C. A. KUENZEL.

AIRSHIP.

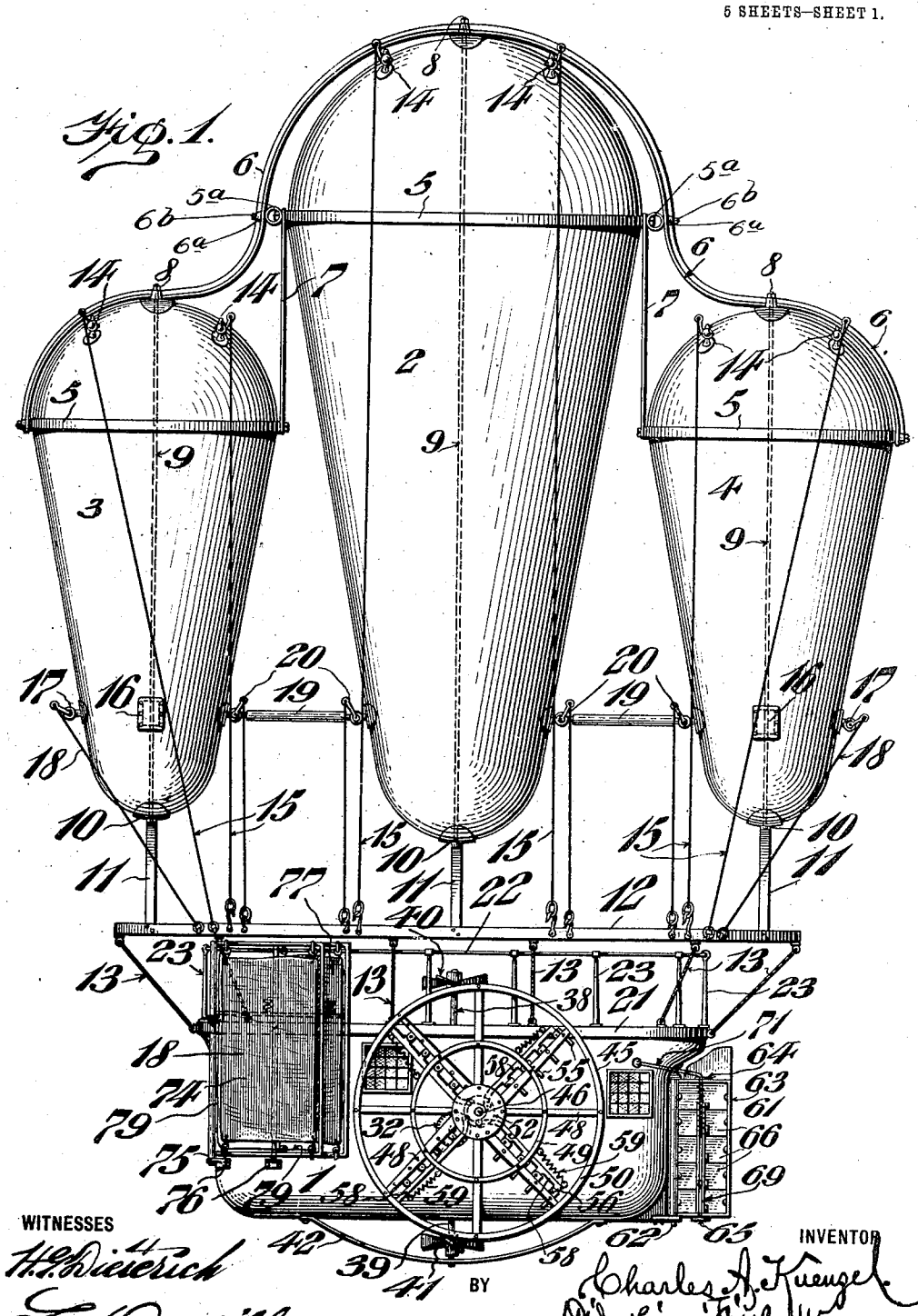
APPLICATION FILED APR. 21, 1910.

1,004,662.

Patented Oct. 3, 1911.

5 SHEETS—SHEET 1.

Fig. 1.



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5 SHEETS—SHEET 2.

