

P. H. McCONNELL.

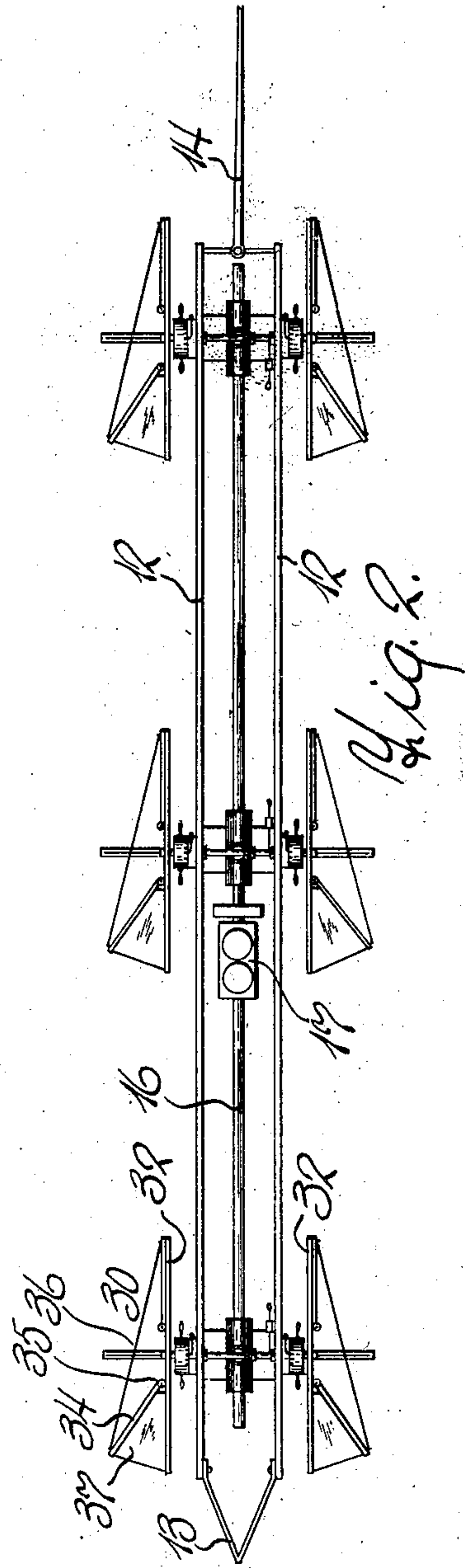
