

No. 837,472.

PATENTED DEC. 4, 1906.

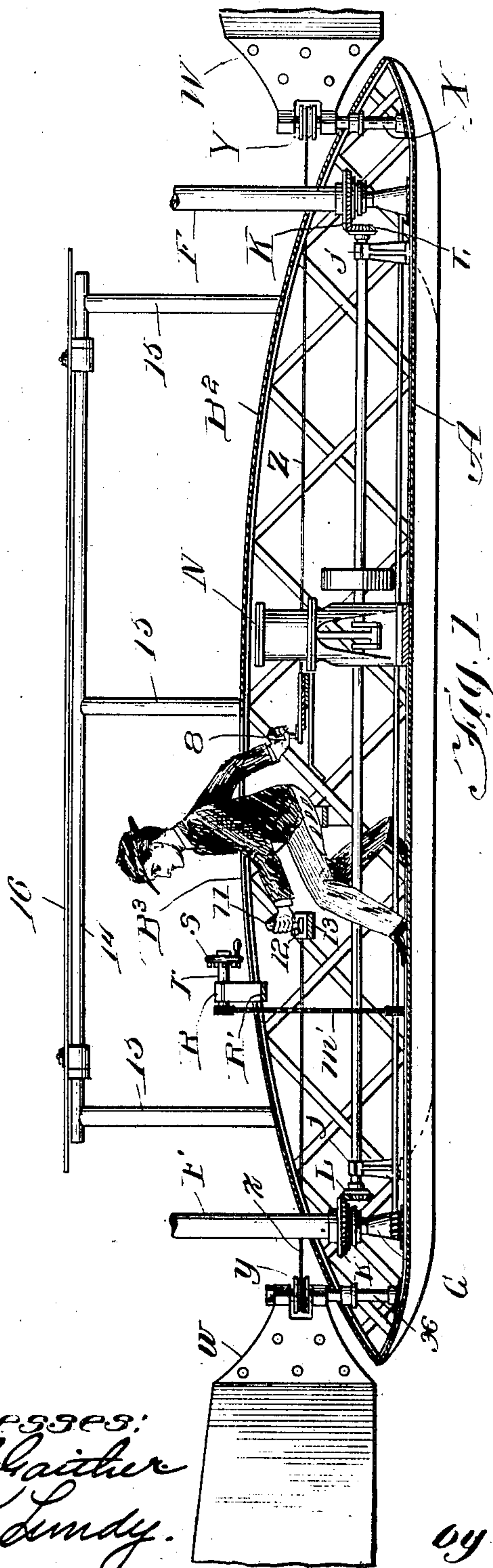
E. HUTCHINSON.

AIR SHIP.

APPLICATION FILED FEB. 6, 1904.

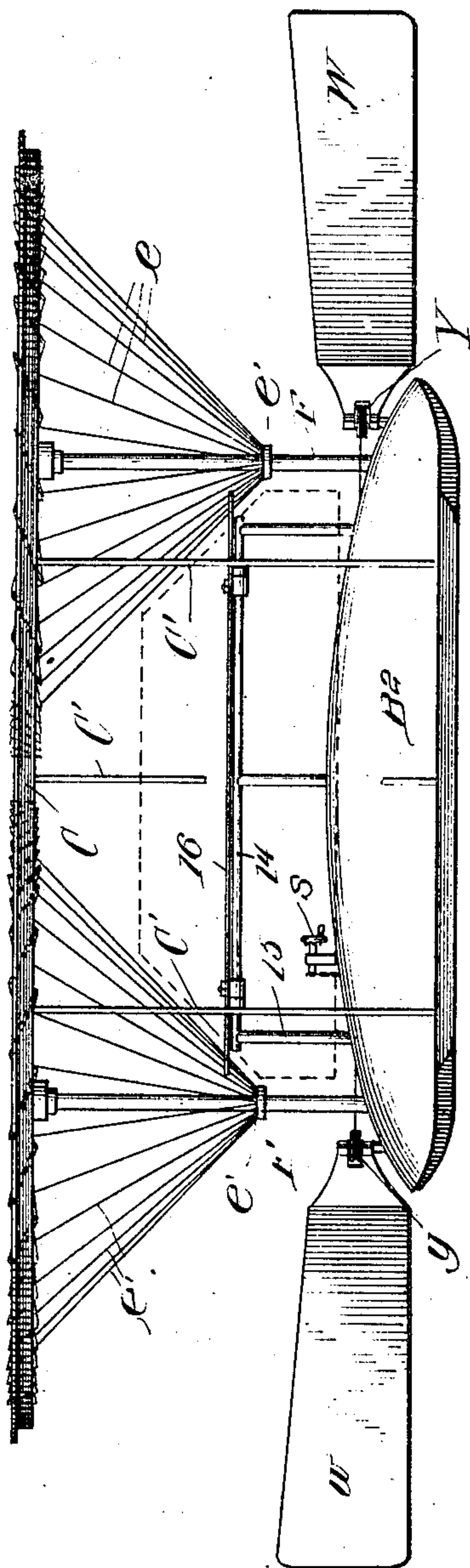
4 SHEETS—SHEET 1.

Fig. 2.



Witnesses:
H. S. Laiter
E. K. Lundy.

Fig. 1.



