(No Model.) 4 Sheets—Sheet 1.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,886. Patented Feb. 10, 1885.

Fig. 1.

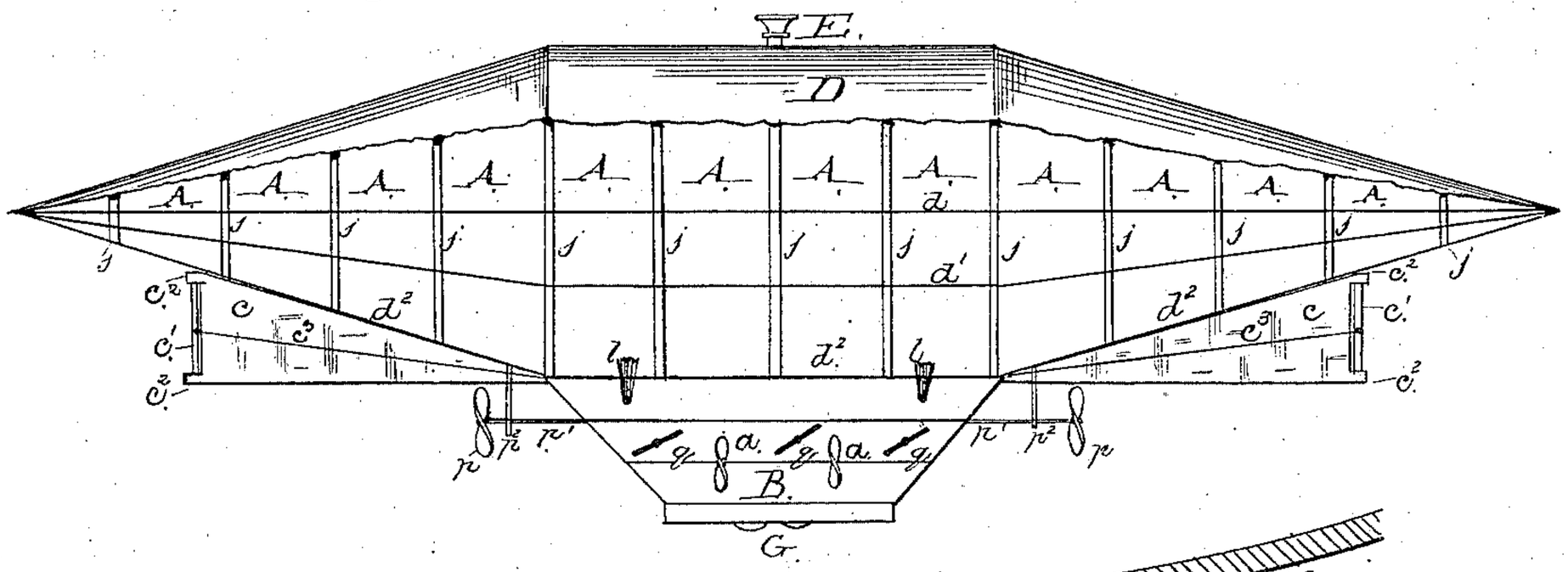


Fig. 15.

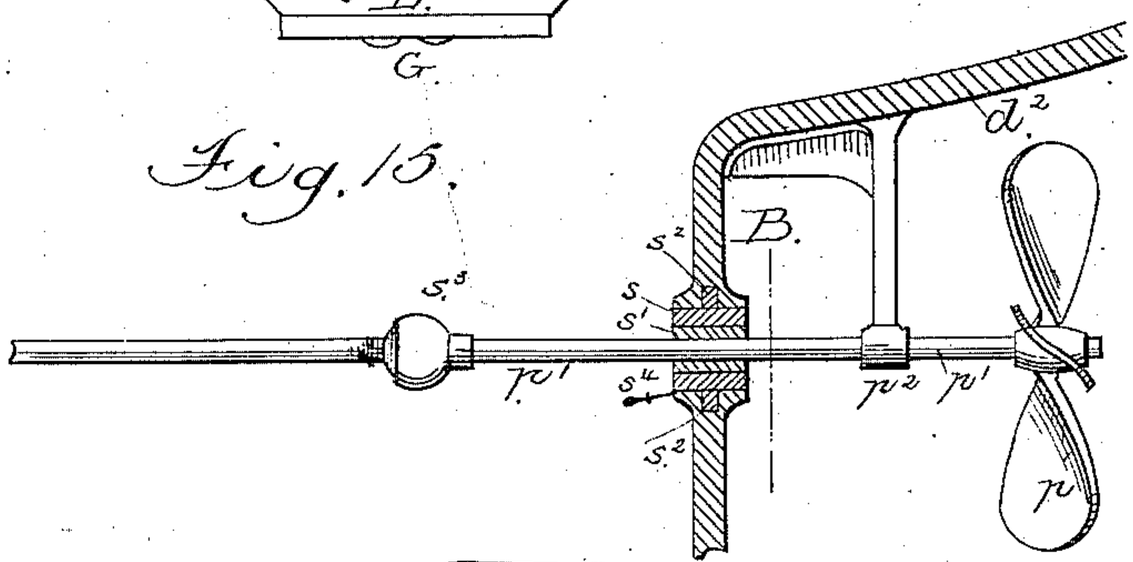


Fig. 14.

