(No Model.)

5 Sheets—Sheet 1.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,885. Patented Feb. 10, 1885.

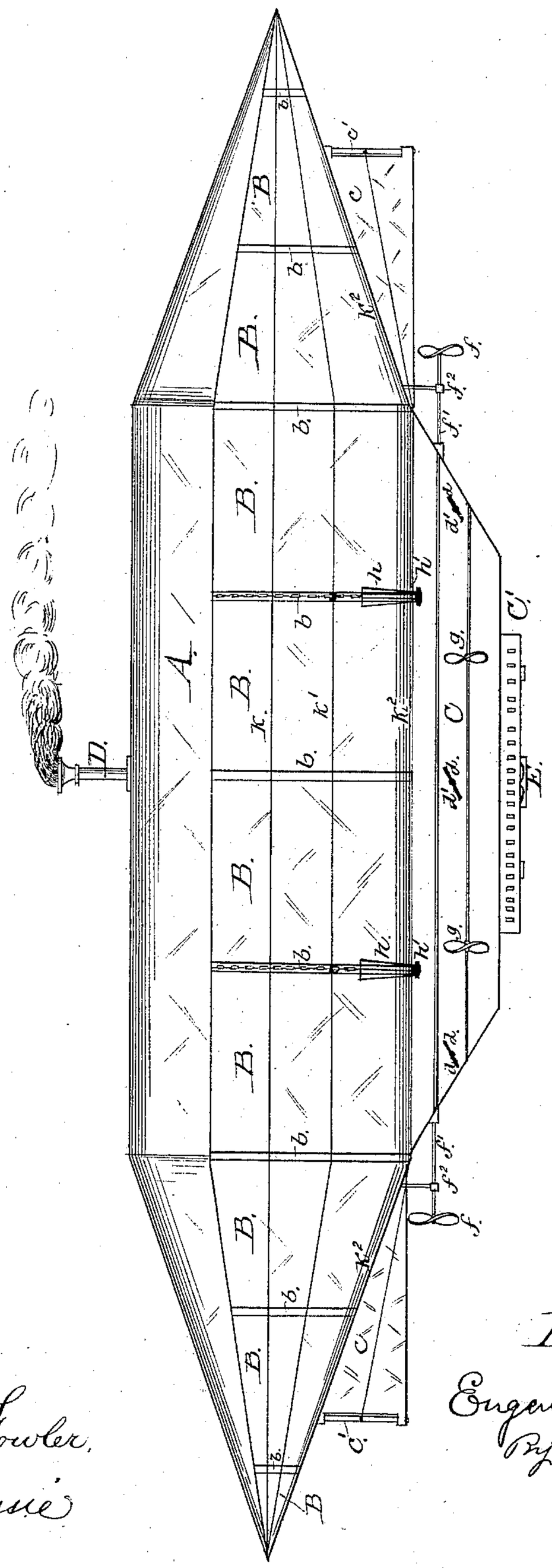

Fig. 1.

Attest;

S. Waller Fowler.

Henry Glassie

Inventor;

Eugene F. Falconnet

By Glassie

his attorney.

(No Model.) 5 Sheets—Sheet 2.

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Fig. 2.

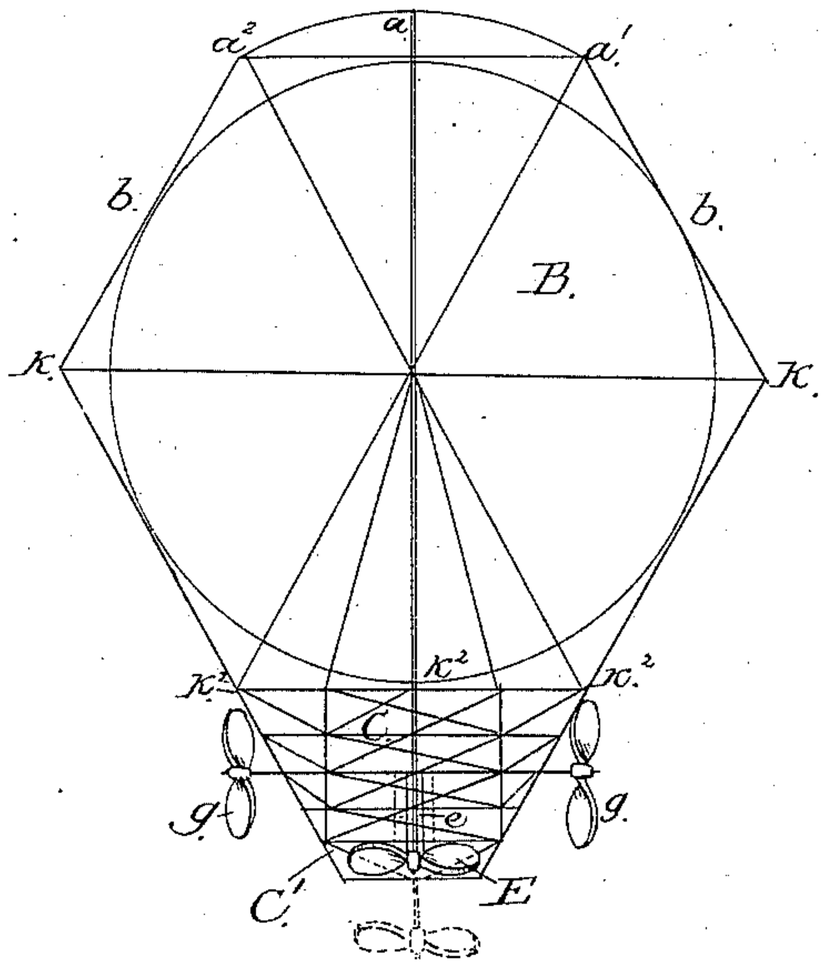
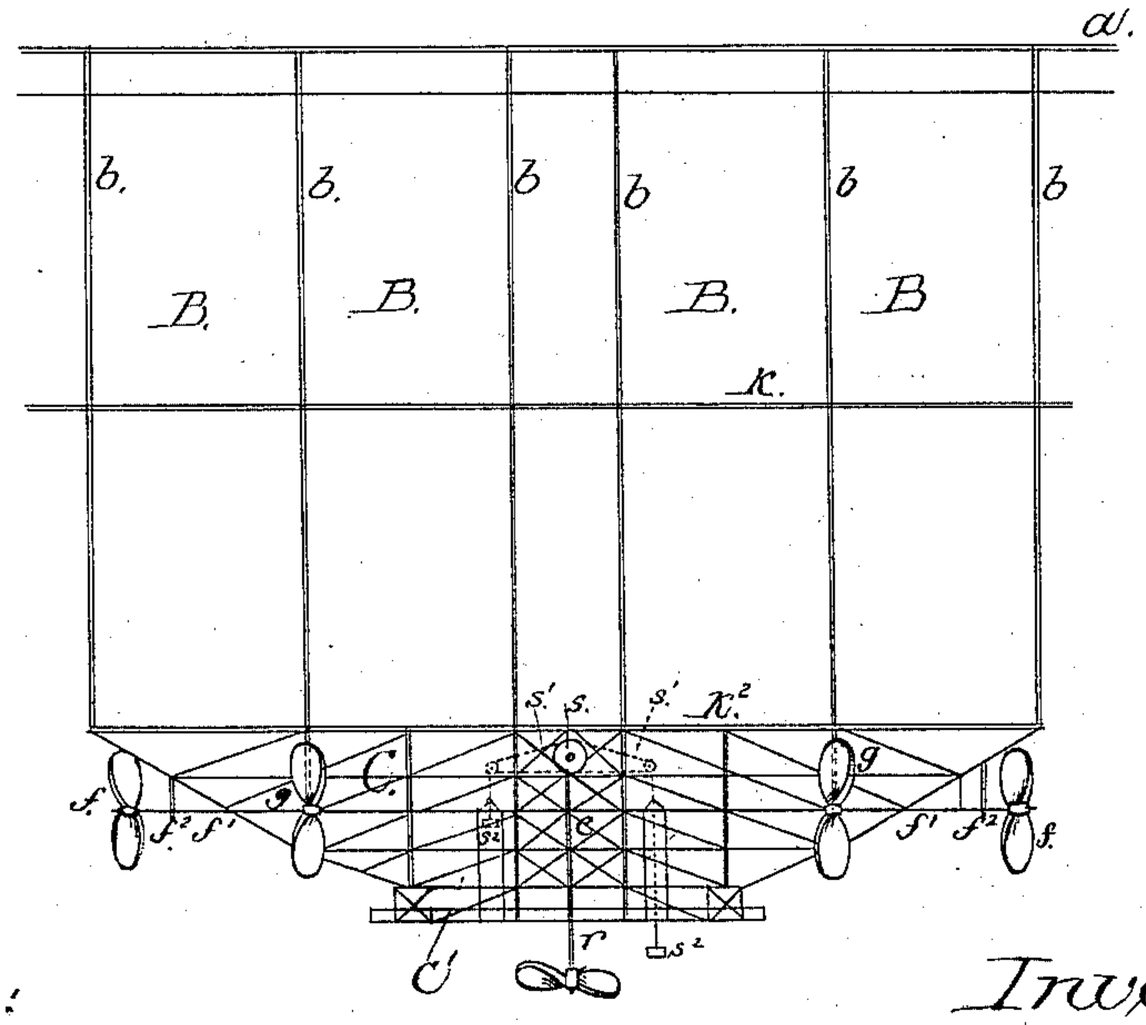


