C. D. THOMPSON.

AIRSHIP.

APPLICATION FILED APR. 25, 1921.

1,425,555.

Patented Aug. 15, 1922.

9 SHEETS—SHEET 1.

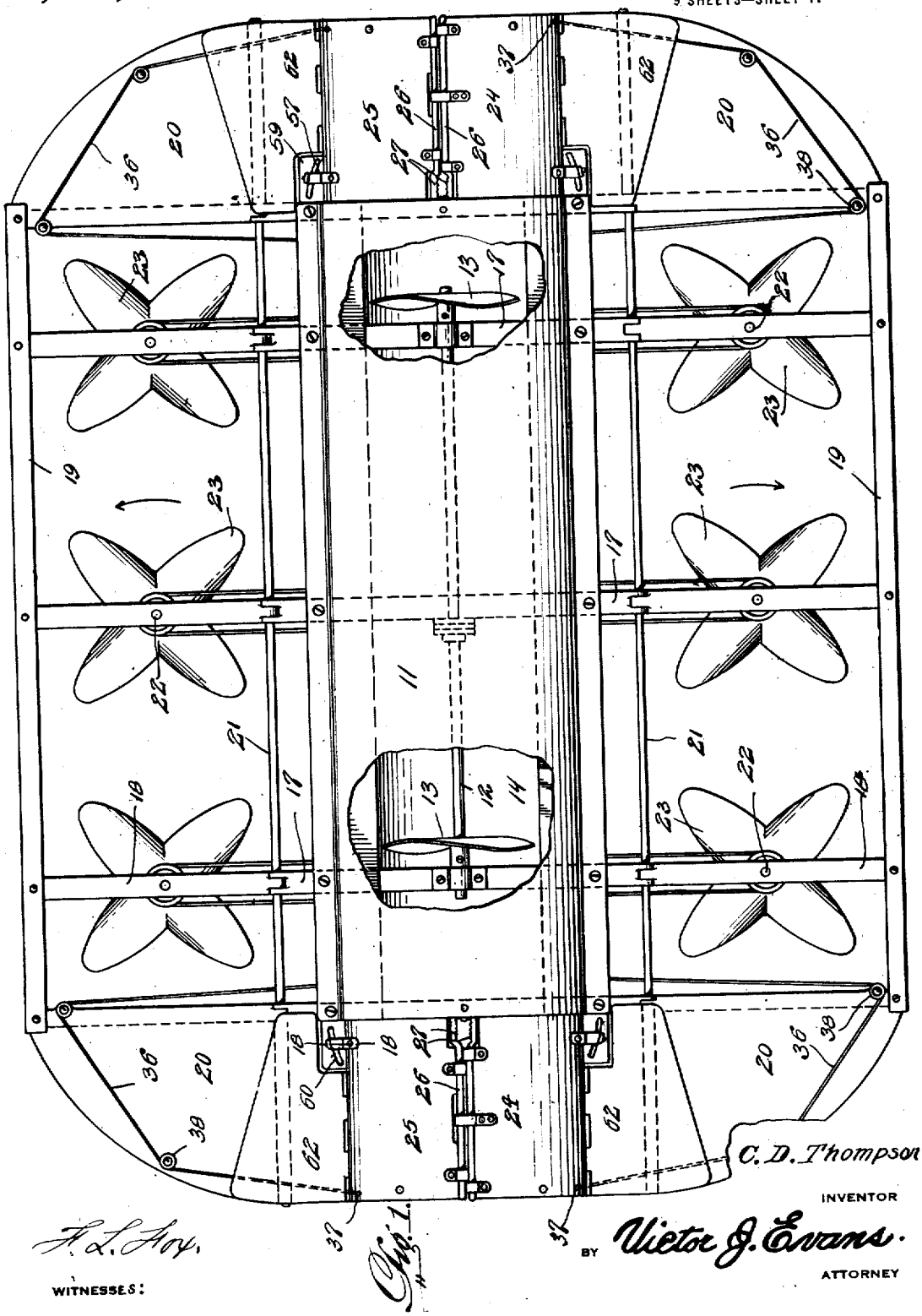

Fig. 1.

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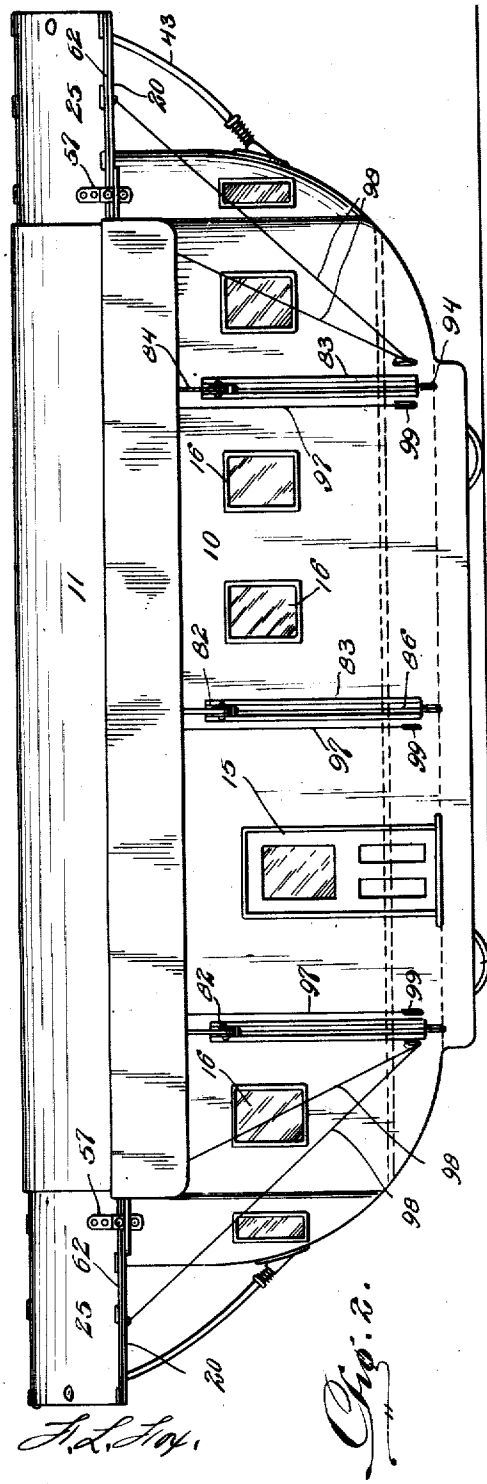

Fig. 2.

