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C. A. LEWIS.

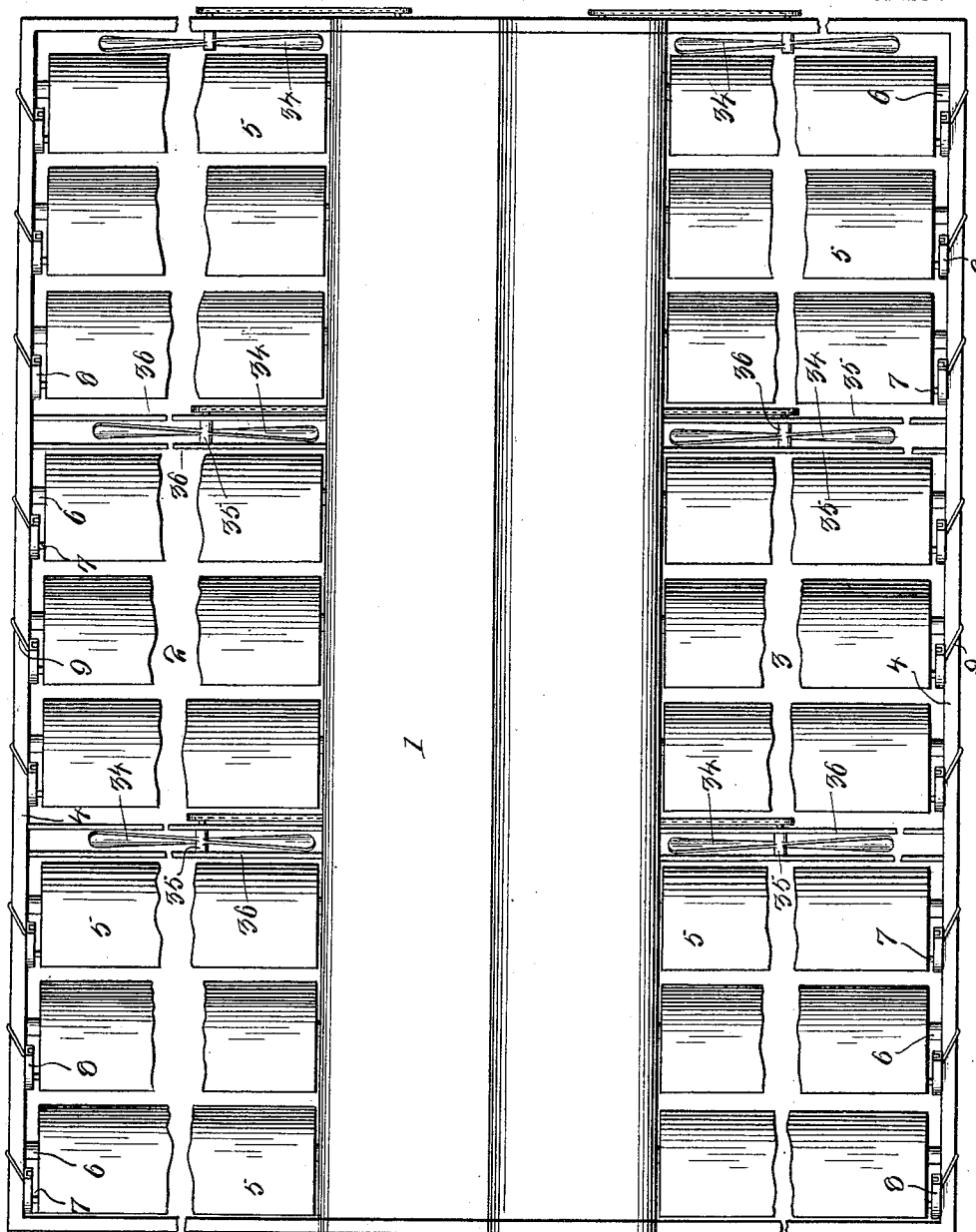
AIRSHIP.