Fig. 4.



Attest:

S. Walter Fowler.

Henry Glassie

Inventor;

Eugene F. Falconnet.

By Glassie

his attorney.

(No Model.) 5 Sheets—Sheet 3.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,885. Patented Feb. 10, 1885.

Fig. 3.

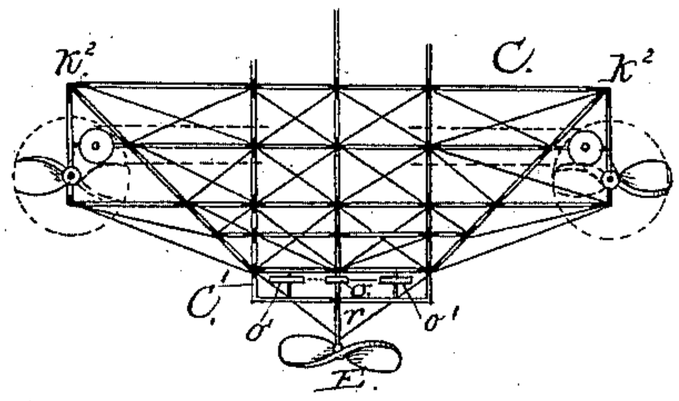


Fig. 5.

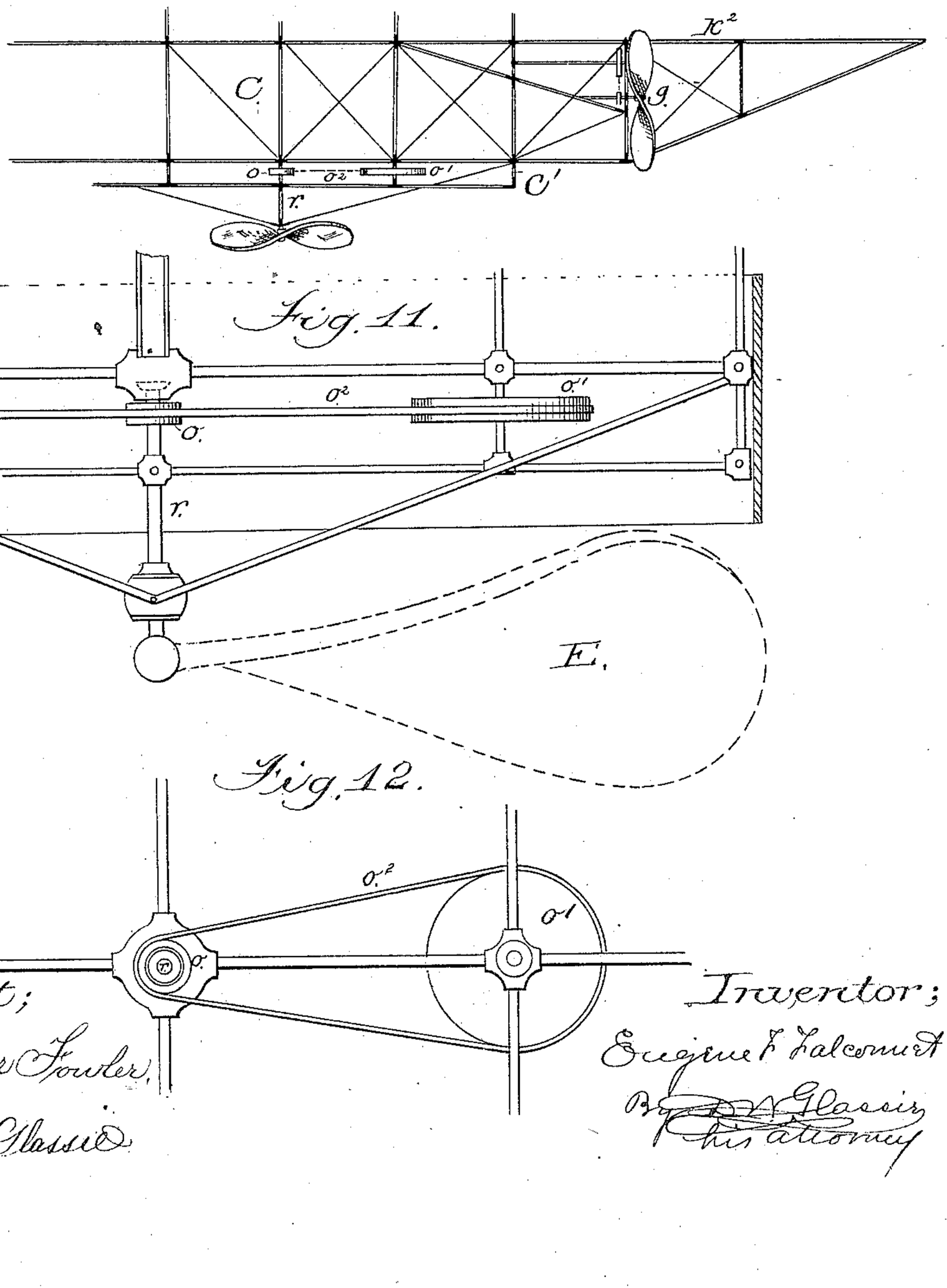


Fig. 11.

Fig. 12.