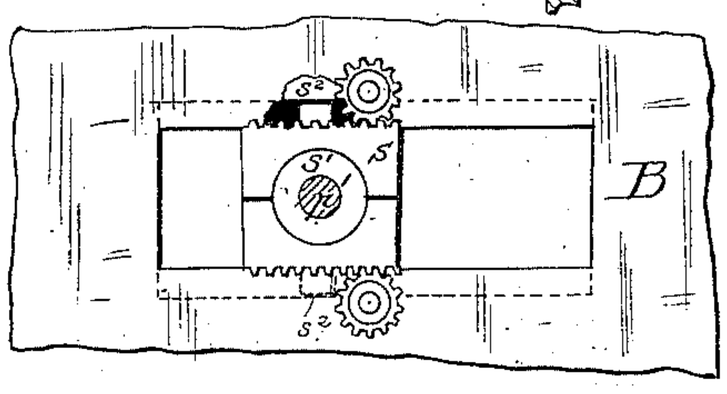
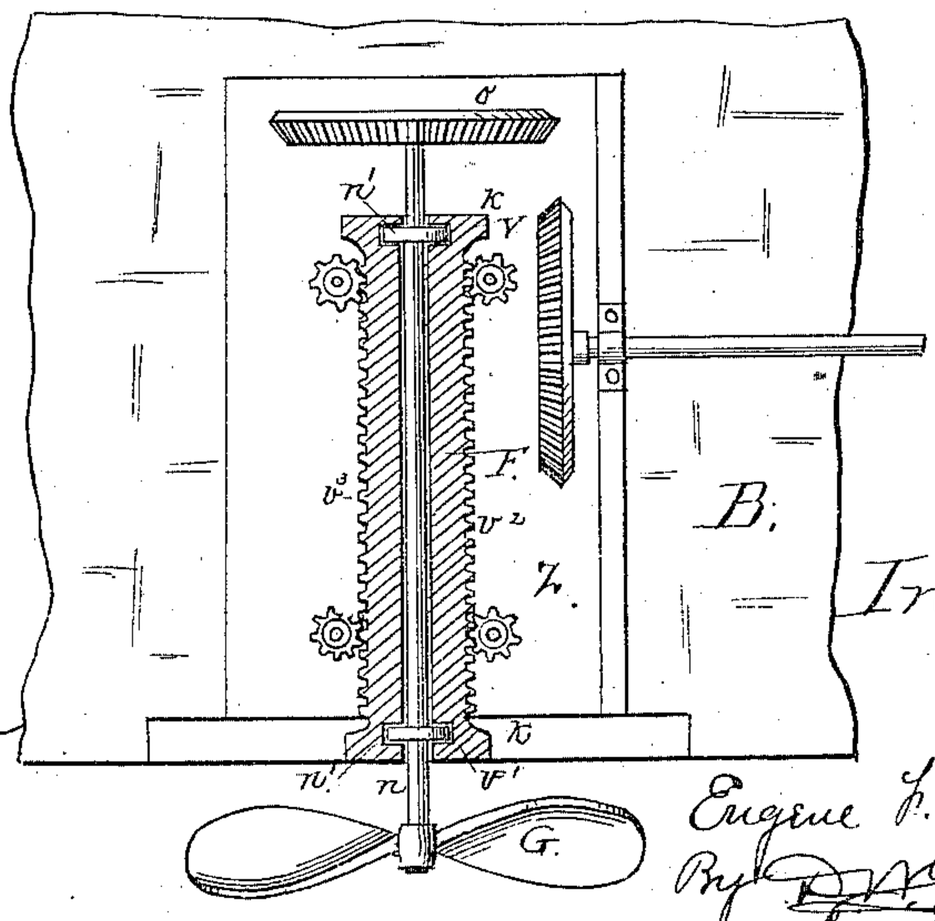


Fig. 16.



Attest:
F. Wales Fowler.
Henry Glassie

Inventor:
Eugene F. Falconnet
By D. Y. Glassie
his Atty.

(No Model.)

4 Sheets—Sheet 2.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,886. Patented Feb. 10, 1885.

Fig. 2.

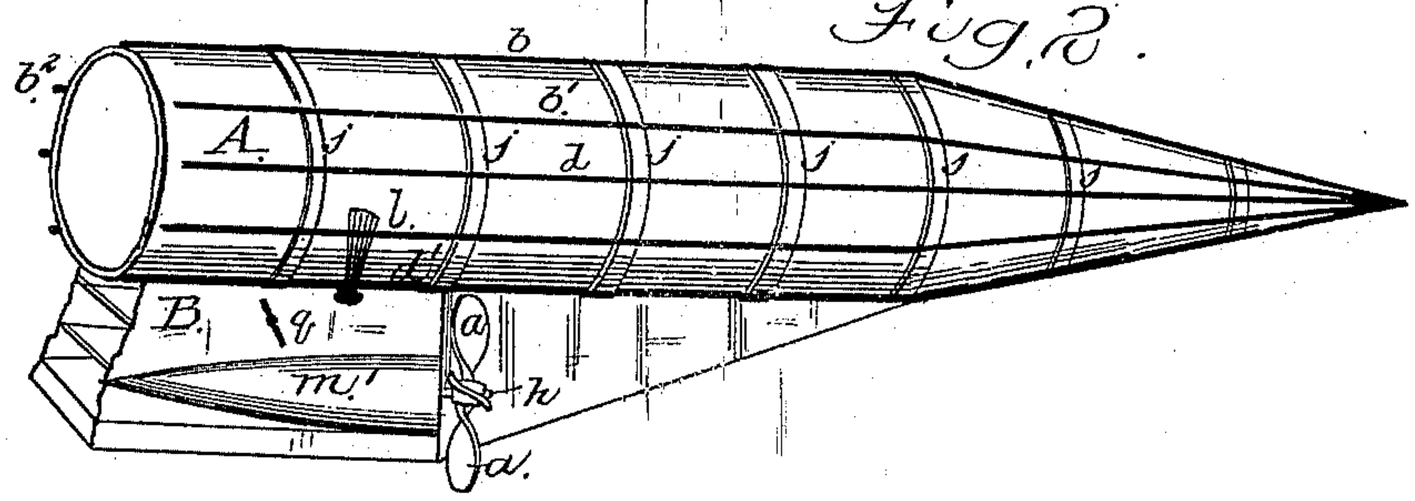


Fig. 3.

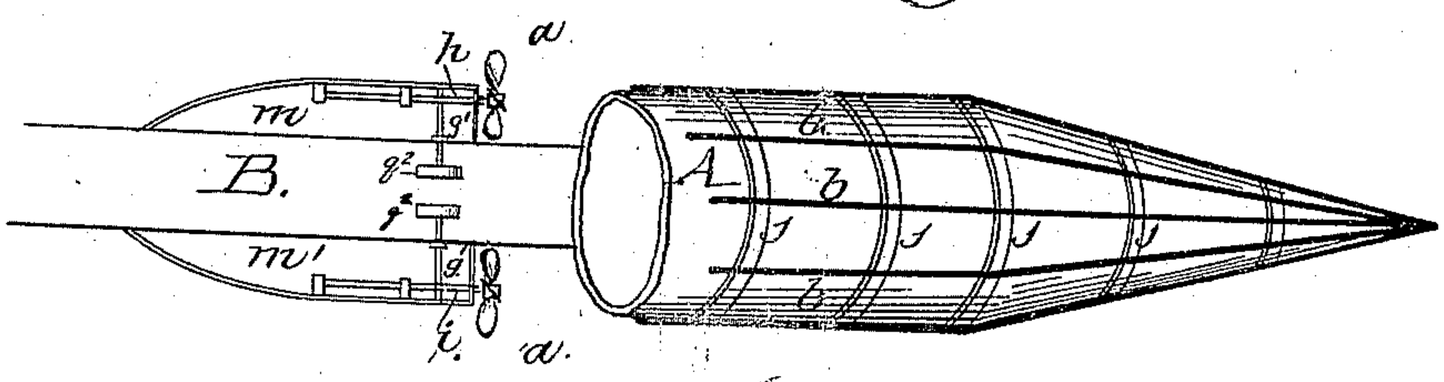


Fig. 4.

