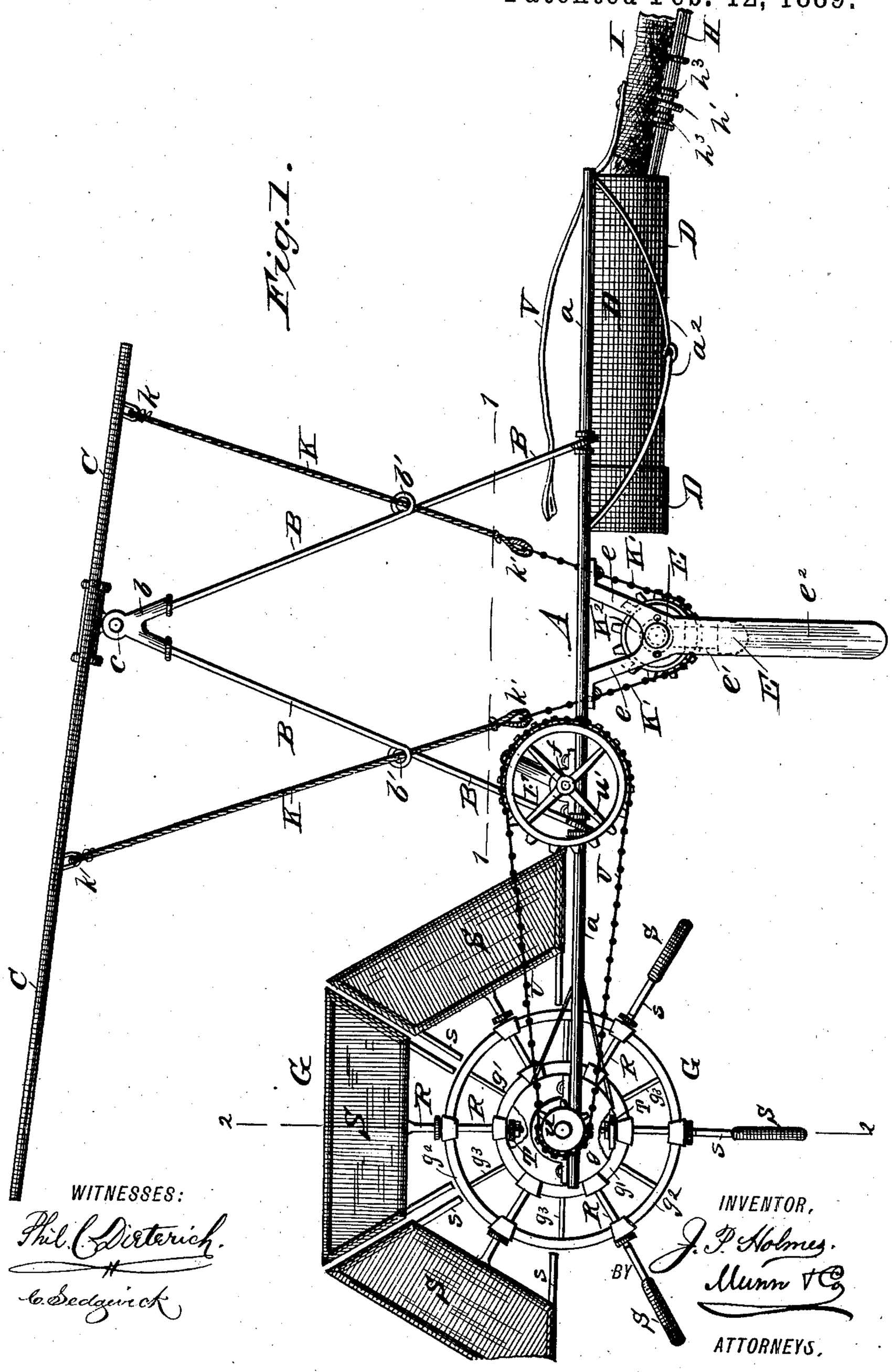
(No Model.) 5 Sheets—Sheet 1.

J. P. HOLMES.

AIR SHIP.

No. 397,647. Patented Feb. 12, 1889.

Fig. 1.



WITNESSES:

Phil. C. Dieterich.

C. Sedgwick

INVENTOR,

J. P. Holmes.

BY Munn & Co

ATTORNEYS.

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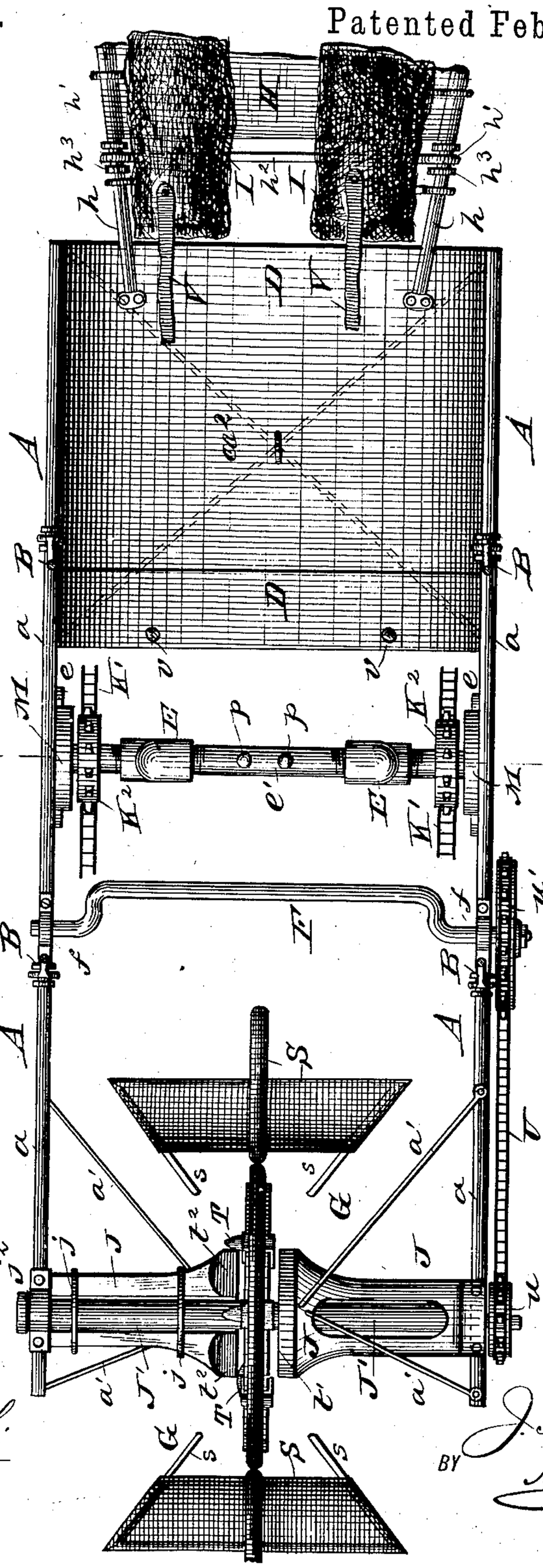
Fig. 2.