Attest;
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(No Model.) 5 Sheets—Sheet 4.

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No. 311,885. Patented Feb. 10, 1885.

Fig. 6.

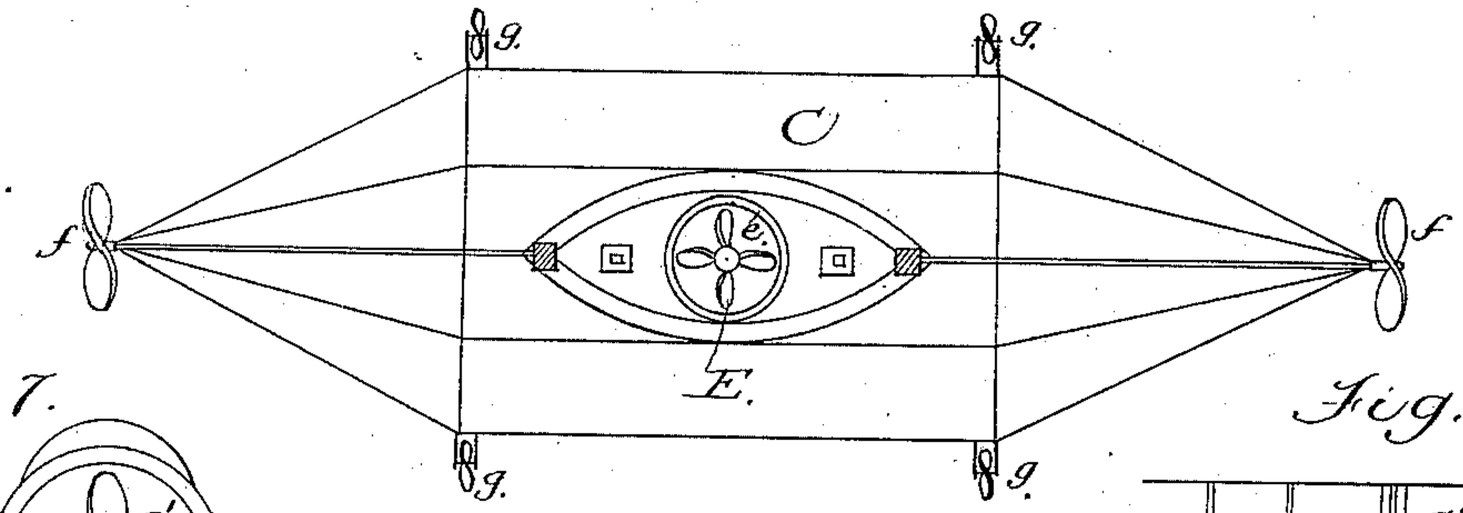


Fig. 7.

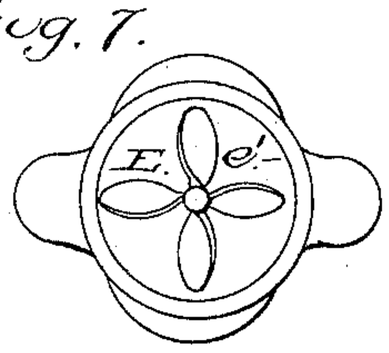


Fig. 10.

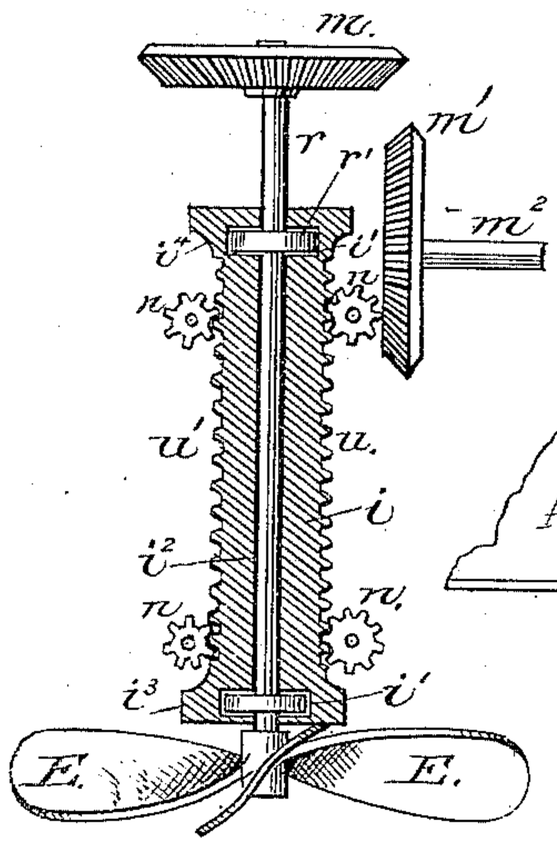


Fig. 13.