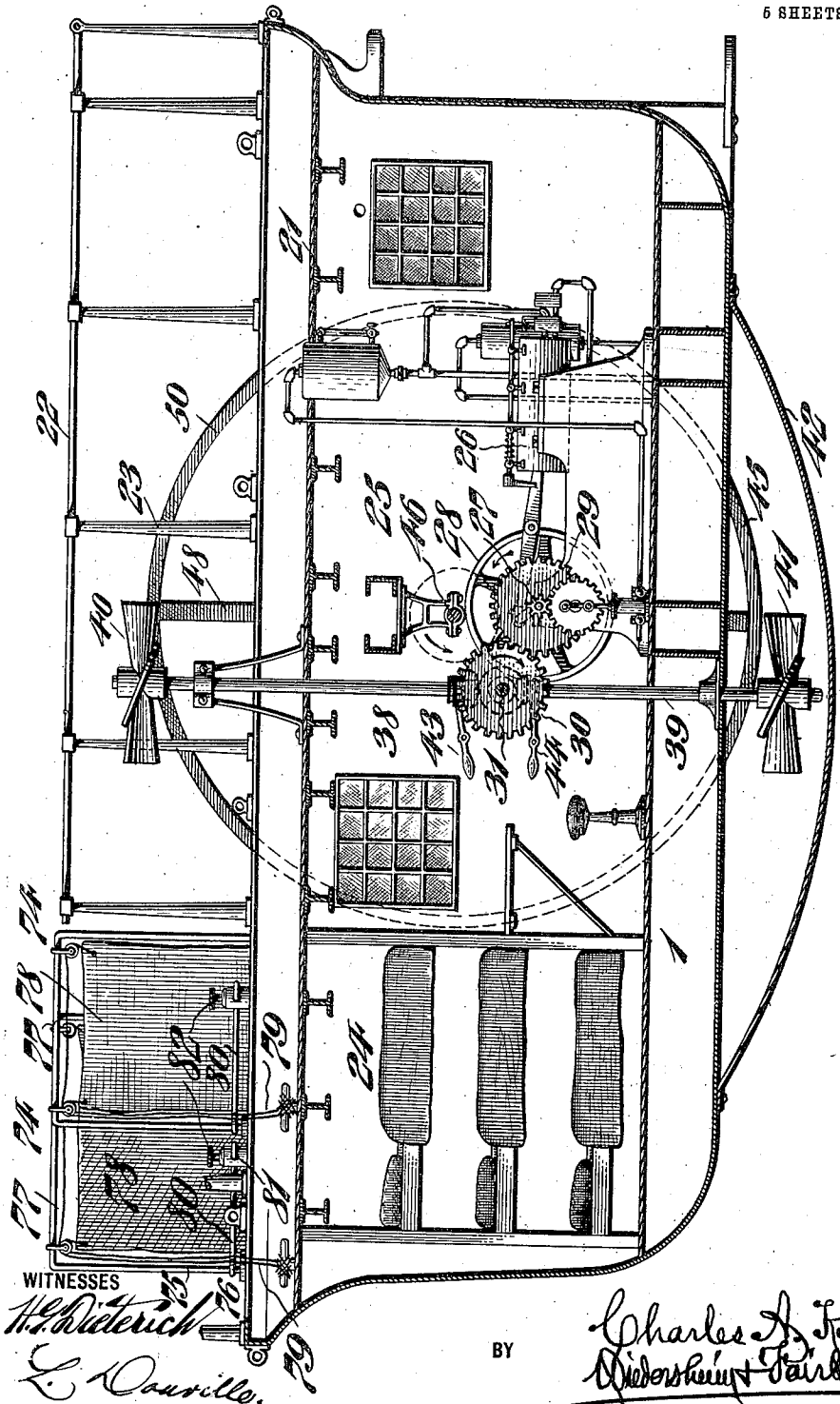

Fig. 2.