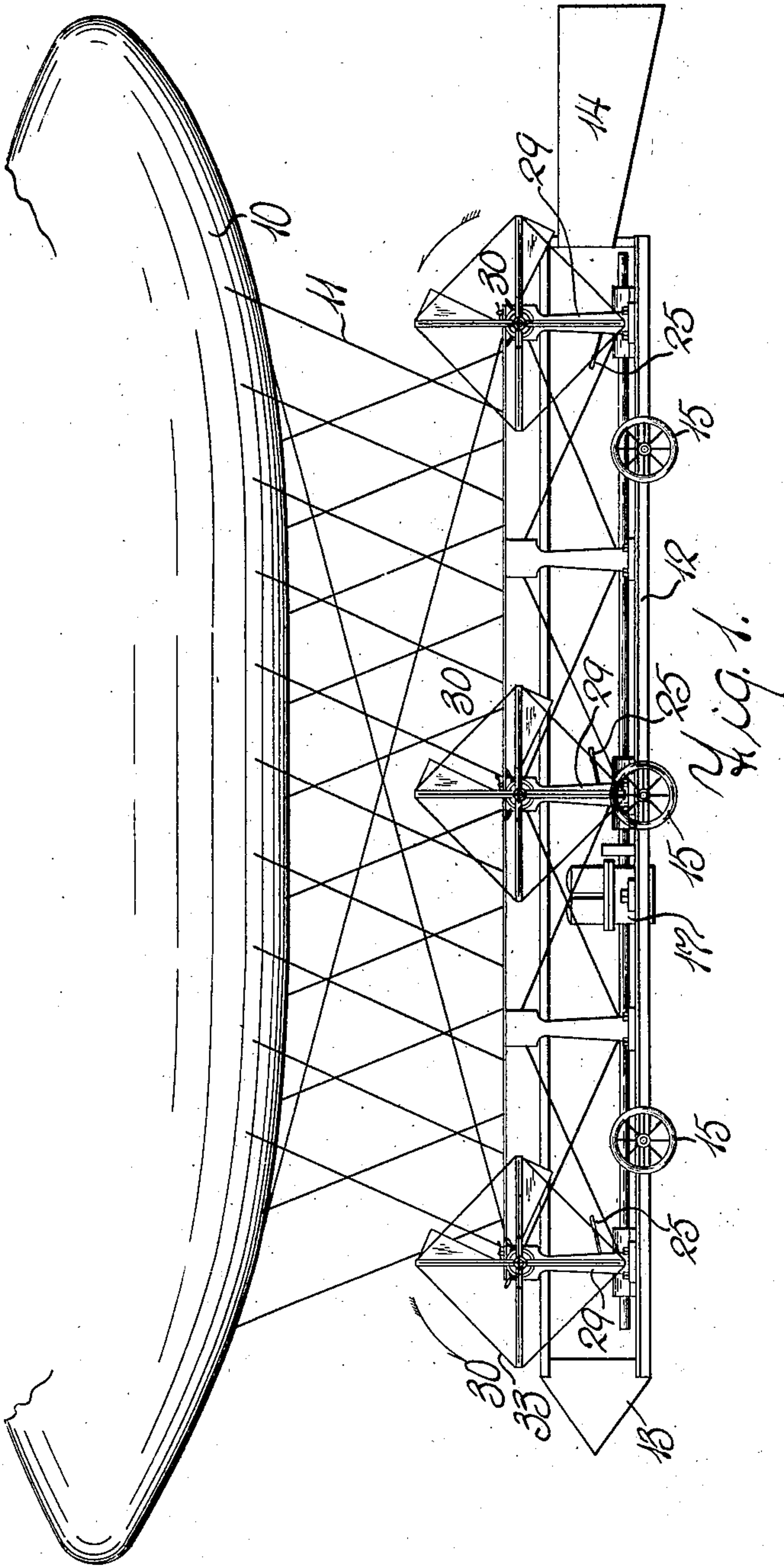
AIRSHIP.