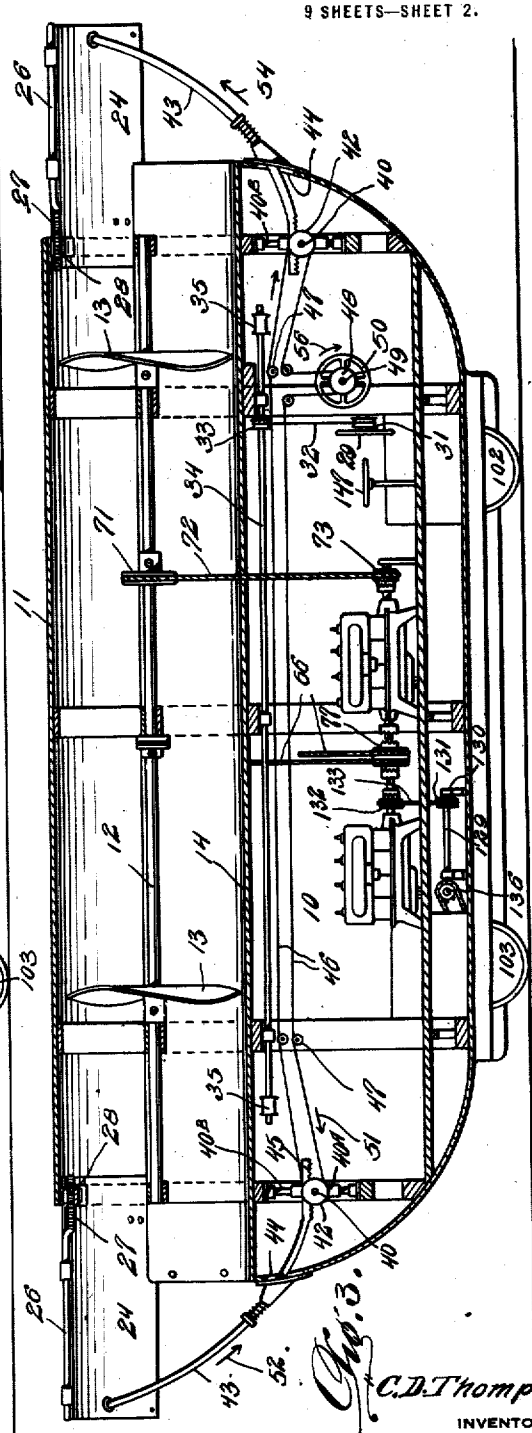

Fig. 3.

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9 SHEETS—SHEET 3.

Fig. 4.

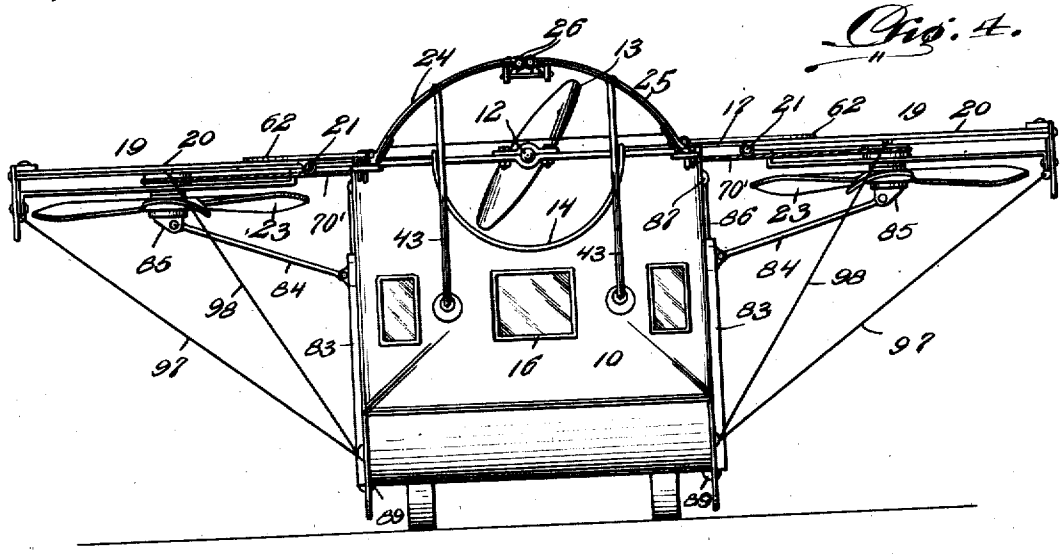
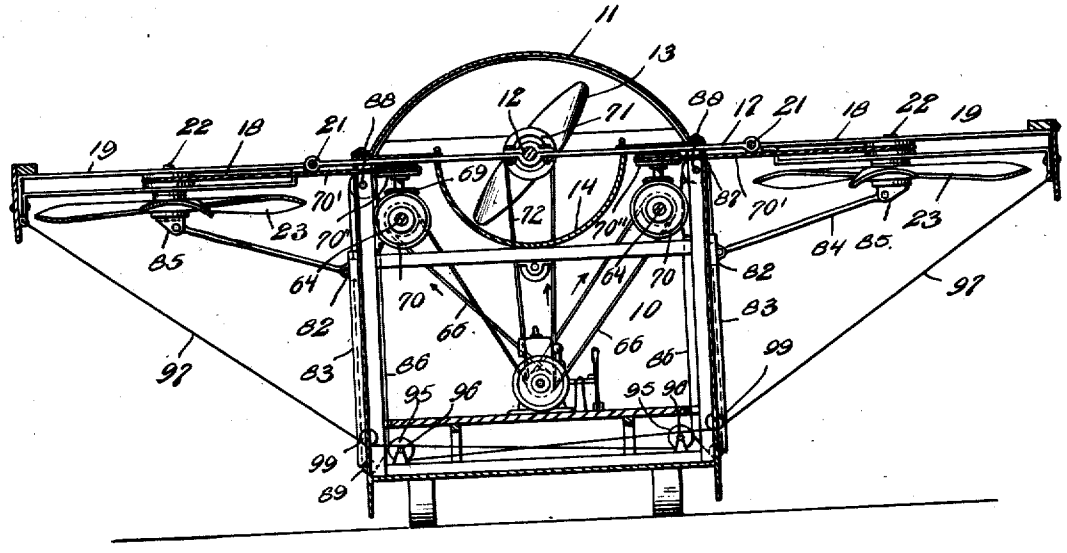


Fig. 5.