WITNESSES:

Phil. C. Dieterich.

C. Sedgwick

INVENTOR

J. P. Holmes

BY

Munn & Co

ATTORNEYS

(No Model.)

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Fig. 3.

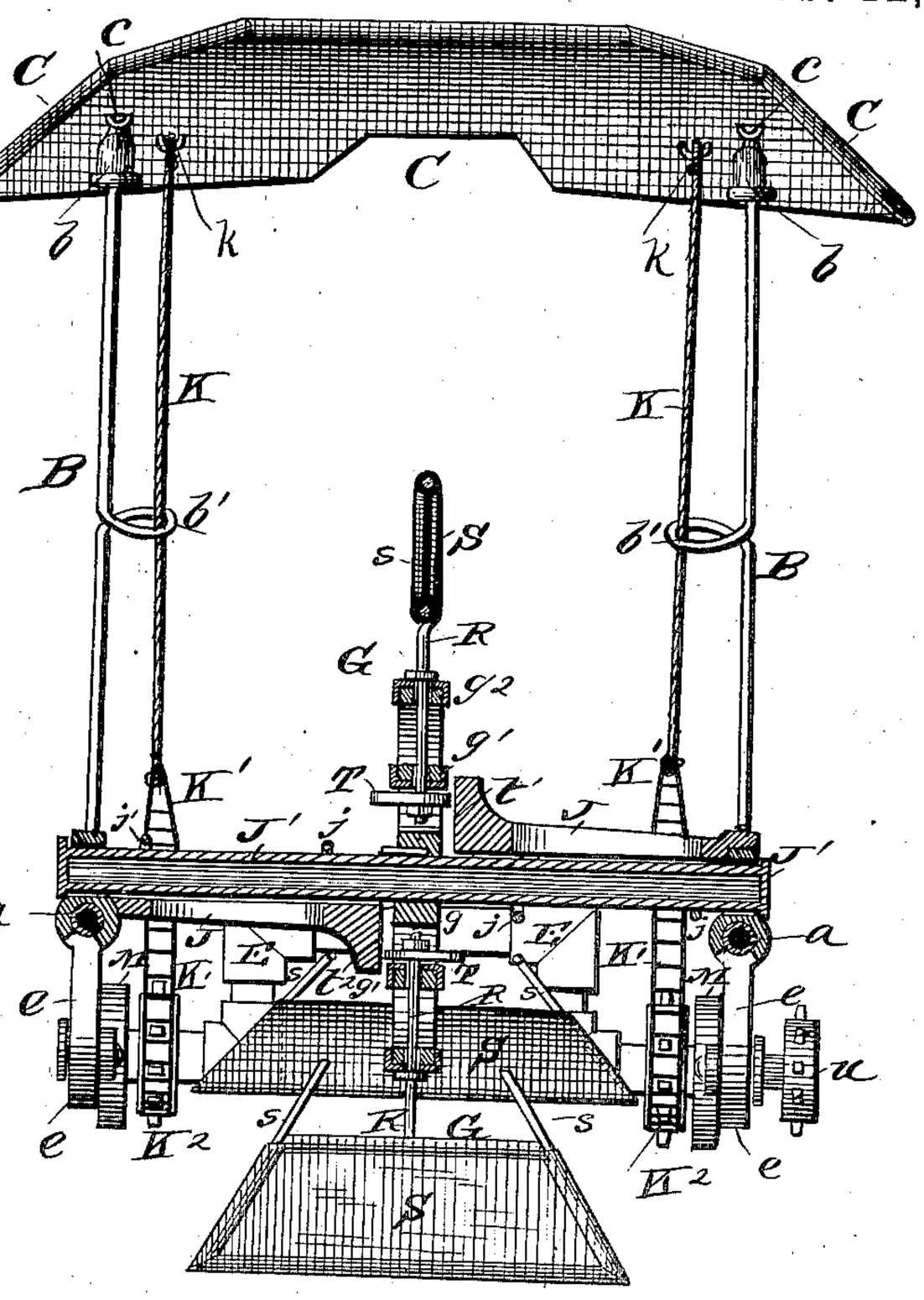
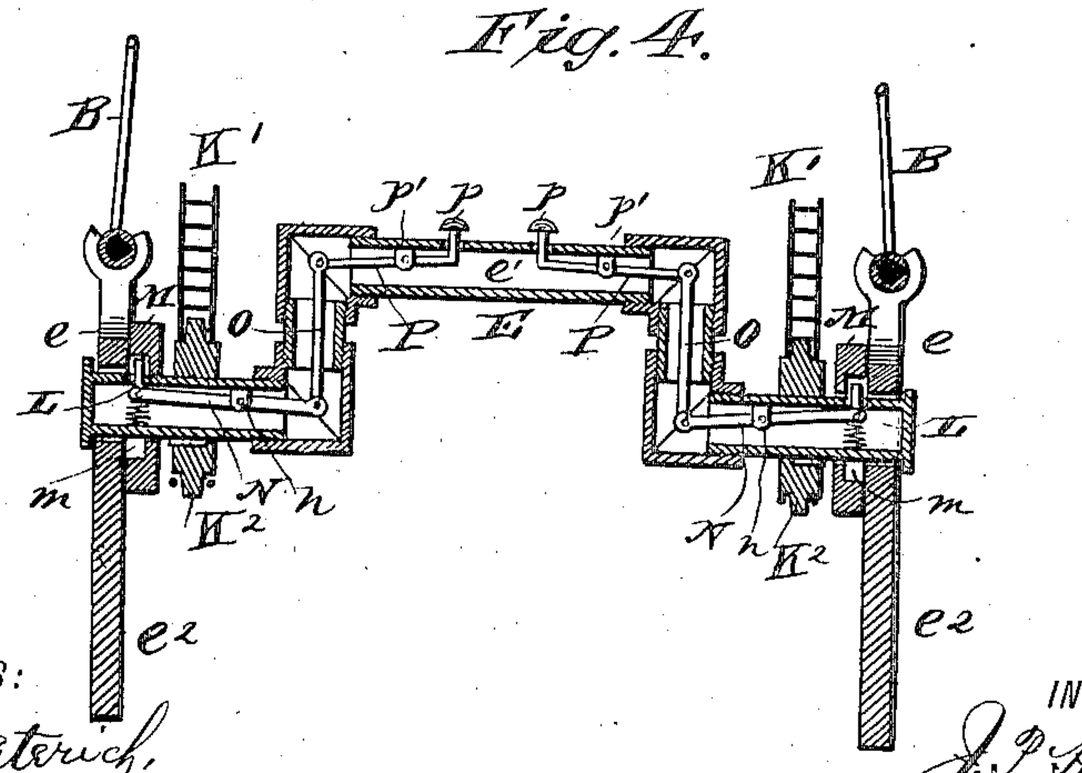