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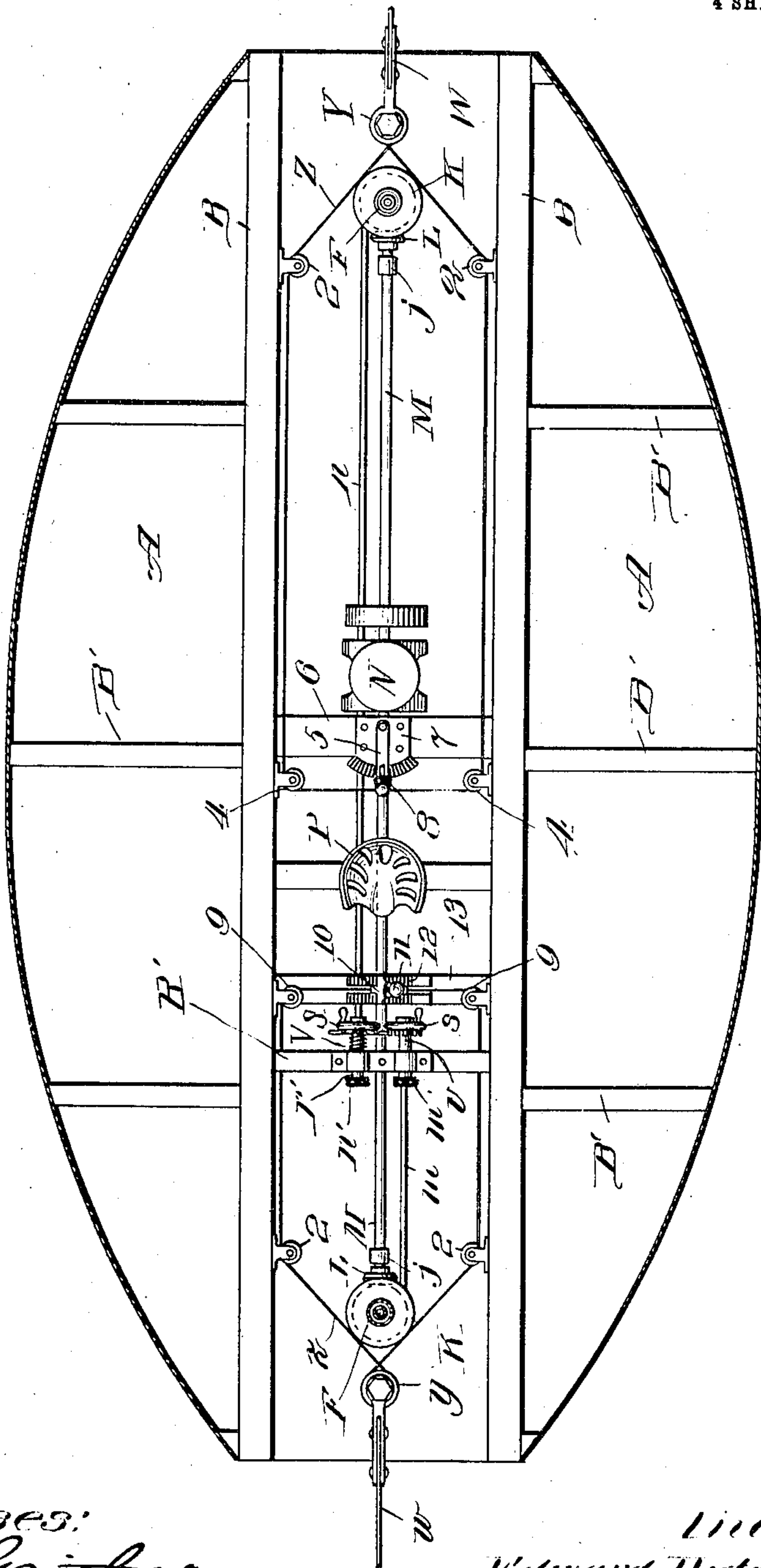
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4 SHEETS—SHEET 2.

Fig. 3.



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4 SHEETS—SHEET 3.