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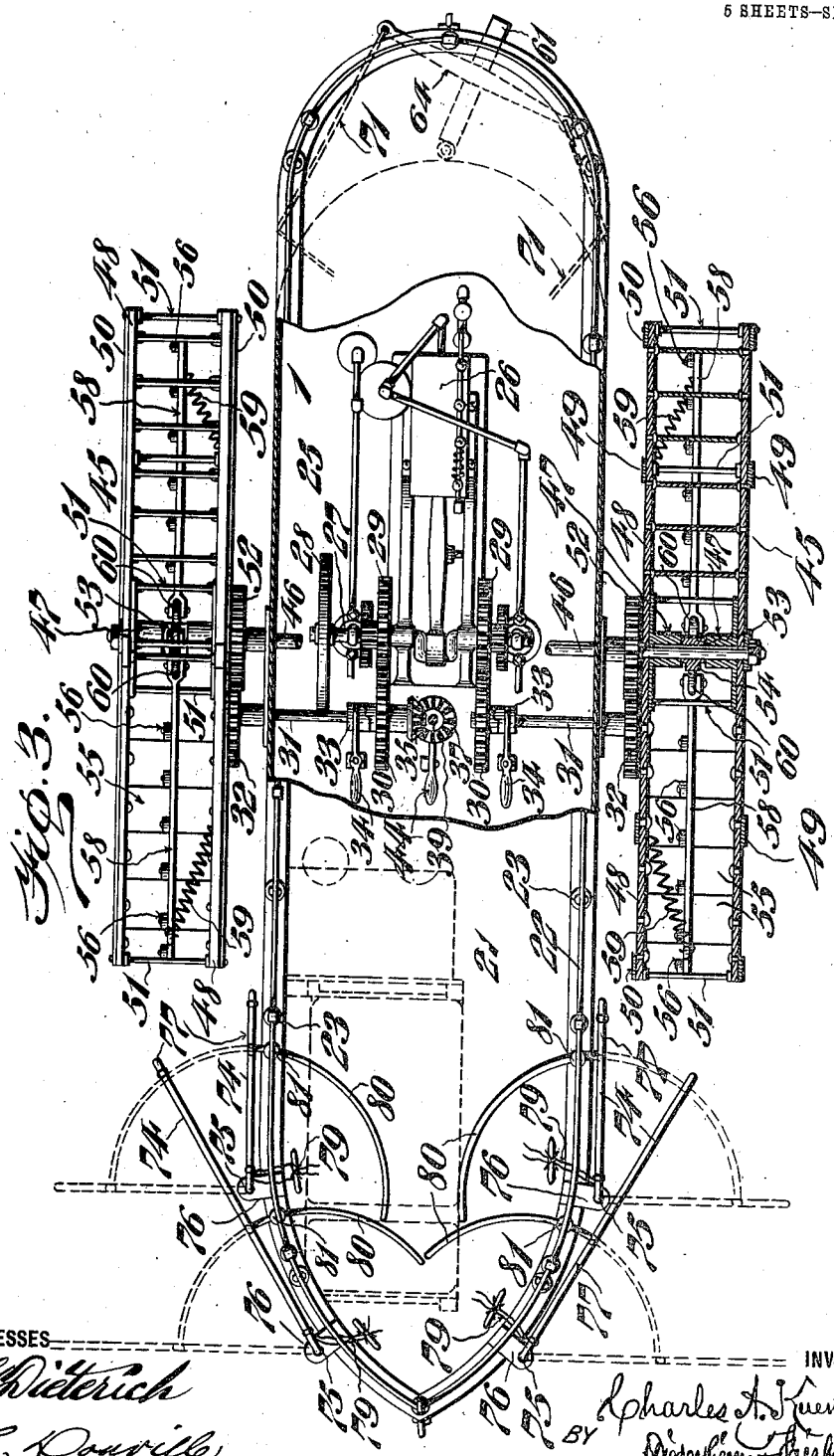
5 SHEETS—SHEET 3.

Fig. 3.