Fig. 4.



WITNESSES:

Phil. C. Dieterich.

C. Sedgwick.

INVENTOR.

J. P. Holmes

BY Munn & Co

ATTORNEYS.

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J. P. HOLMES.

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Fig. 5.

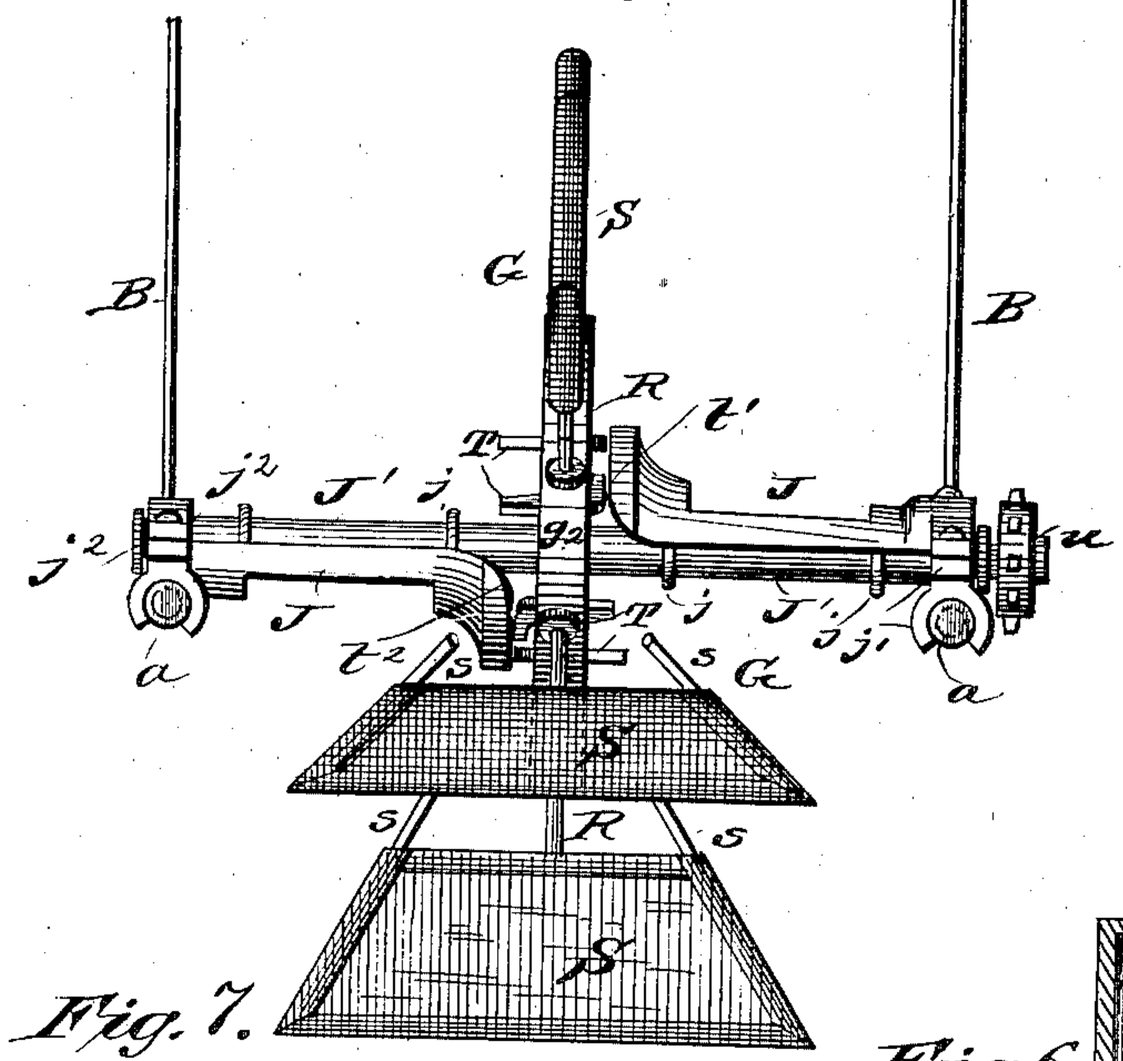
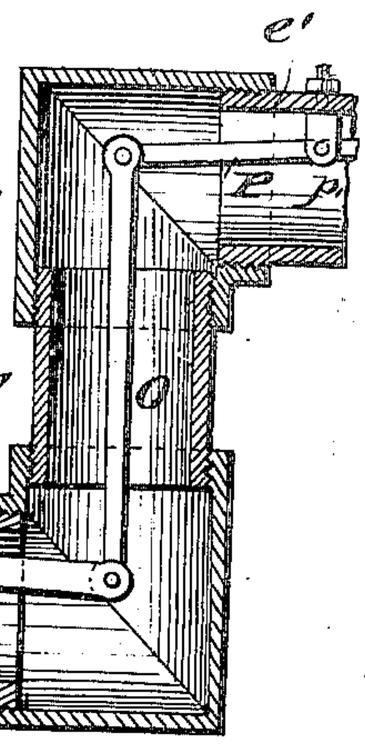