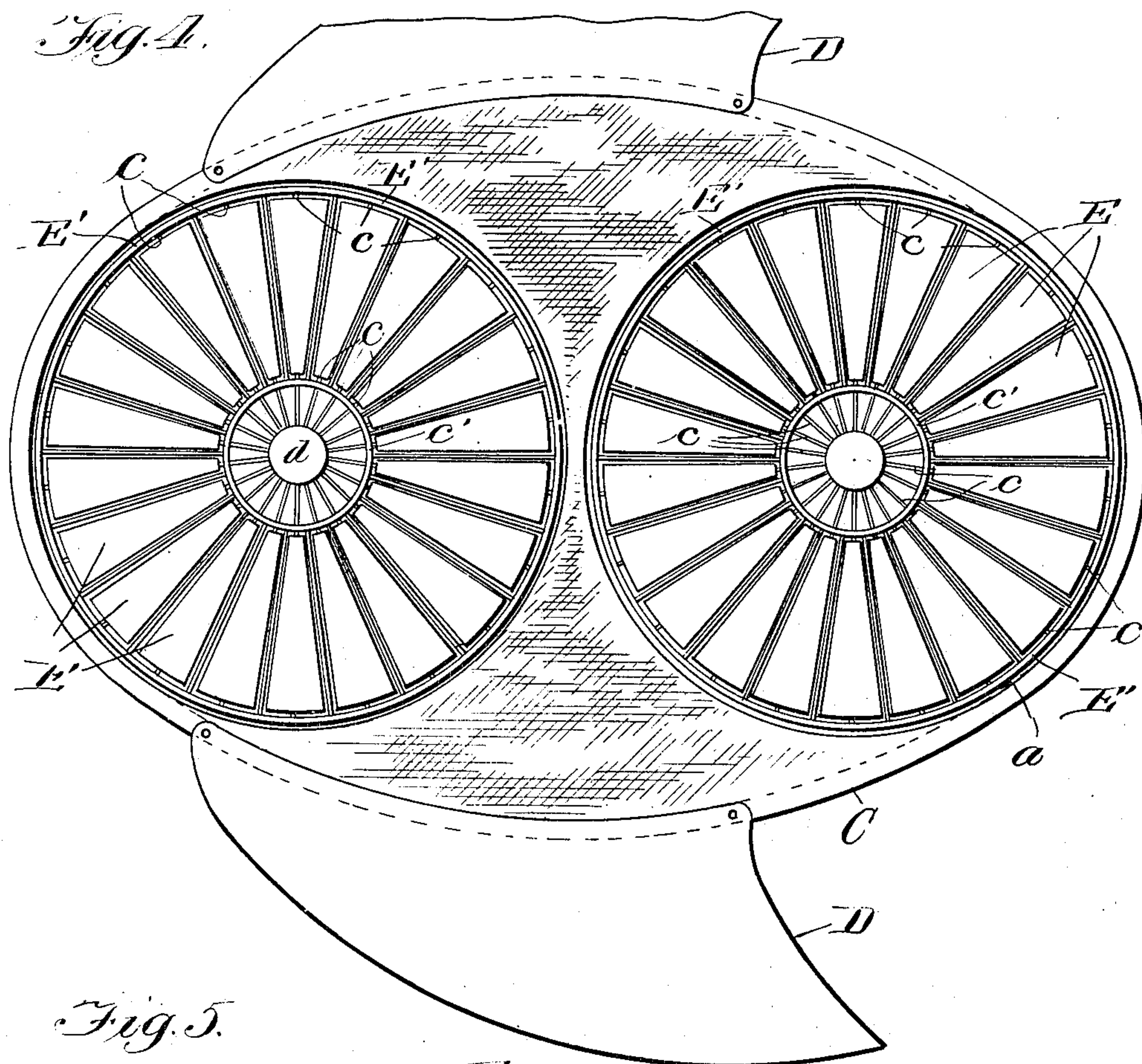
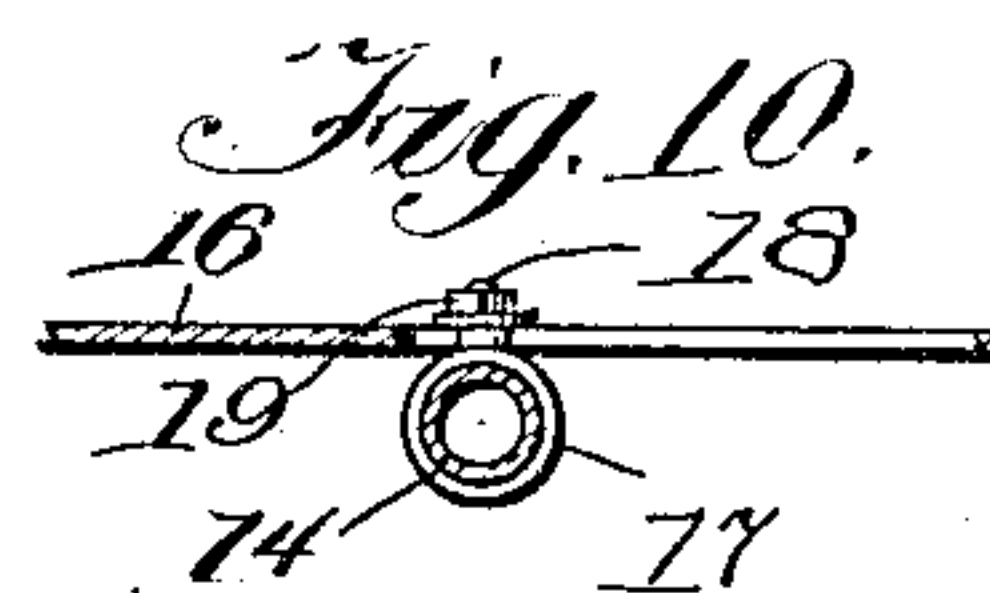
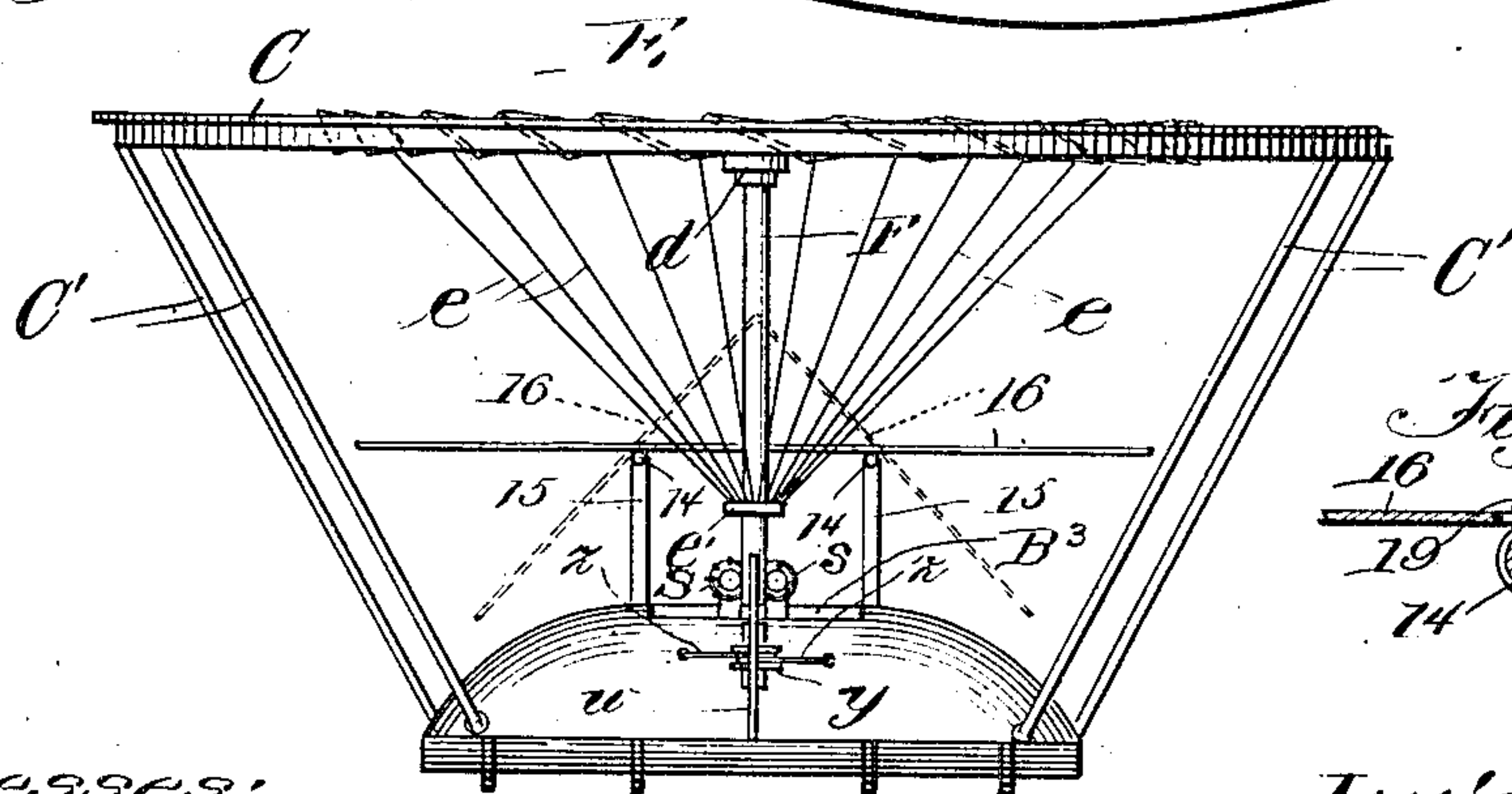


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 7.