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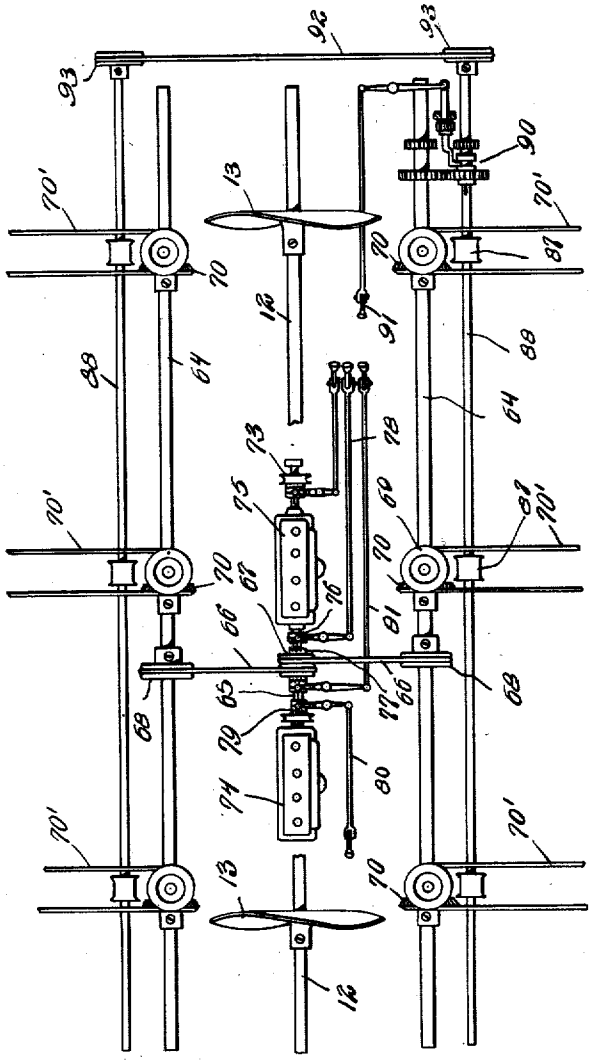

Fig. 6.

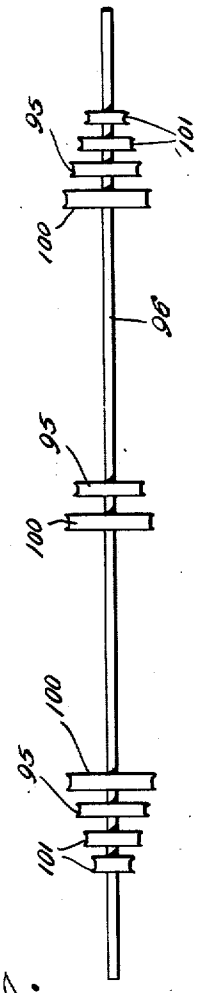

Fig. 7.

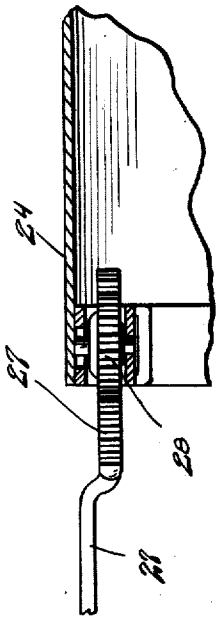

Fig. 8.

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9 SHEETS—SHEET 5.

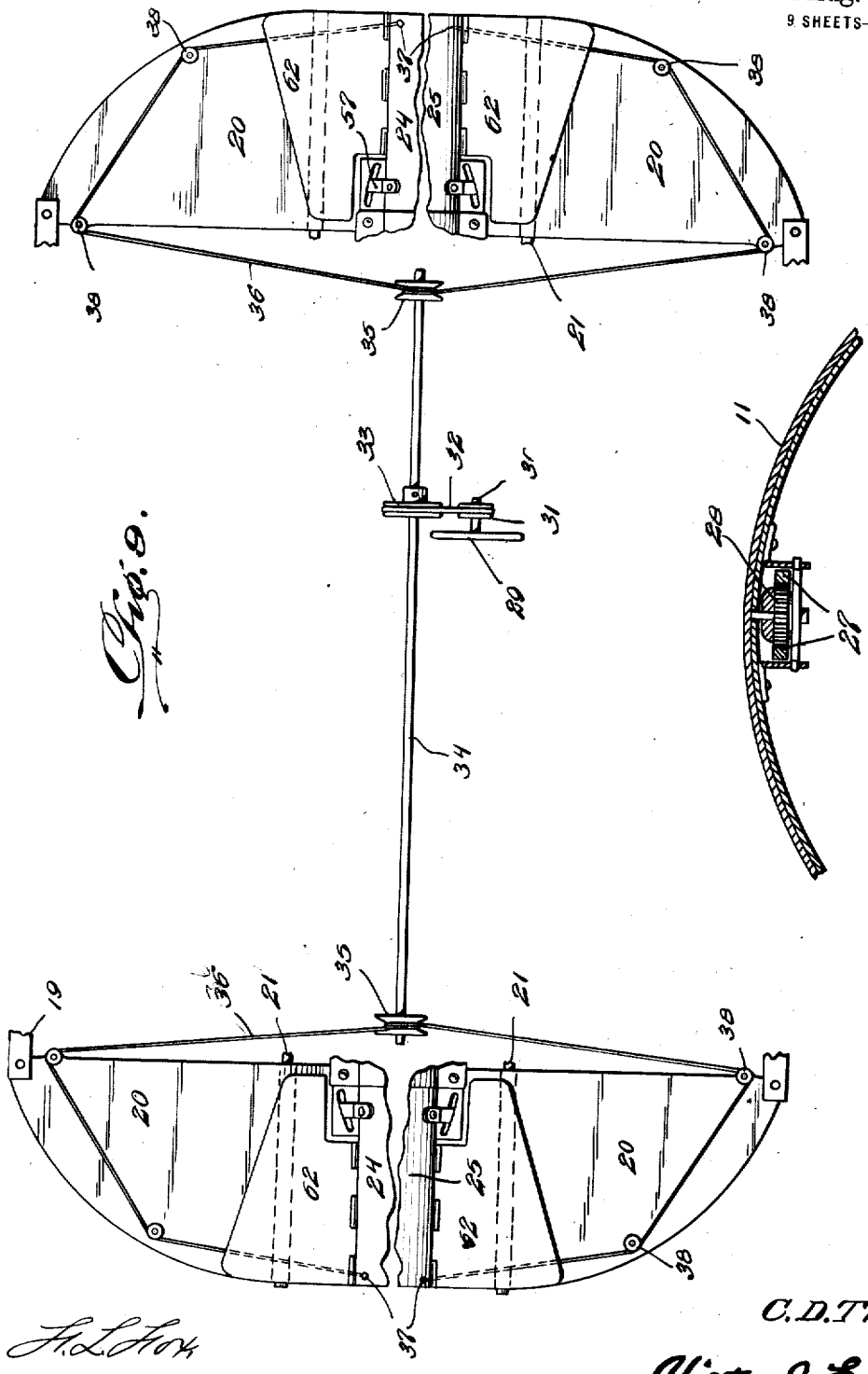

Fig. 9.