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925,494.

Patented June 22, 1909.

2 SHEETS-SHEET 1.



WITNESSES:

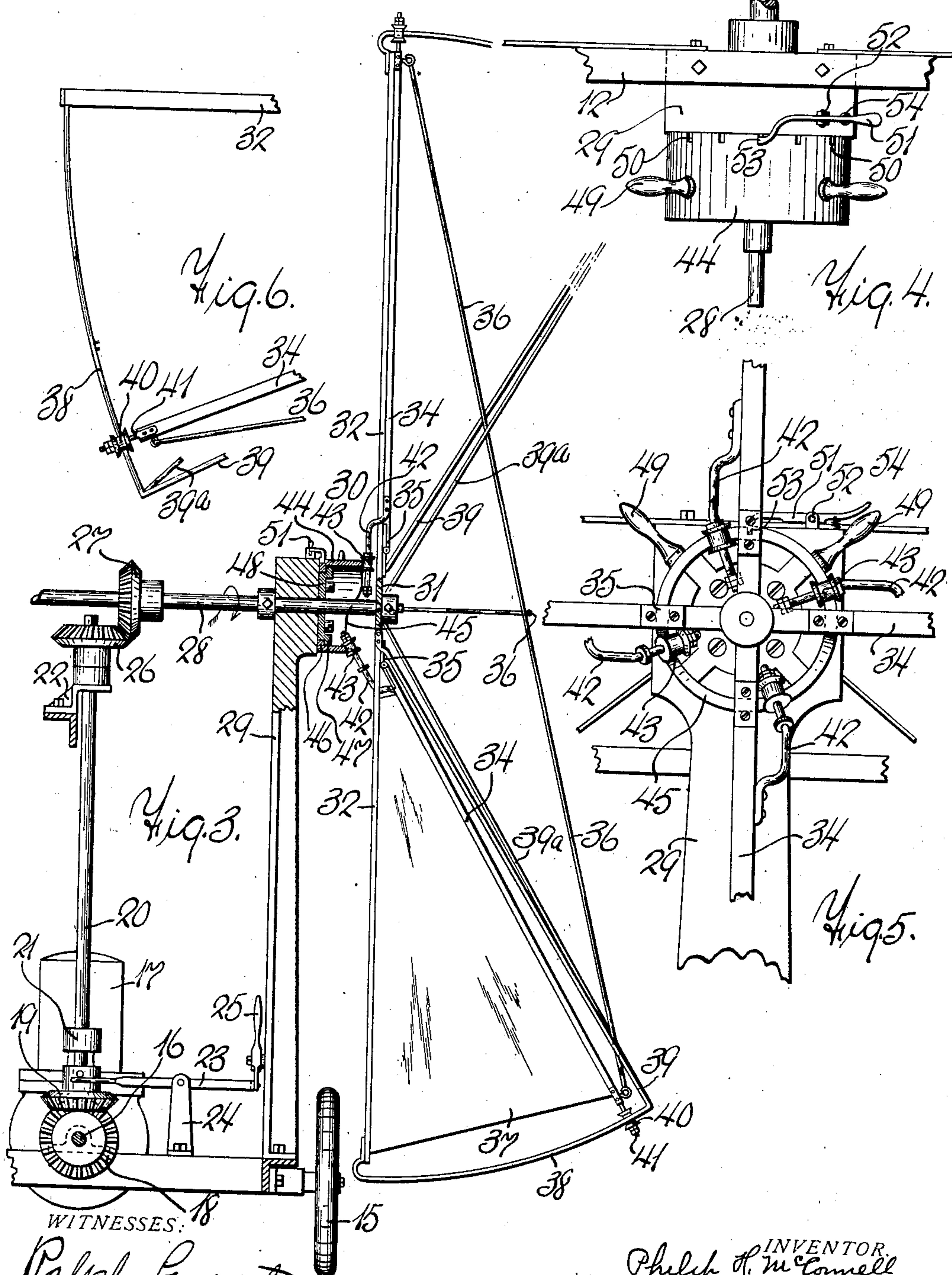
Ralph Faycasty.
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3 SHEETS—SHEET 2.



WITNESSES:

Ralph Lancaster,
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UNITED STATES PATENT OFFICE.

PHILIP H. McCONNELL, OF SYRACUSE, NEW YORK, ASSIGNOR OF ONE-TENTH TO LOUIS BERGEN, OF NEW YORK, N. Y.

AIR-SHIP.

No. 925,494.

Specification of Letters Patent.

Patented June 22, 1909.

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To all whom it may concern:

Be it known that I, PHILIP H. McCONNELL, of the city of Syracuse, county of Onondaga, and State of New York, have invented a new and useful Improvement in Air-Ships, of which the following is a full, clear, and exact description.

My invention relates to improvements in airships and more especially to airships of the self sustaining variety in which gas bags are used to support the vessel.

Usually air ships of this class are raised and lowered by regulating the ballast or the gas supply, but my invention is intended to produce an airship in which the gas supply is practically constant, is sufficient to support the machine, and in which a series of propellers driven by a common shaft, but independently regulated, are used to force the airship ahead or upward or downward, as desired.

The principal feature of my invention lies in the construction and connections of these propellers or fans and the regulating mechanism thereof. Obviously it is necessary in the first instance to have relatively powerful fans which are also light, and to provide for the highest efficiency I have produced fans which have foldable or closable blades arranged to open at the desired point and so get a good grip on the air, and which close after doing their work so as to come back to the starting point in a practically feathered or closed shape. By constructing the fans in this way, they are made to act with the least possible loss of power, and to further provide for the practical control of the ship I have devised a regulator by which the fans can be shifted on their axes so that they will open into working shape at any desired angle to the body of the ship. I have provided means for independently regulating the several fans, and thus I can arrange them so that they will have an upward as well as a forward lift or a downward pull, if desired, thus providing for accurately guiding the ship up or down or horizontally. Thus it will be seen that by having the fans independently regulable I can set one of them, say the bow fan, so as to have an upward lift, and the others to have a horizontal drive, or I can arrange the forward fan so as to get a down pull and have the others drive forward. Thus by

regulating the desired fans I can get any necessary effect. To provide for easy stopping and starting of the machine, I mount it on light wheels so that it can be pushed along the ground, and for steering I provide a common type of rudder.