APPLICATION FILED MAY 20, 1911. RENEWED OCT. 11, 1912.

1,062,545.

Patented May 20, 1913.

4 SHEETS—SHEET 1.



Witnesses

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C. C. Hines.

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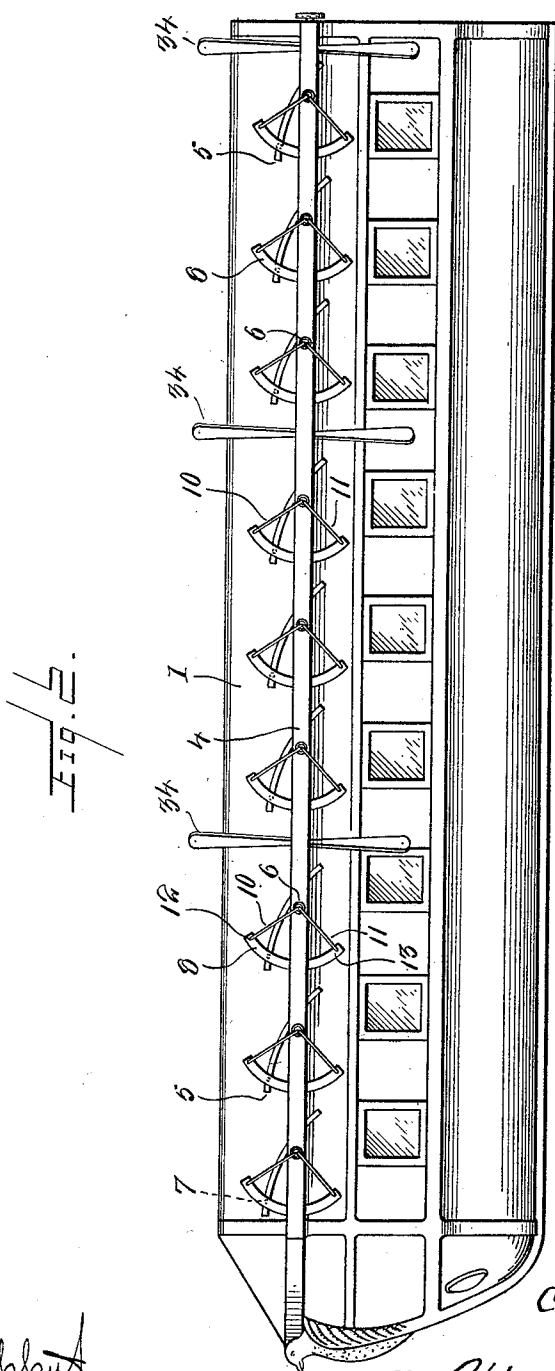