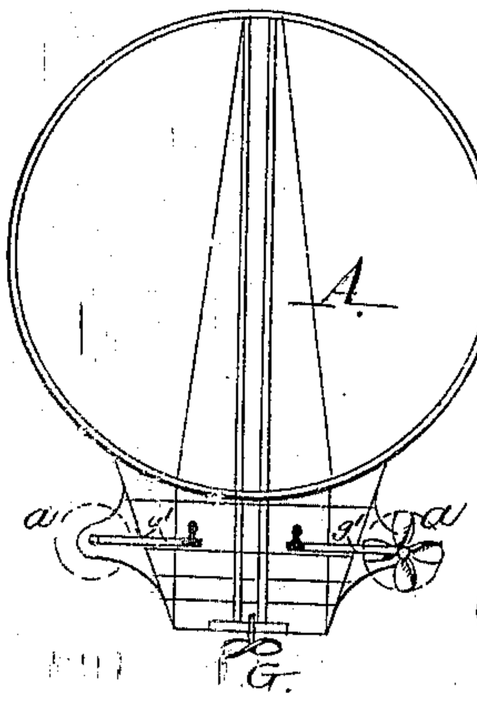


Fig. 5.

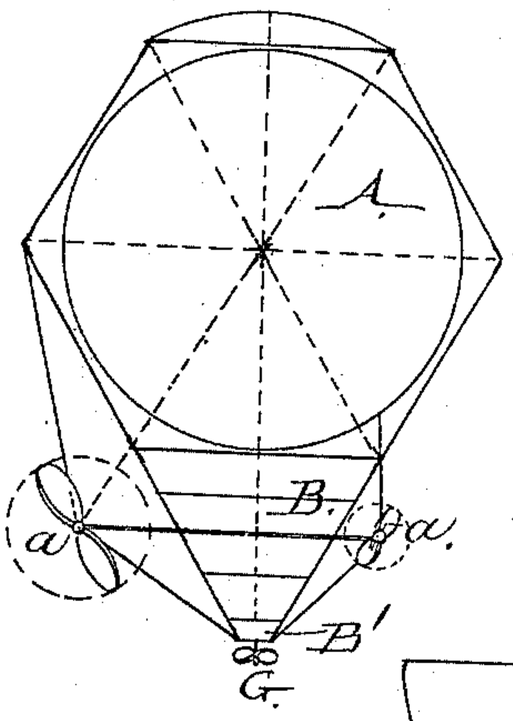


Fig. 7.

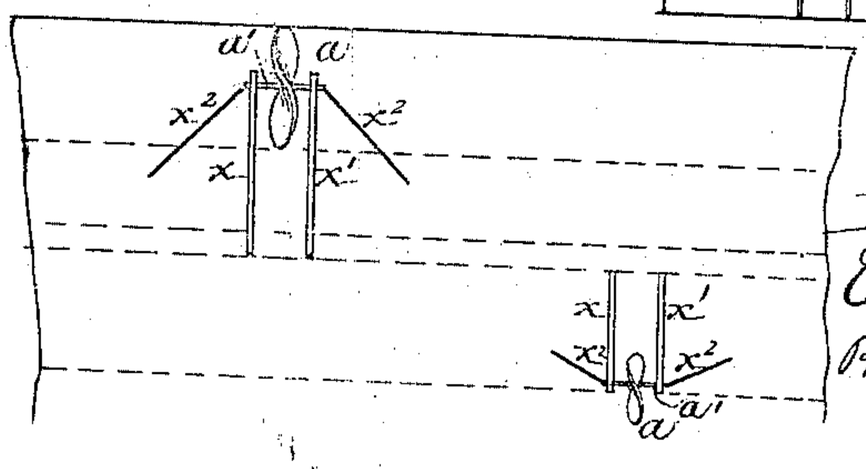
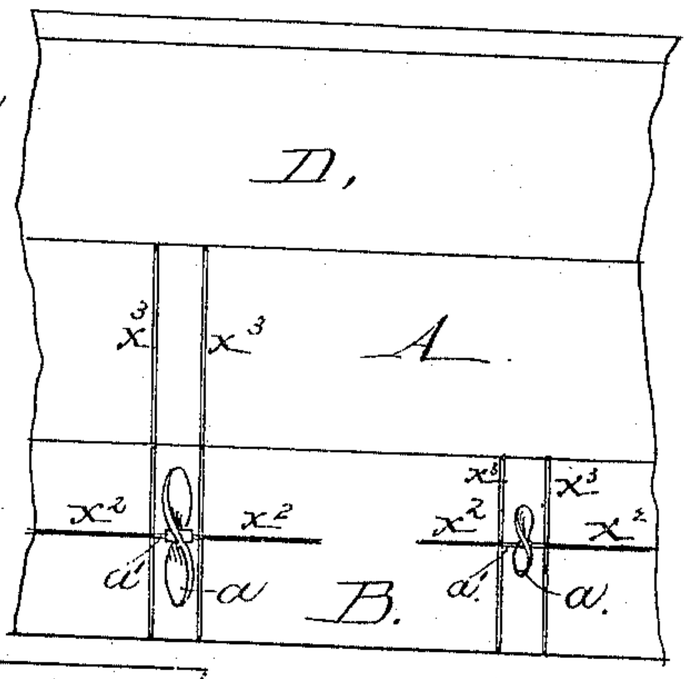


Fig. 6.



Attest:
F. W. Fowler
Henry Glassie

Inventor:
Eugene F. Falconnet
By D. Glassie
his atty.

(No Model.)

4 Sheets—Sheet 3.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,886. Patented Feb. 10, 1885.

Fig. 8.