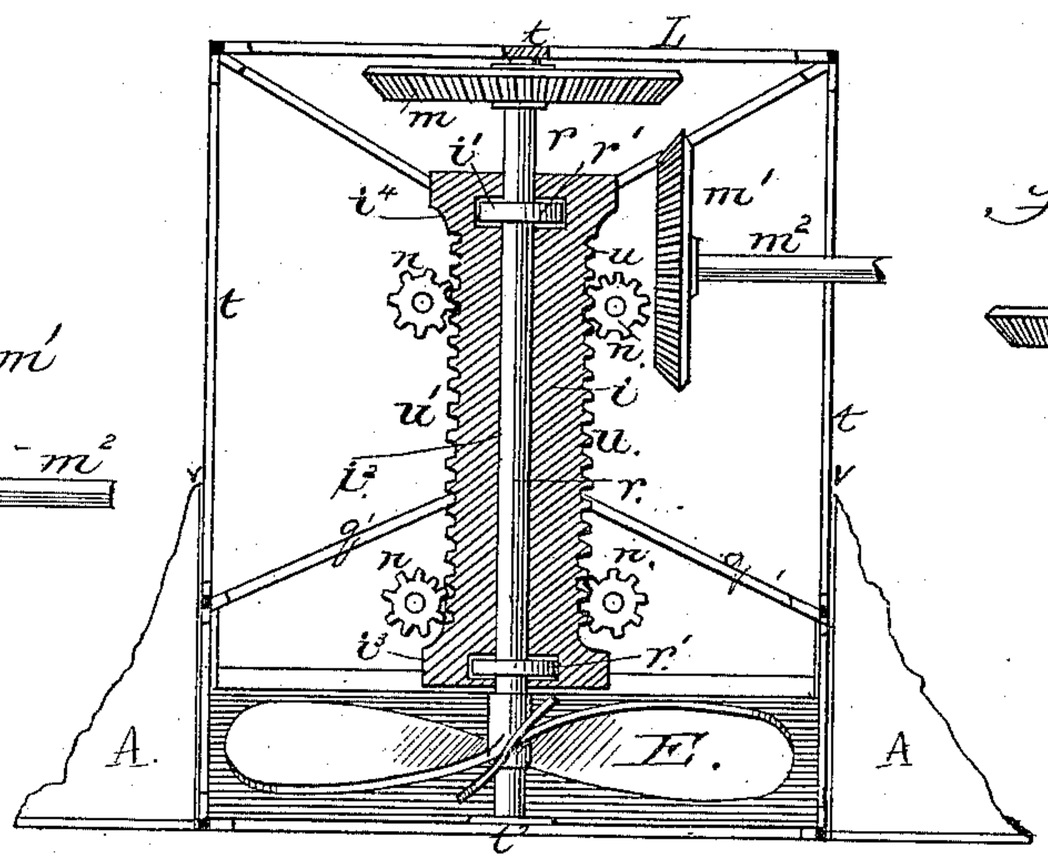


Fig. 14.

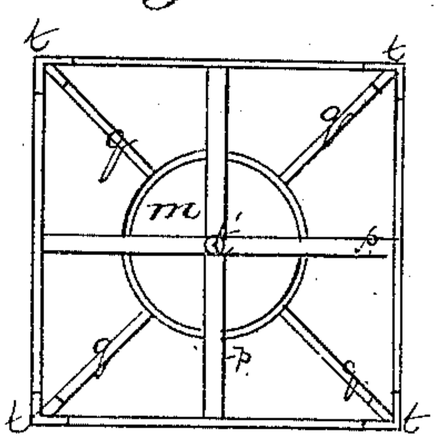


Fig. 8.

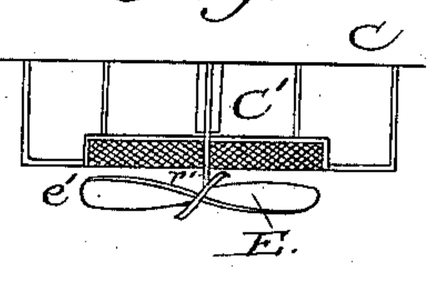
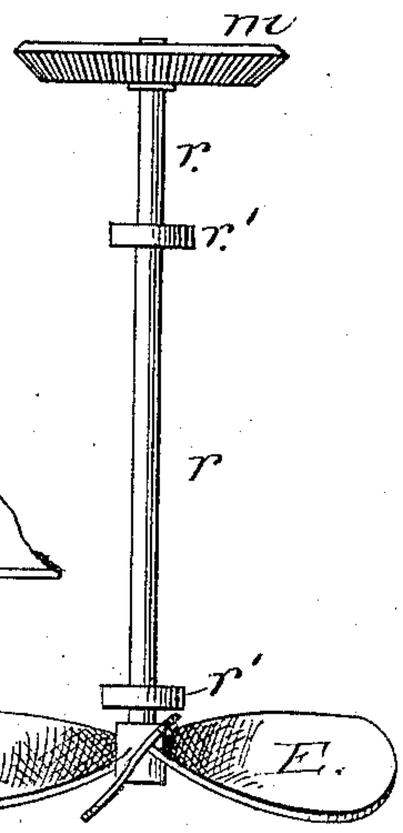


Fig. 9.



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J. Walter Fowler
Henry Glassie

Inventor:
Eugene F. Falconnet
By [illegible] Glassie
his Attorney.

(No Model.) 5 Sheets—Sheet 5.

E. F. FALCONNET.

VESSEL FOR AERIAL NAVIGATION.

No. 311,885. Patented Feb. 10, 1885.

Fig. 16.