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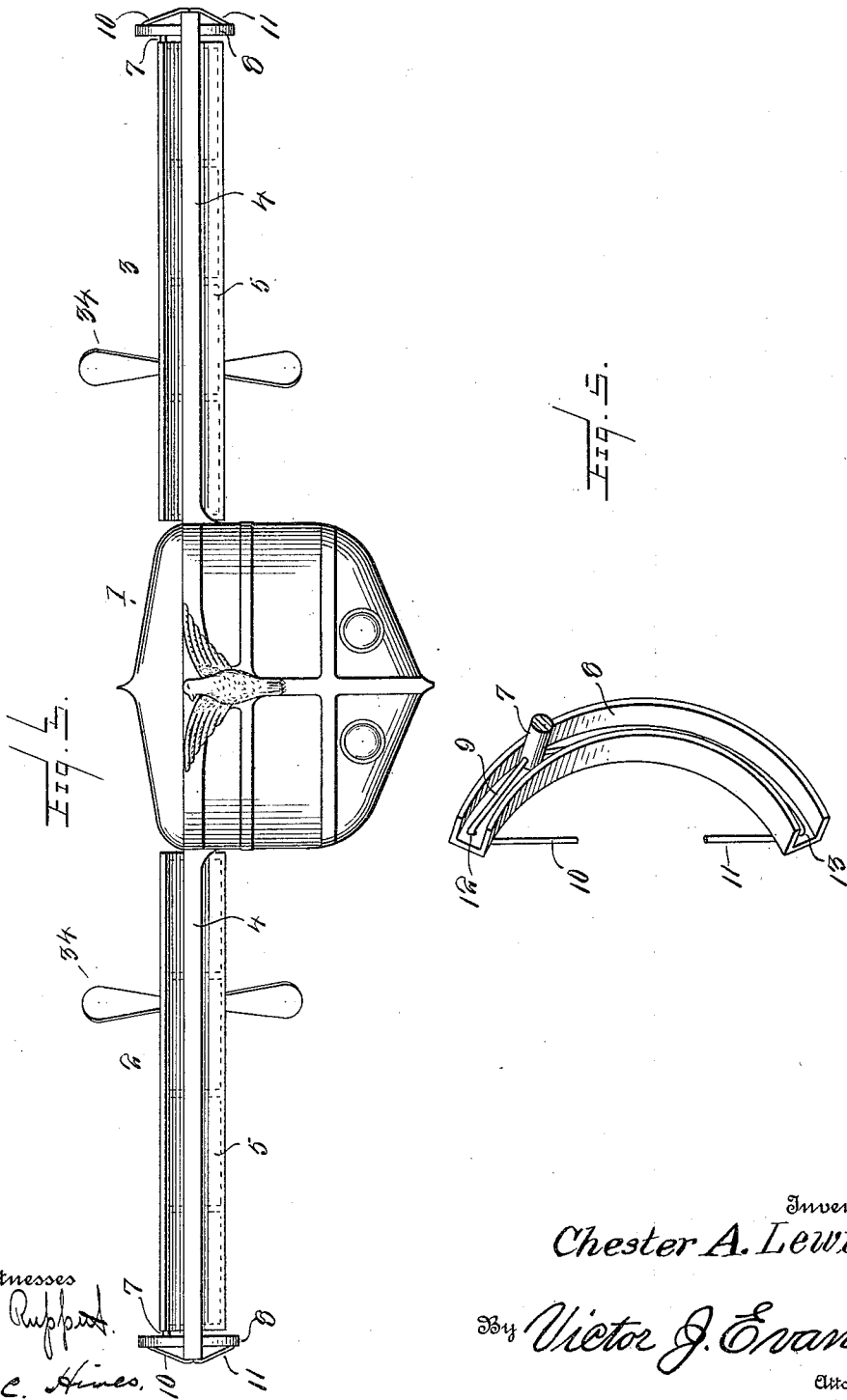
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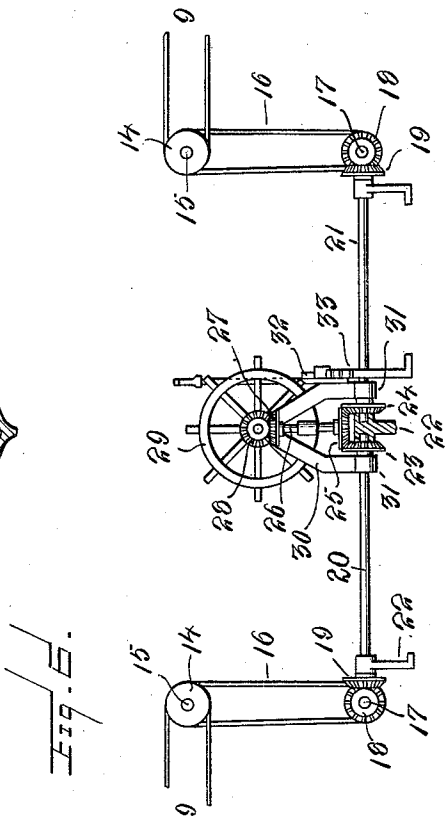
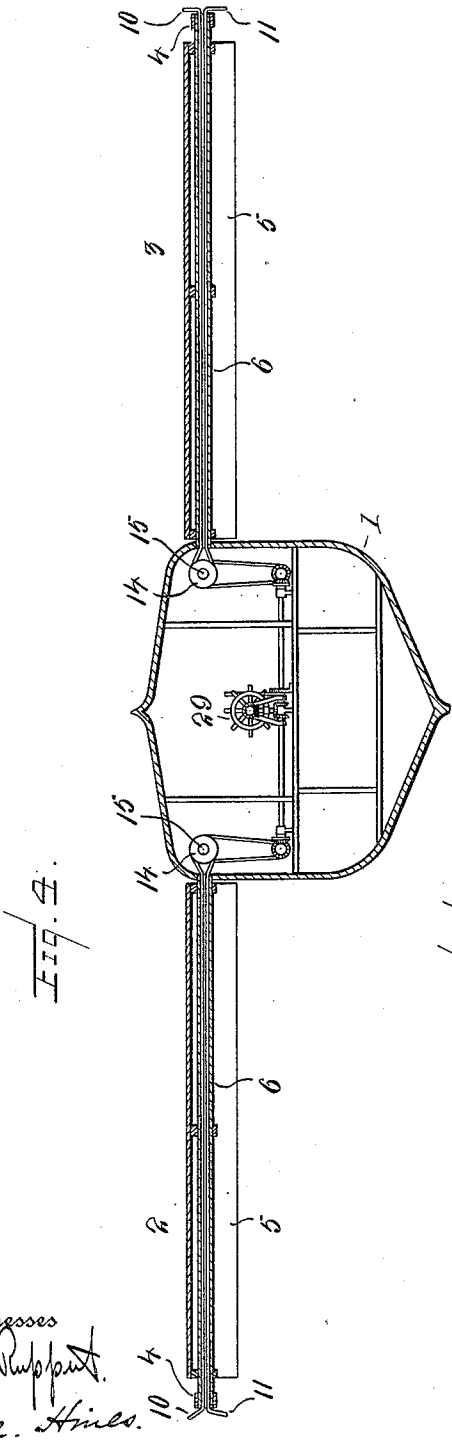
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UNITED STATES PATENT OFFICE.

