J. ROONEY.

AEROPLANE CONSTRUCTION.

APPLICATION FILED JULY 2, 1910.

985,373.

Patented Feb. 28, 1911.

3 SHEETS—SHEET 1.

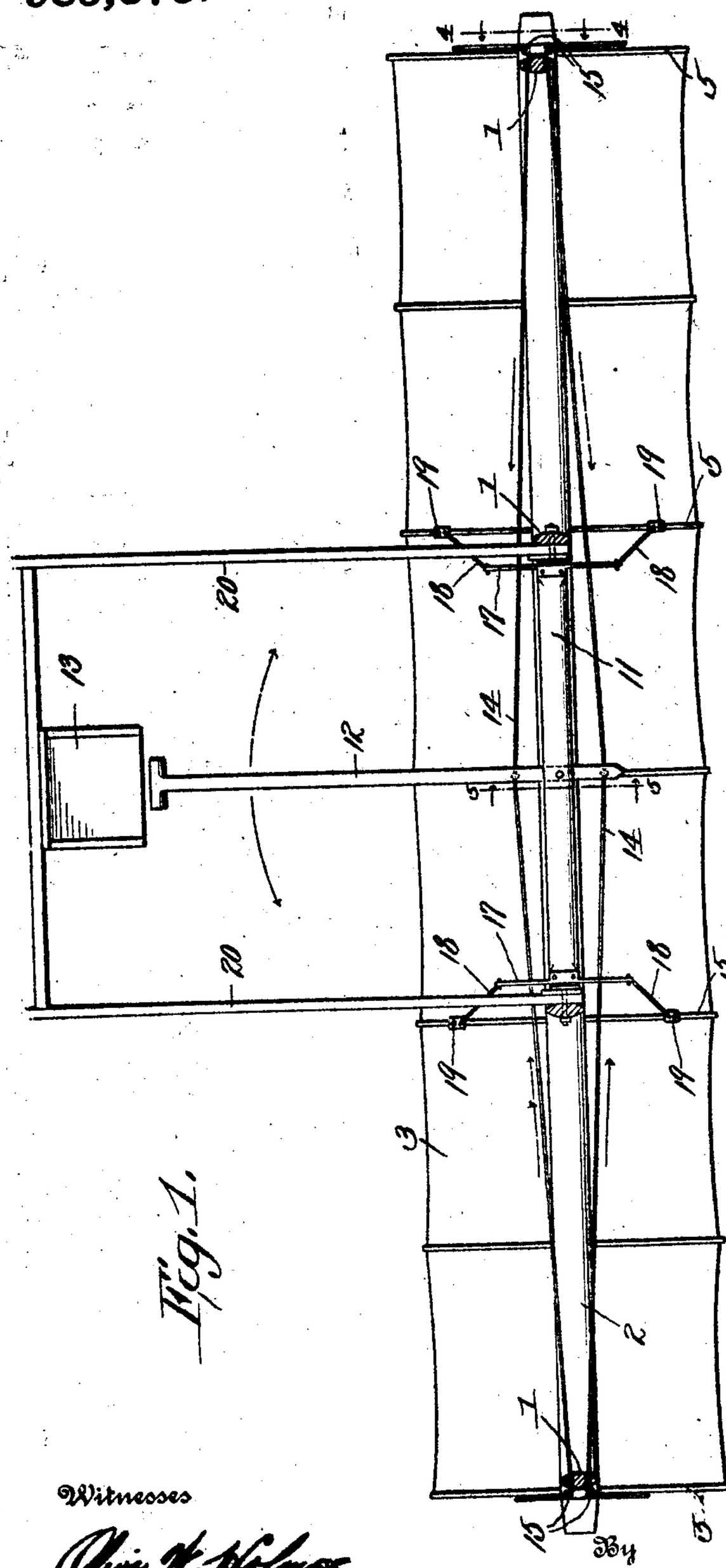

Fig. 1.

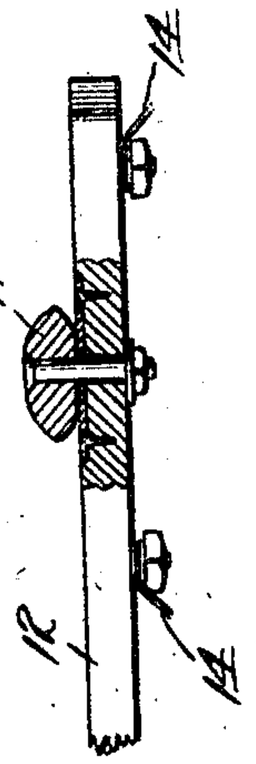

Fig. 5.

