A. A. WYCKOFF.

AERIAL MACHINE.

APPLICATION FILED OCT. 8, 1912.

1,084,777.

Patented Jan. 20, 1914.

3 SHEETS—SHEET 1.

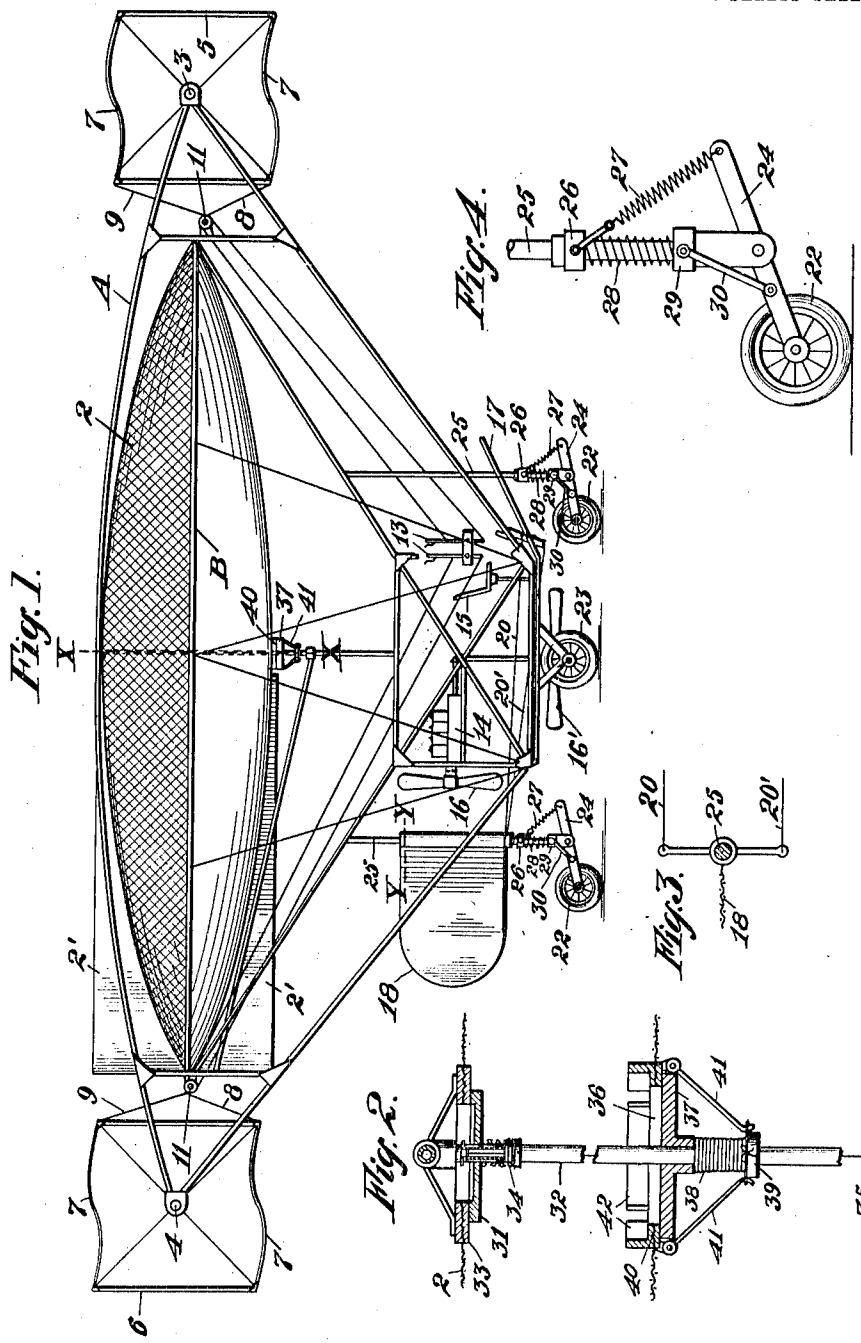


Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 5.