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AIRSHIP.

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Specification of Letters Patent.

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Application filed May 20, 1911, Serial No. 628,468. Renewed October 11, 1912. Serial No. 725,308.

To all whom it may concern:

Be it known that I, CHESTER A. LEWIS, a citizen of the United States, residing at St. Louis, in the State of Missouri, have
 5 invented new and useful Improvements in Airships, of which the following is a specification.

This invention relates to air ships, and its object is to provide an aerial vessel which
 10 will support considerable weight and which embodies sectional wings, the sections of which are adjustable to steer the machine in a vertical plane for ascent and descent and also, if desired, for use alone or in con-
 15 junction with the propelling devices, as controlling elements to balance the ship laterally and bank the same in making turns.

A further object of the invention is to provide an air ship which may be driven at
 20 considerable speed, which is simple of construction and adapted to be easily controlled in flight, launching and landing, and in which a ready and convenient means for adjusting the wing sections is employed.

With these and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and
 25 claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a top plan view of an air ship embodying my invention, portions of the wings or supporting surfaces being broken
 30 away owing to the circumscribed dimensions of the sheet. Fig. 2 is a central vertical longitudinal section through the air ship. Fig. 3 is a front elevation of the same. Fig. 4 is a vertical transverse section on a line
 35 through the axes of opposite vanes of the supporting surfaces. Fig. 5 is a detail view of one of the channeled guides and coacting means for adjusting the associated vane. Fig. 6 is a front elevation, partially in section,
 40 of the steering gear whereby the vanes of the wings or supporting surfaces are adjusted.