Fig. 7.

Fig. 6.



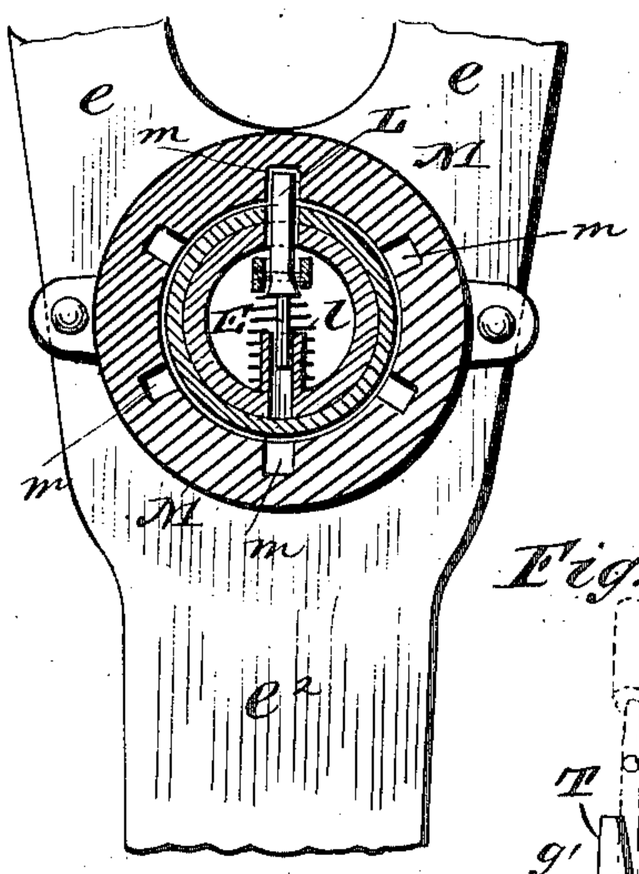
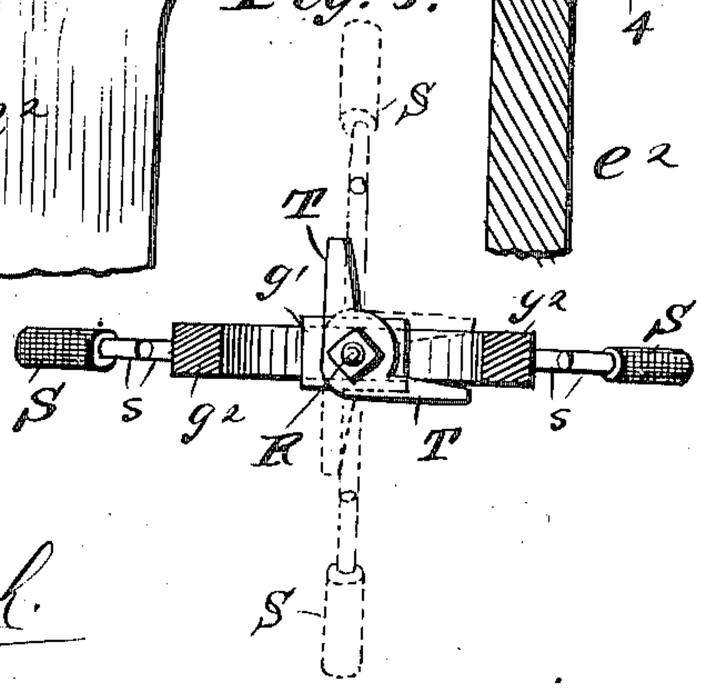


Fig. 8.



WITNESSES:

Phil C. Dieterich.

C. Sedgwick

INVENTOR,

J. P. Holmes.

BY Munn & Co

ATTORNEYS.

(No Model.)

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Fig. 9.