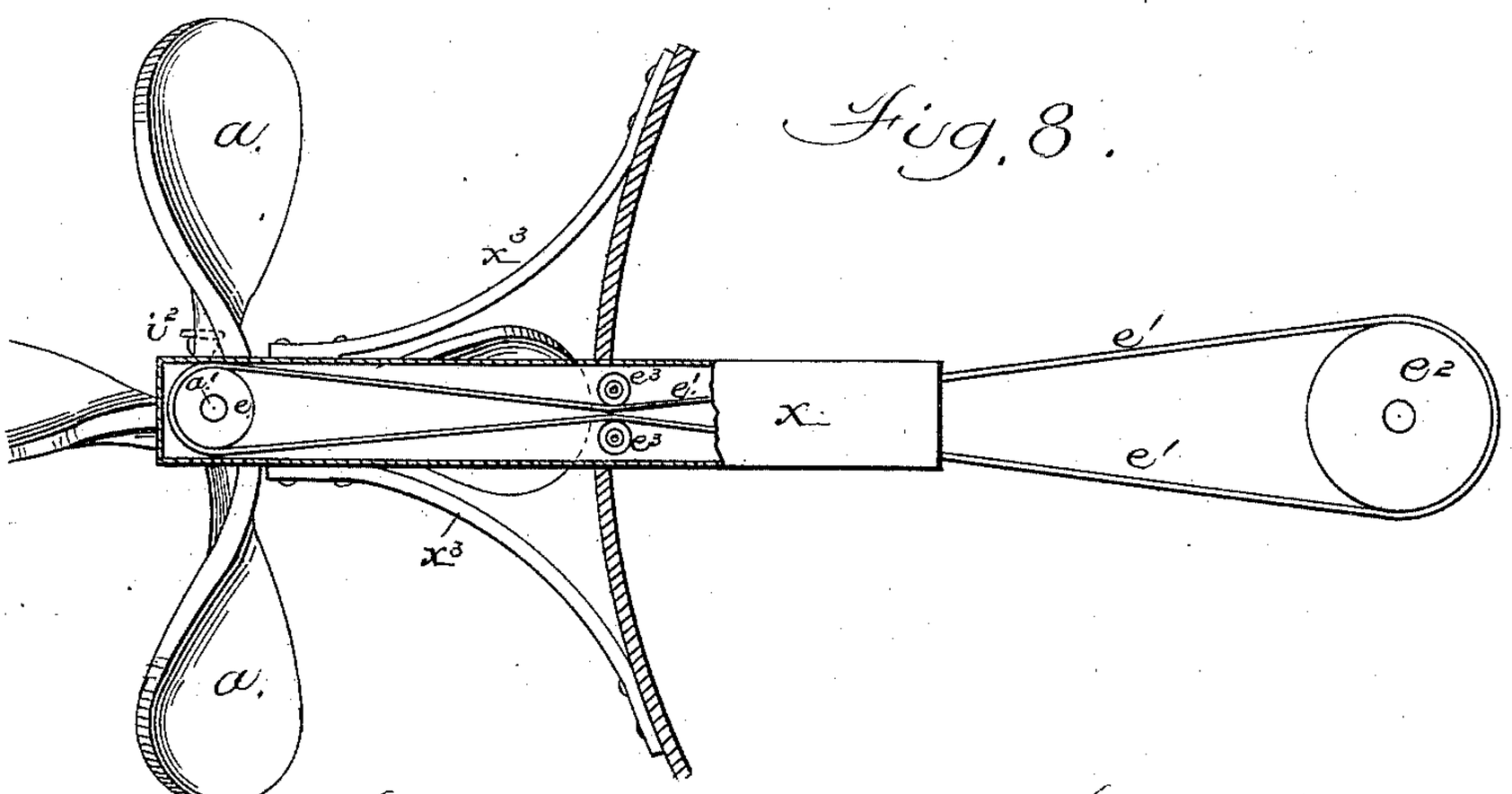


Fig. 10.

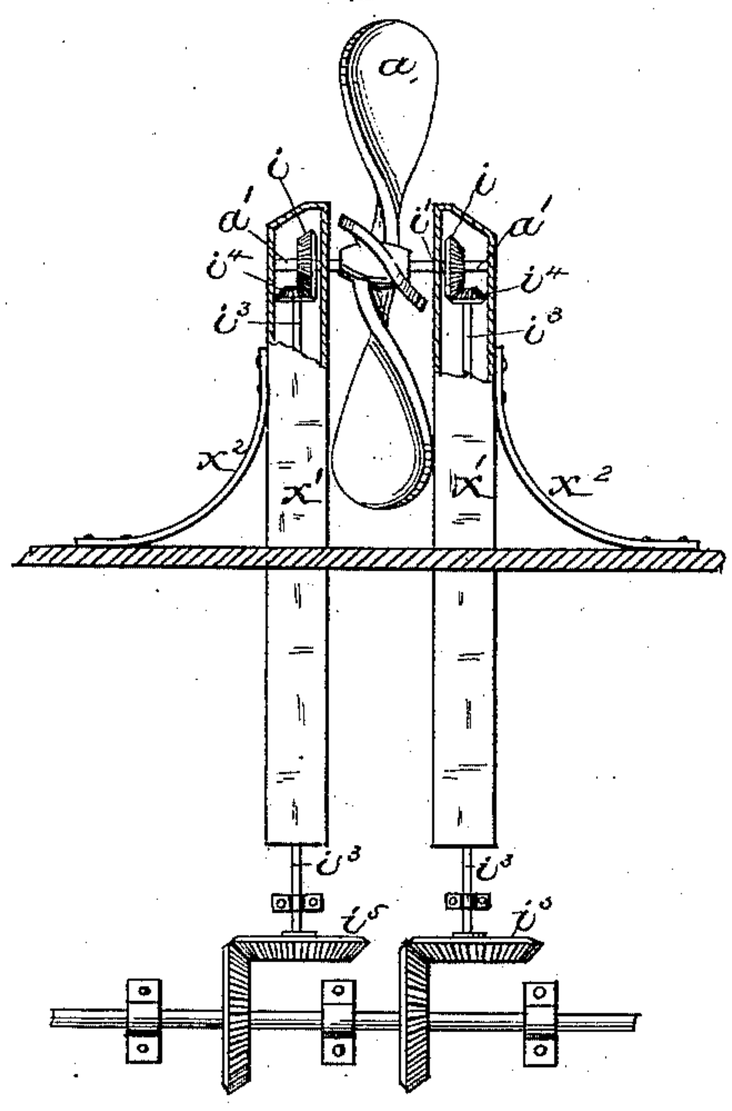
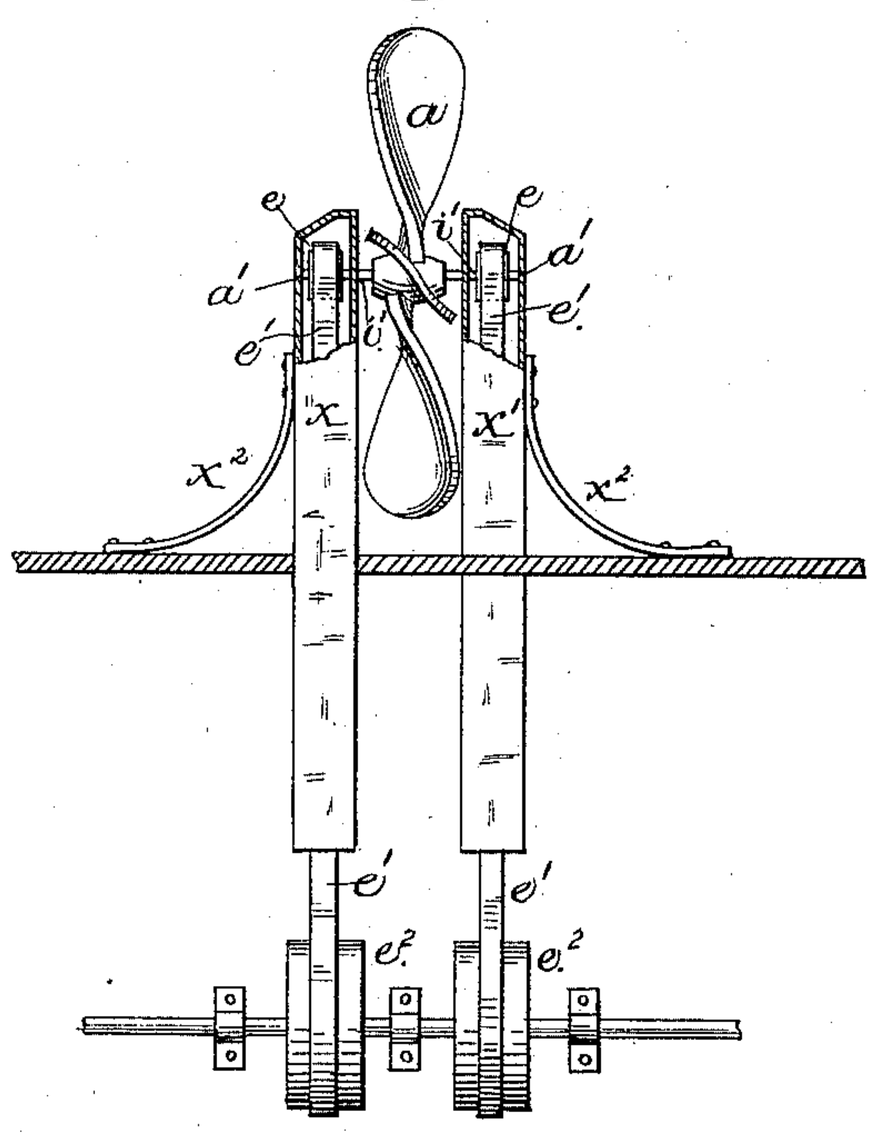