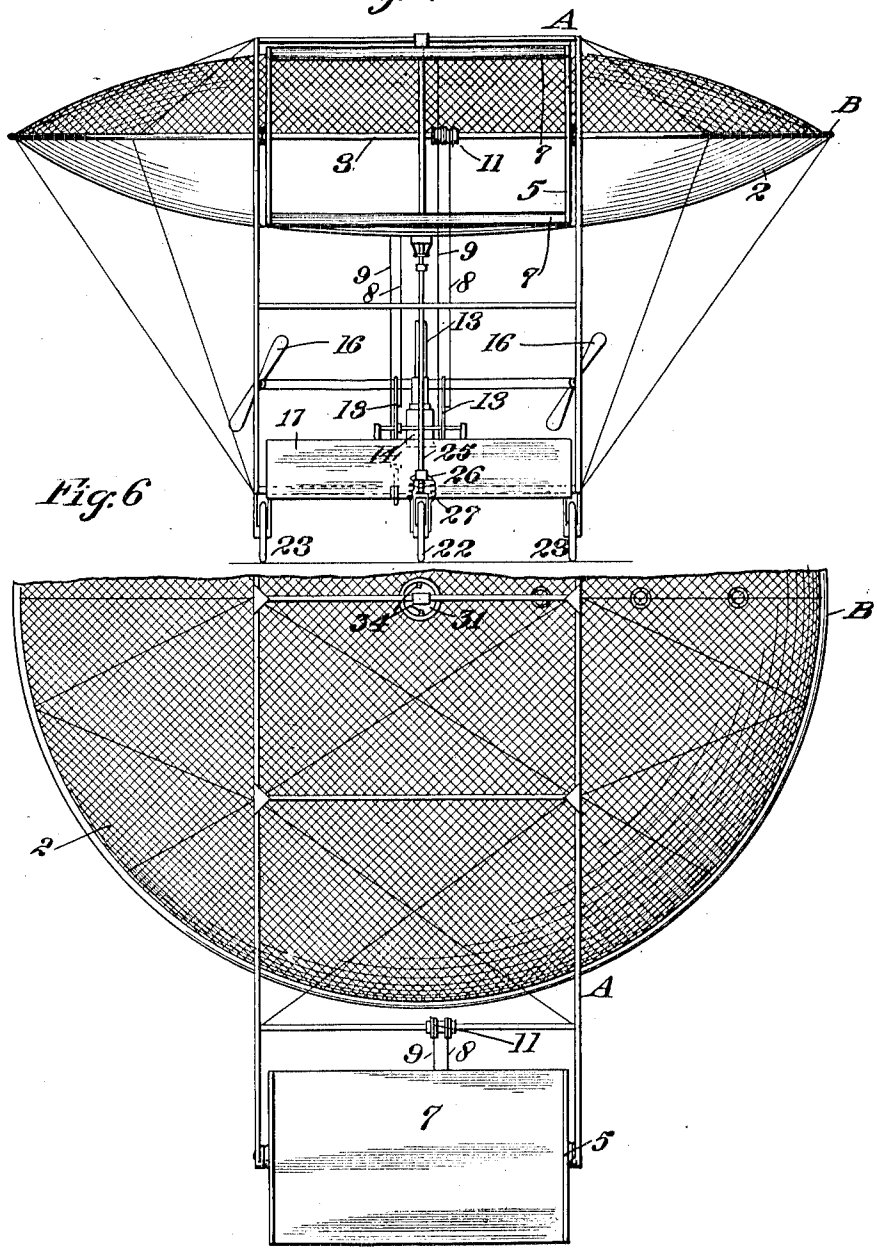


Fig. 6

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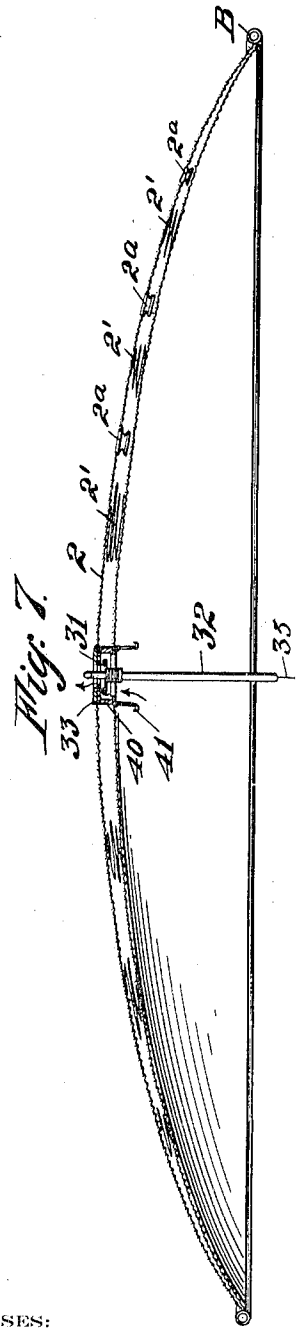


Fig. 7.

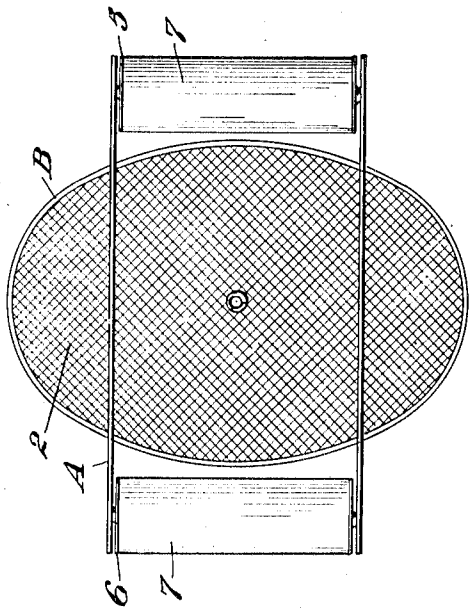


Fig. 8.

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UNITED STATES PATENT OFFICE.

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AERIAL MACHINE.

1,084,777. Specification of Letters Patent. Patented Jan. 20, 1914.

Application filed October 8, 1912. Serial No. 724,621.

To all whom it may concern:

Be it known that I, AMOS A. WYCKOFF, a citizen of the United States, residing in the city and county of Santa Cruz and State of California, have invented new and useful Improvements in Aerial Machines, of which the following is a specification.

This invention relates to an air-ship, and particularly pertains to an air-ship which combines the buoyant features of a balloon, the navigable features of an aeroplane, and which possesses the qualities and characteristics of a parachute.

It is the object of this invention to provide an air-ship in which gas is employed to counterbalance the weight of the ship and for buoyant purposes, and which is combined with planes for raising or descending, and for steering in any direction.

A further object is to provide an air-ship of the character described which is simple in construction and operation, which is adapted to be propelled by motive power and which is so constructed as to insure safe landing in event either the motive power stops or the gas escapes.

The invention consists of the parts and construction and combination of parts as hereinafter more fully described and claimed, having references to the accompanying drawings, in which—

Figure 1 is a side elevation of the invention. Fig. 2 is an enlarged detail section on the line X—X of Fig. 1. Fig. 3 is an enlarged section on the line Y—Y of Fig. 1. Fig. 4 is a detail elevation of the shock absorbing alighting gear. Fig. 5 is a front elevation. Fig. 6 is a partial plan view. Fig. 7 is a detail vertical section of the gas container when deflated and employed as a parachute. Fig. 8 is a detail in plan of a modified form of the gas container.

