

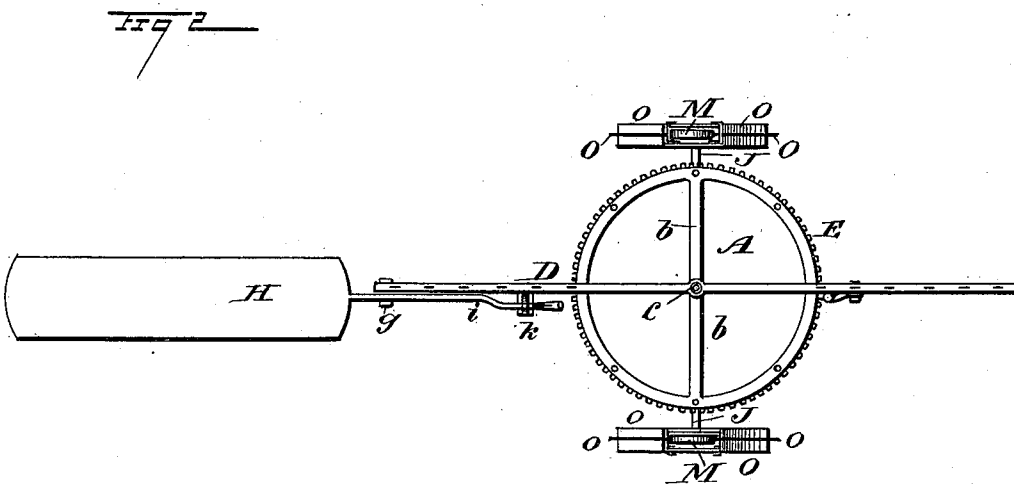
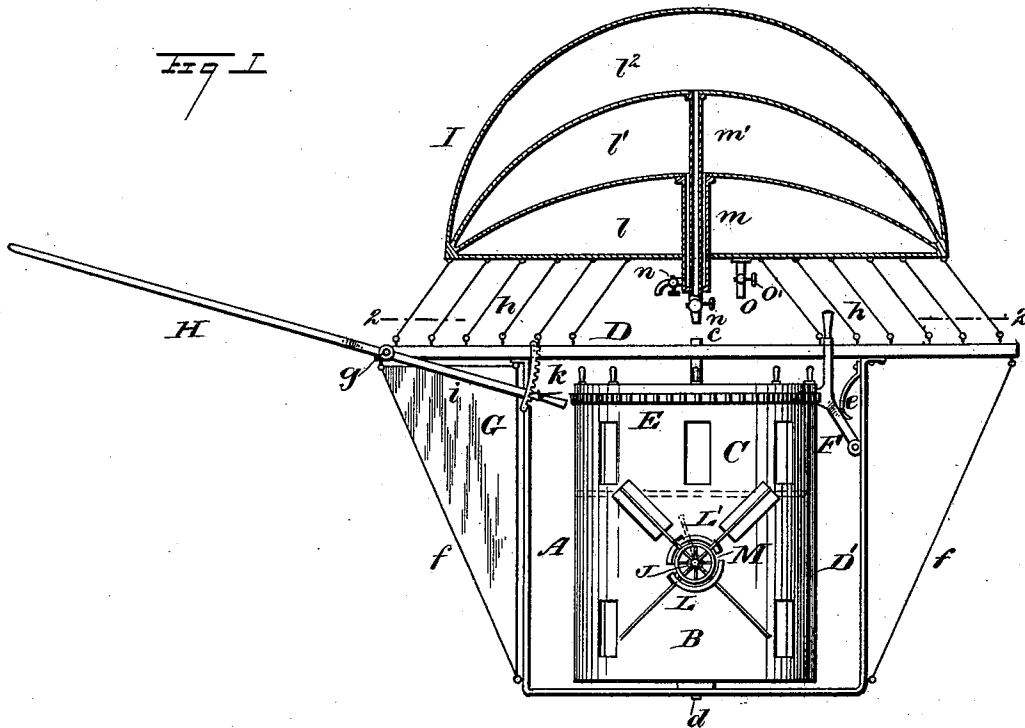
(No Model.)

2 Sheets—Sheet 1.

W. N. RIDDLE.
AERIAL SHIP.

No. 473,344.

Patented Apr. 19, 1892.



WITNESSES:

H. Walker
C. Sedgwick

INVENTOR

W. N. Riddle
BY *Munn & Co*

ATTORNEYS.