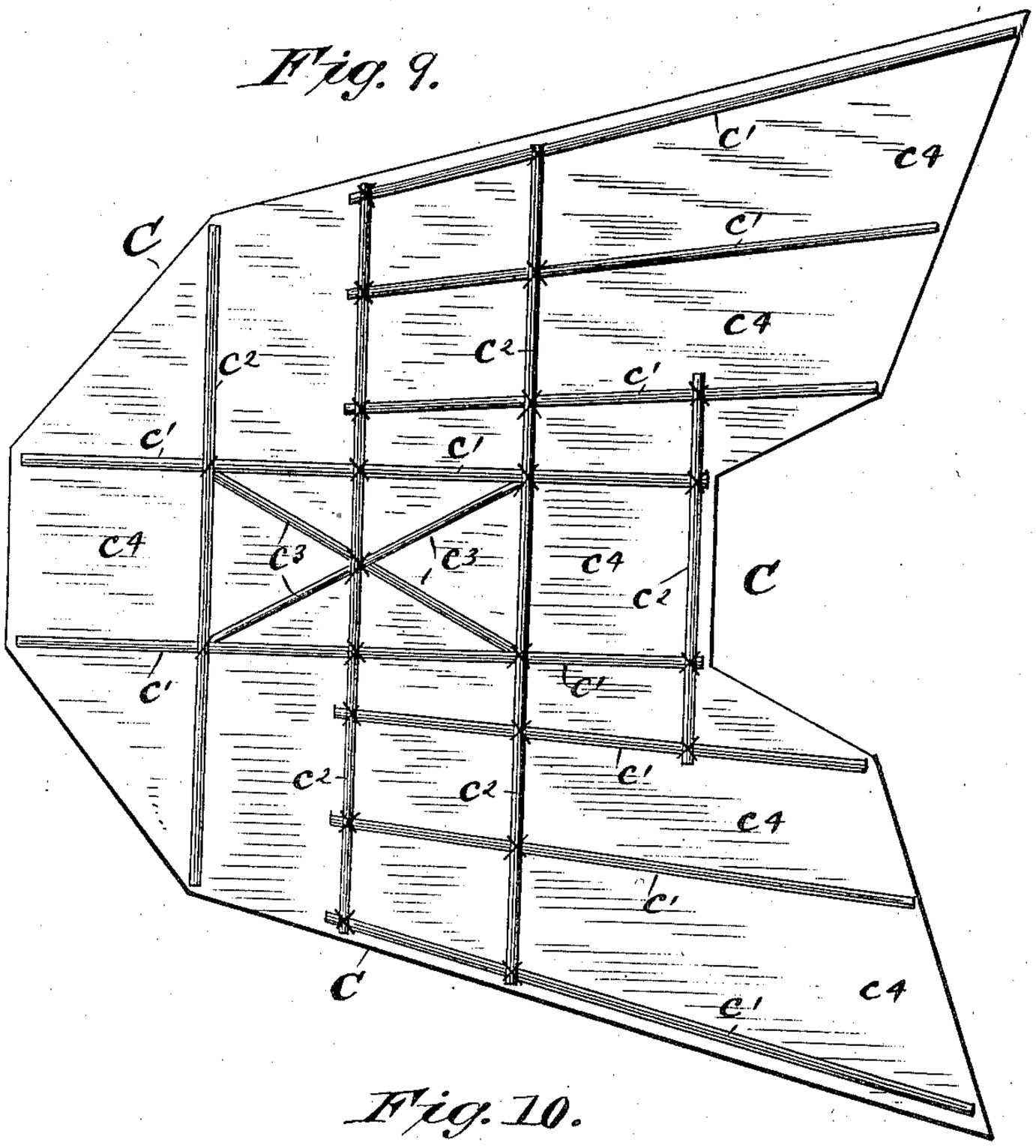
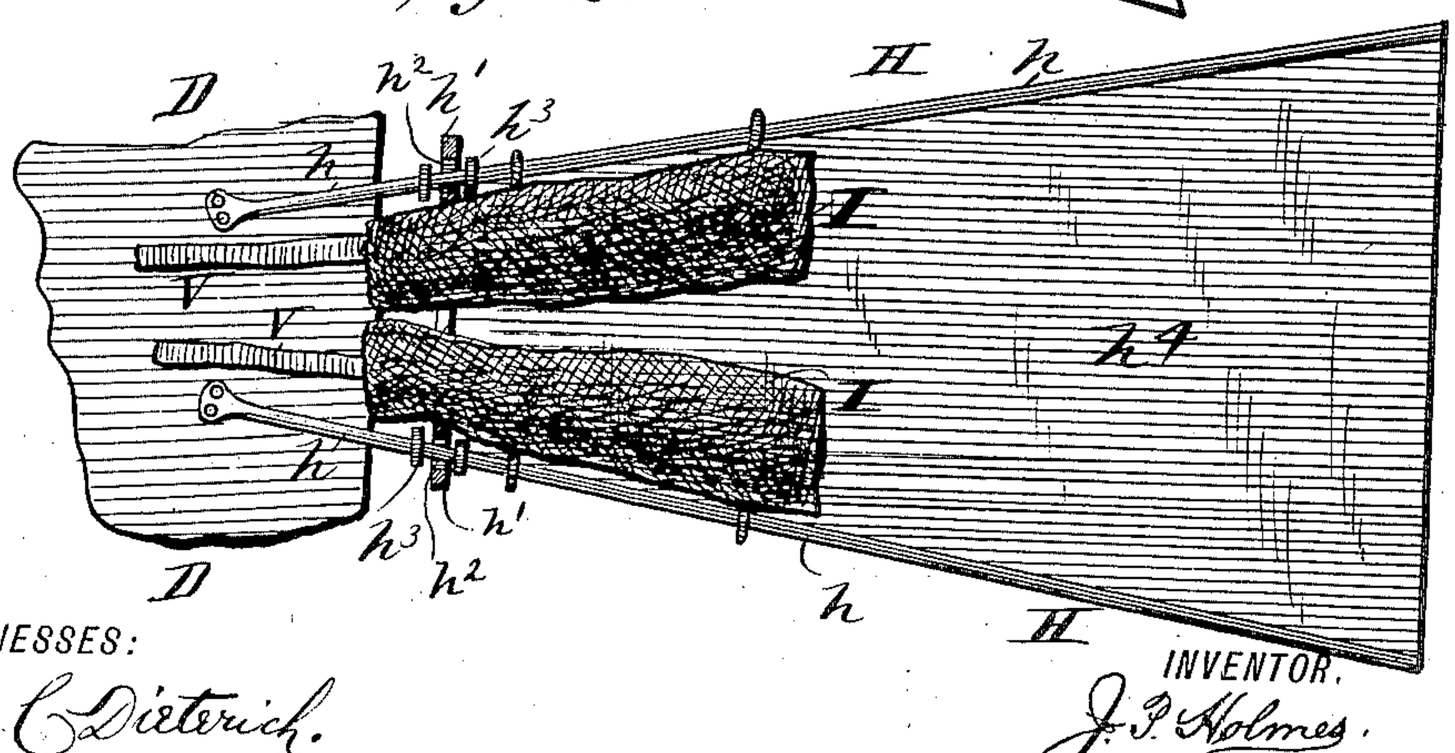