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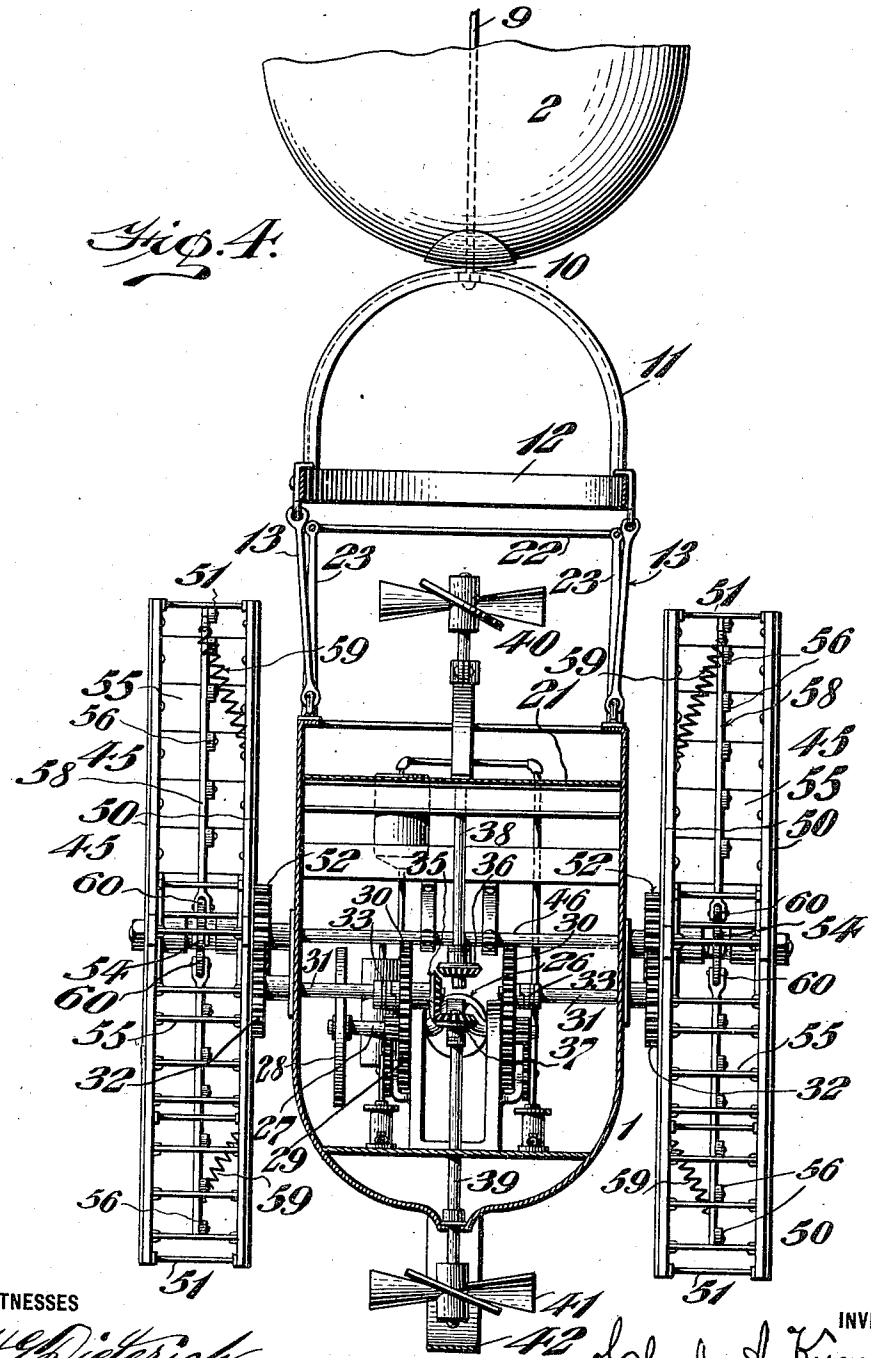
5 SHEETS—SHEET 4.

Fig. 4.



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5 SHEETS—SHEET 5.

Fig. 5.