Fig. 10.

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9 SHEETS—SHEET 6.

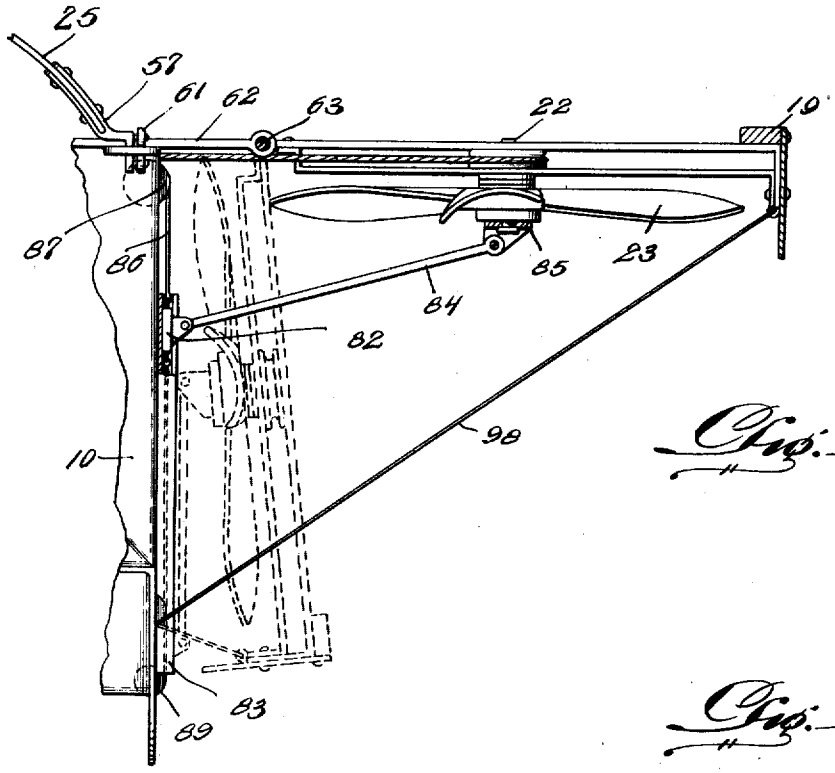
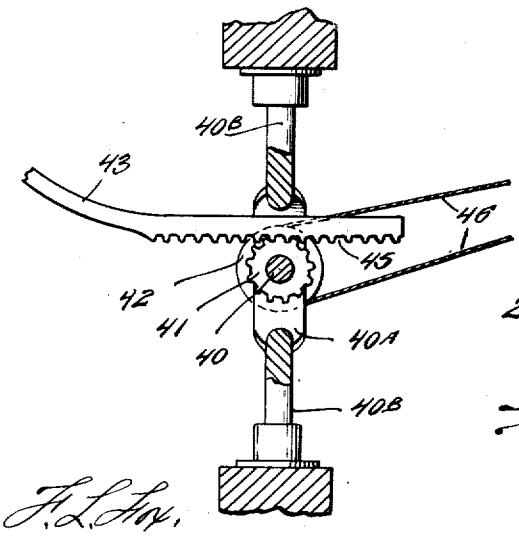
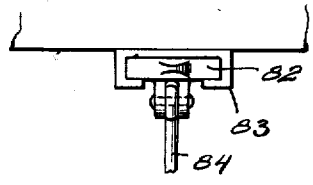


Fig. 11.

Fig. 12.

Fig. 13.





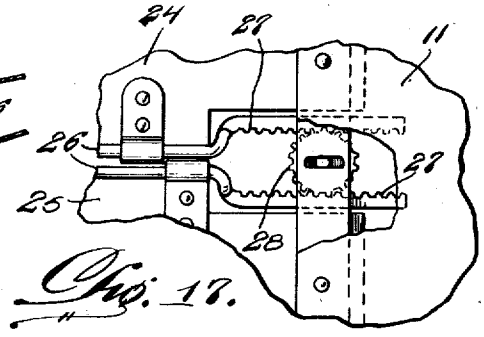


Fig. 17.

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9 SHEETS—SHEET 7.