Fig. 10.



WITNESSES:

Phil C. Dieterich.

C. Sedgwick

INVENTOR.

J. P. Holmes.

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN P. HOLMES, OF OAK VALLEY, KANSAS.

AIR-SHIP.

SPECIFICATION forming part of Letters Patent No. 397,647, dated February 12, 1889.

Application filed April 18, 1888. Serial No. 271,062. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. HOLMES, of Oak Valley, in the county of Elk and State of Kansas, have invented a new and Improved Air-Ship, of which the following is a full, clear, and exact description.

My invention relates to a ship or machine for navigating the air, and has for its object to provide a simple, light, strong apparatus of this character, which may be readily adjusted and controlled by the aeronaut to give the best results in flight with the least expenditure of power.

The invention consists in certain novel features of construction and combinations of parts of the air-ship, all as hereinafter described and claimed.

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 is a side elevation of my improved air-ship, partly broken away. Fig. 2 is a plan view thereof with the aero-plane removed and the frame suspension-bars in horizontal section on the line 1 1 in Fig. 1. Fig. 3 is a front view of the air-ship with the propeller-wheel in vertical transverse section taken on the line 2 2, Fig. 1. Fig. 4 is a detail vertical transverse section of the main frame and the aero-plane-setting shaft and connections, taken on the line 3 3 in Fig. 2. Fig. 5 is a detail front elevation of the propeller-wheel and adjacent parts. Fig. 6 is an enlarged vertical sectional view of one end of the aero-plane-setting shaft, its bearing, and the plane-locking device. Fig. 7 is a detail transverse section taken on the line 4 4 in Fig. 6. Fig. 8 is a detail sectional view of one of the propeller wings or blades and its shaft and trip-arm. Fig. 9 is a top or plan view of the aero-plane, and Fig. 10 is a plan view of the steering vane or rudder of the air-ship.

The air-ship is made with a frame, A, suspended by hanger bars or rods B from an aero-plane, C. At its rear end or stern the frame A, which consists, mainly, of two parallel and horizontal side bars, *a a*, has attached to or hung from it a canvas or other suitable fabric or structure, D, which is fastened to the frame-bars *a a* and forms a rest or support on which the aeronaut will lie face downward on his breast and stomach, so that his hands may conveniently reach a transverse cranked shaft, E, journaled in brackets *e*, fixed to the frame side bars, and also a transverse cranked shaft, F, journaled in bearings *f* on the side bars. The shaft E serves, with suitable connections, to alter the incline or pitch of the aero-plane, and the shaft F, with suitable connections, serves to rotate a propeller-wheel, G, which is journaled at the front or bows of the air-ship.

At the stern of the ship and to the aeronaut's support D the rudder-sail H is connected, and on this rudder lie a couple of long narrow sacks or pouches, I I, which are preferably attached to the support D and to the side bars of the rudder, and are intended to receive the legs of the aeronaut to allow him to guide the ship by his legs in its flight.

This general statement of the construction of the air-ship will now be amplified by a detailed description of its various parts, as follows:

The frame A consists mainly of the two parallel side bars, *a a*, above mentioned, which are stayed or braced at the ship's bows by rods *a'* to cam-sleeves J J, which are fitted onto a shaft, J', which is preferably tubular and is journaled transversely on the frame, and to which the hub of the propeller G is fixed. The shaft J' thus also braces the side bars, *a a*, of the frame. The frame side bars are braced to each other at the rear or stern by the stay-bars a^2 a^2, which are securely bound together where they cross each other beneath the aeronaut's support D, and also strengthen it. The opposite ends of the shafts E F may also be fitted in their journals on the frame side bars in a manner to effectively stay the bars to each other, while allowing free rotation of the shafts.

The aero-plane C is pivoted at *c c* to angular journal-supports *b b*—one at each side of the machine—and in each of these supports *b* are fixed the upper ends of a pair of the main frame suspender-bars B B, which diverge downward and are connected to the respective side bars, *a a*, of the frame A, and preferably at points equidistant from and in front and rear of the journals of the shaft E, which crosses the main frame directly under the pivots *c c* of

the æro-plane, which may thus be rocked up and down on said pivots for adjusting it at best angle relatively to the main frame, the aeronaut's support, and the propeller-wheel for utilizing wind-currents and the propelling force of the wheel to the best advantage in sailing the ship. To adjust the aero-plane on its pivots, I connect to it at two places, *k k*, at each side and about at equal distances from the plane-pivots, a couple of ropes, K K, which run thence downward and through eyes *b' b'*, formed in or held to the two bars B B at that side of the machine, and are connected at their lower ends, *k' k'*, with the opposite ends of a chain, K', which runs on and under a chain or sprocket wheel, K^2, which is fixed to that end of the cranked shaft E. These ropes K, the chain K', and the wheel K^2 are duplicated at the other side of the machine, and whereby, as the shaft E is turned by the aeronaut grasping its cranked central part, *e'*, the chains K' will be operated to draw on the ropes K for setting the aero-plane at any required angle. If desired, the chains K' may extend directly from the wheels K^2 to connect at *k* with the aero-plane, and in this case the ropes K would be dispensed with; but the ropes are at present preferred. The passage of the ropes through the eyes *b'* of the suspender-bars B prevents slip of the chains from their sprocket-wheels, and also prevents undue shaking of the ropes by the wind.

