rear of said balloon, a triangular elevating surface hinged to the front edges of said supporting surfaces with its point forward, a semi-circular tail surface hinged to the rear edges of said supporting surfaces with its curved side rearward, and propellers at the front and center on opposite sides of said apparatus, said supporting surfaces curved longitudinally and hinged along their inner edges, and means for raising and lowering the same.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

MAX GELDNER. [L. S.]

Witnesses:
W. LESLIE CONNER,
F. W. BRANDENBERG.