In the drawings A represents the framework of the air-ship, which may be constructed of bamboo, aluminum, or any other light material. A gas bag or container 2, is formed of a pair of circular fabric portions connected together at their outer edges, capable of being inflated so that it appears as shown in Figs. 1 and 5. This bag 2 is mounted within the framework A, with the peripheral edge of the bag 2 secured at frequent intervals to a horizontally disposed circular frame member B situated centrally of the machine, which circular frame B is secured to the framework A and forms a part thereof. When inflated with gas, this bag will present a comparatively flat appearance and will lie wholly within the framework A. A pair of parallel frame members of the framework A extend some distance to the rear and in front of the gas bag 2 on the upper and lower sides thereof in the direction of the length of the machine, as shown in Fig. 1. At the extreme forward and rear ends of the parallel members of the framework are mounted transversely extending rock-shafts 3 and 4, respectively, each of which are rockable in their bearings and carry vertically disposed rectangular rock-frames 5 and 6 respectively. The rock-frames 5 and 6 are rigidly secured at their centers to the rock-shafts 3 and 4, and mounted on the top and bottom members thereof are superposed rectangular planes 7 which are horizontally disposed. The planes 7 are preferably curved upwardly from their forward edges back to a point near their longitudinal centers, thence curved downwardly and upwardly to their rear edges, thus being substantially ogee in cross section; the tips of the planes being on a plane with the swelled portions thereof. The planes 7 are thus formed to present resisting surfaces to the air to aid in directing the machine up and down; the curved formation of the planes acting to quicken their action. The planes 7 are so arranged on each frame 5 and 6 as to be disposed one above and one below the peripheral edge of the bag 2, as a means for enabling currents of air being directed above and below the gas bag when traveling horizontally or directed either above or below the gas bag when traveling in an inclined direction and when the planes are tilted. These planes 7 are adapted to be operated separately or in unison by rocking the frames 5 and 6 by means of cables 8 and 9 passing over direction pulleys 11, and which are secured to the inner, upper and lower edges of the rock-frames 5 and 6; the cable 8 being attached to the lower edge of the rock-frame and the cable 9 to the upper edge. The cables 8 and 9 after passing over the direction pulleys 11 are connected to any suitable device whereby they may be operated to rock the rock-frames 5 and 6. They are here shown as

connected to levers 13; the cables 8 being attached to the levers on one side of their fulcrum points, while the cables 9 are attached to the levers on the opposite side of their fulcrum points. By this arrangement, when either of the levers 13 are rocked, one cable will be let out while the other will be taken up, thereby rocking the rock-frames 5 and 6 to tilt the planes 7 at various angles, according to whether it is desired to direct the machine up or down.

A motor or engine 14, of any suitable description, is located rearward of the aviator's seat 15, and is designed to rotate vertical propeller blades 16, arranged beneath the gas bag 2 rearward of the center thereof, in either direction so that the vessel may be caused to travel forward or backward; a horizontal lifting or helicopter blade 16′ being disposed beneath the machine to assist in moving it in a vertical direction.

A fabric plane 17 is mounted on the lowermost portion of the framework A beneath the seat 15 and engine 14, and extends transversely across the machine. The forward edge of this plane 17 is inclined upwardly so as to give it a tendency to lift on the air during flight. This plane 17 also serves as a shield or screen beneath the aviator's and passenger's seats, and as such lessens the effects of height on the occupants of the car, as they are prevented from looking directly downward beneath the machine while in flight.

The capacity of the gas bag 2 is intended to be sufficient to lift and buoy the vessel so that the engine 14 and propellers 16 will not have to be depended upon for lifting purposes. At the same time, the lifting power of the engine 14 and propellers 16 is to be great enough that in event the gas should escape from the bag 2, which would cause it to collapse and form a plane or parachute within the framework A and circular frame B, as later described, the machine would still be capable of making a flight. If it should occur that the engine be stopped and the gas released at the same time, a safe landing would still be insured by reason of the parachute action of the deflated bag 2.