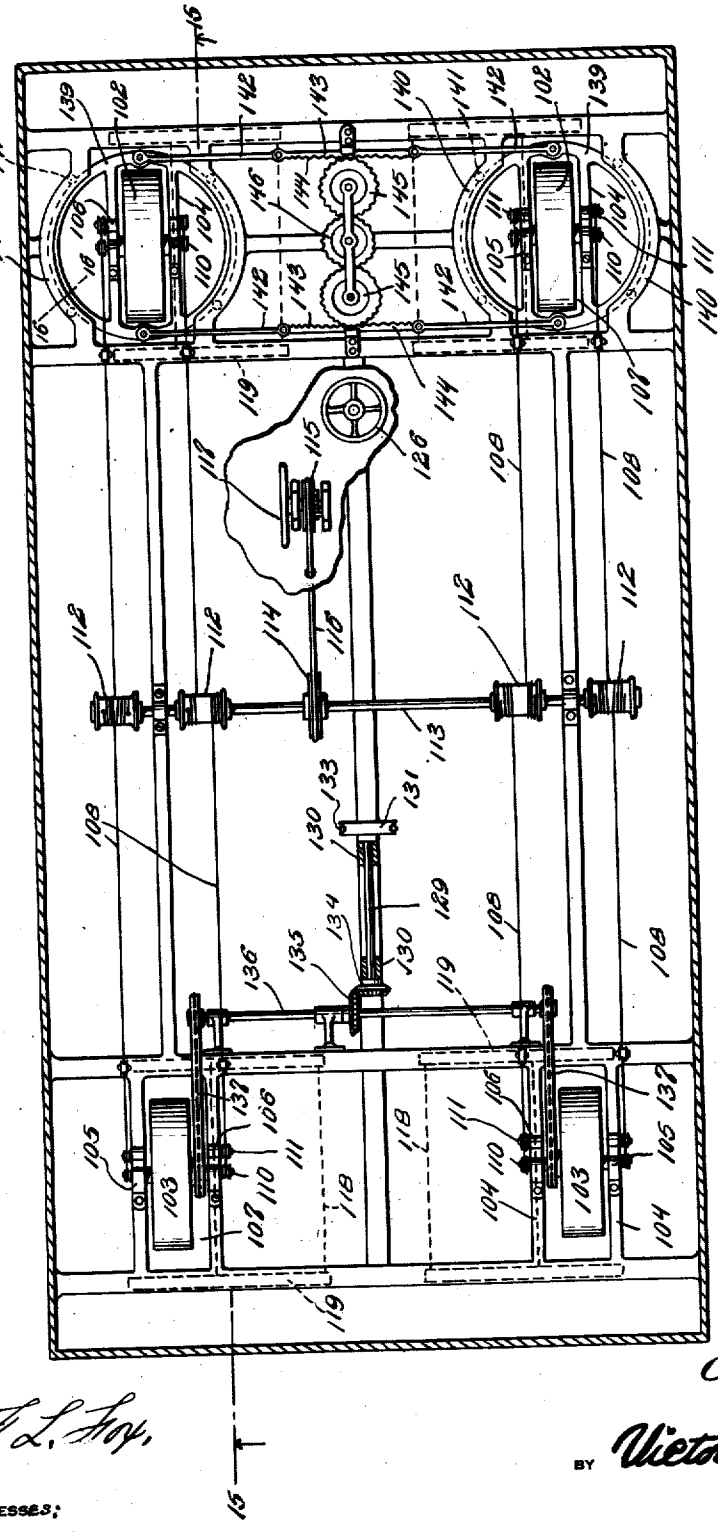

Fig. 16.

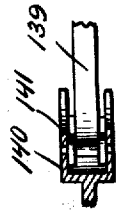

Fig. 14.

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9 SHEETS—SHEET 8.

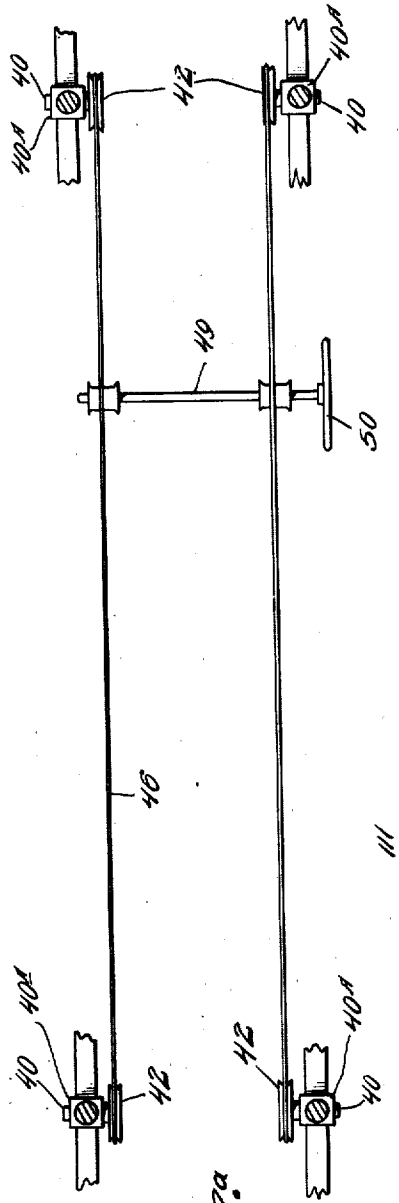

Fig. 17a.

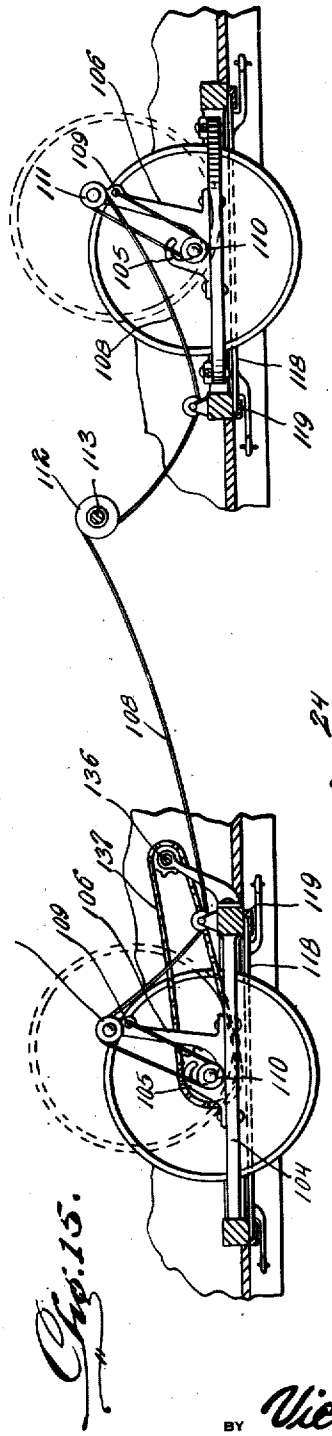

Fig. 15.

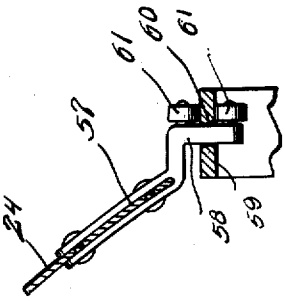

Fig. 18.

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9 SHEETS—SHEET 9.