Fig. 9.



Attest;

T. Walter Fowler.

Henry Glassie

Inventor;

Eugene F. Falconnet

By Henry Glassie

his Attorney.

(No Model.)

4 Sheets—Sheet 4.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,886. Patented Feb. 10, 1885.

Fig. 11.

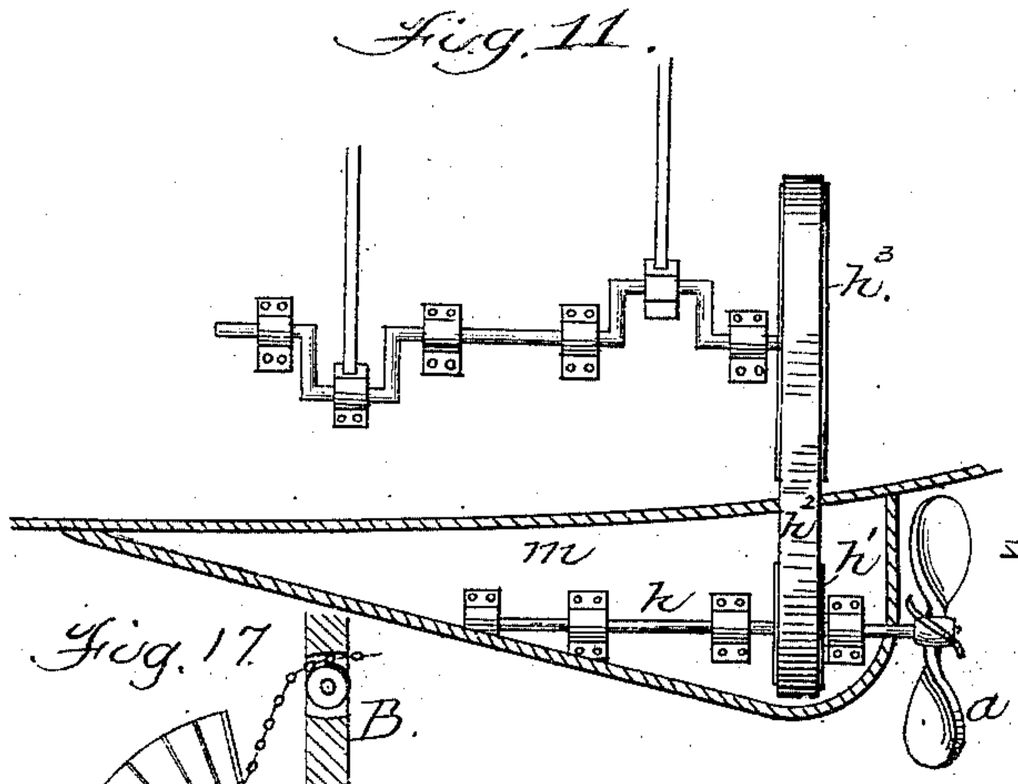
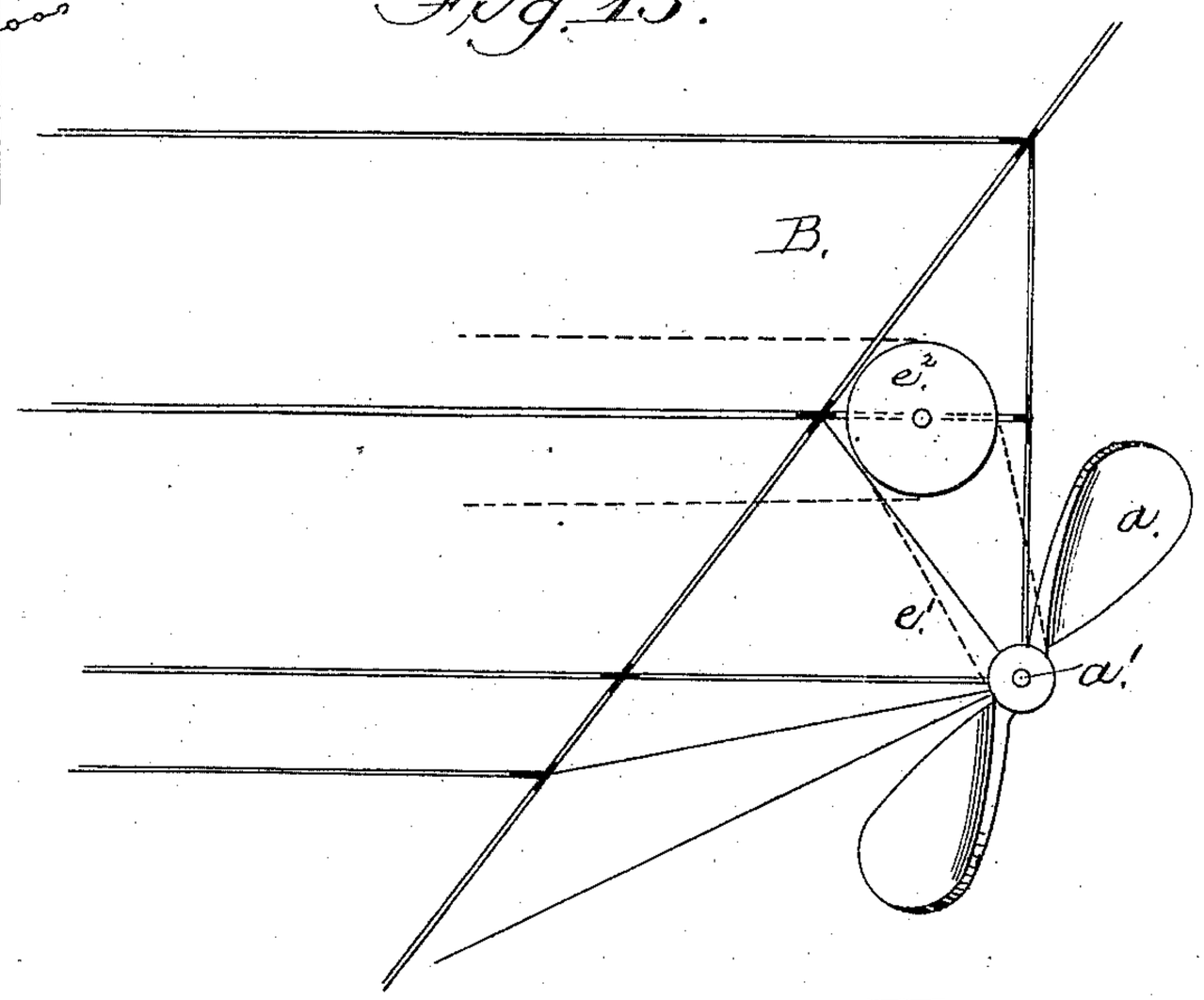