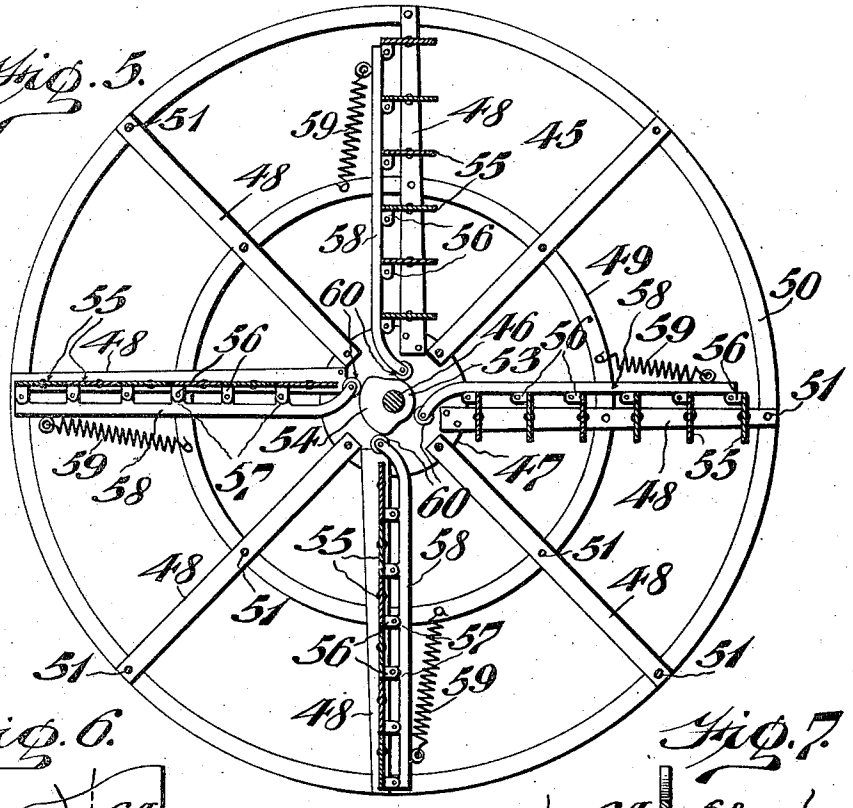


Fig. 6.

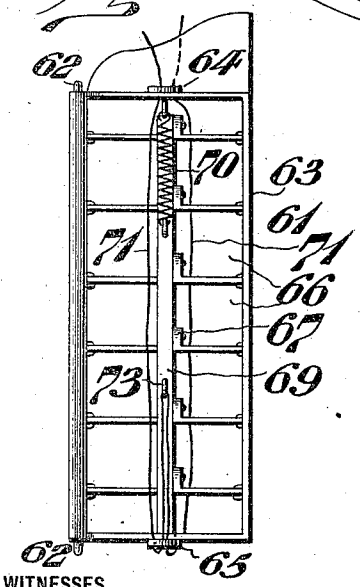
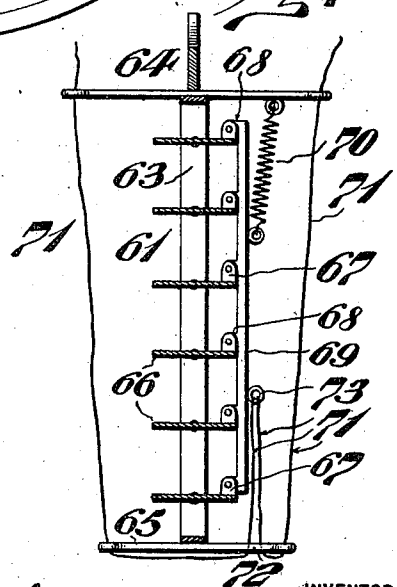


Fig. 7.



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UNITED STATES PATENT OFFICE.

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AIRSHIP.

1,004,662. Specification of Letters Patent. Patented Oct. 3, 1911.

Application filed April 21, 1910. Serial No. 556,798.

To all whom it may concern:

Be it known that I, CHARLES A. KUENZEL, a citizen of the United States, residing at Buena Vista, in the county of Chaffee, State of Colorado, have invented a new and useful Airship, of which the following is a specification.

My invention consists of a dirigible balloon or air-ship constructed to be capable of movement in the air and on water.

It further consists in improved construction and arrangement of the supporting balloons.

It also consists of improved means for controlling the elevation or depression of the air-ship.

It further consists of improved means for propelling the ship.

It also consists of improved means for steering and directing the ship while in motion.

It furthermore consists of additional means for controlling the direction of travel of the ship.

It also consists of improved details of construction and arrangement of the several instrumentalities for propelling and controlling the ship.

For the purpose of explaining the invention, the accompanying drawings illustrate a satisfactory reduction of the same to practice, but the important instrumentalities thereof may be varied, and so it is to be understood that the invention is not limited to the specific arrangement and organization shown and described.

