O. L. DUNTON.

FLYING MACHINE.

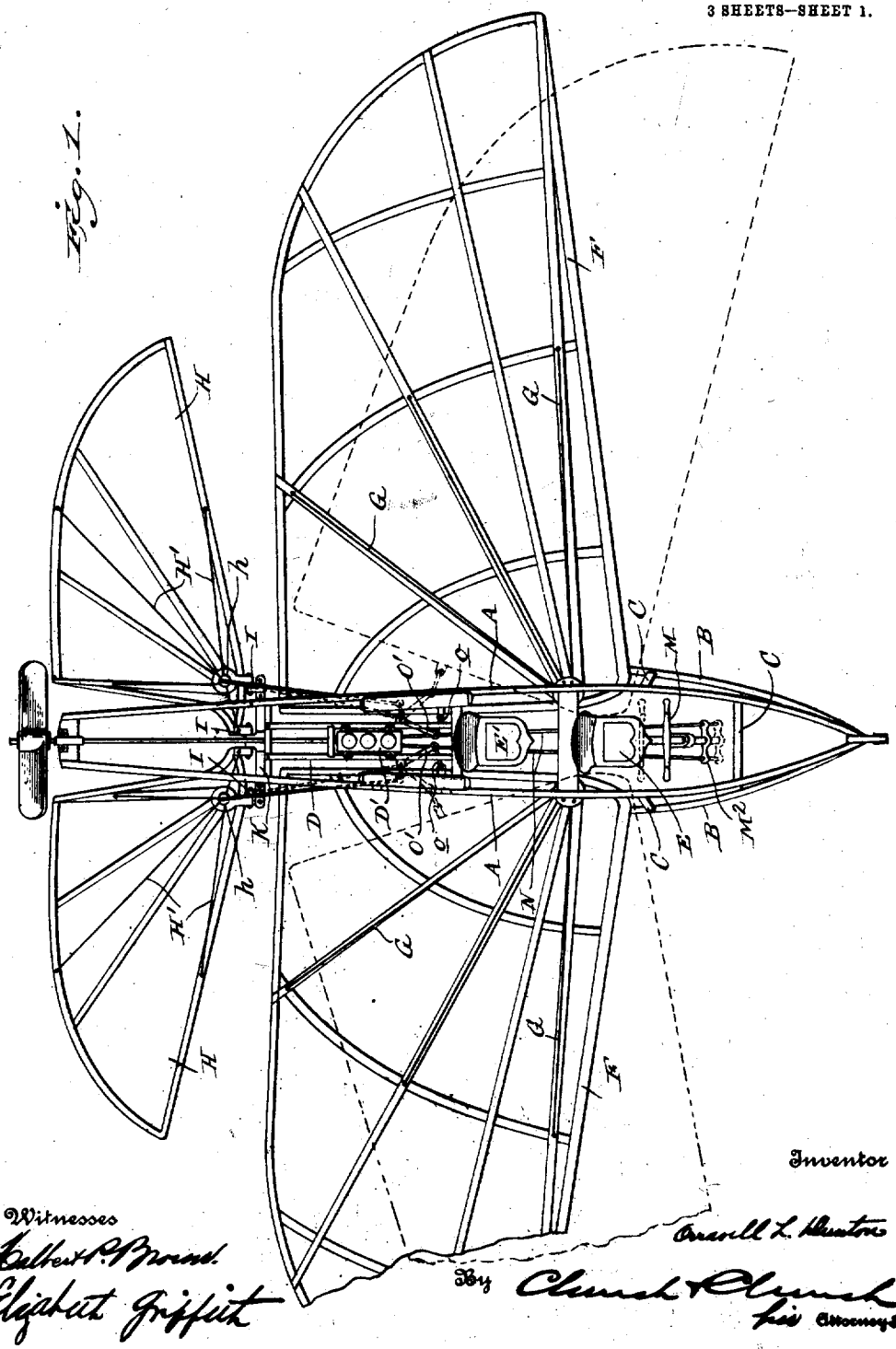
APPLICATION FILED JAN. 10, 1911.

1,018,413.