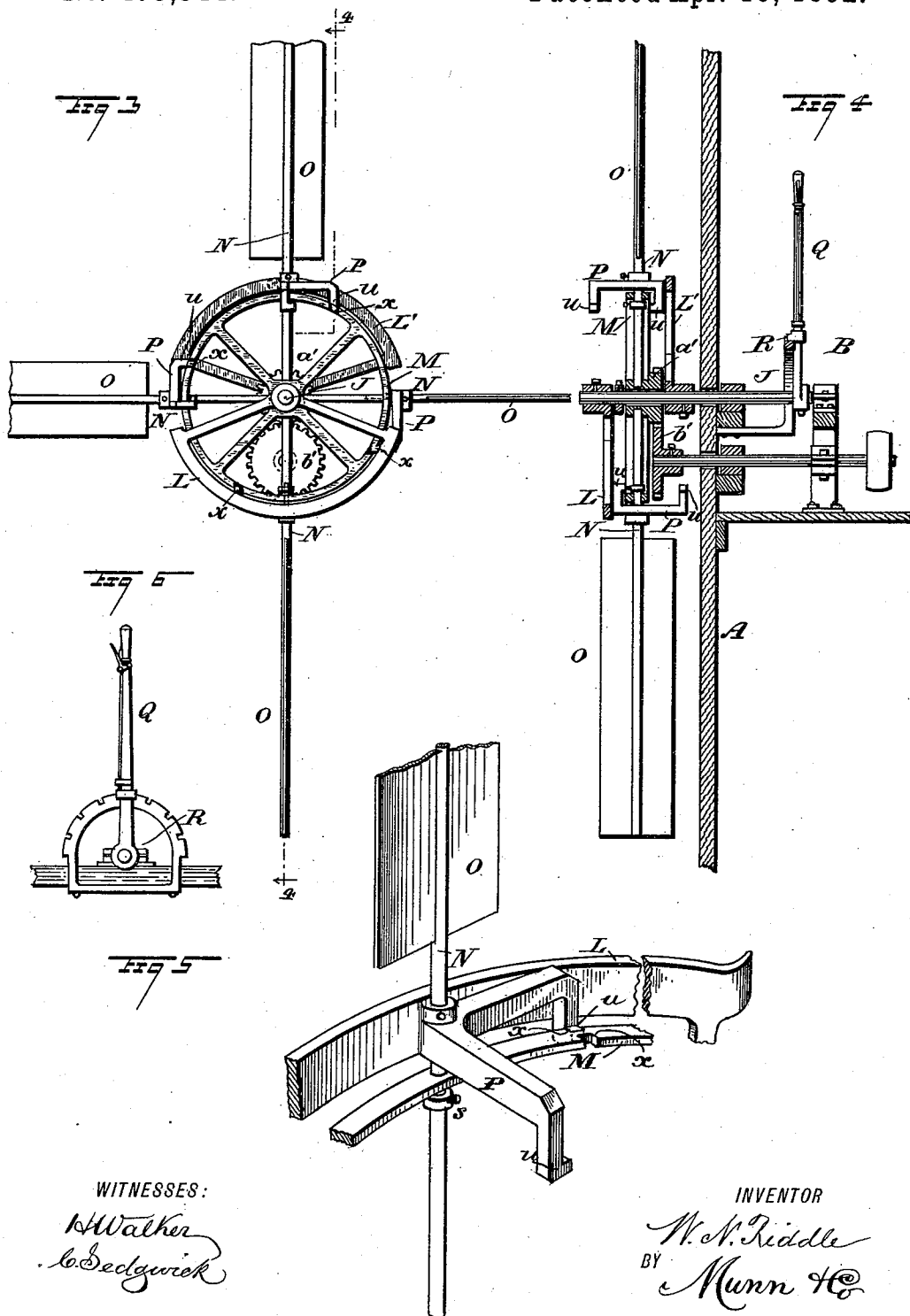
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UNITED STATES PATENT OFFICE.

WILLIAM NELSON RIDDLE, OF CROWLEY, TEXAS.

AERIAL SHIP.

SPECIFICATION forming part of Letters Patent No. 473,344, dated April 19, 1892.

Application filed July 11, 1891. Serial No. 399,184. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NELSON RIDDLE, of Crowley, in the county of Tarrant and State of Texas, have invented a new and useful Improvement in Aerial Ships, of which the following is a full, clear, and exact description.

This invention has more particularly for its object the construction of a ship for navigating the air, which shall be almost or quite as easily governed and controlled as regards its course of travel, irrespective of the direction of the wind and in other respects, as a ship provided with propelling means, used to sail in or through the water; and the invention consists in certain constructions and combinations of parts, including a lifting and propelling wheel, applicable, also, as a submarine propeller, substantially as hereinafter described, and more particularly pointed out in the claims.