Figure 1 represents a side elevation of my improved air-ship. Fig. 2 represents a longitudinal vertical section of the hull or body of the air-ship. Fig. 3 represents a longitudinal horizontal section of the hull. Fig. 4 represents a top plan view of the deck of the hull with parts of the deck broken away and removed. Fig. 5 represents a vertical section of one of the propelling wheels. Fig. 6 represents a side view of the stern rudder. Fig. 7 represents a transverse vertical section of the same.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: 1 designates a boat-shaped hull or body which is supported by three preferably pear-shaped balloons or properly gas bags, one large main balloon 2, and two auxiliary balloons 3 and 4, of suitable material and arranged tandem with the main balloon in the middle and one auxiliary balloon in front and the other to the rear of the main balloon. Metallic bands 5 encircle the balloons at the points of their greatest diameter, and the bands of the auxiliary balloons are secured at their outer sides to the ends of a curved yoke 6, generally conforming to the outlines of the tops of the balloons, and the central arch of the yoke has its ends secured to the opposite points of the band of the main balloon.

Upon reference to Fig. 1 it will be noted that the band 5 has attached thereto in any suitable manner at diametrically opposed points rings or eyes 5^a to which the central arch of the yoke 6 is attached by suitable means, as bolts 6^a, provided upon their outer ends with nuts 6^b. By this means the large and auxiliary balloons are retained in tandem yet provision is made for any necessary movement of the parts relatively to each other to prevent twisting or bending or distortion to such extent as to injure the balloons or their connections. It is to be noted that this connection between the central arch of the yoke and the band 5 of the central balloon 2 is in addition to and independent of the straps 7 now to be described, said connection being somewhat flexible and yielding so as to avoid dead strain on the band of the central bag should the side bags tend to turn or twist the yokes 6 as they are subjected to currents of air independent of the central bag.

Straps 7 are secured at their lower ends to the inner sides of the bands of the auxiliary balloons and at their upper ends to the band of the main balloon and to the yoke forming links, so that the tandem alinement of the balloons is thus maintained by the yoke and the bands. Bolts 8 are secured in the yoke and into the tops of the balloons and have ropes 9 attached to them which pass axially through the three balloons and have their lower ends secured to bolts 10, in the lower ends of the same, suitable reinforcement being provided at the points of attachment of the bolts to form tight joints and to firmly secure the balloons upon the bolts.

The lower bolts are secured to the tops of arched frames 11, the ends of which are secured to an oblong frame 12, from which the hull or body is supported by suitable rods 13, ropes or similar suspension means. Relief valves 14 are provided in the domed tops of the balloons to admit of the gas in

the same being exhaused, and said valves are operated by suitable cords 15, or other means within convenient reach from the hull or body.

Suitably closed handholes or man-holes 16 are provided for each balloon to admit of convenient access to the interior of the balloons. The auxiliary balloons have suitable inlets in their sides controlled by valves 17, actuated through cords 18, within convenient reach of the hull. These inlets or couplings are constructed to have hose or tubes connected to them for charging the auxiliary balloons with gas. At or about at a level with these charging couplings are connected two pipes 19 to opposite sides of the main balloon and to the inner sides of the auxiliary balloons, which pipes have suitably controlled valves 20, one at each end, and the interiors of the main balloon and auxiliary balloons are thus connected, so that gas charged into the latter may flow into the former and the gas pressure in all three balloons will be equalized.

The hull or body of the air-ship is preferably built on the lines of the hull of a vessel, so as to be able to float and be propelled on water, and said hull has a deck 21, surrounded by a rail 22 supported by stanchions 23, from which deck the various controlling and directing means are preferably operated.

Below the deck the hull is preferably partitioned into berth cabin 24, and mess and engine room 25, or into more or less extensive subdivisions according to the capacity of the hull or the requirements for the ship. An engine 26, preferably of the internal combustion type and employing liquid fuel, such as gasolene, is mounted in the engine rooms and connected to drive a crank-shaft 27, transversely journaled upon the bed frame of the engine. The crank-shaft has a fly-wheel 28 and suitable connections to pumps and valve mechanism of the engine, all of which form no specific part of my present invention.