Fig. 12.

Fig. 13.



Attest;
T. Walter Fowler,
Henry Glassie

Inventor;
Eugene F. Falconnet.
by Glassie
his attorney.

UNITED STATES PATENT OFFICE.

EUGENE F. FALCONNET, OF NASHVILLE, TENNESSEE.

VESSEL FOR AERIAL NAVIGATION.

SPECIFICATION forming part of Letters Patent No. 311,886, dated February 10, 1885.

Application filed November 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, EUGENE F. FALCONNET, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Vessels for Aerial Navigation, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to certain new and useful improvements in the class of aerial vessels that are designed to be impelled, handled, and steered by actuating machinery arranged within the vessel through external appliances; and it consists in constructing the entire vessel, including the frame, gas field, hull, and cabin, in one complete compact whole, and in protruding from the sides of the hull at proper intervals wheel-houses or hollow beams in pairs, to provide seats and bearings for side propelling-screws, as well as housings for the connecting-gear; also in the mode of mounting such side screws in the journal bearings or seats so provided in the wheel house or beams; also in the mode of connecting them with the propulsive machinery and actuating them on their axis.

It also consists in providing automatic lubricators to the axle-journals of such side screws, by which means they may be kept lubricated.

Figure 1 is a side elevation of a complete ship, showing the roof, the gas-field, the hull, and cabin protruding below, longitudinal bracing-chords, the fans, and the fins for deflecting the vessel's course, the fin-shaped steering-rudders, the end propelling and steering screws, the projecting beams and side propelling-screws, the central raising and lowering-screw, and smoke-stack. Fig. 2 is a fragment of the same, showing the protruding diminishing wheel-house and a screw mounted at the end of the same. Fig. 3 is a plan of the same, with the gas-field broken away, showing the protruding diminishing wheel-houses on both sides, side screws mounted in place, and connecting machinery. Fig. 4 is a vertical cross-section of the same. Fig. 5 is a modification of the same. Fig. 6 is a side elevation of a fragment of the vessel, showing the side screws mounted between projecting beams, also showing the bracings. Fig. 7 is another view of the same. Fig. 8 is an end elevation of a side screw, showing the projecting beams, one broken away to disclose the belt-gearing, showing also the lubricator. Fig. 9 is a plan of the same. Fig. 10 is a plan of the same, substituting bevel-gear belt-connections. Fig. 11 is a plan of belt gearing and connections when the wheel-house is employed. Fig. 12 is the same, substituting bevel-gear connections for the band-connections. Fig. 13 is a fragment, showing a protruding angle, in lieu of the beams and wheel-house, mounting a side screw. Fig. 14 is an enlarged view of the shifting ways of the adjustable journal-bearings of the end screw. Fig. 15 is another view of the same, showing the universal joint. Fig. 16 is a vertical section of the central raising and lowering screw, the carriage-well, and connecting-gear. Fig. 17 is a fragment of the vessel-hull, showing a side fan in place, also the ribs forming the bases of the fan, the knuckle-joint by which it is secured and on which it moves, and the cables passing inward through the hull, by which the fan is handled.

Similar letters of reference indicate corresponding parts.

Arranged over the top of the vessel, covering the gas-field A, is a thin metal roof, D, secured to the upper longitudinal chords b b' b^2 and periphery of the bulk-head j j j. The metal bulk-heads, forming part of and rising up from the hull B, form the lateral and vertical supports of the vessel and hull, and provide seats for the sections A of the gas-field. d d', together with the chords b b' b^2 and the keelson chord d^2, form the longitudinal bracing-chord of the vessel and extend over the vessel from bow to stern, where they are secured, and passing over or through the periphery of the bulk-heads j, to which they are made fast, support the vessel longitudinally. The hull B of the vessel is made sharp fore and aft and is divided horizontally into decks and vertically into compartments, and the cabin B′ of the ship protrudes from within to part of its depth below the hull, and is provided with doors, windows, and other conveniences for light and air, and internally is provided with accommodations for living. The gas-field A may be constructed of silk, canvas, thin metal, or

other suitable material, and in sections of a size to fit between the bulk-heads *j* longitudinally the dome-ridge chord *b*, keelson-chord d^2 vertically, and the lateral chords *d d'* laterally, and each section is preferably divided internally into subsections by partitions having automatic valves, and provided with an air-sack communicating with the outer air by suitable valves. (Not shown.) E is a smoke-stack passing up through a chimney in the gas-field from the hull to the outer air. The frame of the vessel may be constructed of any light, firm, substantial material that will serve the purpose. I prefer, however, to construct the frame of my vessels of hollow tubing or channel-steel, as better adapted to combine great strength with lightness and firmness, and to secure the several intersections thereof in suitable central, intermediate, elbow, sleeve, and terminal angle-blocks, and to protect the angles and other parts with rubber bolsters.