Referring to the drawings, 1 designates a car preferably of substantially boat form and of considerable length, said car extending
 45 longitudinally in the line of flight and being in practice subdivided into any suitable number of cabins, compartments or quarters for the engines, steering gear, officers, passengers, freight, fuel, etc. This car may
 50 be made of wood, metal or of a composite

structure, and may be equipped with suitable launching and landing gear, if desired.

Arranged at opposite sides of the car and projecting laterally therefrom are wings or supporting surfaces 2 and 3, each extending
 55 approximately the full length of the car and having any desired width or extent of lateral projection therefrom. Each of these wings or supporting surfaces comprises a substantially oblong rectangular frame 4,
 60 rigidly fastened to the body of the car in any suitable manner, and carrying a series of vanes or small wings 5, arranged one in rear of the other, as shown.

The vanes 5 of each wing or supporting
 65 surface are curved from front to rear for the dynamical reaction of the air thereon and are preferably closely grouped, so that the front and rear edges of adjacent vanes form an adjacent space or passage for the
 70 flow of air to the reaction surfaces of the vanes throughout the series. This arrangement of the vanes provides for the use of a comparatively large number of following
 75 vanes, each constituting a supporting surface on which an effective supporting action of the air is secured, the arrangement being such as to obtain maximum lifting capacity in a supporting structure of determined dimensions, as will be readily understood.
 80

The vanes are mounted to turn at points in rear of their transverse centers upon stationary hollow transverse shafts or axles 6 supported by the wing frames and side walls of the car and opening at their ends through
 85 the outer edges of the wing frames and at their inner ends into the body of the car, as shown in Fig. 4. Each vane is provided at its outer edge in advance of its center with a laterally projecting stud or guide
 90 arm 7 arranged to travel within a segmental channeled guide 8 fixed to the outer longitudinal bar of the wing frame and extending above and below the same, the construction being such as to permit each vane
 95 to be adjusted vertically on its axis to a desired degree above or below the horizontal to vary its angle of incidence for different degrees of lifting action and for a variability of adjustment to steer the ship horizontally and vertically and bank the same in
 100 making turns, etc.

The vanes of the two wings or supporting surfaces are adapted to be simultaneously or independently tilted, to which end
 105

the ends of a cord or cable 9 are attached to the guide stud or arm 7 thereof and project upwardly and downwardly therefrom within the channeled guide, the two extremities 10 and 11 of the cable thence passing through guide openings 12 and 13 in the upper and lower ends of said channeled guide and thence projecting through the hollow shaft or axle 6 into the car, within which the central portion of the cord or cable is wound in opposite directions around a pulley 14.

The pulleys 14 controlling the cables of the sets of vanes are supported by longitudinal shafts 15 suitably journaled upon the interior of the car and extending lengthwise thereof, and said shafts 15 are connected by belts 16 or other suitable gear with underlying longitudinal transmission shafts 17 carrying beveled gears 18 which mesh with beveled gears 19 on the outer ends of two transverse controlling shafts 20 and 21 journaled upon suitable bearing brackets 22 within the pilot's cabin or compartment of the car. The inner ends of the shafts 20 and 21 carry beveled gears 23 and 24 meshing with a beveled gear 25 on the lower end of a vertical operating shaft 26, which carries at its upper end a beveled gear 27 meshing with a beveled gear 28 on the shaft of a steering or hand wheel 29.