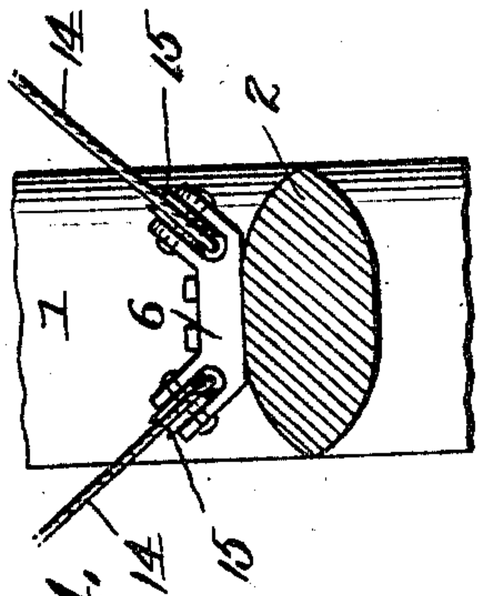

Fig. 4.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

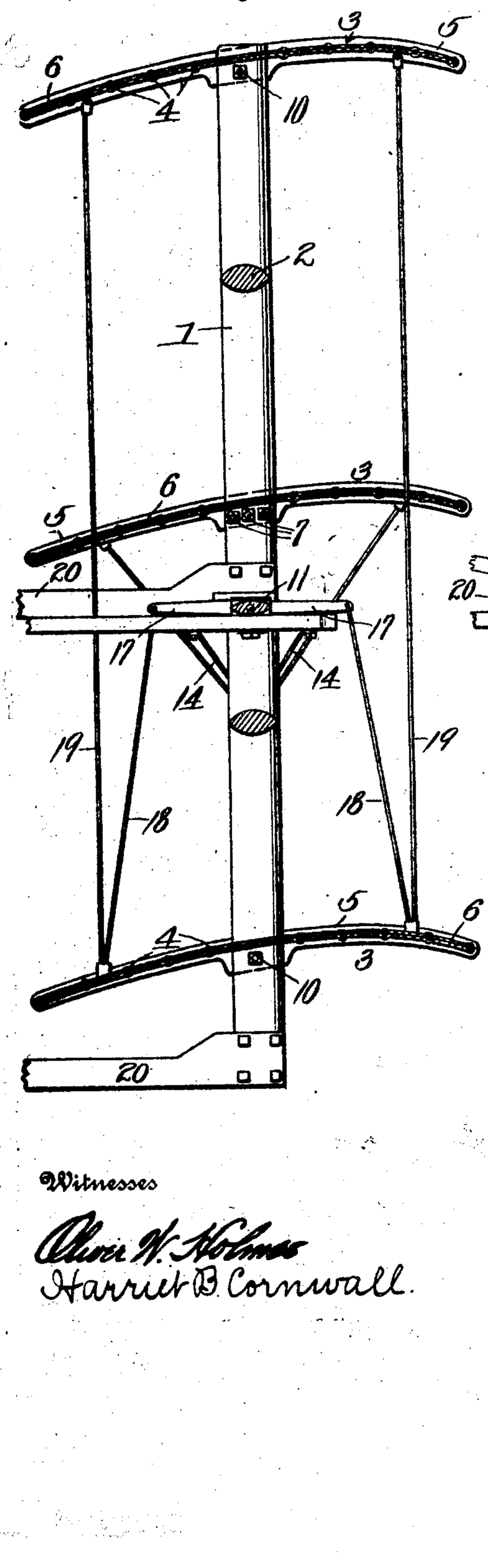
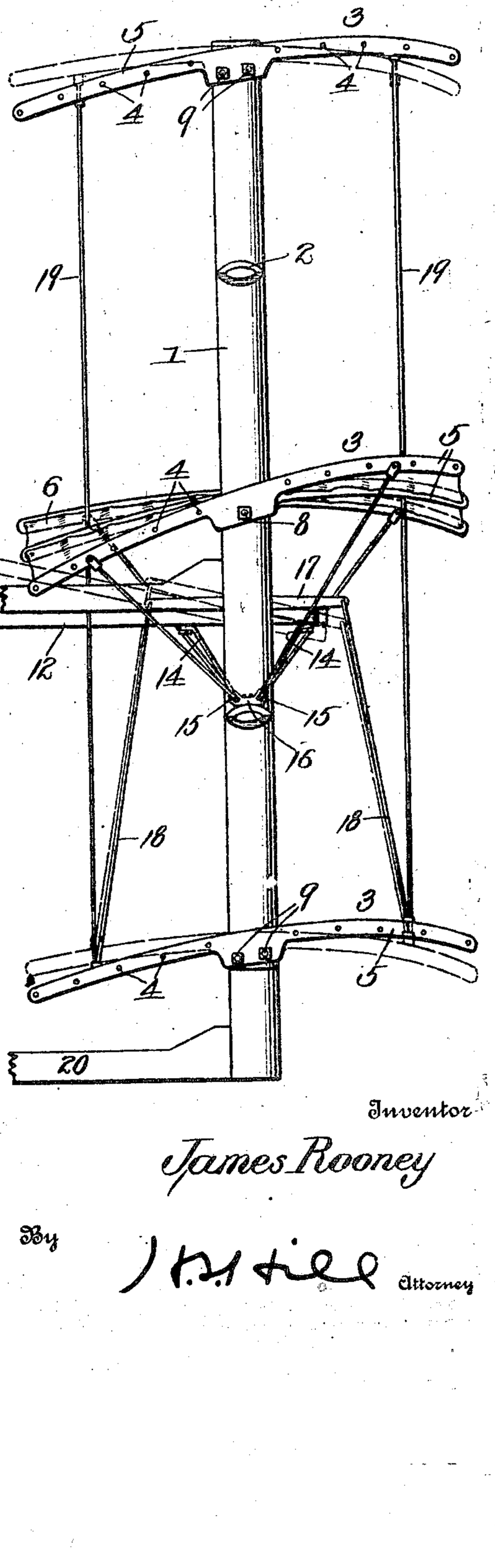