Patented Feb. 27, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



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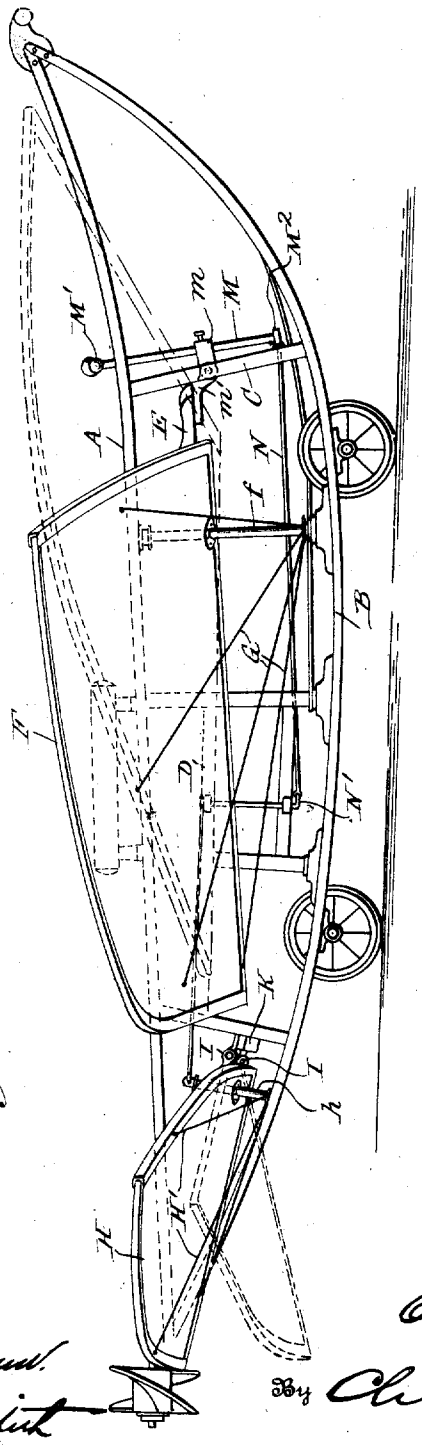

Fig. 2.

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3 SHEETS—SHEET 3.

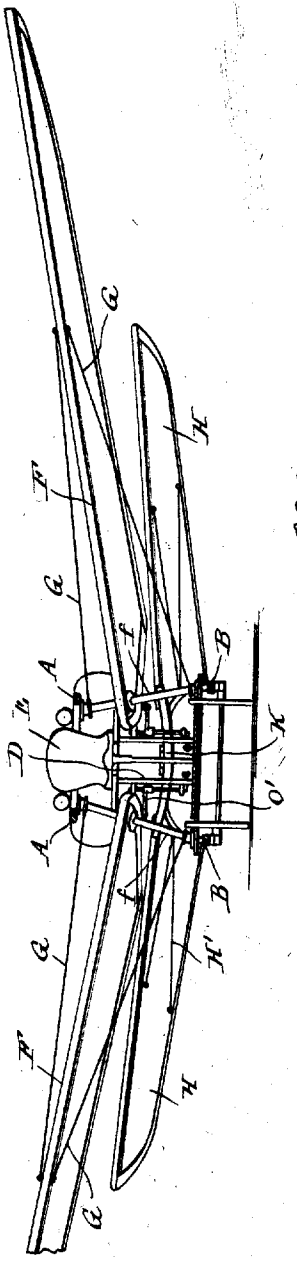

Fig. 3.

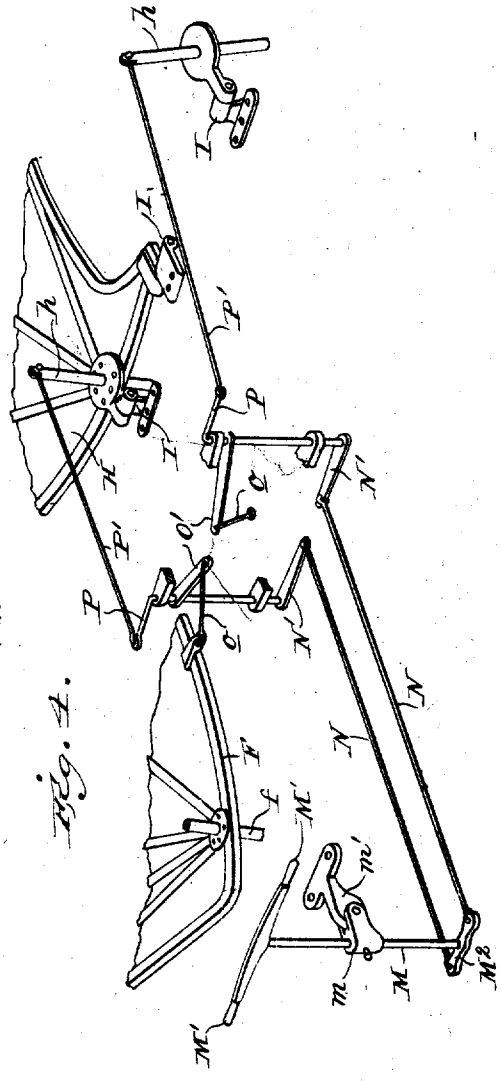

Fig. 4.

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FLYING-MACHINE.

1,018,413. Specification of Letters Patent. Patented Feb. 27, 1912.

Application filed January 10, 1911. Serial No. 601,908.