c is a long light fin-shaped rudder-blade secured by the smaller end through a pivot-joint near the waist amidships to and ranged along on the under side of and conforming to the tapering end of the gas-field to a vertical projecting frame, *c'*, where the larger outer end, provided with gear or other wheels, is secured and works in ways confined in the horizontal bar c^2, forming the segment of an arc, for steering the ship's course laterally. The rudder *c*. preferably one at each end, is handled by tiller chains or cables c^3, secured to the outer large end and carried over suitable pulleys inboard, where they are handled by steering wheels or levers.

l is a fan constructed of ribs covered with any light flexible material, secured by its inner end, through a knuckle-joint, to the outer end of a lateral shaft passing from within out through the side of the hull B, or to a projection formed on the rib of the gas-field of the vessel on both sides, and it opens and closes like a fan. That device is operated by cables or chains secured thereto, and passing thence to within the vessel to suitably-arranged machinery, where they are manipulated for handling, opening, and closing the fans. The fans *l* are arranged at intervals from stem to stern along both sides of the hull B, and are designed to aid the rudder *c* in steering and changing the lateral course of the vessel and in checking its course, and when desired the fans may be used as sails. To illustrate, by opening the fans on one side of the ship, acting on the principle of an oar or paddle in the water, the ship turns in that direction. By opening the fans on both sides, unless the wind be favorable, the course of the ship is checked. Should, however, the wind be favorable, the fans can be used as sails. The fans *l* are designed to open and project their entire diameter beyond the side of the vessel, or to be wholly closed and put up out of the way.

p is an end screw, built of any light material, on a substantial frame, and mounted on a longitudinal axle-shaft, *p'*, supported in brackets and bearings in the hull and within the vessel. The shaft *p'* passes through the end of the hull B to within the vessel, where it is geared to and actuated by internally-arranged propulsive machinery. A screw, *p*, may be mounted at one end of the hull only; but I prefer to mount one at each end of my ship, as the ship is designed to sail either end forward with equal facility.

In addition to propelling forward and backward, the end screws may be employed for the purpose of steering, as follows: The end screw is mounted in a journal-boxing secured in a shifting carriage arranged in ways and connected with the impelling-shaft of a universal joint, as shown in Figs. 14, 15, in which arrangement *s* is a movable carriage having a journal-bearing, *s'*, for the screw-shaft *p'*, and is provided with guides s^2 at top and bottom, by which it is secured in its ways. s^3 is a universal joint, and s^4 is a lever for throwing into and out of gear. When it is desired to change the course or tread of the screw *p*, the carriage *s* is moved to starboard or port, as may be necessary, thus carrying the movement of the screw to that side, and thus bringing the vessel around as on a pivot. A light substantial screw, G, secured on an axle-shaft, *n*, having journal protuberances *n'*, and carrying an impelling-screw, *o*, on the opposite end, and mounted in annular journal-bearings *v v'* on the inside and near the opposite end of a movable carriage, F, the latter provided externally with shoulders *k k'*, racked gear v^2 v^3 and ways by which it is handled, is adjusted vertically in ways within a well, *z*, extending up through the bottom into the hull of the vessel, where it is geared with internally-arranged machinery and made to revolve on its axis, and is employed in raising and lowering the vessel vertically, as is more fully shown in another case now pending.

q q are fins, secured to revolving shafts passing from within out through the sides of the vessel's hull B at intervals from bow to stern on both sides, employed to aid in deflecting the vessel's vertical course in crossing mountains, &c. The fin *q*, like the fan *l*, may be constructed to open and close, is secured by a knuckle-joint on the end of its shaft, which, passing through the side of the vessel to within the hull, is geared with propulsive machinery for handling the same. The fin may be set at any desired angle necessary to deflect the vertical course of the vessel, as is more fully shown in another case pending.

The side propelling-screw, *a*, is constructed of any desired size on a light substantial frame covered with suitable flexible material, and has a wind, the best adapted to rapid travel and to impelling the vessel forward with great speed. The screw *a* is mounted on a journal-shaft, *a'*, which extends through and protrudes from each end of the hub, and which, besides supporting the screw *a* in journal-bearings *i'* in the outer ends of the parallel hollow beams

x x' protruding in pairs from the opposite sides of the vessel's hull at intervals from bow to stern, carries gear-wheels i i or pulley-wheels e e at each end, through which it is geared with and impelled by internally-arranged machinery. The protruding beams are substantially secured by longitudinal bracings x^2 and vertical bracings x^3, to support the strain of the screw a. The several screws a are made to have a uniform tread, and are balanced on their journal axles or shafts a' in the journal-boxings i' in both protruding beams x x' in such a manner that the gearing, cogged wheel i or pulley-wheel e, will come within the chamber of the hollow beams x x', where, through a connecting-shaft, i^3, and gear-wheels i^4 i^5, or an endless belt, e', and a drum, e^2, it is geared to and impelled by propulsive machinery arranged within the vessel. The beams x x', projecting in pairs from the sides of the vessel, may be of any required diameter, may be hollow tubes or cylinders, or only channel-iron, or, for that matter, may be solid, and in length need be but a trifle longer than one-half the diameter of the screw a, and have arranged over the axle journal-bearings i' an oil-cup, i^2, regulated by a lever-valve handled from within the vessel, for lubricating the screw journal-axle. Within the cylinders or beams x x' are bearings for gear-shafting or gearings and idle-belt rollers e^3, to prevent friction. When mounted in the projecting beams x x', the side screw, a, is connected with propulsive machinery within the vessel, and revolved on its axis by the endless belts e' or gear-shafting i^3 through the pulley-wheel e or gear-wheel i, secured on the axle thereof. (See Figs. 6, 7, 8, 9, 10.)

In lieu of the projecting beams x x', wheel-houses m m', having an abrupt end and falling away by diminishing lines to nothing, may be protruded from the sides of the hull from stem to stern. When the wheel-houses m m' are employed, the side propelling-screw is carried on the end of an axle-shaft, h, extending from one side of the screw, and which, in passing through the abrupt end of the wheel-house m, takes bearings therein and in journal-bearings within the house. The axle-shaft h may be made to carry a pulley-wheel, h', or a gear-wheel, g, and connect through a belt, h^2, with a propelling-drum, h^3, or through a gearing-shaft, g', carrying gear-wheels g^2 within the vessel, with propulsive machinery. (See Figs. 2, 3, 4, 11, and 12.)