Fig. 3.



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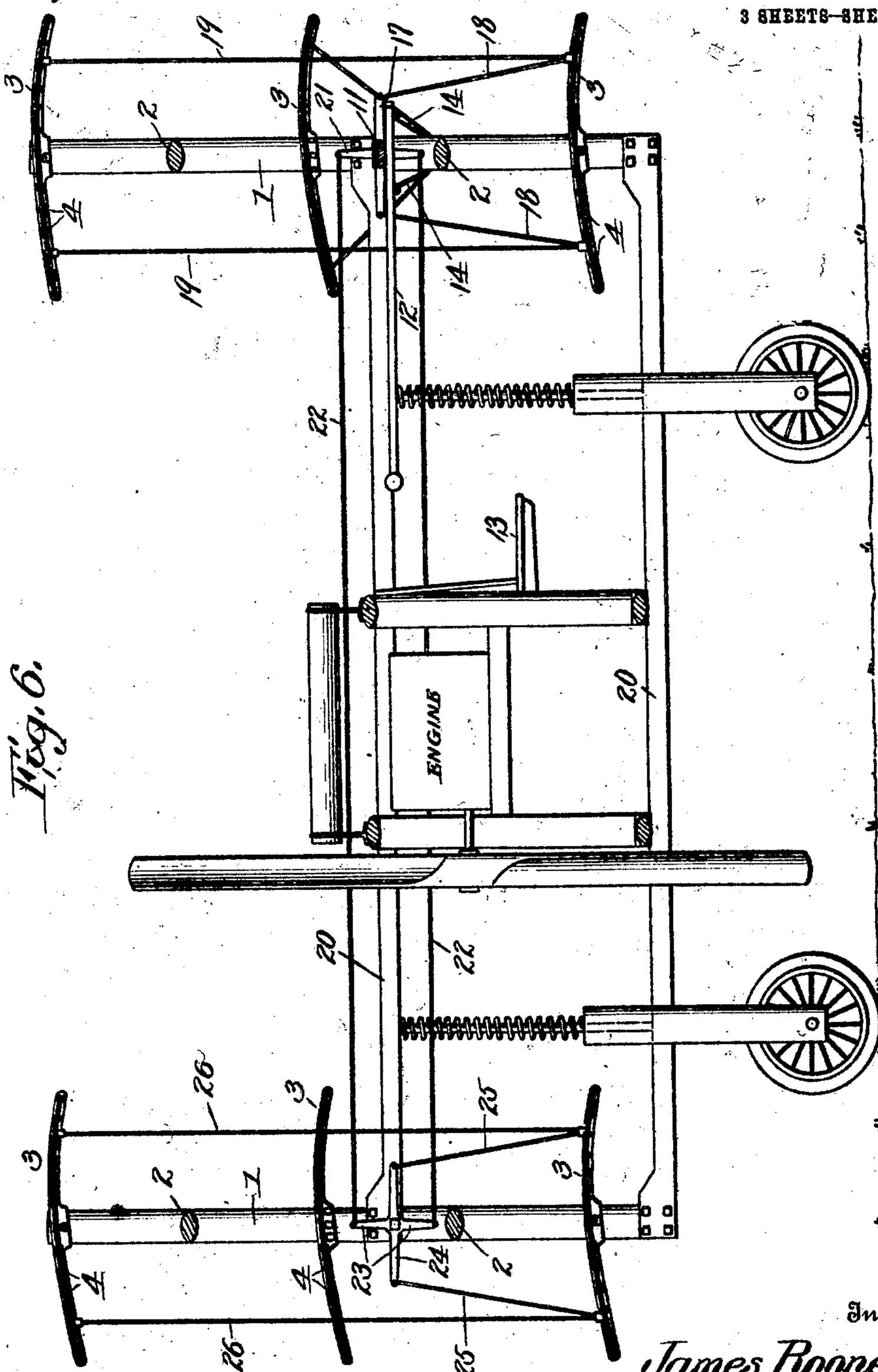
3 SHEETS—SHEET 3.