The shaft 26 and shaft of the wheel 29 are mounted upon a supporting bracket 30, which is preferably in the form of a yoke, the arms of which pivotally engage the shafts 20 and 21, as indicated at 31. By this construction the bracket, vertical shaft and steering wheel are adapted to be tilted in unison in a fore and aft direction, in which operation the gear 25 locks the two gears 23 and 24 together, whereby the controlled shafts 20 and 21 will be simultaneously rocked in a fore and aft direction, or as a unit, forwardly or rearwardly, as desired. Such construction also adapts the gear 30 to be turned in either direction by means of the hand wheel to rotate the two shafts 20 and 21 simultaneously in opposite directions. It will thus be seen that by means of the steering gear above described, the vanes of the wings may be simultaneously tilted upward or downward to like degrees to cause the machine to ascend or descend, whereby it may be steered in a vertical plane, or said vanes may be adjusted in opposite directions, the vanes of one wing upwardly and the vanes of the other wing downwardly, or vice versa for steering the machine horizontally and properly tilting and banking the same in making turns. The bracket 30 carries a spring actuated pawl 32 adapted for engagement with a stationary rack 33, whereby said bracket and associated parts of the gearing may be locked against fore and aft movement, allowing the shafts 20 and 21

to be rocked in reverse directions for lateral control, as will be readily understood.

Any suitable number and arrangement of propellers may be employed for driving the ship. In the present instance I have shown a series of propellers 34 on each side of the longitudinal center of the machine, which propellers are mounted on shafts 35 journaled on bars 36 on the wing frames. The propellers rotate in spaces between adjacent planes and are driven by chain and sprocket or other suitable gearing from motors within the car. The number of propellers and driving motors employed will vary according to the intended size, carrying capacity and speed of the ship, but under all conditions sufficient driving power will be installed to propel the ship at considerable speed, so that the ship will be able to weather heavy winds and carry a considerable number of passengers or amount of freight. It will be understood, of course, that while the adjustability of the vanes of the wings will afford ample control under normal conditions to balance and steer the ship both vertically and horizontally, rudders in addition to the vanes may be employed and the propellers may be placed under the complete control of the pilot so that their driving speeds may be varied to assist in the steering and balancing operations.

Having thus described the invention, what I claim is:

1. An air ship comprising an elongated car extending longitudinally in the line of flight, wing frames secured to the opposite sides of the car and extending laterally therefrom, said wing frames being substantially coextensive in length with the car, transverse axles upon the wing frames having passages leading therethrough to the interior of the car, a longitudinal series of wings pivotally mounted upon the axles of each wing frame, and controlling means for tilting said wings including flexible elements extending through the passages of the axles.

2. An air ship comprising an elongated car extending longitudinally in the line of flight, wing frames attached to and projecting laterally from the sides of the car, a longitudinal series of vanes pivoted to tilt vertically on hollow axes carried by each wing frame, connections leading from said vanes through said hollow axes to the interior of the car, and controlling mechanism operating through said connections for tilting the wings, said mechanism being operative to tilt the wings simultaneously upwardly or downwardly or simultaneously in opposite directions vertically.

3. An air ship comprising an elongated car extending longitudinally in the line of flight, wing frames attached to and projecting laterally from the sides of the car, hollow transverse axles carried by each wing

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frame and communicating with the interior of the car, a series of vanes pivoted to tilt vertically upon the axles of each wing frame and provided with guide arms, curved
5 guides upon the wing frames engaged by said guide arms, flexible connections attached to the guide arms and extending in guided relation to the guides inwardly to the car through the hollow axles, and means coupled
10 to said connections whereby tilting motion may be imparted to the vanes.

4. An air ship comprising an elongated car extending longitudinally in the line of flight, wing frames attached to and projecting
15 laterally from the car, vanes pivotally mounted to tilt vertically on hollow axes carried by each wing frame, shafts disposed longitudinally within the car, flexible connections between said shafts and the vanes for tilting the latter up or down, said con- 20
nections extending through said hollow axes, control shafts, gearing between said control shafts and the first named shafts, and controlling mechanism operative for rocking
25 said control shafts in the same direction or in opposite directions simultaneously.

In testimony whereof I affix my signature in presence of two witnesses.

CHESTER ARTHUR LEWIS.

Witnesses:
F. H. SPEARS,
J. P. ROBINS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."