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

Figure 1 represents a side elevation of an air-ship embodying my invention; Fig. 2, a partial plan or sectional view of the same, mainly upon the line 2 2 in Fig. 1. Fig. 3 is a side elevation, in part, of the propelling-wheel and its operating mechanism upon a larger scale; and Fig. 4 is a vertical section thereof at right angles to Fig. 3, mainly upon the irregular line 4 4 in said Fig. 3. Fig. 5 is a view in perspective of the propelling-wheel in part, but mainly illustrating the devices by which the blades of said wheel are turned during the rotation of the latter, to give them a feathering action. Fig. 6 is a side view of certain details, as hereinafter specified.

A is the hull or main body of the ship, substantially of an upright cylindrical form, and intended to be divided horizontally into two compartments B C, one above the other, the lower one B to be used for freight and the machinery employed to actuate the lifting and propelling wheels, and the upper compartment C to be used for passengers.

The hull or body A is provided with one or more cross-bars *b*, that extend across the center of the top of said body from side to side

thereof, and in the center of which is a pin or upright pivot *c*, arranged to pass through a main frame-piece D above, so as to centrally and vertically pivot the vessel or its body A at its upper end, the lower end of the body A being also similarly pivoted, as by a pin *d*, through a yoke-piece D', that extends down and under the sides of the body A and is connected above to the main frame-piece D, and serves in connection with it to form a general main frame. The body or hull A is also provided with a substantially horizontal circular rack E at or near its upper end outside of it; also, the main frame is provided with a catch F, controlled by a spring *e* and forming a spring-catch, and serving to engage with the rack E to hold the body A stationary in any required position of its circular travel about or around its vertical axis.

Connecting the two ends of the main frame-piece D with the lower corners of the yoke D' of the main frame are two cords *f f*, that act as braces. One of these cords and the main frame have applied to or connected with them an angularly-shaped upright rudder G, which may be termed "stationary" so far as its connection with the main frame is concerned, its straight upright side being next to the body A or one side piece of the yoke D'.

H is a laterally-projecting blade-like second rudder, which is pivoted, as at *g*, to the one end of the main frame-piece D and projects outwardly from it in a backward direction at an angle to and beyond the stationary rudder G. This second rudder H, which is horizontally pivoted to the back end of the main frame-piece D, is capable of being adjusted up or down to direct the vessel, and is locked, when adjusted, by a lever-handle *i*, adapted to engage with a rack *k*, secured to the main frame-piece D.

From the main frame-piece D cords *h* are attached to an upper buoyant or gas receptacle I, divided into compartments *l l' l''*, (any number of them,) arranged one above the other. These compartments, which are more or less of convex or partly-globular form above, while separate from one another, are united so as to form but a single buoyant chamber or receptacle, and are connected with one another by central upright tubes *m m'*, ar-

ranged to slide up or down, one within the other, and extended to project below the lower compartment l , where they are provided with stop-cocks $n n$ to facilitate the charging of the compartments with gas and to close egress of the gas therefrom when charged. The one tube m is made of sufficient size to pass over the other tube m' and leave a space around it to permit of the gas passing to the middle compartment l' , but is made to form a close fit at its lower end around the tube m' , connecting with the top compartment l^2 to prevent any waste or leakage of gas. In addition to these telescoping tubes $m m'$ the lower compartment l is provided with a separate tube o and stop-cock o' for charging it with gas. This divided construction of the buoyant receptacle l , while it provides for the ready charging of the compartments with gas to buoy up the vessel, makes said compartments comparatively independent of one another, so that if one compartment collapses or bursts there will be others left, thereby contributing largely to the safety of the ship.

I will now proceed to describe the means used to propel the vessel. J is a horizontal shaft arranged to project through either side of the body A , preferably one for either side. This shaft has fixedly secured upon its outer projecting portion two upright partly-circular tracks $L L'$, each of which is somewhat less than a semicircle and which are arranged not only one above the other, the one circling below and the other above, but are arranged out of a common plane with each other, so that the one lies outside of the other, laterally, at a given distance from it. Between these tracks $L L'$ an upright propelling-wheel M is arranged to rotate upon the shaft J . This wheel M is provided with a hub and spokes extending to the rim and is provided between the spokes or certain of them with radial shafts N , fitted to turn within sockets in the hub and through holes or bearings in the rim of the wheel beyond which they project, and are fitted on their outer ends with paddles, blades, or floats O , said shafts being restrained from slipping out of longitudinal movement by a washer s , secured on them inside of the rim of the wheel.