The crank-shaft has two cog-wheels 29 which mesh with cog-wheels 30, loose upon two transverse and alined shafts 31, the outer ends of which project through and are journaled in the sides of the hull and have cog-wheels 32 secured upon their outer ends. Suitable clutches 33 actuated by levers 34 or similar means, slide upon and revolve with these shaft-sections 31, and engage corresponding clutch-portions upon the loose cog-wheels 30, so that said shaft-sections may be individually or jointly revolved from the engine-shaft. One of the loose cog-wheels has a bevel gear-wheel 35, secured to its inner side, and said gear may mesh with bevel gears 36 and 37, respectively, sliding upon and revolving with the inner ends of two axially alined vertical shafts 38 and 39, journaled in suitable bearings and respectively projecting through the deck and the keel of the hull and respectively carrying upon their outer ends propellers or helicopters 40 and 41, one a distance above the deck and the other below the keel.

A curved guard 42 is secured to the keel to protect the lower helicopter from injury in landing the air-ship upon the ground, or when getting in shoal water when the ship is floated in water. The bevel gears of the helicopter shafts are moved into and out of engagement with the driving gear by suitable levers 43 and 44, or other suitable means.

Two propelling or paddle-wheels 45 are journaled upon the ends of a transverse stationary shaft 46, or upon two stationary stub-shafts, and each of said wheels has two hub sections 47, revolving upon the shaft-ends and each having radiating spokes 48, to the middle of which are secured brace-rings 49, and to the ends of which are secured rims 50. The two sections of each wheel are spaced apart and secured together by spacing bolts 51, having their ends secured in the brace-rings and in the rims. A cog-wheel 52 is secured upon the inner side of each wheel and meshes with the cog-wheel 32 upon the driven shaft-section 31, so that the paddle wheels may be revolved from said shaft-sections.

A cam 53 is secured upon the wheel-shaft between the inner ends of the hub-sections and has a bulge 54 extending over about one third of the periphery of the cam and about two thirds of the periphery concentric with the shaft. Blades or vanes 55 are pivoted at the middles of their side-edges between pairs of the spokes of the wheel, in the present case between four pairs of spokes; and said vanes have ears 56, to which ears 57, upon radially movable bars or rods 58 are pivoted, so that the vanes may be tilted to stand at right angles to their pair of supporting spokes when the bar is moved inward and in a plane with said spokes when the bar is moved outward.

Springs 59 are secured to the bars near their outer ends and to one brace-ring of the wheel to draw the bars radially inward, and rollers 60 are journaled in the inner ends of the bars and bear against the periphery of the cam, the bulge of which acts upon the rollers and bars against the inward pull of the springs. The cam is so adjusted upon the stationary shaft that the rollers upon the actuating bars rise upon the cam-bulge when the respective radial sets of vanes are in a substantially horizontal position and pointing forward, so that the vanes are rocked to present their flat faces to the resistance of the element (air or water) in which the ship travels, and presents such

faces in this position until they have passed the lowermost point of their revolution, when the rollers travel off from the bulge and follow the concentric periphery of the cam and thus permit the springs to draw the bars inward to tilt the vanes with their edges presenting in the direction of their revolution, thus offering no resistance to their travel until the rollers again rise on the cam-bulge, as clearly illustrated in Fig. 5 of the drawings. It will thus be seen that the actuation of the vanes of the propelling wheels is essentially the same as that of the buckets of a feathering paddle-wheel.

A rudder 61 is pivoted at the stern-post of the hull in the usual or any preferred manner, upon pintles 62 and said rudder consists of a rectangular frame 63, having a yoke 64 transversely secured to its upper end-piece and a smaller yoke 65 transversely secured to its lower end piece. Vanes 66 are pivoted at the middles of their side-edges in the vertical side-pieces of the rudder-frame, in the same manner as the vanes of the propeller wheels, and these vanes have ears 67, to which ears 68, upon a bar 69, are pivotally connected, so that the vanes may be set vertically or horizontally by moving the bar down or up.

A spring 70 has one end secured to the bar and the other end to the upper yoke, to normally draw the bar upward to tilt the vanes into horizontal position at right angles to the plane of the rudder. The rudder is actuated by means of two tiller cords or ropes 71, suitably disposed of in the hull or upon the deck of the same, and passing down through openings in the ends of the upper yoke, down and through openings in the ends of the lower yoke and again up through an opening 72 in the yoke, whence they pass to an eye 73 or other fastening means, upon the bar, to which their ends are secured.