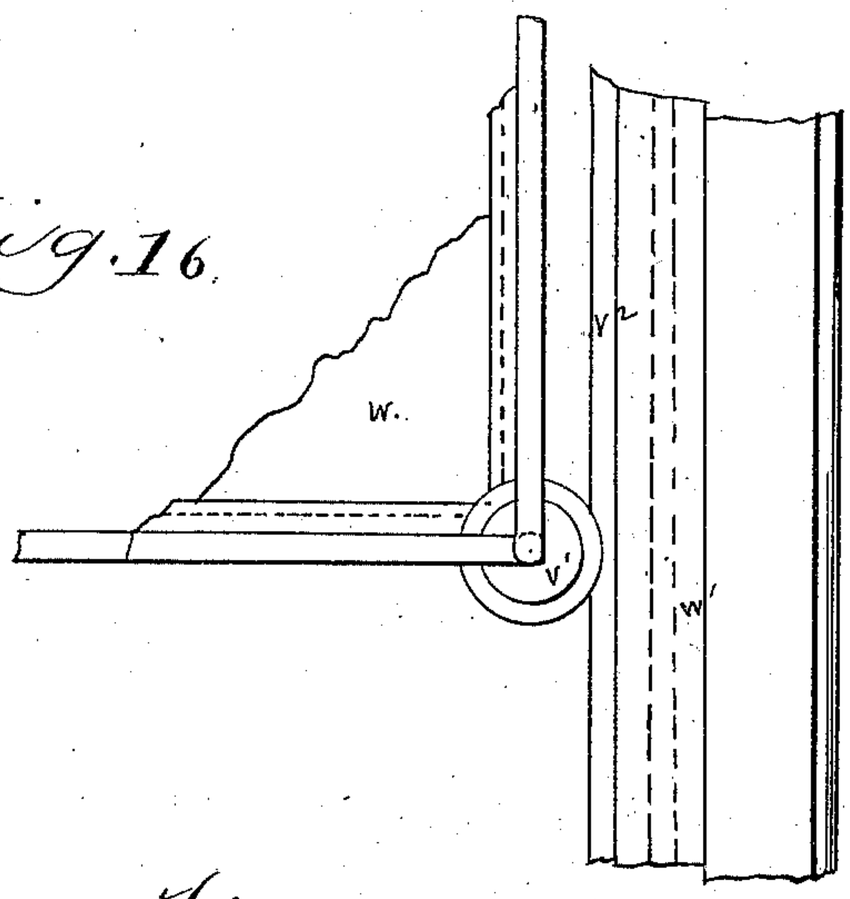


Fig. 17.

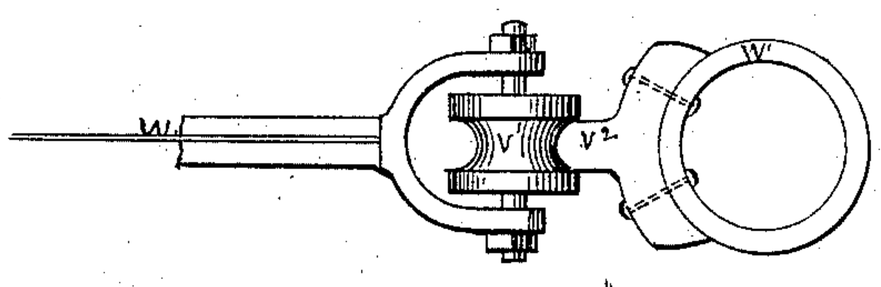


Fig. 18.

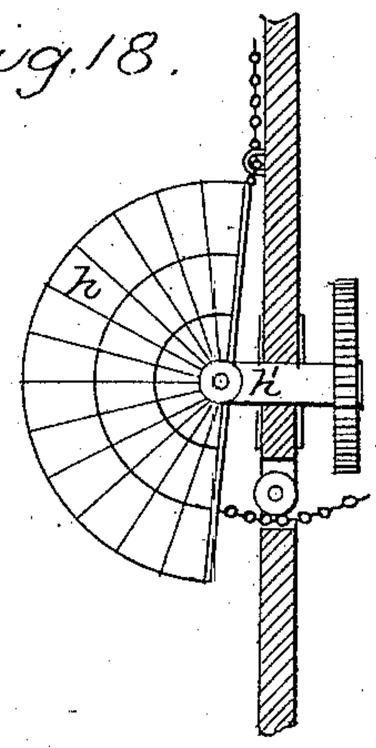
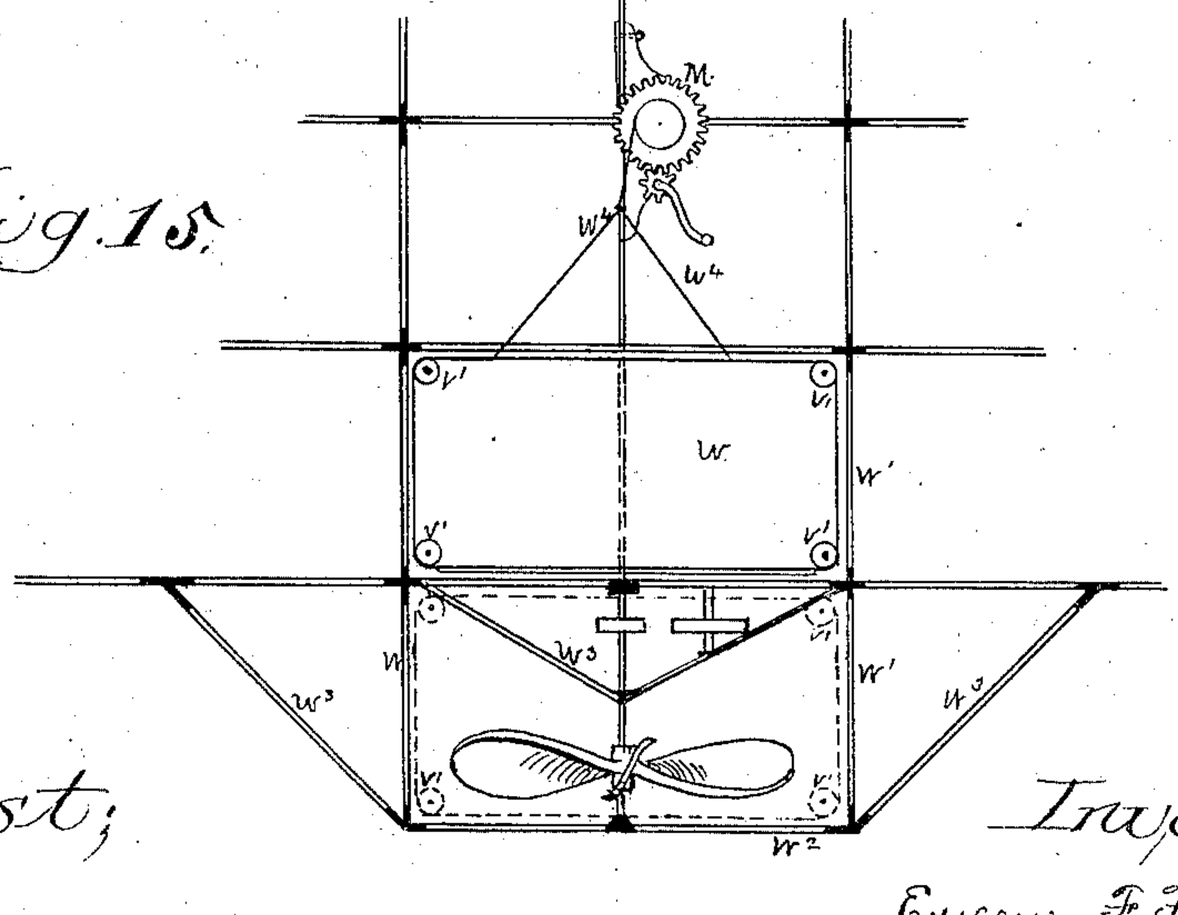