In navigating the aerial machine, the operator raises or lowers the machine by tipping the planes 7 by means of the hand-levers 13, as before described; the rear edge of the rock-frame 5 being moved downward and the front edge of the rock-frame 6 tipped upward in order to direct the ship in an upward direction, this action being reversed when it is desired to move in a downward direction. A rudder 18 is vertically disposed on the framework A between the propellers 16, the turning of which from side to side by any suitable means through a pair of cables 20 and 20′, enables the operator to steer the ship from right to left, as desired; the rudder 18 being placed between the propeller 16 so that the currents of air induced by the latter will be directed against the sides of the rudder when it is turned from side to side, thereby quickening the turning or steering action thereof. A vertical stabilizing fin or plane 2′ extends along the longitudinal center of the gas bag 2 on the upper and lower side thereof rearward of its center; the fin 2′ being supported on the framework A so as not to interfere with the deflation and collapsing of the gas bag 2. The framework A is fitted with a suitable shock absorbing alighting gear which is here shown as consisting of a pair of wheels 22 disposed in alinement on the longitudinal center of the machine, at the front and rear thereof, and a pair of wheels 23 disposed between the wheels 22 on the opposite sides thereof. Each of the wheels 22 is mounted on a lever 24 fulcrumed on the lower end of a vertically extending rod 25 mounted on the framework A. The outer end of the lever 24 is connected to a sleeve 26, slidably mounted on the rod 25 by means of a helical spring 27, or other yieldable member, as particularly shown in Fig. 4. The sleeve 26 is normally retained in a limited uppermost position by means of a helical spring 28 wound on the rod 25 beneath the sleeve 26. The helical spring 28 bears between the sleeve 26 and a similar sleeve 29 slidably mounted on the rod 25; the sleeve 29 being connected to the inner portion of the lever 24 by means of links 30. By this construction, when the lever 24 is rocked upward on its inner end, the sleeves 26 and 29 will be moved toward each other, in opposition to the spring 28; the downward movement of the sleeve 26 being governed by the tension of the spring 27. The springs 27 and 28 thus act in conjunction with each other to cushion the rocking movement of the lever 24.

The gas bag 2 is fitted at its highest point with an escape valve of any suitable construction, the opening of which allows the gas to escape from the bag 2. This valve is here shown as consisting of a disk 31 slidably mounted on a vertically disposed standard 32, which standard is supported on the framework A and projects upward through the gas bag 2. The disk 31 is adapted to seat on a rim 33 attached to the gas bag 2, and is normally held in its closed position by a helical spring member 34 on the standard 32 and by the pressure of the gas on the inside of the bag 2. It is designed to be actuated to release the gas in the bag 2 by means of a cord 35 which connects with a pin on the disk 31, extending through vertical slots formed in the standard 32; the cord 35 passing through the interior of the standard.

When the gas bag is deflated while the machine is in flight, the lower portion of the bag collapses against the upper portion. The upper and lower sections of the bag 2, by reason of being formed in the shape of opposed segments of spheres connected together at their edges, will assume the shape of a parachute, as shown in Fig. 7, when the lower section reverses on exhausting the gas from the bag. As a means for preventing oscillation of the machine when the parachute is thus formed, it is necessary to provide an opening at the highest point of the bag 2 to allow air to pass from the underside of the parachute to the upper side thereof at its center. As a means for accomplishing this, an opening 36 is formed in the lower section of the gas bag 2 around the standard 32, which opening is closed by means of a valve 37, when the gas bag 2 is inflated.

The valve 37 is in the form of a disk or plate, slidably mounted on the standard 32 and supported upon a helical spring 38 bearing against a collar 39 on the standard 32. When the gas bag 2 is inflated, the valve 37 contacts the rim 40 of the opening 36, as shown in Fig. 2, which rim 40 is held in tight contact with the plate 37 by means of the spring 38 and hook members 41, which are mounted on the rim 40 and are temporarily tied to the collar 39 in such manner as to be easily released.

Upwardly extending projections 42 are formed on the rim 40, which are designed to contact the rim 33 of the valve on the upper portion of the gas bag 2 in such manner as to separate the rims 33 and 40, where the upper and lower portions of the gas bag are collapsed together to form a parachute, so that when the valve 31 is open, air may pass from the underside of the lower portion of the gas bag through the opening 36 and the valve 31, as indicated in Fig. 7.

It is manifest that while I have shown and described the gas bag 2 as formed of two concavo-convex sections, that it may be formed of any other shapes and in any suitable manner, which when the bag is deflated will form an umbrella shaped structure or parachute and when inflated will be comparatively flat and elliptical in cross section, and which, whether inflated or deflated will act as a plane for supporting the machine in the air. For instance, the upper and lower portions of the bag may be formed of substantially flat flexible material of any suitable outline which, when deflated, will form a plane, and when the machine is moving downward will assume the shape of a parachute; or it may be formed with the upper and lower portions in the shape of segments of spheres either formed integral or connected together at their edges. In the latter instance the upper portion may be made rigid if desired; the essential feature being that the lower portion be flexible so that it can attain either a concave or convex shape in relation to the upper portion, according to whether the bag is being employed as a balloon and gas container or as a parachute and plane. It is also manifest that while I have described the gas bag as circular in plan, that it does not necessarily have to be in this exact form, particularly where the end planes 7 are employed, as it may be nearly circular or elliptical, as shown in Fig. 8, or in any other suitable outline.