It is obvious that either of the two features shown in Figs. 11 and 12, or that shown in Fig. 13, where in lieu of either the wheel-house or projecting beams an angular frame is employed, can be used to carry the side screw, the idea being to carry the side screws in immovable or stationary supports, as contradistinguished from the movable supports employed by other inventors, which have not been entirely satisfactory, besides necessitating the employment of extra machinery of great weight, additional power, requiring an increased quantity of fuel and propulsive machinery and heavier frame-work to support it, besides the great danger and risk of its getting out of order and repair.

Instead of relying upon one set of screws for propelling, raising, lowering, and steering aerial vessels, as heretofore attempted, I find that I can economize weight and power and gain strength and efficiency by employing different screws for different purposes, and distributing to each its legitimate function. To illustrate, by my raising and lowering screw G, I propose to make vertical ascents and descents; by the end screw, p, the rudder c, and the side fans, l, to guide and steer the vessel laterally; by the side propelling-screws a and the fins q, I purpose moving longitudinally and deflect vertically, so that after having obtained a position in mid-air, and started the side screws, I am not required to stop or slacken them for the purpose of turning or varying the points of the compass or ascending or descending, unless it be necessary to move immediately vertically.

While I have here shown and described somewhat in detail the construction and form of the vessel, the arrangement and use of the fans and fins, and the central screw and its connection, I do so merely to show the relations of the several parts to each other; but as I have heretofore—to wit, November 8, 1883—filed and have now pending in the Patent Office applications for patents bearing Serial Nos. 111,236, 111,238, 111,239, and 111,240, covering these features, I do not purpose claiming them, broadly, here; but

What I do esteem as new, and desire to protect by Letters Patent, is—

1. In aerial vessels constructed on one common frame and comprising a gas-field, hull, and cabin in compact form, series of stationary parallel hollow beams x x', arranged horizontally in pairs at right angles to and projecting from both sides of the vessel's hull, and provided in the outer ends with journal-boxings i, for receiving propelling side screws, a, and lubricating-fountain i^2, and with internally-arranged gearing machinery for engaging with and actuating propelling side screws, the whole constructed and arranged substantially as pointed out.

2. In aerial vessels constructed on one common frame, series of stationary parallel hollow beams x x', arranged horizontally in pairs at right angles to and projecting from both sides of the vessel's hull, and provided in the outer ends with journal-boxings i, for receiving propelling side screws, a, and lubricating-fountains i^2, and with internally-arranged gearing machinery for engaging with and actuating side screws, in combination with propelling side screws, a, the whole constructed and arranged substantially as shown and described.

3. In vessels for aerial navigation, beams x x', arranged horizontally in pairs parallel to each other projecting from the sides of the vessel's hull at right angles thereto, and car-

rying side propelling-screws connected with and actuated by machinery arranged within the hull of the vessel through suitable gearing machinery arranged within the beams, substantially as shown and described.

4. In vessels for aerial navigation, hull B, and stationary parallel hollow projecting beams $x\,x'$, in combination with side screws, a, axle-shaft a', gear-wheel i, axle-boxings i', connecting gear-wheel i^4, connecting-shaft i^3, gear-wheel i^5, and impelling gear-wheels i^6, for propelling such vessels, substantially as shown and described.

5. In vessels for aerial navigation, hull B, projecting beams $x\,x'$, securely braced in place, in combination with side screws, a, axle-journal a', journal-boxings i', lubricating-fountain i^2, and connecting propulsive gear extending to within the hull for propelling such vessels, substantially as shown and described.

6. In combination in aerial vessels constructed in compact form on one common frame, embracing the gas-fields A, hull B, cabin B', and provided with projecting beams $x\,x'$ for supporting the side propelling-screws, a, center vertical screw, G, mounted in bearings in movable carriage F for raising and lowering the vessels, adjustable fins q on the sides of the vessel for deflecting its vertical flight, fans l, secured to the sides of the vessel, and rudder-blades c, for steering the vessel laterally, and screw p for propelling forward, all arranged and connected into a common whole for raising, lowering, steering, propelling, and varying the course of vessels for aerial navigation, substantially as shown and described.

7. In combination, an adjustable and propelling and steering screw, p, protruding out beyond, and mounted and taking bearings in, suitable supporting-brackets, and a movable carriage transversely placed and secured and operated in fixed ways m, laterally constructed in the end of the vessel's hull, and connected with and operated by propulsive machinery within the vessel through horizontal gearing, actuating-shaft intersected within the hull by a universal joint for propelling and changing the course of vessels for aerial navigation, substantially as shown and described.

8. In combination, side propelling-screws, a, axle-shaft h, journal-boxings i', stationary parallel hollow beams $x\,x'$, arranged in pairs at right angles to and projecting from both sides of the vessel's hull, connecting-gear arranged within the beams $x\,x'$, propulsive machinery within the vessel, and vessels for aerial navigation, substantially as shown and described.

9. For mounting and handling end propelling and steering screws in vessels for aerial navigation, shifting carriage s, provided with journal-bearings s' and guides s^2, and adjusted in and in combination with ways arranged in a transverse aperture in the end of the vessel's hull, and shifting gearing machinery as shown, the whole constructed and arranged substantially as indicated.

10. The combination of adjustable propelling-screw p, revolving shaft p', intersected by a universal joint, s^3, pending bracket p^2, journal-bearings s', shifting carriage s, adjusted in horizontal ways laterally placed in the end of the vessel's hull, and vessel for aerial navigation, constructed and arranged substantially as shown and described.

11. In combination, the movable carriage s, mounted and operated in fixed ways constructed in the end of the vessel's hull, and provided with journal-boxings s' for the axle-shaft p' of the end screws, p, the connecting and actuating gearing as shown, axle-shaft p', and universal joint s^3, for adjusting, handling, and actuating the end steering and propelling screws in vessels for aerial navigation, substantially as shown and described.

12. In combination, side propelling-screws, a, mounted in fixed supports and actuated by machinery within the hull through proper gearings, and the revolving and adjustable side fins, q, also handled by machinery within the vessel's hull for propelling and vertically deflecting the flight of vessels for aerial navigation, substantially as shown and described.

13. In combination, side propelling-screws, a, mounted in fixed supports protruding from the side of the vessel, and actuated by machinery within the hull through proper connecting-gear, and adjustable side fans, l, for varying the lateral course of vessels for aerial navigation, substantially as shown and described.

14. In combination, side propelling-screws, a, mounted in fixed supports protruding from the side of the vessel and actuated by machinery within the hull through proper connecting-gear, and fin-shaped rudder-blades c, secured in ways in frame c', for steering vessels for aerial navigation, substantially as shown and described.

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

EUGENE F. FALCONNET.

Witnesses:
GEO. M. FLETCHER,
W. D. TALBOT.