Fig. 6.



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AEROPLANE CONSTRUCTION.

985,373. Specification of Letters Patent. Patented Feb. 28, 1911.

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To all whom it may concern:

Be it known that I, JAMES ROONEY, citizen of the United States, residing at Croton-on-Hudson, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Aeroplane Constructions, of which the following is a specification.

The present invention relates to certain new and useful improvements in the construction of aeroplanes, and pertains more particularly to novel means for warping and tilting the planes for the purpose of balancing the machine and causing the same to ascend or descend as may be desired by the aviator.

The object of the invention is the provision of an aeroplane embodying novel means of construction whereby the planes may be either warped or tilted through the medium of a single lever, thereby simplifying the construction of the aeroplane and placing the same under perfect control.

The invention further contemplates a steering and balancing construction for aeroplanes which is positive and reliable in its operation, which is simple in its construction, and which is comparatively light in weight.

With these and other objects in view, the invention consists in certain combinations and arrangements of the parts as will more fully appear as the description proceeds, the novel features thereof being pointed out in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:—

Figure 1 is a horizontal sectional view through a superposed set of planes constructed in accordance with the invention and constituting the front of an aeroplane. Fig. 2 is a vertical sectional view through the central portion of the said set of planes. Fig. 3 is an end view of the same, the middle plane being shown as warped, while the top and bottom planes are shown as having the middle portions thereof tilted into proper position for causing a slight descent of the machine. Fig. 4 is an enlarged horizontal sectional view on the line 4—4 of Fig. 3. Fig. 5 is an enlarged vertical sectional view on the line 5—5 of Fig. 1, and Fig. 6 is a longitudinal sectional view through an aeroplane embodying a modified form of the invention.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In carrying out the invention, a series of superposed planes are mounted upon a suitable supporting frame, a portion of the planes being designed to be warped for balancing the machine, while the remained of the planes are designed to be tilted and moved into various angles to the line of flight for the purpose of causing the machine to ascend or descend as may be desired.

The numerals 1 designate a series of four uprights which are connected at intermediate points in their length by a pair of lateral frame members 2, the said uprights and lateral members coöperating with each other to form the frame upon which the superposed planes 3 are mounted. In the present instance three of the planes 3 are utilized, and each of the said planes 3 is formed with a series of spaced and parallel wires or flexible tension members 4 which connect the cross pieces 5 and have a covering 6 of canvas or similar material applied thereto. The cross pieces 5 preferably have a slightly curved or arched formation as indicated upon the drawing, and the said cross pieces of the various planes 3 are secured to the uprights 1. The middle plane 3 is located between the lateral frame members 2 and is designed to be warped for the purpose of balancing the machine, while the upper and lower planes 3 are located toward the ends of the upright members 1 and are designed to have the middle portions thereof swung into various angles to the line of flight for the purpose of directing the aeroplane up or down as may be desired. The two middle cross pieces 5 of the intermediate plane 3 are rigidly secured to the corresponding uprights 1 in some suitable manner as by means of the bolts 7, while the end cross pieces 5 of the middle plane 3 are pivotally connected to the corresponding uprights 1 in

some suitable manner as by means of the pivot bolts 8. It will thus be obvious that by swinging the two end cross pieces 5 of the middle plane in opposite directions, the said middle plane may be warped, as indicated in Fig. 3, so as to cause one side of the machine to rise and the opposite side of the machine to be lowered as may be required for balancing the device.