Fig. 15.



Attest;

S. Whittemore,

Henry Glassie

Inventor;

Eugene F. Falconnet

By D. K. Glassie

UNITED STATES PATENT OFFICE.

EUGENE F. FALCONNET, OF NASHVILLE, TENNESSEE.

VESSEL FOR AERIAL NAVIGATION.

SPECIFICATION forming part of Letters Patent No. 311,885, 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 that class of aerial vessels that are designed to be impelled, handled, and steered by actuating machinery arranged within the hull through external appliances; and it consists in introducing into such vessels an adjustable central vertical screw through which the vessel, when at equipoise, may be raised into mid-air or lowered thence to the earth.

It also consists in the manner of mounting such screw in a movable carriage secured in ways and arranged to be lowered into position or raised into its housing; or it may be mounted in stationary and fixed bearings partly within the hull and partly in a metal frame below the hull, where it may be housed by lowering about it a box-housing; also, in the method of connecting such screw with propulsive machinery within the hull and revolving it in either direction on its axis.

Figure 1 is a side elevation of a complete vessel, showing the gas-field, hull, cabin protruding therefrom below, side propelling and end propelling and steering screws, vertical flight-deflecting fins, lateral flight-deflecting fans, steering apparatus, and the vertical central screw protruded from its housing for use. Fig. 2 is a vertical cross-section of the same, taken at the central vertical screw, showing the screw housed in full lines, and in position for use in dotted lines, showing, also, the gas-field, hull, bracings, and two side propelling-screws. Fig. 3 is a vertical cross-section of the hull, taken amidships, showing the mode of bracing and supporting the hull, the location of central, raising, and lowering screw and projecting frames in which side propelling-screws are mounted and supported. Fig. 4 is a longitudinal vertical section of a fragment of the gas-field and hull, taken through the central lines, showing the longitudinal bracing of the hull, the location of the central raising and lowering screws, fore and aft screws, and side propelling-screws, showing, also, the mode of raising and lowering the central screw and its ways. Fig. 5 is a modification of the same, with the gas-field omitted. Fig. 6 is a plan of the hull, looking up from the bottom, showing the side and end screws and the central vertical screw housed, and outlooks fore and aft of it. Fig. 7 is an under plan of the well for housing the vertical screw, showing the screw in place. Fig. 8 is a vertical cross-section of the same, showing the movable carriage in its ways and the vertical screw lowered for use. Fig. 9 is the vertical screw and axle-shaft, showing an actuating gear-wheel on the end and projecting journal-shoulders intervening. Fig. 10 is a vertical section of the movable carriage, showing the vertical screw mounted on its axle-shaft, carrying a gear-wheel at the opposite end and mounted in its bearings within the carriage, the carriage having external racked gear, showing also cogged gearing-wheels by which it is moved into and out of position, and the gearing propulsive wheel. Fig. 11 is a modification of the same, showing the vertical screw connected and actuated by beltings and pulley-wheels. Fig. 12 shows the belt-connections of the latter. Fig. 13 is an elevation of the raising and lowering screw and a vertical section of the screw-carriage, and a strengthening-frame, in which it is partially supported. Fig. 14 is a plan of the screw-carriage frame, looking down from the top, showing the gear-wheel through which the screw is revolved on its axis. Fig. 15 is a fragment of the vessel's hull, showing one of the panels of the screw-housing lowered into position, the arrangement by which it is lowered, and the frame for supporting as well the housing as the screw. Fig. 16 is a vertical fragment of the hull-frame and of the frame of a panel, showing the track, ways, and grooved wheel for lowering and raising the panel into and out of position; Fig. 17, cross-section fragment of the same. Fig. 18 is a vertical fragment of the side of the vessel's hull, showing a side fan mounted on the outer end of a shaft passing outward from within the vessel, together with the multiple joint by which the

fan is secured to the shaft, and the cables by which it is opened and closed.

Similar letters of reference indicate corresponding parts.

A is a thin metal roof, secured to the topmost longitudinal chords *a a' a²* and the vertical bulk-heads *b*, and extending over the upper portion of the vessel covering the segregated gas-field B, fitted and secured between the bulk-heads *b*.

k and *k'* are longitudinal chords, and *k²* is the keelson-chord, all employed in supporting and strengthening the vessel longitudinally.

C is the hull of the vessel, and C' is the cabin, protruding below the hull, which is divided horizontally into decks and vertically into compartments.

D is a smoke-stack passing, by way of a properly-constructed fire-proof chimney or well, up through the gas-field from the hull to the open air.

The frame of the hull of such vessel may be constructed of any light strong durable material and be properly inclosed; but I prefer to construct it of tubing or channel-steel, secured at the several intersections by suitable angle-blocks, and to inclose it within a thin metal sheeting.