To lock the aero-plane at any desired adjustment, I have provided a latch device and operating means therefor, (shown most clearly in Figs. 4, 6, and 7 of the drawings,) which represent the shaft E made hollow, in the preferred way, and fitted at each end with a slide-bolt, I, which is normally forced through the shaft by its spring *l* far enough to engage any one of a series of interior notches, *m*, made in a casing, M, which is fixed to the adjacent bearing *e* of the shaft E. To the bolt L, at each of the bearings *e*, at opposite sides of the machine, is pivotally connected one end of a lever, N, which is fulcrumed in a forked bearing, *n*, held, preferably by a bolt and nut, to and within the shaft, and the other end of the lever N is connected to one end of a link, O, which passes through the right-angular part or wrist-bar connection *e'* of the crank, and at its other end is connected to one end of a lever, P, which is fulcrumed to a forked bearing, *p'*, held by a bolt and nut to and within the wrist portion or bar *e'* of the cranked shaft. At their inner adjacent ends the two levers P P are formed or provided with pins *p p*, which project through the crank-wrist *e'*, and are close enough together to allow both of them to be depressed by one hand of the aeronaut—the same hand by which he will turn the shaft E to adjust the aero-plane. With this construction it is obvious that by depressing the pins or buttons *p* the bolts L at each side of the ship will be simultaneously withdrawn from the notches *m* of the casings M, with which they had been engaged, and the shaft E may then be turned by the hand holding the pins or buttons in, to set the aero-plane by the draft of the chain and ropes K' K, and when the desired adjustment is obtained the buttons or pins *p* will be released and the springs of the bolts L will instantly project them into other notches *m* of the casings M to lock the plane in its new position. I prefer to make the cranked shaft E of sections of light metal tubes screwed together at the joints; but the shaft may be made of a bent tube, if preferred. The system of levers and links N O P may also be arranged outside of and along the cranked shaft, should it be made of a solid rod or bar, and may be operated substantially in the manner above described. It is manifest that while the aero-plane is being adjusted by one hand of the aeronaut, as above described, his other hand is free to turn the cranked shaft F to continue the rotation of the propeller, and in a manner presently explained.

The aero-plane C is made with a frame comprising a series of longitudinal rods, *c'*, and transverse rods c^2; which are preferably tapered toward their ends and are suitably bound or clamped together where they cross each other, and about at the center of the plane a couple of crossed light-metal brace-rods, c^3 c^3, are preferably employed. This rod-frame is covered at one face, preferably its under side, by a silken fabric, c^4, shaped marginally as shown in Fig. 9 of the drawings, the whole making a very light and strong structure well adapted for its purposes.

I will next describe the propeller and its connections with the main frame and means for operating it from the shaft F, as follows: As hereinbefore stated, the hub *g* of the propeller G is fixed to the tubular shaft J', which is journaled at opposite ends in boxes formed at the end parts of the sleeve-cams J J, and in half-boxes *j' j²*, held to the opposite side bars, *a a*, of the frame A. One of the sleeves J is arranged above the shaft J' and the other sleeve is below the shaft, and both sleeves are snugly held to the tube by bent rods *j j*, which, with the stay-bars *a'*, connecting the sleeves and the side bars *a* of the main frame A, hold the sleeves securely in place, while allowing free rotation of the propeller-shaft J' within the sleeves. The half-box *j'*, holding the sleeve which is above the shaft J', is also provided with a box or bearing which either partly or wholly surrounds the adjacent frame-bar *a*, and the half-box *j²*, formed at the outer end of the sleeve J, lying under the shaft, is also provided with a box or bearing which partly or wholly encircles the other side bar *a* of the frame A, and as shown most clearly in Fig. 5 of the drawings. The sleeves J, the tubular shaft J', and the frame-bars *a a* thus mutually support each other, while the propeller blades or wings are free to rotate between the opposing inner ends or cam-faces

of the sleeves J J, to cause feathering of the blades to the air, as presently explained.

The frame of the propeller-wheel consists of the wheel-hub g and two outer rings, g' g^2, which rings are connected by spokes g^3, and in the frame are journaled the radial shafts R of the propeller-blades, each of which is made with a bent rod frame, s, fixed at its outer transverse cross-bar to the outer end of the shaft R and covered by a silk or other fabric, S, which in certain positions of the blade offers resistance to the wind. The opposite ends of the blade-frame s are cut away to allow the frame to clear the ring g^2 when the blades turn as the propeller rotates. To the shaft R of each of the propeller-blades is fixed at its angle an elbow-lever, T, the equal arms of which are adapted to act alternately on the inner cam-faces, t' t^2, of the sleeves J J on the propeller-shaft J'. It is obvious that as the propeller is rotated the action of the blade trip-levers T on the cam-faces t' t^2 of the sleeves J J will turn the frames s S of the blades edgewise to the wind, and so hold them during their rotation or passage through the air above the level of the propeller-shaft, and will turn the blades flatwise to the wind during their passage around below the level of the propeller-shaft, and as clearly represented in the drawings. This construction and action of the propeller assures its maximum lifting and propelling power to raise and urge the air-ship forward and with minimum loss by back-pressure of the air. The propeller is operated by a chain belt, U, which extends from a chain or sprocket wheel, u, on its shaft to a larger sprocket-wheel, u', on the end of the cranked shaft F, which is turned by the aeronaut lying on the support D, as hereinbefore explained.