As a means for insuring stability, a series of flexible partitions 2′ may be formed between the upper and lower portions of the bag 2 if desired, thus dividing the space within the bag into a series of compartments, each of which is provided with a suitable escape valve 2^a, by the opening of which the gas therein may be released.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is—

1. In an aerial machine, a gas container formed with upper and lower portions joined together at their edges and adapted to form a balloon when inflated and a plane and parachute when deflated, a frame to which the upper and lower portions of the container are attached, and means for forming a passage through the upper and lower portions at their vertical centers, comprising a normally closed valve disposed centrally of the upper portion of the gas container, a valve in the lower portion of the gas container opposite the first-mentioned valve, and means for retaining the lower valve in a closed position when the gas container is inflated.

2. In an aerial machine, a gas container formed of a pair of horizontally disposed portions secured together at their peripheral edges to form a bag substantially circular in plan and elliptical in cross section when inflated, and concavo-convex when deflated, and used as a plane and parachute, a circular frame to which the bag is attached at its periphery, and means for forming an air passage through the bag at its vertical center when deflated, comprising alined valves disposed centrally of the upper and lower portions of the gas container and adapted to register when the gas container is collapsed, the upper valve normally closed and the lower valve normally open, means for retaining the lower valve in the closed position when the gas container is inflated, and means for opening said valves.

3. In an aerial machine, a gas container formed of a pair of horizontally disposed portions secured together at their peripheral edges to form a bag substantially elliptical in cross section when inflated and concavo-convex when deflated and used as a plane and parachute, a circular frame to

which the bag is attached at its periphery, valved means for discharging the gas from the bag centrally of its upper portion, and means on the lower portion of the bag communicating with said valve when the bag is deflated to form a continuous opening from one side of the bag to the other, comprising a normally open valve on the lower portion of the gas container, and means for closing said valve when the gas container is inflated.

4. In an aerial machine, a gas bag formed with an upper and a lower portion coöperating when deflated to form a plane and parachute, and operating when inflated as a balloon, means for holding the upper and lower portions of the bag in an extended position, comprising a vertical standard extending through the lower portion of the gas bag and connected to the upper portion thereof, and means for engaging the lower portion of the gas bag to said standard, means for forming an open passage through the upper and lower portions at their centers, consisting of a normally closed valve in the upper portion of the gas bag surrounding the standard and adapted to be closed when the gas bag is inflated.

5. In an aerial machine, a gas bag formed with an upper and a lower portion coöperating when deflated to form a plane and parachute, and operating when inflated as a balloon, means for holding the upper and lower portions of the bag in an extended position, comprising a standard attached at its upper end to the upper portion of the gas bag and extending through the lower portion thereof, and means for forming an open passage through the upper and lower portions at their centers, said means including a gas discharge valve in the upper portion and a valve in the lower portion arranged to register with the discharge valve when the bag is deflated.

6. The combination in an aerial machine of a main frame convergent toward the ends and having horizontal shafts at said ends, a flattened buoyant gas holder fixed thereon, supplemental frames turnable upon said shafts, horizontal planes on the supplemental frames located above and below the ends of the main frame, cords connecting the inner top and bottom members of the supplemental frames, guide pulleys on the main frame for said cords, a car beneath the main frame, means carried by said car whereby the cords are moved to tilt the supplemental frames in unison, a vertical turnable rudder carried upon the main frame, a horizontal plane located beneath the car, and means for forming an air passage through the center of the gas holder to form a parachute, consisting of valves in the upper and lower sections of the gas holder.

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

AMOS A. WYCKOFF.

Witnesses:
ADA L. PALMER,
JAMES O. WANZER.