The gas-bags B, which give buoyancy to the vessel, may be constructed of silk, linen, canvas, or thin metal or other suitable material, and are preferably divided internally into compartments by thin partitions having automatic valves, and may be provided with internally-arranged safety air-sacks, communicating with the outer air through proper connecting-valves.

c is a long fin-shaped rudder blade, secured at the waist amidships by the smaller end, and extending along on the under side of the diminishing ends of the vessel toward the nodes to vertical projecting frames *c'*, where the larger end is secured and works in ways for changing the lateral course of the vessel.

h is a fan secured by its inner end, through knuckle-joint *h'*, to the outer end of a shaft which passes from within out through the side of the vessel's hull C, or to protuberances on the ribs of the bulk-heads *b*, and is opened and closed like a fan, and operated by cables or chains secured thereto, and carried over suitable wheels or pulleys to the interior of the vessel, where they are handled by machinery. The fans *h* are arranged at intervals fore and aft between the ends of the hull, along both sides of the vessel, and are designed to aid the rudder *c* in changing the lateral course of the vessel.

f is an end screw, mounted on a longitudinally-placed axle-shaft, *f'*, supported in brackets *f²*, and after passing through the hull to within the vessel is geared to and actuated by propulsive machinery therein. A screw, *f*, may be provided, one at each end of the vessel, or at one end only, as may be preferred, and as well for steering the vessel laterally as for propelling forward.

g are side propulsive screws, mounted in projecting beams, arranged in pairs along the side of the hull for the purpose, or at the end of wheel-houses constructed thereon, as shown. The side screws, *g*, are arranged along the sides of the hull at intervals, and are connected by belting or shafting with and actuated by machinery arranged within the hull, and are employed to impel the vessel forward either end front.

d is a revolving side fin, arranged along the sides of the hull on both sides, employed to aid in deflecting the course of the vessel vertically in crossing mountains, &c. The fin *d* may be secured by a knuckle-joint, and, like the fan *h*, may be constructed to open and close like a fan. The fin *d*, however, is preferably rigidly secured by one end to a revolving shaft, *d'*, passing through the sides of the vessel to within the hull, where, by suitable gearing, it is connected with and actuated by propulsive machinery.

Passing from below upward through the bottom of and into the hull C is a well, *e*, constructed with a view to providing ways for the carriage *i* of the vertical raising-and-lowering screw E. The well *e* is connected by suitable apertures with the interior of the hull, through which machinery for handling the carriage *i* and actuating the screw E is introduced, and terminates in a recessed curbed chamber, *e'*, at the outer end, in which the screw E is housed when not in use.

E is a light substantial screw, with a sufficient curvature to give it great traveling force, mounted on an axle-shaft, *r*, having journal protuberances *r'*, by which it is journaled in its seat, and carrying a beveled gear-wheel, *m*, at the opposite end, through which momentum is communicated to the screw by gearing with the bevel-wheel *m'*, carried by a propelling-shaft, *m²*, connected with actuating machinery when the screw E is needed for use and has been thrown into gear. The screw E is mounted in annular journal-boxings *i*, near the top and bottom, in the bore *i²* of the movable carriage *i*, where it is operated, when used. The movable carriage *i* may have any external form, need be but long and heavy enough to give steadiness to the screw E, and is provided externally with a projecting shoulder, *i³ i⁴*, at the bottom and top to prevent the carriage *i* going too far, ways on the sides to steady it in place, and racked gear *u u'*, for mechanically throwing it into and out of gear, and internally with a bore, *i²*, and annular journal-boxings *i'*, for receiving and securing the screw axle-shaft *r* and journal protuberances *r'* in place.

With a view to giving steadiness to the carriage *i*, the screw E, when lowered into position below the hull for use, has a frame, L, of metal tubing or channel-iron, consisting of four or more vertical uprights, stanchions, or posts, *t*, laterally supported by horizontal chords *p*, and diagonal braces *q q'*. The supporting-frame L provides an additional journal at top *t'*

and at bottom t^2 for the screw E, and is steadied and works in ways v in suitable vertical beams arranged within the hull of the vessel.

It is obvious that the screw may be secured in stationary supports, and, when it is requisite to house it, panels w may be lowered down over it, thus forming a boxing or housing below the hull. When the screw is mounted in fixed bearings, a metal frame of tubing or channel-iron is constructed below the hull and cabin proper, in which w' are posts, w^2 are longitudinal and lateral chords, w^3 are end braces, w^4 are cables for raising and lowering the panel out of and into position, and M is a crab by which the panels are handled.

v' is a grooved wheel employed in steadying the panels while being handled, and v^2 is a vertical rail on which the grooved wheel v' travels. The panels w are provided on the ends with grooved wheels v', which ride on their own axles in suitable journal-bearings, and with a cable, w^4, which, passing upward into the hull, is carried over a crab, M, handled by machinery, for raising and lowering the panels out of or into place. The vertical posts W′ are provided with a vertical rail or track, v^2, on which the grooved wheels v' run.

The vertical screw E, for raising and lowering the vessel when mounted in its movable carriage i, is arranged in its ways within the well e, and the cogged wheels $n\ n'$ are made to gear with the cogged rack $u u'$, secured on the outside of the carriage i, and the connections made with the propulsive machinery within the hull of the vessel. When not required for use by the cogged wheels $n\ n'$, the carriage i is carried upward into the well e until the screw E is completely housed in the curbed recess e', and everything is snug and out of the way; but when required for use, by the same cogged wheels $n\ n'$ the carriage i is lowered until the screw E protrudes below the hull and the bevel gear-wheels $m\ m'$ are brought in contact and gear with each other, when the screw E may be actuated in either direction to carry upward or downward.

It is obvious that band-wheels may be substituted for the gear-wheels $m\ m'$, and the screw E be impelled by an endless belt, as shown in Figs. 3, 5, 12, and 13, wherein o is the band-wheel on the screw-shaft r.

o' is the propelling-drum, and o^2 the endless belt. It is also apparent that in lieu of the racked gear $u\ u'$ on the carriage i, and the gearing-wheels $n\ n'$, for raising and lowering the screw E out of and into gear, band-wheels or any other mechanical device may be employed for that purpose, and the carriage i may be balanced by weights, as shown in Fig. 4, where s is a general drum, s', cables for suspending the carriage i, and s^2 ballast or weights for holding it in suspension.

When preparing an aerial vessel for a trip, the vessel and cargo are brought to equipoise on the ground by inflating the gas-field to that point, the central screw is then thrown into gear and revolved rapidly on its axis to travel upward, which overcoming inerta carries the ship upward into mid-air, where as it rises into a lighter atmosphere and the displacing gas is more thoroughly inflated or expanded, the ship readily retains its position. Having attained the altitude desired, the side and end screws are set to work and force the vessel forward on her course, the central screw in the meantime being thrown out of gear and housed in the well, and the fins d brought into use for deflecting the vessel's course vertically—that is to say, by being set at angles tending upward, downward, or horizontally, as may be desired, the fins d direct the course of the vessel upward or downward, or without deviation in a plane. In the meantime the vessel is being steered on her course laterally by the rudders c and side fans, h, and when obdurate by the end screws, f, and vertically by the fins d.