The end cross pieces 5 of the upper and lower planes 3 are rigidly secured to the end uprights 1 in some suitable manner as by means of the bolts 9, while the intermediate cross pieces 5 of the said upper and lower planes are pivotally connected to the intermediate upright members 1 in some suitable manner as by means of the pivot bolts 10. With this construction, it will be obvious that by swinging the said intermediate cross pieces of the upper and lower planes into various angles with the line of flight, the machine can be caused to ascend or descend.

At a point below the intermediate plane 3, a horizontal bar 11 is journaled between the intermediate uprights 1 so as to be turned freely about a longitudinal axis and have a rocking movement. The operating lever 12 is pivotally mounted at a point toward the forward end thereof to the middle portion of the bar 11 so that the said bar can be rocked through the medium of the said lever. The rear end of this lever 12 is designed to be grasped by the aviator who may sit upon the seat 13, and the said lever is also designed to be moved laterally either to the right or to the left about its pivotal connection with the bar 11 as a center. The said lever 12 is connected at points upon opposite sides of the pivot center thereof with intermediate portions of a pair of cables or wires 14, the said cables extending longitudinally of the set of planes, passing through openings in the end uprights 1, and being drawn around pulleys 15 journaled in blocks 16 secured to the projecting end portions of the lower lateral frame member 2. After passing around these pulleys 15, the extremities of the two cables 14 are carried up and secured to opposite ends of the end cross pieces 5 of the middle plane 3. When the lever 12 is swung laterally to the right or to the left, the cables 14 are caused to move in opposite directions so that at each end of the machine one of the cables will be taken in and the other cable let out. It will also be apparent that the cable which is taken in at one end of the machine will be let out at the opposite end of the machine, so that the end cross pieces 5 of the middle plane 3 will be swung in opposite directions and the said plane warped so as to have a tendency to lift one side of the machine and depress the opposite side.

The two extremities of the bar 11 have the cross arms 17 rigidly applied thereto, the said cross arms projecting upon opposite sides of the bar and having the extremities thereof connected by means of the wires or cables 18 to the intermediate cross pieces 5 of the lower planes 3. It will also be observed that these intermediate cross pieces 5 of the lower plane are connected by the vertical wires or cables 19 to the intermediate cross pieces of the upper plane so that the said intermediate cross pieces of the upper and lower planes will always move in unison. These vertical cables 19 pass loosely through the intermediate plane 3 so as not to interfere in any manner with the operation thereof. When the main lever 12 is moved up and down, it will be obvious that the rocking movement of the bar 11 will operate through the cross arm 17 and the cables 18 and 19 to tilt the intermediate portions of the upper and lower planes and project the same at various angles to the line of flight.

A complete aeroplane would preferably comprise two sets of planes connected in some suitable manner as by means of the frame members 20, and a possible modification of the invention is illustrated in Fig. 6 in which the top and bottom planes of the front and rear sets are connected with each other so as to be moved simultaneously. The two sets of planes are constructed in substantially the same manner as previously described, with the exception that the middle plane 3 of the rear set is rigidly secured to the uprights 1 so that it can neither be warped nor tilted. The two extremities of the horizontal bar 11 at the front of the machine are provided not only with the cross arms 17, but also with the upwardly and downwardly projecting arms 21, the extremities of the said arms 21 being connected by the wires or cables 22 to corresponding arms 23 which project upwardly and downwardly from intermediate portions of levers 24 which are secured to the intermediate uprights 1 of the rear set of planes. These levers 24 have the extremities thereof connected by the wires or cables 25 to the intermedite cross pieces 5 of the lower plane, and the said intermediate cross pieces of the lower plane are connected by the wires or cables 26 to the intermediate cross pieces 5 of the upper plane. The wires 26 pass freely through the intermediate plane so as not to interfere in any manner with the same, and cause the intermediate portions of the upper and lower planes to be tilted simultaneously. With this construction, it will be apparent that the upper and lower planes of both the rear set of planes and forward set of planes are connected to each other so as to be operated simultaneously

through the medium of the lever 24 for producing an ascent or descent of the aeroplane. Particular attention may be directed to the fact that a single lever is employed for balancing the machine and for causing the machine to ascend or descend, the said lever being moved horizontally for balancing the machine, and vertically for directing the machine up or down. It will also be noted that the peculiar construction of the planes particularly adapts the same to the warping and tilting adjustments which have been previously described.