To all whom it may concern:

Be it known that I, ORRAVILL L. DUNTON, a citizen of the United States, residing at North Adams, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Flying-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates to aeroplanes and is more especially applicable to that type of aeroplanes employing multiplanes, the planes being located one in front of the other on each side of the body of the machine.

The objects of the invention are to provide for a more effectual control of the machine by causing relative movements of the front and rear planes to effect both changes in altitude and direction of progress, the means whereby the direction of progress is changed also serving to impart lateral stability and to enable the operator to recover balance when the balance is disturbed by fluctuations in the air current.

Referring to the accompanying drawings,—Figure 1 is a top plan view of an aeroplane embodying the present improvements, the planes being shown in full lines in one position and in dotted lines in the extreme opposite position; Fig. 2 is a side elevation with the planes in full and dotted lines corresponding to the positions shown in Fig. 1; Fig. 3 is a front elevation with the planes in the position shown in dotted lines, Fig. 1, in which position they are set for riding to a higher altitude; Fig. 4 is a diagrammatic view showing the connections between the planes and with the operator's control lever, whereby the planes may be moved for guiding the machine to a higher or lower altitude, or to the right or left, or to restore lateral balance should the same be lost through any extraneous forces.

Like letters of reference in the several figures indicate the same parts.

While the body of the aeroplane may be of any suitable desired construction, that illustrated is preferred. It consists essentially of light longitudinally extending truss frames embodying bars A, A at the top and B, B at the bottom, all connected together at the front and rear ends, and at intermediate points braced one from the other, by transverse and upright bridge pieces C, C. Within the main frame there is arranged a secondary or engine frame D upon which the engine D′ is suitably secured in the longitudinal axis of the machine, and, preferably, slightly in rear of the center of gravity of the machine as a whole. Two fuel tanks are provided, one on each side of the engine, and preferably secured to the top bars A of the main frame. In front of the engine there is a seat E for the operator, and in rear of the operator's seat there may be arranged a second seat E′ for a passenger. Obviously these seats may be of sufficient size to accommodate more than one passenger, but it is preferred to have them arranged one in front of the other and at a height which will bring the center of gravity of the loaded machine well up in the main frame.

The main planes extend transversely out from each side of the machine, being indicated by the reference letter F, and each at its inner edge is hinged to swing on an axis inclined inwardly at the top, in the preferred construction the shafts *f*, forming the axes of the planes, being journaled or mounted in bearings secured to cross pieces on the top and bottom longitudinal bars, respectively, of the planes, said shaft being arranged at substantially right angles to the planes and being set at an inward inclination, whereby the outer ends of the planes are higher than the inner ends, or, in other words, the planes converge downwardly. Each plane is substantially flat and provided with braces G extending from outer portions of the plane frame to the top and bottom ends of the shaft, respectively. The shafts or axes of the planes are located forward of the center lines of the planes, the location with respect to the center of gravity of the whole machine being such that the center of gravity and the center of sustaining pressure of the plane, when the planes are in an intermediate position, will be substantially in line, whereby upon a movement of the planes toward the front or rear the center of sustaining pressure will be shifted with respect to the center of gravity, and consequently the machine may be caused to dip or rise as the case may be. It will be understood, of course, that the planes are normally set at such an angle of incidence as will sustain the machine when traveling at the rate of speed for which the machine is designed, and this angle is main-

tained substantially uniform with relation to the body of the machine, regardless of the movement of the planes about their axes.

In rear of the main planes there is a pair of supplemental or rear planes H, each preferably resembling in shape the main planes, but of considerably smaller size, said supplemental planes being hinged at their forward edges on substantially horizontal axes or hinge bearings I. These hinged bearings are conveniently mounted on a cross piece or transverse bearer K carried by the main frame, and in order that the rear planes may have normally a slight angle with relation to each other, or converge downwardly, the bearings are set at a slight angle to each other, as will be understood from an inspection of Fig. 3. The rear or supplemental planes H are provided with vertical shafts *h* from the ends of which braces H′ extend outwardly to the frame of the planes for bracing the same, and these shafts are preferably utilized as the means whereby the controlling attachments or connections may be made with the planes.