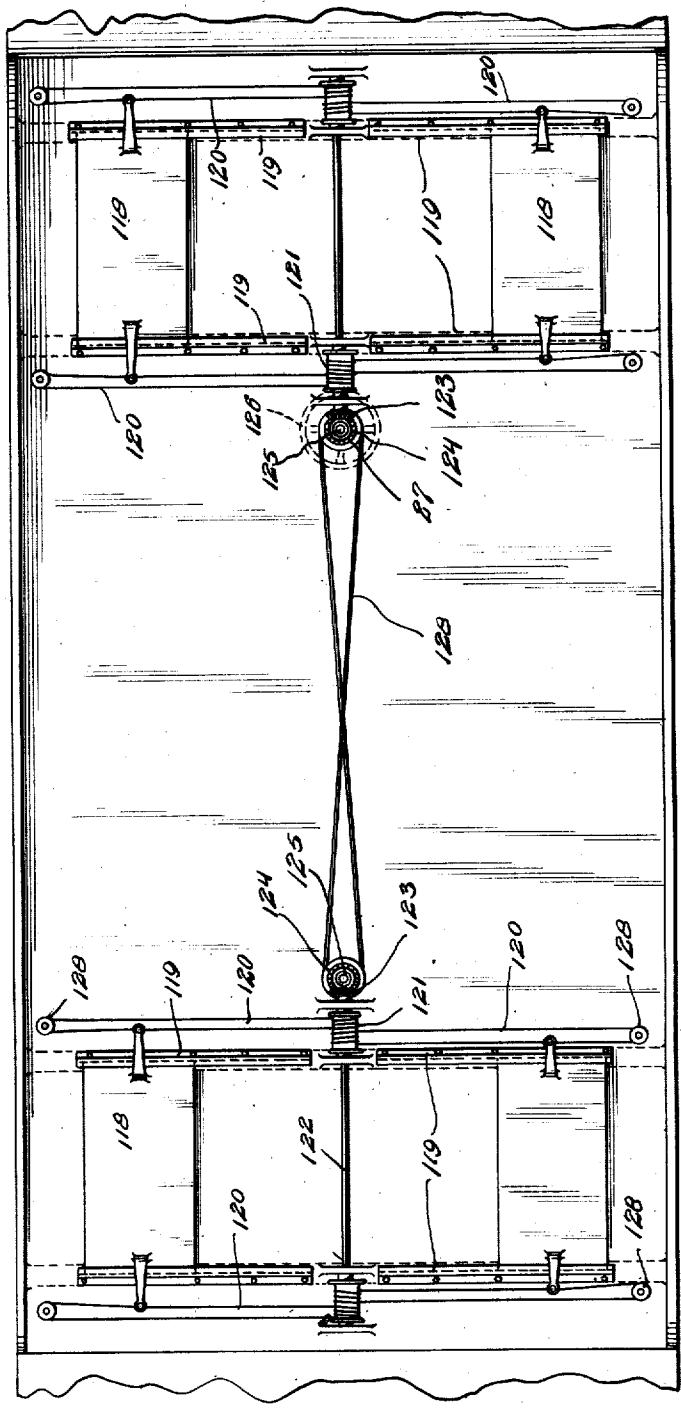

Fig. 19.

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UNITED STATES PATENT OFFICE.

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AIRSHIP.

1,425,555. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed April 25, 1921. Serial No. 464,097.

To all whom it may concern:

Be it known that CHARLES D. THOMPSON, a citizen of the United States, residing at Kirksville, in the county of Adair and State of Missouri, has invented new and useful Improvements in Airships, of which the following is a specification.

This invention relates to airships, and ha particular application to a machine wherein use is made of a plurality of sustaining propellers mounted on vertically disposed shafts, and driving propellers carried by a horizontally disposed shaft.

One of the principal objects of the invention resides in equipping the machine with movable members projecting beyond the opposed ends of the machine, and susceptible of simultaneous vertical adjustments in opposite directions to assist in the raising or lowering of the machine, and also susceptible of horizontal adjustment for guiding the machine to the left or right, means being provided for controlling the movements of said members.

Another object of the invention resides in the provision of means for lifting the ground engaging wheels and positioning the same within the body of the machine, and subsequently closing the openings through which the wheels pass, the means being further utilized for lowering the wheels to a position for use when landing.

In carrying out the invention, I make use of a motor for operating the driving propellers, and a separate motor for operating the sustaining propellers, a clutch mechanism being provided which allows the first mentioned motor to be coupled with the driving mechanism of the sustaining propellers, in event the latter mentioned motor becomes disabled for any particular reason.

It is also my purpose to mount the sustaining propellers upon frame-like members which are capable of being folded substantially in parallel relation at the opposed sides of the machine, or extended for use as the occasion requires, means being provided whereby the frame-like members can be conveniently adjusted to occupy either of their positions.

The nature and advantages of the invention will be better understood when the following detailed description is read in connection with the accompanying drawings, the invention residing in the combination, construction, and arrangement of parts as claimed.

In the drawings forming part of this application, like numerals of reference indicate similar parts in the several views and wherein:

Figure 1 is a top plan view of the machine, partly in section.

Figure 2 is a side elevation.

Figure 3 is a longitudinal sectional view.

Figure 4 is an end elevation.

Figure 5 is a transverse sectional view.

Figure 6 is a plan view of the operating means for the propellers, and the reversing mechanism for controlling the movements of the frame-like members above referred to.

Figure 7 is a detail view of one of the operating shafts over which certain cables are trained which control the movements of the frame-like members.

Figure 8 is an enlarged fragmentary view through one of the adjustable members for directing the machine, showing the connection between the latter and the body of the machine.

Figure 9 is a plan view showing the means utilized for adjusting the said members laterally for directing the machine to the right or left.

Figure 10 is an enlarged fragmentary view taken at right angles to Figure 8.

Figure 11 is a fragmentary view showing by full lines the active positions of the frame-like members which support the sustaining propellers, the folded position of which members are indicated by dotted lines.

Figure 12 is a detail view of the cross head which is embodied in the mechanism for controlling the movements of the frame-like members which support the sustaining propellers.

Figure 13 is an enlarged sectional view showing the means for controlling the vertical adjustments of the directing members.

Figure 14 is a plan view of the running gear and steering mechanism, also showing the means for raising the ground engaging wheels.

Figure 15 is a sectional view taken on line 15—15 of Figure 14 looking in the direction of the arrows.

Figure 16 is a section taken on line 16—16 of Figure 14.

Figure 17 is a fragmentary plan view of the connection between the frame and the

body of the machine and the movable directing members.

Figure 17[a] is a plan view partly in section showing the means utilized for raising or lowering the directing members.

Figure 18 is a sectional view taken on line 18—18 of Figure 1.

Figure 19 is a bottom plan view showing the sliding doors for closing the openings through which the ground wheels pass, and the means for controlling the doors.

Referring to the drawings in detail, 10 indicates the body of the machine which includes a substantially arch-shaped top portion 11, beneath which is arranged a shaft 12 which carries the driving propellers 13 A semi-cylindrical member 14 is positioned between the shaft 12 and the body 10 of the machine to prevent air currents from being driven in the direction of the occupants of the machine as will be readily understood, the propellers 13 operating between the arch-shaped member 11 and the member 14 as clearly illustrated in Figures 3 and 4. The body 10 is provided with an entrance opening which is normally closed by a door 15 and is also equipped with windows 16. The shaft 12 is operated by a motor in a manner to be hereinafter more fully described. The arch-shaped member 11 is supported upon the frame of the machine which includes the spaced parallel members 17 illustrated in Figure 1, these members projecting an appreciable distance beyond the member 11 and having pivotally connected thereto the spaced parallel members 18 forming part of adjustable frames 19 arranged at the opposed sides of the machine. These frames also include planes 20 which project beyond the ends of the arch-shaped member 11, and which planes together with the frames 19 are susceptible of vertical swinging movement upon the parallel shafts 21 which constitutes pivots therefor. The manner in which these frames are adjusted will be hereinafter fully described. The spaced parallel members 18 of the frame support the vertically disposed shafts 22 upon which are mounted the horizontally disposed sustaining propellers 23.