It will thus be clear that a pull upon either of the tiller ropes will pull the bar down and vertically tilt the vanes, so that the rudder will offer a solid surface to the medium through which the hull travels whenever it is swung to either side to guide the hull, while the vanes will resume their horizontal position and offer no resistance in their edgewise movement through the air or water when the pull upon the tiller rope or ropes is released.

For the purpose of insuring perfect horizontal steerage of the ship and particularly when the latter is propelled through the air, one or more steering sails or planes 74 are vertically pivoted on each side of the hull and preferably at or near the bow. Said planes have pintles 75 which are pivoted in brackets 76 upon the sides of the hull. While the planes may be formed from integral boards or plates, the planes here disclosed are constructed with rectangular frames 77 in which rectangular sails 78 of canvas or other textile material are stretched and secured by suitable cords 79 within control from the hull.

Quadrant rods 80 concentric with the pintles of the steering planes are secured to the same with their outer ends and slide in guides 81, on the deck of the hull, clamping screws 82 or similar locking means being provided for securing the rods and maintaining the planes in their adjusted position. It will be evident that when one or more of the planes are swung outward on one side of the hull, the resistance from the same will direct the air-ship toward that side.

In practice, the inflating gas for the balloons is admitted to the auxiliary balloons through the valves 17, and thence the gas flows through the connecting pipes into the main balloon, so that the gas-pressure within all of the balloons is equalized. The capacity of the balloons is adjusted to their required lifting capacity. I provide the horizontal propellers or helicopters above and below the hull, so that by revolving the upper helicopter, the lifting power of the balloons will be assisted without discharge of ballast from the ship, and by revolving the lower helicopter the ship may be lowered against the lifting power of the balloons without discharging and wasting gas from the balloons. The feathering propelling wheels or paddle wheels will propel the ship through the air when raised by the balloons, and through water, when the hull is floating upon water, and the vanes in said wheel will only meet with resistance of the supporting medium at the points where they will effect propulsion, being feathered and only presenting their edges during the remainder of their revolution.

The feathering vanes of the rudder admit of the same returning from any operative position to which it has been moved by pulling upon a tiller rope, without resistance to such return, as the vanes in the rudder only present their edges in such return movement. Absolute promptness and certainty of steerage are attained by the steering planes on the sides of the hull. All controlling devices for the propelling vertical adjustment and horizontal steerage of the ship are within convenient access on deck and in the engine room, so that the ship may be manipulated by a minimum of crew.

The ship is capable of use and propulsion in the air and on water, and the same propelling and steering means employed for aerial navigation perform the same function on the water.

As each propeller wheel has an independent and controllable connection, by means of the clutches and their levers, in the present instance, horizontal steering of the ship

may also be performed by individual manipulation of such wheels, and the ship may be turned on a comparatively short radius curve by revolving one wheel and either stopping or backing the other.

Tanks or receptacles for oxygen for use in high altitudes, fuel for the engine, and other supplies may be suitably disposed in the hull.

By preference all parts of the ship and engine are made of aluminum, to insure the least possible weight of the ship and consequent greatest possible carrying capacity proportionate to the cubic dimensions and capacity of the gas bags or balloons.

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

1. In an airship, a plurality of gas bags arranged side by side, a yoke above said bags, bands adapted to encircle said bags, means for securing said bags with said yoke at the top of each bag and at the terminals of said yoke, straps connected with the bands of the outside bags and extending upward to the band of the intermediate bag, and means yieldingly and firmly connecting the band of the intermediate bag within the sides of said yoke.

2. In an airship, a large main balloon, two smaller auxiliary balloons arranged at opposite sides of said main balloon, bands around said balloons, a yoke attached to the tops of said balloons, and having its ends secured to the outer sides of the bands of the auxiliary balloons, bolts on said yoke and rings on the band of the main balloon, said rings being connected with said bolts forming a flexible but firm connection for the band of the central balloon with the side of said yoke.

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Witnesses:
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CHAS. HERRLE.