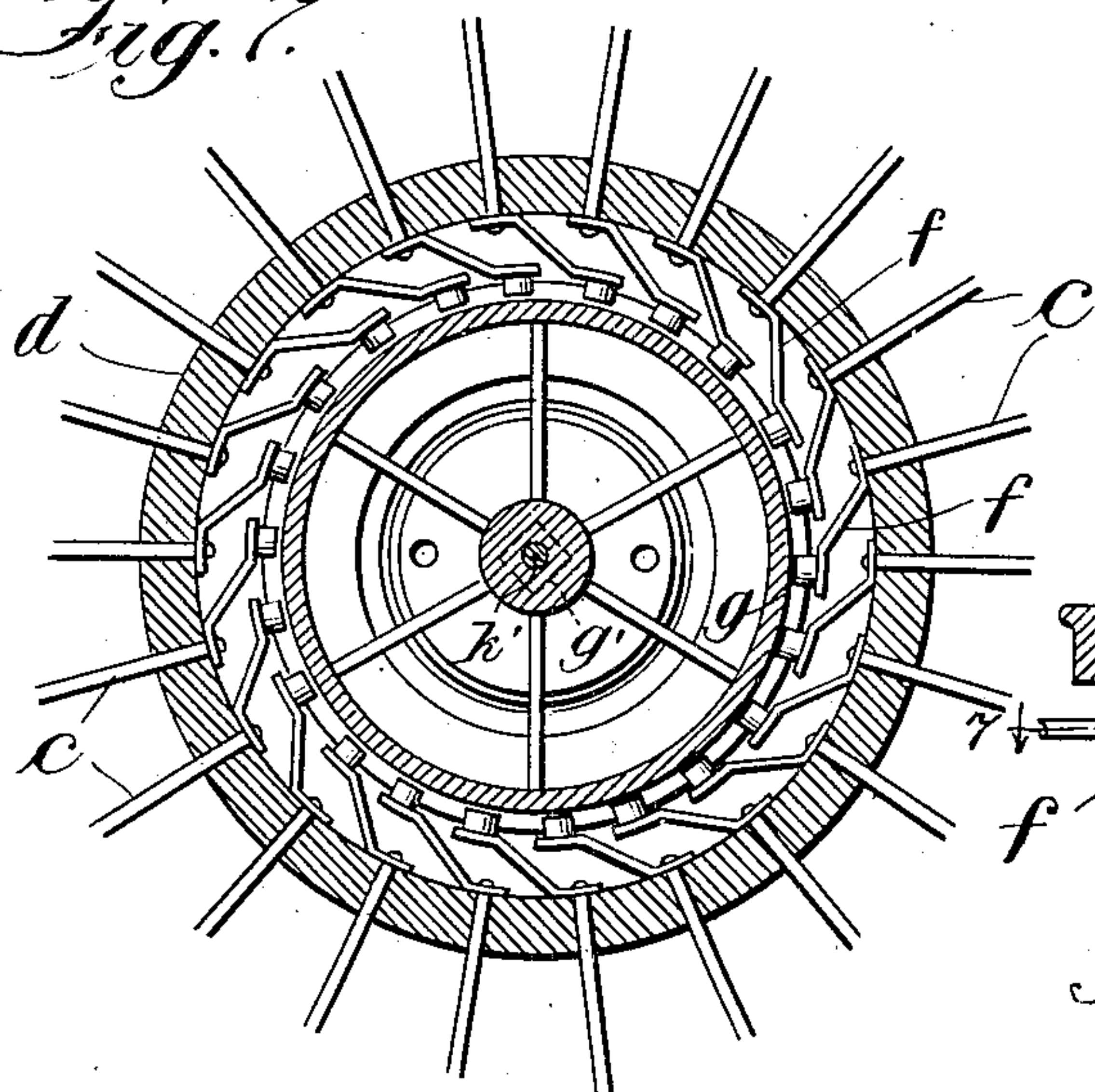


Fig. 6.