Projecting from the opposite ends of the arch-shaped member 11 are what I term movable directing members. Each of these members are made up of two identically constructed sections 24 and 25 respectively, the sections being shaped to unitedly define a semi-cylindrical member which in reality forms a continuity of the arch-shaped member 11. Each section is supported by a rod 26, these rods being associated with the meeting edges of the respective sections 24 and 25, and the corresponding extremities of these rods arranged adjacent the arch-shaped member 11 are offset and provided with teeth 27 which mesh with a pinion 28 journaled between the arch-shaped member 11. This construction provides for relative movement between the sections 24 and 25 of each member, when the member is adjusted laterally to direct the machine to either the right or left, depending upon the particular direction of movement of the members. The members are simultaneously adjusted horizontally through the instrumentality of a hand wheel 29 which is carried by a stub shaft 30 upon which is fixed a pulley 31. An endless belt 32 is trained over this pulley and a relatively large pulley 33 fixed upon the shaft 34, the shafts being arranged longitudinally of the machine and supporting pulleys 35 at the opposed ends thereof. A cable 36 is provided for each pulley 35, and each cable is wound about its adjacent pulley as illustrated in Figure 9, the terminals of said cable being connected to the outer edges of the respective members 24 and 25 of each member as indicated at 37 in Figures 1 and 9. Each of the cables 36 are similarly disposed, and are trained over pulleys 38 in a manner so that when the shaft 34 is rotated in one direction, the directing members will be shifted laterally to direct the machine to the right, and when the shaft 34 is rotated in an opposite direction, the directing members will be reversed to direct the machine to the left.

These directing members are also susceptible of vertical adjustment for lifting or lowering the machine as will be readily understood, although the normal position of the members is illustrated in Figures 1 and 2. For adjusting the members vertically, I provide spaced pairs of stub shafts 40 which are arranged transversely of the machine adjacent the opposed ends thereof, and supported by yokes 40[A] which are carried by vertically disposed pivots 40[B]. Fixed upon each shaft is a toothed wheel 41, and a pulley 42. This mounting of the shafts 40 allows the directing members to be moved laterally as will be readily understood. Depending from each section 24 and 25 of each directing member above referred to is a curved arm 43 which passes through an opening 44 in the body of the machine, each arm 43 terminating to provide a straight toothed portion 45 which meshes with the adjacent wheel 41. Trained over the pulleys 42 of the respective shafts 40 is a cable 46 which is also trained over idle pulleys 47, certain of the latter mentioned pulleys directing the cable over a pulley 48 fixed upon the shaft 49 which is rotated by means of the hand wheel 50. When the hand wheel 50 is rotated in the direction indicated by the arrow in Figure 3, the cable 46 is moved in the direction indicated by the arrow in 51, rotating the shafts 40, which in turn rotates the toothed wheels 41, thereby effecting an adjustment of the curved arms 43 at the op-

posed ends of the machine, one set of these arms moving downwardly as indicated by the arrow 52, while the other set of arms move upwardly as indicated by the arrow 54. Consequently, the directing members at the opposed ends of the machine are simultaneously adjusted vertically, but one of these members are moved upwardly, while the other is moved downwardly. This adjustment may be reversed by turning the hand wheel 50 in the direction opposite to that indicated by the arrow 56 in Figure 3, the adjustments of the directing members vertically controlling the movements of the machine in an upward or downward direction. Supported by each section 24 and 25 of each directing member is an angular-shaped arm 57, the terminal of which is offset and extended downwardly as at 58 through a slot in a bracket 59. This slot is indicated at 60 and limits the movements of the directing members laterally, friction between the arm 57 and the bracket 59 being minimized by use of rollers 61 carried by the offset extremity of the arm and arranged to engage the opposed sides of the bracket as clearly illustrated in Figure 18.

Hingedly mounted upon each section 24 and 25 of each directing member is a wing 62, the hinged joint of this member being indicated at 63. These wings 62 are normally arranged horizontally, and closes the space between the directing members and the planes 20. The wings 62 are susceptible of vertical movement incident to the rise or fall of the machine as will be readily understood.

Arranged longitudinally of the machine are shafts 64 which are driven from an engine shaft 65 by means of endless belts 66, these belts being trained over suitable pulleys 67 carried by the engine shaft and over pulleys 68 fixed upon the shafts 64. Carried by a vertical shaft adjacent the shaft 64 is a beveled gear 69 which meshes with a similar gear 70 carried by the shafts 64. As clearly illustrated in Figure 6, there is one of these beveled gears 70 for each gear 69, and consequently when the shafts 64 are rotated, the propellers 23 are operated by means of the cables 70′ which are trained over pulleys 70″ carried by the vertical shafts above referred to, and also over pulleys associated with the sustaining propellers 23. The shaft 12 which carries the driving propellers 13 is also equipped with a pulley 71 over which is trained a belt 72, the latter being trained over a pulley 73 carried by an engine shaft as clearly illustrated in Figure 3. As clearly illustrated in both Figures 3 and 6, I employ a motor indicated at 74 and operating the sustaining propellers 23, while the motor 75 is utilized for operating the shaft 12 which carries the driving propellers 13 Between the two motors 74 and 75 I arrange a clutch mechanism which includes a clutch collar 76 slidably mounted upon the engine shaft of the engine 75 and normally spaced from a cooperating clutch collar 77 associated with the pulleys 67 over which are trained the belts 66 which operate the shafts 64. The clutch collar 76 is operated by means of a rod 78, and can be quickly moved into engagement with the collar 77, to couple the pulleys 67 with the motor 75, whereby the shaft 64 and the sustaining propellers may be operated by the motor 75 in an emergency, or in other words, in event that the motor 74 becomes disabled, and fails to operate. The clutch mechanism is also provided with sliding clutch engaging members 79 which are mounted on the shaft of the engine 74, so that this particular motor can be operatively associated with the pulleys 67 or disconnected therefrom as the occasion requires. These clutch engaging members 79 are controlled by operating rods 80 and 81 respectively.