Arranged and fast on each shaft N , immediately outside of the rim of the wheel, is a bell-crank lever P , having its two arms substantially at right angles with each other and constructed at their outer extremities to form flanges or wrists $u u$, projecting inward relatively to the axial center of the wheel, parallel with the sides of the rim of the wheel, or thereabout. The arms of each bell-crank lever P come in contact, respectively, as the wheel is rotated, and ride by their sides or edges against the backs of the tracks $L L'$ to turn the shafts N , with their paddles, one-fourth of a circle round and back again, while the flanges $u u$ on the arms of the bell-crank levers come to a state of rest within recesses

x in the rim of the wheel to prevent the shafts N from turning more than the fourth of a circle. In this way the arms of each bell-crank lever act respectively and successively upon the stationary tracks $L L'$ to turn each paddle-shaft accordingly as the outer or inner arm of the lever P becomes the acting one by striking the outer track L or inner track L' , respectively. At other times the paddle-shaft is held from turning. This intermittent turning action of the shafts N gives the paddles O a feathering action, so that they will only strike the air on their flat side during half of the revolution of the wheel M —say the lower half of the paddles' motion—to propel the ship as required, and so that the paddles will present one edge surface to the air in the direction the wheel revolves during the other half of the wheel's rotation, and so have little or no opposing effect. Thus only half the paddles of either wheel M take hold on the air at any one time. Each wheel M may be driven or rotated by gearing $a' b'$, actuated by any suitable prime mover or motor within the body A of the vessel, the spur-wheel a' being fast on the wheel M , which latter rotates loosely on the shaft J .

The shaft J , on which the tracks $L L'$ are fixedly secured, extends within the body A of the vessel any suitable distance and is suitably supported at different points in its length. Secured on this shaft J is a lever Q , provided with a spring-catch and a tooth capable of being engaged by shifting said lever with a toothed fixed quadrant or partly-circular rack R at any desired point in the length of the latter. By this arrangement or provision the shaft J , with its attached inside and outside upper and lower tracks $L L'$, may be turned axially and be locked or held at any desired adjustment in a circular direction to virtually change the position of the paddle-wheel, as regards its propelling action or exposure of the propelling-paddles, to successively alternate a flat or edge presentation to the air in any given direction—inclining, for instance, either in an upwardly or downwardly direction.

To steer the ship or to control its course of flight, first the upright rudder G is stationary, so that it would always be in a position in direction of the wind. If the wind changes, it, acting upon this rudder G , would more or less turn the ship around accordingly to bring its propelling-wheels in a position to propel the ship in a given direction, and by means of the rotatable body A on its upright pivots and the catch F the position of the propelling-wheels after the vessel is in motion may be changed relatively to the wind to propel the ship in the required direction.

By the adjustment of the shaft J with its attached inner and outer tracks $L L'$ the direction of the propelling force as produced by the paddle-wheels may either be in upward or downward direction, if required, so that if

it should be necessary to lower the ship the gas in the receptacle I need not be allowed to escape, but the tracks L L' be adjusted, as described, to effect the desired result.

5 The pitch and balance of the ship may be regulated by adjusting or turning the rudder H.

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

10 1. In an air-ship, the combination, with a main frame, of an upright hull or vessel-body capable of rotation on upper and lower pivots within said frame, propelling-wheels applied to opposite sides of said hull or body, and one
15 or more rudders attached to said main frame, substantially as specified.

2. In an air-ship, the combination, with the hull or body of the vessel and its outer main frame, of a gas-receptacle above, connected
20 with the main frame, constructed of a series of gas-holding compartments, one above the other, and telescopic tubular connections between certain of the compartments, adapted to pass the gas from one of said compartments
25 to the other, and faucets for charging the receptacle with gas, essentially as described.

3. In an air-ship, the combination, with the upright rotatable hull A, having a circular
30 rack E and propellers carried by and on opposite sides of the hull, of the main frame D D', within which said hull is pivoted above and below, the catch F, attached to said main frame, adapted to engage with the circular

rack E, the stationary rudder G, and the adjustable rudder H, substantially as specified. 35

4. The combination, with either propelling-wheel shaft J, of the wheel M, fitted to freely rotate upon said shaft, the upper and lower partly-circular tracks L L', arranged the one at a distance apart laterally from the other
40 and secured upon the shaft J, the radial paddle-shafts N, with their attached paddles O, carried by said wheel, made capable of turning on their axes to produce a feathering action of the paddles, and the bell-crank levers
45 P, secured on the paddle-shafts outside of the wheel M and provided with inturned flanges or wrists *u u* at their outer ends for operation in conjunction with the wheel and the stationary tracks L L', essentially as and for the
50 purposes herein set forth.

5. The combination of the toothed lever Q and the stationary toothed quadrant or partly-circular rack R with the rotatable shaft J, the tracks L L', secured on said shaft, the wheel
55 M, independently rotatable on said shaft, the radial turning paddle-shafts N, with their attached paddle O, and the bell-crank levers P, having inturned flanges or wrists *u u* at their opposite ends for operation in relation to the
60 tracks L L', substantially as described.

WILLIAM NELSON RIDDLE.

Witnesses:

M. A. MABRY,
J. W. CLARK.