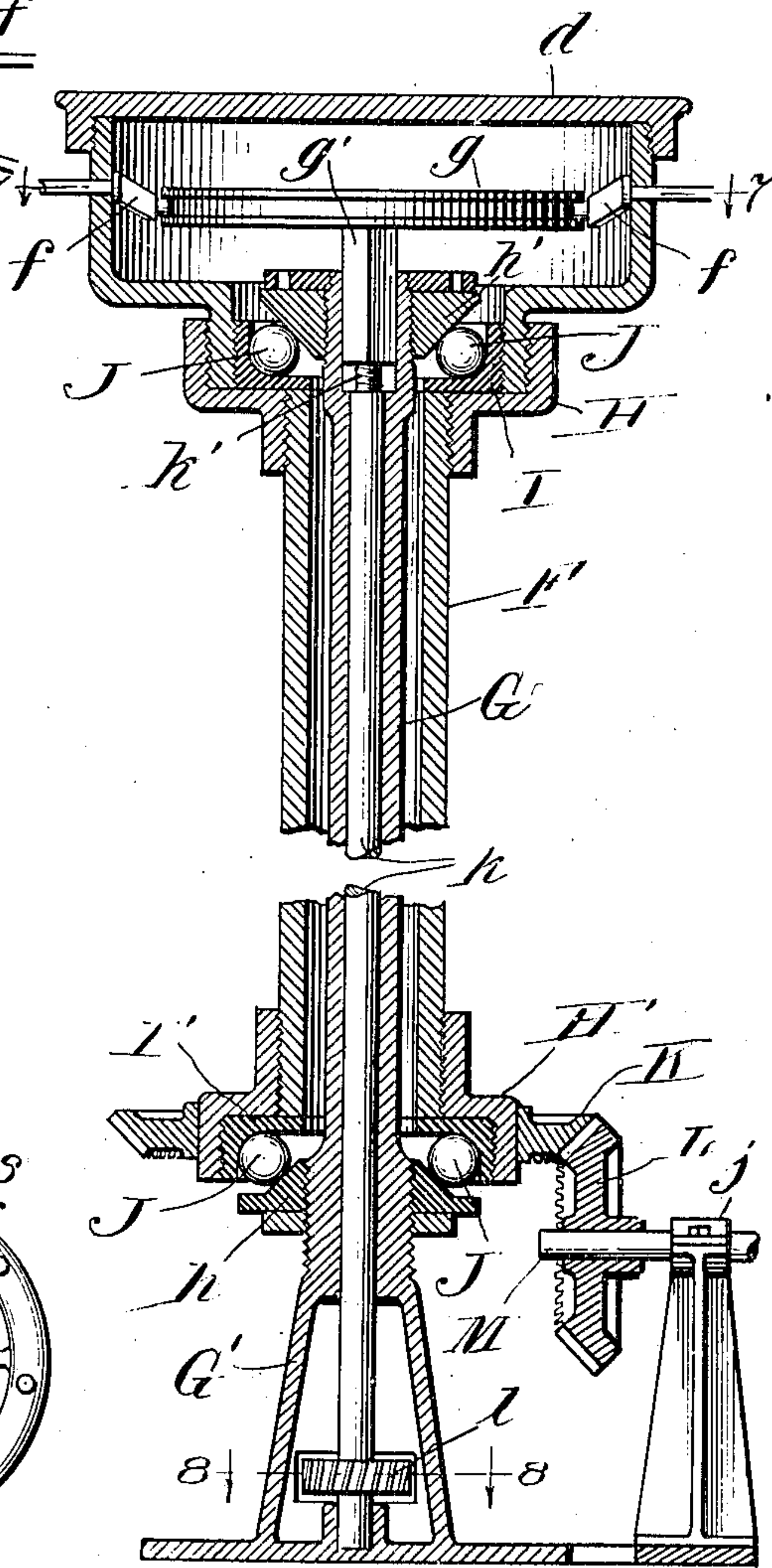


Fig. 8.

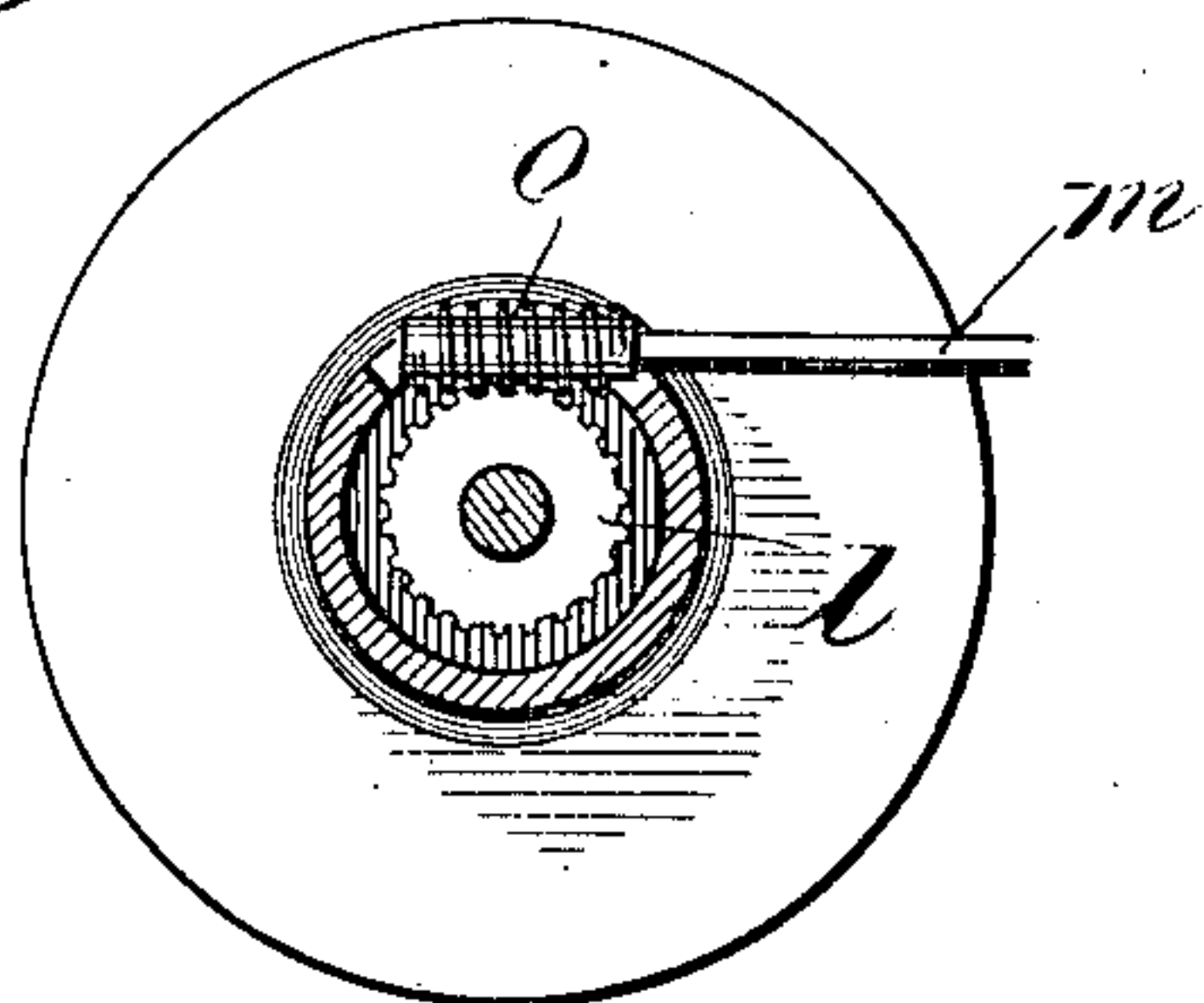
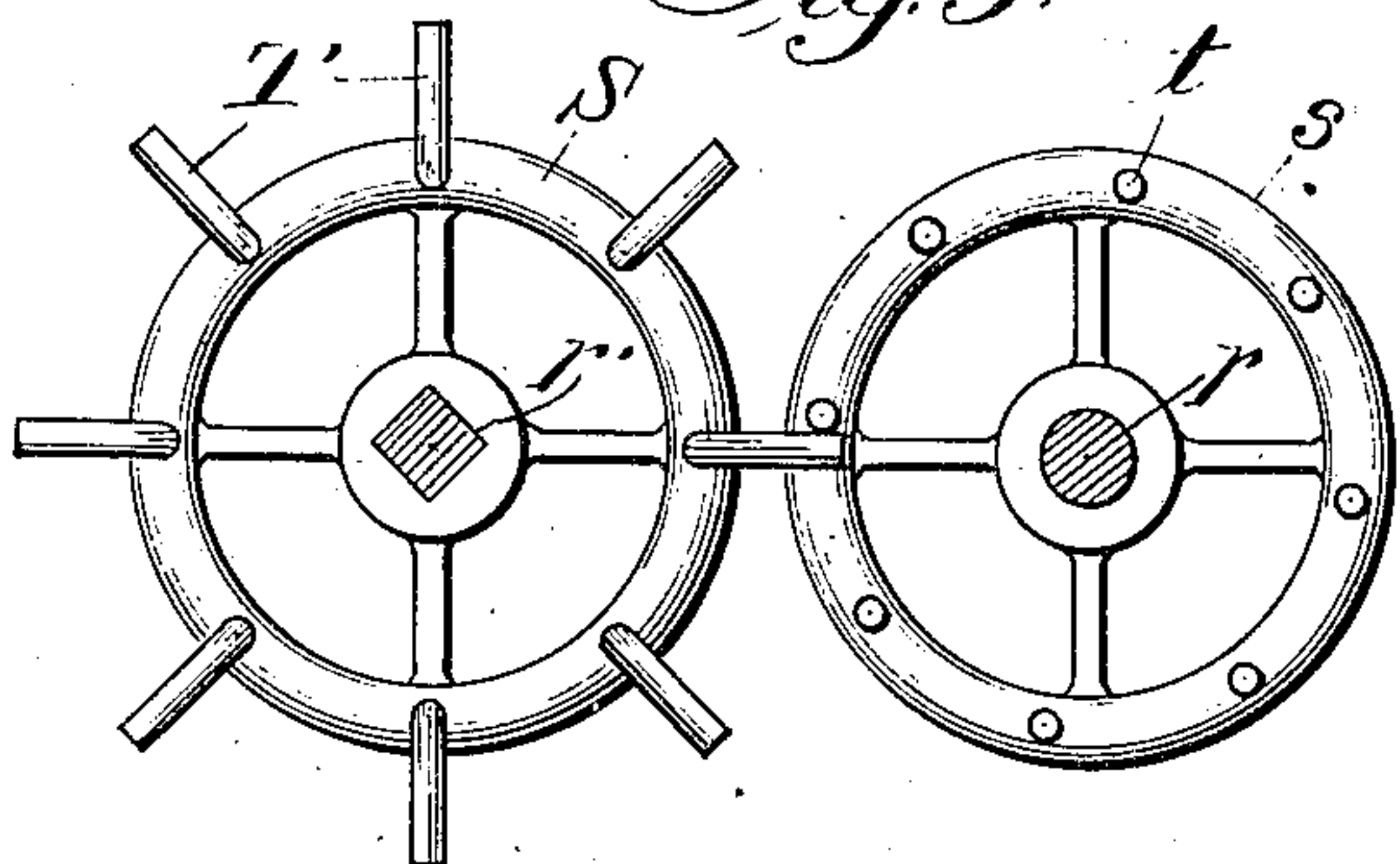


Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWARD HUTCHINSON, OF PANUCO, MEXICO.

AIR-SHIP.

No. 837,472.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed February 6, 1904. Serial No. 192,307.

To all whom it may concern:

Be it known that I, EDWARD HUTCHINSON, a citizen of the United States, and a resident of Panuco, in the State of Vera Cruz and Republic of Mexico, have invented certain new and useful Improvements in Air-Ships, of which the following is a full, clear, and exact description.

My improvement relates to air-ships of the gliding type; and its object is to utilize the principles of the aeroplane and combining therewith a suitable number of revoluble lifting-wheels or propellers which by proper manipulation and control render aerial navigation both practicable and safe. This I accomplish by the means hereinafter fully described, and as particularly pointed out in the claims.

In the drawings, Figure 1 is a side view of my invention. Fig. 2 is a longitudinal central section through the body of the car drawn to a larger scale and with the rudders and lifting-fans broken away. Fig. 3 is a horizontal section of the same, taken just above the plane of the floor of the car. Fig. 4 is a plan view of the air-ship drawn to the same scale as Fig. 1. Fig. 5 is an end elevation of the same. Fig. 6 is a vertical central section of one of the fan-shafts and mast supporting the same drawn to a larger scale. Fig. 7 is a horizontal section therethrough taken on dotted lines 7 7, Fig. 6, looking in the direction indicated by the arrows. Fig. 8 is a similar section taken on dotted line 8 8, Fig. 6, looking in the direction indicated by the arrows. Fig. 9 is a detail view showing, on an enlarged scale, the gearing connecting the shafts for regulating the position of the vanes of the lifting-fans. Fig. 10 is a detail view of the joint or hinge connecting the secondary aeroplane to its supporting-frame.

In the drawings, A represents the floor of the car of my invention, which is, except for a short slightly turned-up portion at each end, perfectly flat, and its edges bound an elliptical area, the ends of which, intersected by its major axis, are correspondingly truncated. The ends of the end edges of the floor of the car made by thus truncating the same are connected, and said floor is made more rigid by parallel trussed frames B B, and the tops of these frames B B are arched from end to end of the car and at suitable points along their length are reinforced by the transverse braces B' B'. This framework of the car is

covered by a turtle-back deck B², that has a hatchway B³ in it, up through which the body of the operator projects and provides a hold in which the actuating mechanism of the air-ship is housed.

Supported in a perfectly horizontal plane by suitable poles C' C', whose lower ends rest in suitable sockets secured to the floor of the car near its side edges, is an aeroplane C, which is preferably of an elliptical shape and extends over considerably more area than that covered by the car. This aeroplane may, if desired, be provided with wings D D, which may be either permanently or removably secured to its outer frame on each side thereof according as desired, and said aeroplane is provided with a forward and a rear circular opening *a a*, the diameter of which corresponds to almost one-half of the length of the same. These openings *a* are occupied by the lifting-fans of my invention, each of which has vanes E, that can be turned on their axes at any angle within the range of ninety degrees, either in an open position, as when it is desired to lift the ship vertically, or open to a different extent, as when it is desired to lift one end of the ship higher than the other to get it in position to glide through the air in the manner of an aeroplane, or closed, so that said vanes will be in the same plane and present with the aeroplane C practically an unbroken flat surface during the horizontal flight of the air-ship through the air. The vanes E of each fan are mounted on spindles *c*, which radiate from the head *d* of shafts F, which latter are located near each end of and extend up from the car and are supported by and revolve around the masts G, secured to and arising from the floor A, the one near one end of the car and the other near the opposite end of the same. The outer ends of spindles *c* are journaled in an outer ring or annulus E', which is reinforced and held in a horizontal position by stay-rods *e e*, whose lower ends converge toward and are suitably secured to said shafts nearer the car-body, substantially as shown. The inner ends of said spindles extend through a suitable annulus *c'* and through suitable bearings in the sides of the head *d* of said shaft F and are provided with corresponding cranks *f*, the inner ends of which are preferably provided with studs or have friction-rollers journaled thereto that enter the circumferential groove in the rim

of the wheel *g*, whose vertical position controls the rotative position of the spindle *c* and the angle of the vanes mounted thereon.