With these ends in view and with the general object of producing a safe, powerful and easily controlled airship, my invention consists of certain features of construction and combinations of parts which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a side elevation of the airship embodying my invention. Fig. 2 is a plan view of the body of the ship with the gas bag removed. Fig. 3 is an enlarged detail sectional view showing the construction of a fan and its connection with the driving engine or motor. Fig. 4 is a plan view of the fan regulator. Fig. 5 is a face view of said regulator, and Fig. 6 is a detail showing an arrangement of braces for stiffening the fan more especially when it is in its open position.

The airship is provided with a suitable gas bag 10 which forms no part of my present invention, and which can be of any usual kind, preferably of the well known cigar shape, and the body 12 of the airship can be of any approved design, and is supported from the gas bag by lines 11 as usual. The frame 12 is, however, preferably relatively long so as to offer little resistance to the wind, it has a pointed prow 13 for the same reason, and a rudder 14 which can be operated in any usual way. The body of the machine is also preferably provided with light wheels 15 so that it can be easily pushed along the ground or into and out of a suitable housing. The body carries a motor 17 which should be a light gas engine, but which can be a motor of any approved kind, and this drives a main shaft 16 running longitudinally of the body and connecting by bevel gears 18 and 19 with a series of vertical shafts 20 which are mounted in suitable brackets 21 and 22 and which carry the fans as presently described. In order that the driving connection to any fan may be easily broken when desired,

the gear 19 is keyed to the shaft in the usual way with slip gears, so as to be moved longitudinally on the shaft, and it is operated by a shipper 23 provided with a suitable bracket 24 and connected with a lever 25. This lever 25 is within easy reach of the operator so that, as stated, any fan can be thrown out of gear by simply moving the lever.

Each shaft 20 connects by bevel gears 26 and 27 with a horizontal shaft 28 which is mounted in brackets 29 and carries a fan 30. The fan 30 and the regulator for controlling it comprise my invention. Each fan has a suitable hub 31 and radial spokes 32, as shown clearly in the drawings. There can be any desired number of these spokes, but four answer the purpose perfectly. The spokes 32 are stayed by braces 33 connecting the spoke ends as shown in Fig. 1.

Each spoke 32 has near its inner end an arm 34 which is hinged to the spoke as shown at 35, and which when closed lies parallel with the arm as shown at the top of Fig. 3, but which when open swings out at an angle to the arm as shown at the bottom of the same figure. The diametrically opposed arms 34 are connected together by a link or rod 36, which is shorter than the combined length of the opposed spokes 32 so that when one arm 34 is closed the opposite arm is pulled open, and vice versa. Each arm 34 connects with its spoke 32 by a web 37 which is flexible, and can be conveniently, stout canvas, leather, or similar material, but I do not limit the invention to such materials, as any flexible arrangement of web can be substituted for that shown. The outer ends of the arms 34 are also stiffened on the back side, that is the side opposite the thrust of the arm as it swings against the air, by a brace 38 which extends from the end of the arm 32 laterally and then diagonally inward as shown at 39, where it connects with the base of the spoke 32, as shown clearly in Fig. 3. A brace 39^a also extends from the outer part of the brace 39 to the next adjacent spoke as shown in Figs. 3 and 6. The outer end of the arm 34 where it comes opposite the brace 38, has an extension 41 and a roller 40 thereon runs on the brace 38 so that the arm 34 moves easily back and forth with relation to the spoke 32, and is at the same time substantially braced.

To provide for regulating the fan and for opening the blades at the right time, I use a cam regulator which operates on the arms 42, one of which is secured to each of the arms 34 near its inner end, and the arm 42 is bent inward slightly so as to provide for necessary clearance, and has slidably arranged thereon a roller 43 which engages the edge 45 of the cam regulator 44, this being of cylindrical shape, and it is mounted

to turn on the plate 48, the part 44 having to this end an inturned flange 46 which engages an outturned flange 47 on the plate 48. The plate 48 is rigidly secured to the upper part of the bracket 29 or equivalent support.