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

1. In an aeroplane, the combination of a frame, a plurality of planes mounted upon the frame, a rock shaft, a lever pivotally mounted upon the rock shaft and forming means for turning the rock shaft, cables connected to the lever upon opposite sides of its pivot point and also connected to corners of one of the planes whereby the said plane can be warped through the medium of the lever, and means actuated by the rock shaft for tilting portions of another of the planes.

2. In an aeroplane, the combination of a frame, a plurality of planes mounted upon the frame, a rock shaft, a lever pivoted upon the rock shaft and adapted to turn independently of the rock shaft when swung in one direction and to turn the rock shaft when swung in another direction, cables connected at intermediate points in their length to the lever upon opposite sides of its pivot point, the extremities of the said cables being connected to the corners of one of the planes whereby the said plane can be warped through the medium of the lever, and means actuated by the rock shaft for tilting a portion of another of the planes.

3. In an aeroplane, the combination of a frame, a plurality of planes mounted upon the frame, a rock shaft, a lever pivoted upon the rock shaft so as to swing independently of the rock shaft when moved in one direction and turn the rock shaft when moved in another direction, a cross arm carried by the rock shaft, connecting means between the cross arm and one of the planes for tilting a portion of the said planes, and means actuated by the lever for warping another of the planes.

4. In an aeroplane, the combination of a frame, a plurality of planes mounted upon the frame, a rock shaft, a cross arm carried by the rock shaft, connecting means between the ends of the cross arm and one of the planes for tilting a portion of the said plane, a lever pivotally mounted upon the rock shaft so as to turn independently thereof when swung in one direction but to turn the rock shaft when swung in another direction, and connecting means between the said lever and one of the planes for warping the said plane.

5. In an aeroplane, the combination of a frame formed with a series of uprights, a plurality of planes mounted upon the frame, a rock shaft journaled between a pair of the uprights and arranged substantially parallel to the planes, cross arms at the ends of the rock shaft, connecting means between the cross arms and one of the planes for tilting a portion of the said plane, connecting means between the said plane and another plane whereby the second mentioned plane will be tilted simultaneously with the first mentioned plane, a lever pivot upon the rock shaft so as to move independently of the rock shaft when swung in one direction but turn the rock shaft when swung in another direction, and cables connected at intermediate points in their length to the lever on opposite sides of its pivot point, the ends of the cables being connected to the corners of one of the planes for warping the said plane.

6. In an aeroplane, the combination of a frame, a series of flexible planes carried by the frame, each of the said planes being formed with a number of cross bars and a portion of the planes having intermediate cross bars pivotally mounted and end bars rigidly mounted while other planes have end cross bars pivotally mounted and intermediate cross bars rigidly mounted, and means for moving the pivoted cross bars for warping a portion of the planes and tilting portions of the other planes.

7. In an aeroplane, the combination of a frame, a plurality of flexible planes mounted upon the frame, each of the frames being formed with a series of cross bars and a portion of the planes having intermediate cross bars pivotally mounted and end cross bars rigidly mounted while other planes have end cross bars pivotally mounted and intermediate cross bars rigidly mounted, a rock shaft, a lever pivoted upon the rock shaft so as to move independently of the rock shaft when swung in one direction but turn the rock shaft when swung in another direction, connecting means between the rock shaft and the intermediate cross bars of those planes in which the intermediate cross bars are pivotally mounted, and connecting means between the lever and the end cross bars of those planes in which the end cross bars are pivotally mounted.

8. In an aeroplane, the combination of a frame, three superposed planes mounted upon the frame, the said planes being flexible and each of the planes being formed with a series of cross bars, the intermediate cross bars of the upper and lower planes being pivotally mounted and the end cross bars of the said planes being rigidly mount-

ed, while the intermediate cross bars of the middle plane are rigidly mounted and the end cross bars of the middle plane are pivotally mounted, a rock shaft, cross arms upon the rock shaft, connecting means between the cross arms and the intermediate pivotally mounted cross bars of the upper and lower planes, a lever pivoted upon the rock shaft so as to turn independently thereof when swung in one direction and to revolve the same when swung in another direction, and connecting means between the lever and the pivotally mounted end cross bars of the middle plane.

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

JAMES ROONEY.

Witnesses:

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H. S. HILL.