The mast *G* is tubular throughout its length and has its base *G'* spread and provided with basal flanges which are secured in any suitable manner to the floor of the car. Just above the base portion *G'* said mast is screw-threaded and provided with a ball-bearing cone *h*, and its upper end (which terminates about in the plane of the bottom of the head *d* of the shaft *F*) is likewise screw-threaded and has a ball-bearing cone *h'* mounted thereon in the reversed position.

The head *d* on the shaft has its lower end reduced in diameter and interiorly and exteriorly threaded to enable it to screw into the bell *H*, secured on the upper end of the cylindrical central portion or body of shaft *F*, and to permit of the ball-bearing cup *I* being screwed into the same. The lower end of said cylindrical central portion or body of shaft *F* has a bell *H'* screwed into the same, and this bell has seated and secured therein the bearing-cup *I'*. As a result of this construction when the antifriction-balls *J* are placed between said cones and bearing-cups and said cups properly adjusted and locked the shaft *F* will be supported by the mast *G* in such manner as to prevent endwise movement thereof and yet be perfectly free to revolve. The shafts *F F* are each provided with a miter-gear *K* at their lower ends, which are engaged and driven by the pinions *L* on the adjacent ends of the drive-shaft *M*. The drive-shaft extends longitudinally from one mast at one end of the car to the mast at the other end of the same and is journaled in suitable bearings *j j*, secured to and arising from the floor thereof, and it is driven by a suitable engine *N*, which is located, preferably, just to the rear of the center of length of the car. It will be noticed that owing to the engagement of the gears *K* of the forward and rear fan-shaft at points nearest the center of the car or at points diametrically opposite each other one shaft will be revolved in one direction and the other shaft in the opposite direction.

The position of the wheel *g* for controlling the position of the vanes of the fans is regulated by means consisting of a vertical shaft *k*, the heel of which is journaled in bearings located in the center of and inclosed by the base *G'* of each of the masts, and the main portion of its length extends up through and is journaled in the bore of the said mast above its base. The upper portion of the bore of mast *G* is slightly increased in transverse dimensions and squared, and the portion *k'* of the shaft *k* extending up into this squared portion of the bore of shaft *G* is reduced in diameter and screw-threaded. Wheel *g* is provided with a square downwardly-extending central boss *g'*, which en-

ters the upper squared portion of the bore of shaft *G* and is tapped longitudinally and engaged by the reduced upper screw-threaded extension *k'* of shaft *k*. In operation when shaft *k* is revolved, so that its extension *k'* will screw into the boss *g'* of disk *g*, said disk will move downward and cause the vanes of the fan to assume a more correspondingly horizontal or closed position, and when the shaft *k* is turned so that its upper extension *k'* will screw out of the boss *g'* said disk will move upward and cause the vanes of the fan to open to a more inclined open position. Shaft *k* is revolved according as desired by the operator by securing to the lower end thereof just above its bearings a worm-gear *l* and engaging this worm-gear by a worm *O*, which engagement is permitted by cutting away a portion of the side walls of base *G'* of the mast *G*, substantially as shown in Fig. 8 of the drawings. These worms *O* are secured on the ends of the longitudinal shafts *m* and *n*, and the worm and its shaft *m*, engaging the shaft *k* at the forward end of the car, are arranged in a longitudinal plane on one side of the center of said shaft, while the worm and its shaft *n* are arranged in a longitudinal plane on the opposite side of the center of the rear shaft *k*. The seat *P* for the operator is located in front of the center of length of the car, so as to obtain a more equal distribution of the load the ship is to carry, and in order to place the means for controlling the angles of the vanes of the fans under his control the shaft *n* extends from the rear of the machine to a suitable point in front of him, and the shaft *m* extends from the front of the car to a point in the same transverse plane as the forward end of shaft *n*. The adjacent ends of these shafts *m* and *n* are provided with suitable sprocket-wheels, and these sprocket-wheels are connected by suitable link chains *m'* and *n'* to sprocket-wheels on the forward ends of corresponding forwardly-extending spindles *r r'*, journaled in suitable bearings *R*, secured in the central portion of a cross-bar *R'*, connecting the trussed frames *B B* of the car. The rear end of the spindle *r* extends through its bearings and has secured thereto a hand-wheel *s*, which latter has a series of equidistant spurs *t* extending forwardly therefrom. The rear end of spindle *r'*, which is square, extends through its bearing and has a corresponding hand-wheel *S* slidably mounted thereon, which is provided with a corresponding series of equidistant radiating spurs *T*, corresponding in position to the spurs *t* of the wheel *s*, by which they are engaged when said hand-wheels are in the same transverse plane. Between the wheel *S* and the bearings *R* spindle *r'* is surrounded by an expansion coil-spring *V*, which keeps the wheel *S* normally at the limit of its movement rearward on said spindle *r'*. The conse-

quence of this construction is that when said wheels are in engagement the revolving of the one will correspondingly move the other and insure the turning of the vanes of the forward and rear fans on their axes to a corresponding extent; but when it is desired to turn the vanes of either the forward or the rear fan to an extent different from the vanes of the other fan wheel S is pushed forward out of engagement with wheel s to permit of the independent manipulation of said fans.