The rudder or tail-vane H of the air-ship is made with a frame consisting of two opposite side rods or bars h h, which are connected in any suitable manner to the aeronaut's support D or its frame or braces, and extend rearward and preferably diverge toward their back ends. To these side bars h h is connected loosely a cross-bar, h', which is provided at the ends with eyes h^2 h^2, through which the bars h h are passed, and collars or washers h^3 at each side of the eyes prevent slipping of the cross-bar along the side bars, but allow free up-and-down play of the side bars in the eyes. A silk or other suitable fabric, h^4, is held to and between the rudder side bars to offer resistance to the wind. The connection of the rudder side bars to the aeronaut's support also allows a bodily up-and-down movement of the entire rudder, which in its construction somewhat resembles the tail of a bird. The leg sacks or pouches I I for the aeronaut are preferably attached both to the support D and to the opposite side bars h h of the rudder, and the sacks are preferably provided with straps or cords V, which are intended to be passed over the back of the aeronaut and fastened at their front ends to suitable buttons, r, fixed to the front edge of the canvas support D. It will be seen that while the aeronaut, lying on the support D, has the aero-plane-adjusting shaft and devices, and also the propeller-operating shaft and connections, in full command of his hands, his legs within the rudder-sacks I are free to raise and lower the rudder either bodily in horizontal plane or to raise either side bar of the rudder higher than the other to set the rudder fabric h^4 at any required twist or angle or angles of inclination to the horizon to guide the air-ship in its flight.

It is obvious that as the aeronaut is supported back of the point of suspension of the main frame, and as the tendency of the propeller is to lift the front of the air-ship as it moves forward, the aeronaut, lying in a downwardly and backwardly inclined posture, can sustain a considerable portion of his weight on his legs and feet, and thus the more easily operate the ship to the best advantage without exhausting his strength.

The bearings or brackets e for the shaft E are extended downward at e^2 to strike the ground before the propeller does in alighting, and thus prevent injury to the propeller. I may at times provide a head-rest for the aeronaut on the support D, and the latter may also be provided with holes, through which the aeronaut's arms will be passed to reach the aero-plane adjusting and propeller-operating cranks when the parts are relatively arranged otherwise than shown in the drawings, and as will readily be understood.

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

1. An air-ship consisting of the horizontal frame having upwardly-extending supports between its ends, the vertically-rocking aero-plane mounted on the upper ends of said supports, the vertical propeller at the front end of the frame, the aeronaut's support between the rear ends of the frame, and the propeller and aero-plane-operating mechanisms within reach of the front end of said support, and the rudder-sail extending from the rear end of the aeronaut's support for operation by the legs of the operator, substantially as set forth.

2. An air-ship consisting of the horizontal frame having upwardly-extending supports or suspension-rods between its ends, the aero-plane pivoted to rock vertically on the said supports, the propeller mounted at the front end of the frame, the support at the rear end of the frame, upon which the aeronaut may lie, the horizontal crank-shaft journaled between the propeller and front end of the aeronaut's support within reach of the operator, gearing connecting said shaft and propeller, a second horizontal crank-shaft journaled on the frame adjacent to the said aeronaut's support, and having connections with the aero-plane fore and aft of the fulcrum, locking-

bolts at opposite ends of the said second shaft engaging parts of the frame to lock the plane in position, and operating-levers at the cranked or hand-hold part of the shaft connected with said bolts, whereby the aeronaut may rotate the first-named shaft with one hand and release and operate the second shaft with the other, substantially as set forth.

3. In an air-ship, the combination, with an aero-plane, and a frame suspended therefrom and carrying an aeronaut's support, and to which frame the plane is fulcrumed to rock fore and aft, of a transverse tubular cranked shaft, E, journaled on the frame or in brackets held thereto, latch-bolts L, fitted to and within the ends of the shaft and adapted to engage any one of a series of notches *m*, formed in casings M on the frame, levers and links N O P, fitted in the shaft, and the two levers P, extended at *p p* through the center of the crank-wrist in reach of the aeronaut, substantially as described, for the purposes set forth.

4. In an air-ship, the combination, with a frame suspended from an aero-plane and carrying an aeronaut's support, of a propeller consisting of a shaft, *J'*, journaled on the frame, and blades or wings pivoted by their radial shafts to the propeller hub or body, sleeves J J, held to the shaft one above and the other below it and one at each side of the propeller, and said sleeves having cam-faces t' t^2 and trip-levers T on the propeller-blade shafts and operating on the cam-faces to turn and hold the blades into and out of the wind as the propeller rotates, substantially as herein set forth.

5. In an air-ship, the combination, with a frame suspended from an aero-plane and supporting a propeller and its operating mechanism, of a support for the aeronaut at the stern of the frame, a rudder-sail connected thereat and behind the aeronaut's support, and sacks held to the rudder and adapted to receive the legs of the aeronaut lying on the support, substantially as herein set forth.

6. In an air-ship, the combination, with the main frame carrying an aeronaut's support and a propeller and its operating mechanism, all suspended from an aero-plane, of a rudder, H, consisting of side bars, *h h*, a cross-bar, *h'*, having end eyes, h^2, receiving the bars *h*, loosely, a fabric, h^4, held to and between the bars *h h h'*, and sacks I I, held one to each side bar of the rudder and adapted to receive the legs of the aeronaut, substantially as described, for the purposes set forth.

7. In an air-ship, the combination, with the main frame carrying an aeronaut's support and a propeller and its operating mechanism, of a rudder, H, held to the aeronaut's support, sacks I I, held one to each side bar of the rudder and adapted to receive the legs of the aeronaut, and straps or cords V, connected to the sacks and adapted for attachment at their forward ends to the aeronaut's support or the frame, substantially as described, for the purposes set forth.

JOHN P. HOLMES.

Witnesses:
GEO. R. SATER,
F. D. SANGER.