By my central screw I essay simply to overcome the difficulties of raising and lowering aerial vessels. The screw being at the center of weights and gravitation, everything is carried up with it simultaneously, so that, unless badly loaded, no part of the vessel can rise faster than another, and immediately the screw is no longer needed it is thrown out of gear and housed, so that no unnecessary angles or obstructions are exposed to the air-currents.

While it is true I have shown in my drawings and described in my specification in this case generally the form, construction, general appointments, and arrangement of aerial ships, the mode of mounting, securing, and operating side fans and end adjusting rudder-blades for deflecting the lateral course of aerial vessels, adjustable side fins for deflecting the vertical course of aerial vessels, and the mode of mounting and operating side and end propelling-screws for aerial vessels, I do so merely to show the construction of a complete ship and the relation of each part to the other. As I filed on the 8th of November, A. D. 1883, and now have pending in the United States Patent Office, applications for patents on three specific features, numbered, respectively, 111,237, 111,238, 111,239, and 111,240, I do not claim them herein.

Having now fully described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. A movable supporting-carriage adjusted in ways and arranged to travel vertically within the hull of the vessel, and provided with journal-bearings for and carrying a vertically-mounted propelling-screw for vertically raising and lowering aerial vessels, the whole constructed and arranged substantially as shown and described.

2. In combination, the central screw, E, axle-shaft r, journal-bearings $i'\ r'$, movable supporting carriage i^2, supporting-frame t, and engaging gearing $n\ u\ u'$, the whole constructed and arranged to be secured and operated within and designed for vertically rais-

ing and lowering vessels for aerial navigation, substantially as shown and described.

3. A movable supporting-carriage provided with external engaging gearings and internal journal-bearings, arranged to travel vertically in ways within the vessel's hull and be handled by connecting-gear, as shown, in combination with propelling-screw E, secured on the outer end of the rigid axle-shaft vertically mounted on journal-bearings within its supporting-carriage, the whole constructed, arranged, and adjusted to be handled and actuated by machinery within the vessel for vertically raising and lowering aerial vessels, substantially as shown and described.

4. In vessels for aerial navigation, a vertically-arranged movable carriage secured in ways constructed in a well passing upward into the hull of the vessel, and carrying a vertical central screw for raising and lowering such vessels, substantially as shown and described.

5. In vessels for aerial navigation, a vertical central screw mounted in and carried by a movable carriage secured in ways arranged in a well passing upward from below into the hull of the vessel, constructed and arranged substantially as shown, and for the purpose set forth.

6. In vessels for aerial navigation, a central screw secured on a perpendicularly-arranged axle-shaft carrying an impelling-wheel at the opposite end, and provided with shoulder-bearing protuberances by which it is secured in its mountings, in combination with movable vertical carriage having angular journal-boxings in a central bore for securing the axle of the vertical screw, and provided with projecting shoulders at top and bottom and a toothed rack secured longitudinally along the sides, substantially as and for the purpose shown and described.

7. In combination, the vertically-mounted central raising-and-lowering screw, movable supporting-carriage provided with journal-bearings and engaging gearing, and the supporting-frame L, the whole constructed and arranged as shown and described.

8. In vessels for aerial navigation, a central screw secured on perpendicularly-arranged axle-shaft provided with shoulder-bearing protuberances by which it is mounted in place in a movable carriage adapted for carrying the same, and adjusted within the vessel's hull, and carrying on the opposite end impelling-wheel, in combination with propulsive machinery arranged within the hull for revolving it on its axis, substantially as and for the purpose described.

9. In vessels for aerial navigation, a central screw secured on a perpendicularly-arranged axle-shaft carrying an impelling-wheel at the opposite end, and provided with shoulder-bearing protuberances by which it is secured in its mountings in annular journal-boxings in the central bore of movable vertical carriage having projecting shoulders at the top and bottom and provided with a toothed rack-gear for gearing, and in combination with machinery arranged within the vessel for raising and lowering the screw and its carriages, and propulsive machinery for impelling the vertical screw on its axis, substantially as and for the purpose described.

10. In combination with vertically-mounted central raising-and-lowering screw and its movable carriage, the supporting-frame L, substantially as shown and described.

11. In combination, the central screw, E, axle-shaft r, journal-bearings r', movable annular journal-boxings i', toothed rack $u\ u'$, pinions $n n'$, impelling-wheel m, gearing-wheel m', and machinery arranged within the vessel for lowering and raising the screw into and out of position and impelling it when in position, substantially as shown and described.

12. In combination, raising-and-lowering screw E, mounted on a vertical shaft carrying a gearing-wheel at the opposite end, movable supporting-carriage i, constructed as shown, provided with journal-bearings for supporting the vertical screw, supporting-frame L, consisting of vertical stanchions and horizontal and diagonal braces and support, and ways v, the whole constructed and arranged to support and give steadiness to the vertical screws for raising and lowering vessels for aerial navigation, substantially as shown and described.

13. In combination, screw E, axle-shaft r, having journal protuberances r', and an impelling-wheel, m, carriage i, having a bore, i^2, annular journal-boxings i', external shoulders, i^3 i^4, racked gear $u\ u'$, and ways for guiding and supporting it, gear-wheels n, n', and m, well e, and actuating machinery, in a device for raising and lowering vessels for aerial navigation, substantially as shown and described.

14. In combination, the gas-fields B, adjustable side fins, d, and adjustable central raising-and-lowering screw, E, arranged, adjusted, and operated as shown, for raising and lowering and vertically deflecting the course of aerial vessels propelled, steered, and handled by internally-arranged machinery through external appliances, substantially as shown and described.

15. A raising-and-lowering device comprising a screw, E, axle-shaft r, journal-shoulders i', impelling-wheel m, carriage i, having a bore, i^2, annular journal-boxings i', shoulders i^2 i^3, and gear-rack $u\ u'$, gear-wheels n, n', and m', in combination with well e, entering from below and extending upward into the hull C, of vessels for aerial navigation, substantially as and for the purpose described.

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

EUGENE F. FALCONNET.

Witnesses:

GEO. M. FLETCHER,

W. D. TALBOT.