I prefer to employ both a forward and a rear rudder *w* and *W*. These rudders are mounted on vertical spindles *x* and *X*, located and suitably journaled in bearings between the ends of the car-body and the adjacent fan-shafts, and these rudders are turned in either direction, according as desired, by the operator by providing said spindles with suitable drums *y* and *Y*, which are secured thereto above the top of the car. Secured to these drums are guide-ropes *z* and *Z*, which are made to take one loop or bight around said drums and then their ends crossed and extended to the opposite truss-frames *B B* of the car, whence they pass around suitable sheaves *2 2* and are extended alongside said frames *B* toward the center of length of the car. The rear guide-ropes *Z* extend to and pass round the sheaves *4 4*, secured to the frames *B B* in a transverse plane back of the operator-seat *P*, and have their ends extend transversely toward the center of width of the car, where they are connected to a lever *5*, whose rear end is pivoted to a suitable plate supported centrally upon the cross-bar *6*. The said plate *7* has its forward edge provided with a segmental series of teeth, so that by the proper manipulation of its handle *8* when said lever is moved on its pivot, either to the right or left, it may be made to engage said teeth, and thereby be retained in the position in which it is moved, according as desired by the operator. The guide-ropes used in connection with the forward rudder after they pass over sheaves *2 2* extend to and pass round sheaves *9 9*, secured to frame *B* in a transverse plane in front of the operator's seat and then extend toward the center of width of the car and have their ends secured to a sliding block *10*, which is provided with a handle *11*, arising from the same and moved in a transverse guideway *12*, that is supported centrally on the cross-bar *13*, connecting the trussed frames *B B*, substantially as shown.

The general description given of the means for steering the air-ship is thought to be sufficient, especially in view of the fact that I do not claim that such steering apparatus involves the exercise of any invention on my part and as such general description is thought sufficient to convey an intelligent idea of the means desired to be employed by me for this purpose. I do not desire to be

confined to the exact mechanism and the construction and arrangement thereof as hereinbefore described, because it is obvious that many changes will probably be made therein when such air-ship is reduced to practice and put in operation.

I have provided parallel corresponding horizontal frames *14 14*, which are located on either side of the operator at an equal distance on either side of the center of width of the car and are supported a suitable distance above the operator by uprights or posts *15 15*. Supported on these frames are two corresponding rectangular awnings *16 16*, the adjacent longitudinal edges of which meet midway between frames *14 14* and are hinged together. These awnings *16* are hinged at suitable points to frames *14 14* by means of sleeves *17*, which have threaded studs *18*, projecting therefrom, that extend through transverse slots in said awnings, and have nuts *19* to clamp the awnings thereto. Now by lifting the center of said awnings (after having loosed nuts *19*) a gable-shaped roof may be formed over the operator, which when said nuts are tightened so as to retain the awnings in such position will afford ample protection for the operator, or, if desired, these awnings may be arranged in the same horizontal plane and made to serve as an aeroplane, substantially as shown in Fig. 5 of the drawings. These awnings are made of sufficiently light material, yet strong, so as not to add much weight to the ship. They may, however, if desired, be dispensed with.

What I claim as new is—

1. An air-ship comprising a suitable car, a motor, a stationary aeroplane above said car having suitable rear and forward openings therein, and a horizontal fan respectively located in each opening and actuated by said motor, the vanes of one of said fans being rotatively adjustable either simultaneously with or independently of the vanes of the other.

2. An air-ship comprising a suitable car, a motor, a stationary aeroplane above said car having suitable rear and forward openings therein, a horizontal fan respectively located in each opening and actuated by said motor, the vanes of one of said fans being rotatively adjustable independently of the vanes of the other, and a movable auxiliary aeroplane mediate said car and said stationary aeroplane.

3. An air-ship comprising a suitable car, a motor, a stationary aeroplane above said car having suitable rear and forward openings therein, a horizontal fan respectively located in each opening and actuated by said motor, the vanes of one of said fans being rotatively adjustable independently of the vanes of the other, and a collapsible auxiliary aeroplane mediate said car and said stationary aeroplane.

4. An air-ship comprising a suitable car, a motor therein, a stationary aeroplane above said car, a horizontal fan, respectively located above the bow and stern of said car and actuated by said motor, the vanes of one of said fans being rotatively adjustable independently of the vanes of the other, and a movable auxiliary aeroplane located in a plane mediate said car and fans.

5. An air-ship comprising a suitable car, a mast secured to and arising from each end of the same, a tubular shaft supported by and revolving on each mast, a motor operatively connected to and actuating said shafts, a horizontal fan connected to and revolving with each shaft, the vanes of said fans being rotatively adjustable either simultaneously or independently of each other, means controlling said adjustment, and a stationary aeroplane disposed above the car in the horizontal plane of said fans.

6. An air-ship comprising a suitable car, tubular masts secured to and arising from each end of the same, tubular shafts supported by and revolving on said masts the upper ends or heads of which are increased in diameter, horizontal fans, movable vanes therefor, spindles on which said vanes are mounted the inner converging ends of which extend through suitable bearings in the sides of the head of said shaft and are provided with suitable cranks, a vertically-adjustable device having a circumferential groove in its periphery into which the adjacent extremities of said spindle-cranks enter, and means for controlling the said vertical adjustment of said device.

7. An air-ship comprising a suitable car, tubular masts secured to and arising from each end of the same, tubular shafts supported by and revolving on said masts, the upper ends or heads of which are increased in diameter, horizontal fans, movable vanes therefor, spindles on which said vanes are mounted the inner converging ends of which extend

through suitable bearings in the sides of the head of said shaft and are provided with suitable cranks, a non-rotatable vertically-movable disk having a circumferential groove in its periphery, and having a downwardly-extending central boss engaging the bore of said mast, a vertical shaft journaled in said mast having an upper screw-threaded extension adapted to enter and engage the interiorly-threaded longitudinal bore of said boss.

8. An air-ship comprising a suitable car, tubular masts secured to and arising from each end of the same, tubular shafts supported and revolving on said masts, horizontal fans connected to and revolving with said shafts consisting of vanes and spindles therefor the inner ends of which are journaled in said shaft, vertical shafts journaled in the bore of said masts and operatively connected to said spindles at their upper ends, worm-gears secured to said last-mentioned shafts, worms engaging the same, and hand-operated mechanism for controlling the rotation of said worms.

9. An air-ship comprising a suitable car, tubular masts secured to and arising from each end of the same, tubular shafts supported and revolving on said masts, horizontal fans connected to and revolving with said shafts consisting of vanes and spindles therefor the inner ends of which are journaled in said shaft, vertical shafts journaled in the bore of said masts and operatively connected to said spindles at their upper ends, worm-gears, secured to said last-mentioned shafts, worms engaging the same, and hand-operated mechanism for simultaneously or independently controlling the rotation of said worms.

In testimony whereof I have hereunto set my hand this 27th day of January, 1904.

EDWARD HUTCHINSON.

Witnesses:

E. K. LUNDY,

FRANK D. THOMASON.