By reference to Fig. 3 it will be seen that one part of the cam regulator 44 extends outward well beyond the opposite part, and it will be observed that the rollers 43 are arranged to follow the cam edge 45 of the regulator. Consequently when one roller 43 is opposite the wider part of the cam, the arm 42 will be pushed inward closing the arm 44 which swings on the hinge 35, and the opposed roller 43 will be on the narrower part of the cam, while the rod 36 will pull on one of the arms 34 and open the web 37 of the fan blade to action against the air.

For driving ahead, the regulator 44 is adjusted so that the blade of the fan will open just as it swings downward and rearward, and this will, of course, cause the opposite blade to close as it swings upward and forward, and thus the fan has its blades opened only at the time that they are actually doing work. It will be seen further that by adjusting the cam cylinder 44 I can make the blade open at any desired point. Thus by having the blades open as they come to a horizontal position, the tendency will be to lift upward on the machine, while by shifting the cam farther so that the blades begin to act only as they reach a vertical position beneath their axes, the tendency will be to pull the airship downward toward the earth. To provide for this adjustment I have suitable handles 49 on the cam cylinder 44, and the cylinder is held in position by a releasable lock which on being freed permits the cam to be turned to the desired point. A simple means of locking and releasing the cam is shown in Figs. 4 and 5. Here the cam cylinder 44 has a series of notches 50 therein which are engaged by the bent end 53 of a dog 51, the latter being pivoted as shown at 52 on an adjacent support and pressed by the spring 54 so as to normally lock the cylinder 44. By operating the dog 51, that is by pressing on its outer end, the cylinder 44 can be freed and turned to the desired position.

From the foregoing description it will be clearly seen that I have produced a driving means for buoyant airships which is easily regulable, and by which the direction of drive can be perfectly controlled, while the driving fans are adapted to work with great efficiency. It will be obvious that the airship can be equipped with any necessary number of these fans, and that any suitable driving mechanism can be used for giving motion to them. In practice I prefer to arrange the fans in pairs as shown in Fig. 2, with the pairs arranged so that there shall be one of each pair on each side of the body

12, as in this way I get a perfectly balanced machine.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:—

1. In an apparatus of the kind described, the fan comprising radial spokes, laterally arranged braces on the spokes, arms hinged to the spokes and running on the braces, webs connecting the arms and spokes, and a connection between opposite arms whereby the closing of one opens the other.

2. The combination with the fan having spokes with arms hinged thereon, and webs connecting the arms and spokes, of a connection between opposed arms whereby the closing of one opens the other, and cam mechanism to operate the arms by the turning of the fan.

3. In an apparatus of the kind described, the fan comprising radial spokes, arms hinged to the spokes so as to open in relation thereto, webs connecting the spokes and arms, and a connection between opposed arms on opposite sides of the fan's axis, whereby the closing of one arm opens the other.

4. The combination of a fan having hinged arms, an adjustable cam, means for operatively connecting the cam and arms, whereby the arms are successively actuated by the cam, and connections between the opposed arms whereby the arms actuated by the cam control the opposed arms.

5. The combination with a fan having openable blades and a connection between the opposed blades, whereby the closing of one opens the other, of a normally stationary but rotatably adjustable cam, an operative connection between the cam and the blades,

to adjust the blades, and a locking device to fix the position of the cam.

6. In an apparatus of the kind described, a fan, comprising a hub having rigid radial spokes, arms hinged to the spokes near the hub, webs connecting each arm with its adjacent spoke, generally triangular braces arranged on the spokes adjacent to the arms, a sliding connection between the arms and the braces, and an operative connection between the arm on one side of the fan and the arm on the opposite side of the fan's axis, whereby the closing of one arm opens the other.

7. The combination of a fan having hinged arms, an adjustable cam, means for operatively connecting the cam and arms, whereby the arms are successively actuated by the cam, connections between the opposed arms whereby the arms actuated by the cam control the opposed arms, and a locking device to fix the position of the cam.

8. In an air ship, the combination of a fan having radial rigid spokes, arms hinged to the spokes, webs connecting adjacent arms and spokes, a second set of arms rigidly secured to the first mentioned arms, an adjustable cam stationed near the hub of the fan and serving as an abutment for operating the second set of arms successively for closing the arms successively, and means connected to opposed arms whereby the cam actuated arm actuates the opposed arm in an opposite direction, and a locking device for the cam.

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Witnesses:

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