The pivoted frame-like members 19 which support the sustaining propellers are susceptible of being folded into parallel relation at the opposed sides of the machine as clearly indicated by dotted lines in Figure 11, although the normal position of these members is illustrated by full lines in the same figure. For controlling the movements of the frame-like members 19, I make use of a plurality of cross heads 82, each of which slide vertically in a guide 83. There is one of these cross heads for each parallel element 18 of the frame-like members, the cross heads being associated with an arm 84 which is also connected with the bracket 85 which supports the adjacent propeller 23. A cable 86 is trained over pulleys 87 carried by a shaft 88 which is arranged in spaced parallel relation to the shafts 64, and these cables 86 are trained over idle pulleys 89, and have their terminals connected to the opposed ends of the cross heads 82. Consequently, when the shaft 88 is rotated incident to the rotation of the shaft 64, a pull is exerted upon the cross heads 82 in one or the other direction, depending upon the particular direction of rotation of the shafts 88, so as to either lower the frame-like members 19 to their folded positions illustrated by dotted lines in Figure 11, or to extend the frames to their normal positions for use. For controlling the direction of rotation of the shafts 88, I provide a reverse gear mechanism indicated at 90 in Figure 6 which is controlled by means of a manually operated lever 91, the shafts 88 being rotated in unison by reason of the endless belt connection 92 which associates the corresponding ends of the shaft as illustrated in Figure 6, this belt being trained over pulleys 93 supported by the shafts 88 for this purpose. The ca-

bles 86 are trained over idle pulleys 94 and thence over the pulleys 95 fixed upon the shaft 96 extended longitudinally of the machine. The frame-like members are further braced by cables 97 and 98, there being one of these cables 97 arranged adjacent each cross head and trained over idle pulleys 99, then extended across the bottom of the machine and over the pulleys 100 carried by the shaft 96. The cables 98 are arranged adjacent the ends of the machine and are divergently disposed, these cables passing through openings in the machine in the same manner as the cables 97, and trained over pulleys 101 carried by the shaft 96. When the frame-like members are lowered to thei folded positions the slack in the cables 97 and 98 are taken up to prevent these cables from becoming entangled in the adjacent parts of the machine.

The machine is equipped with ground wheels, the front pair of which are indicated at 102 and the pair at the rear of the machine indicated at 103. The wheels are journaled in bearings provided by the spaced parallel members 104, and each bearing is formed to provide a hook-like portion 105 which retains the wheels in position for use when landing. Rising from each parallel member 104 is a standard 106 which is spaced from the hook-like member 105 to permit the wheels in their entirety to be moved upwardly within the body of the machine through openings 107 which are provided in the base of the machine as illustrated in Figure 15. Arranged at the opposite sides of each wheel are cables 108, the terminals of which are secured to the standards 107 as at 109, the cables being trained over pulleys 110 supported by the axle of the wheel, and thence over a pulley 111 journaled at the upper ends of the standards 106. These cables extend upwardly to the center of the machine and are coiled about drums 112 carried by the shaft 113 in a manner to wind and unwind so as to elevate the wheels to the dotted line position illustrated in Figure 5 when the shaft 113 is rotated in one direction. When rotating in an opposite direction, the cables unwind from their respective drums and allow the wheels to project through the openings 107, in a position for use. The shaft 113 supports a pulley 114 over which and a pulley 115 is trained an endless belt 116, whereby the shaft 113 is rotated upon rotation of the shaft supporting the pulley 115, which shaft is equipped with a hand wheel 117.

When the wheels are elevated to the position illustrated by dotted lines in Figure 15, the openings 107 through which wheels pass are closed by sliding doors 118, these doors sliding transversely of the machine in suitable guides 119. Each door is connected to cables 120 arranged at the opposed sides of the door openings, these cables being connected with drums 121 in a manner to be wound about the drums to move the doors 118 toward each other to a closed position, and unwound from the drums to permit the drum to be moved to an open position. The drums 121 are carried by the ends of a shaft 122, one end of each shaft supporting a beveled gear 123 which meshes with a similar gear 124 supported by a shaft arranged at a right-angle to the shaft 122, and which shaft is indicated at 125. One of these shafts 125 is rotated through the instrumentality of a hand wheel 126, while each of the shafts 125 support pulleys 127 about which is trained an endless belt 128 the runs of which are crossed as illustrated in Figure 19, so that when the hand wheel 126 is rotated, in either one or the other direction, the doors 118 at the opposed ends of the machine are simultaneously closed or opened. The cables 120 are trained over suitable pulleys 128.

Arranged beneath and parallel to the engine shaft, is a shaft 129 which is journaled in suitable bearings 130, and the shaft 129 is equipped with a pulley 131 over which and the pulley 132 associated with the engine shaft, is trained an endless belt 133, whereby said shaft 129 is rotated from the motor of the machine. The shaft 129 supports a beveled gear 134 which meshes with a similar gear 135 carried by a transversely disposed shaft 136 to rotate the latter mentioned shaft for the purpose of driving the rear traction wheels 103. Each of the latter mentioned wheels is equipped with a sprocket over which is trained a driving chain 137, these chains being trained over sprockets supported on the ends of the shaft 136.

The spaced parallel members 104 supporting the front wheels 102 upon part of an annulus indicated at 139, and this annulus, there being one of the front wheels 102, is rotated within a channel-shaped guide 140 in which are arranged friction bearings 141. Connecting the annuli of the wheels 102 are spaced parallel rods which are made up of pivotally connected sections 142 and an intermediate section 143 which is provided with teeth 144, the latter meshing with the adjacent pinions 145. Interposed between the pinions 145 and meshing therewith is an additional pinion 146, so that when the steering wheel 147 is rotated in either direction, the annuli 139 are turned within their guides 140 thereby shifting the front wheels 102 to steer the machine.

While it is believed that from the foregoing description, the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be re-

sorted to when desired as fall within the scope of what is claimed.

What I claim is:

1. The combination with an airship, of directing members projecting from the opposed ends thereof, said members being substantially arch-shaped and including relatively movable sections, said directing members being susceptible of vertical and horizontal movements, and means for simultaneously adjusting said members as and for the purpose specified.

2. The combination with an airship, of directing members projecting from the opposed ends thereof, each member including two sections designed to unitedly define a member of semi-cylindrical formation, a rod supporting each section, said rods being arranged substantially parallel and having offset extremities, teeth on said extremities, a pinion arranged between said rods and meshing with the teeth thereof, said sections being relatively movable, means for simultaneously adjusting said members in either horizontal or vertical planes for the purpose specified.

3. The combination with an airship, of directing members projecting from the opposed ends thereof, said members being substantially semi-cylindrical, each member including relatively movable sections, said members being susceptible of horizontal adjustments, a transverse shaft adjacent each member, yokes supporting said shafts in a manner to permit said members horizontal adjustment, a curved arm depending from each member and terminating to provide a toothed portion, a pinion carried by each shaft and meshing with the toothed portion of the adjacent arm, and means for operating said shafts simultaneously whereby said members are adjusted vertically for the purpose specified.

In testimony whereof I affix my signature.

CHARLES D. THOMPSON.