Although it is contemplated that under certain circumstances it may be necessary or, desirable to have manual control of the planes which will enable them to be moved independently in the normal operation of the machine, it is designed that the control of the planes shall be interdependent and that the operator shall have the means at hand whereby he can, through the manipulation of the same handle, simultaneously set both the main and supplemental planes in the same direction on opposite sides of the machine, or in opposite directions on opposite sides of the machine, the relative movement of the planes on the same side of the machine, however, always corresponding. This control mechanism, as illustrated, embodies an operating handle or combined operating handle or lever M, journaled in a bearing *m* pivotally mounted to swing vertically in a bearing *m′* secured to the frame, preferably, immediately in front of the operator's seat. The operating lever at its upper end is provided with hand pieces M′ and at its lower end with a cross head or T M^2. Extending rearwardly from opposite ends of the cross head M^2 are connecting rods or links N, which at their rear ends are jointed to crank arms N′ on the engine frame or other suitable portion of the main frame, and in addition to the crank arm N′ they carry relatively long crank arms O′ connected by links *o* with the main planes, and relatively short crank arms P connected by rods or links P′ with the upper ends of the brace shafts of the rear or supplemental planes. The crank arms O′ and P are so set on the shaft O with relation to each other that a rotation of the shaft in one direction will swing the main planes forwardly and the rear planes downwardly, while a movement of the shaft in the opposite direction will swing the main planes rearwardly and the supplemental planes upwardly. With the construction as described, therefore, the operator may, by pulling directly backward on the operating lever, swing the main planes toward the front of the machine, and turn the supplemental planes down and by pushing forwardly on the said lever, all of said planes will be swung in the opposite direction, to wit:—the main planes rearwardly and the supplemental planes upwardly.

By turning the operating lever in its bearing it is obvious that the main plane on one side may be swung in one direction and the main plane on the other side in the opposite direction, but in such case the rear or supplemental planes on each side are moved as before described with relation to the movement of the forward plane, that is to say, if one main plane is swung forwardly and the opposite main plane rearwardly, the supplemental plane of one side is swung downwardly, and that on the other side upwardly, respectively.

From the foregoing it will be readily seen that as the forward planes swing ahead of the center of gravity, the rear planes deflect downwardly and add to the surface of the sustaining power of the machine, so that the sustaining surface is still at the rear of the center of gravity. Furthermore, it will be seen that while the rear planes deflect downwardly from their neutral position so that their under surface becomes active, the angle of deflection does not equal that of the forward planes. Abnormal movement of the rear planes such as may be necessary or desirable for rising from the ground, is not provided for by the mechanism illustrated herein, nor is it thought that the mechanism for accomplishing these ends would add anything to the clearness of the disclosure, and hence the same has been omitted.

With the arrangement described, when it becomes necessary to steer the machine to the right or left this may be accomplished by moving the forward planes, one forwardly and the other backwardly, the rear planes at the same time correspondingly adjusting themselves to keep the balance of the machine, and the machine will swing in the direction in which the center of gravity is forward of the sustaining center of the main plane. By the same manipulation lateral balance of the machine is maintained or restored without increasing the angle incident to the line of flight, as in other aeroplanes, as heretofore constructed, and consequently there is no drag on the machine to be counteracted by the opposite movement of a rudder, such as has heretofore been employed, but which may be entirely omitted with the present construction. For example,

to steer the machine through a gust of wind, or if the air current is stronger on one side than the other, thereby raising one side higher than the other, in order to right the machine the handle bar is turned toward the direction which moves the higher main plane backwardly and the lower main plane forwardly. At the same time the rear plane on the high side is deflected upwardly and that on the low side downwardly. The sustaining surface on the lower side is thus increased or rendered more effective, and the forward planes are set so as to turn the machine in the direction which will cause it to right itself and swing into the wind.

What I claim is:

1. In an airship of the aeroplane type, the combination with oppositely disposed main sustaining planes supported on axes at their inner ends to swing in substantially the plane of their sustaining surfaces, whereby the center of sustaining pressure may be moved toward the front or rear with respect to the center of gravity of the machine, of a pair of supplemental planes in rear of the main planes hinged on substantially horizontal axes, and connections whereby the supplemental planes are swung vertically in accordance with the front and rearward movements of the main planes.

2. In an airship of the aeroplane type, the combination with the main planes hinged on substantially vertical axes to swing substantially horizontally toward the front or rear of the machine, of supplemental or rear planes hinged on substantially horizontal axes, and connections between the front and rear planes on each side of the machine, whereby the rear planes are deflected vertically in unison with the substantially horizontal movement of the main planes.

3. In an airship of the aeroplane type, the combination with the front planes pivoted on substantially vertical axes and movable toward the front or rear to shift the center of sustaining pressure to the front or rear with respect to the center of gravity of the machine, of a pair of rear planes mounted on substantially horizontal axes to swing vertically, and connections between the front and rear planes on the same side of the machine, whereby their movements are correlated.

4. In an airship of the aeroplane type, the combination with the downwardly converging sustaining planes mounted on axes at their proximate ends arranged at substantially right angles to the plane of their sustaining surfaces, and means for swinging said planes on said axes to shift the center of sustaining pressure with respect to the center of gravity of the machine, of supplemental planes on each side of the machine mounted on substantially horizontal axes, and connections intermediate said supplemental planes and main planes, whereby, as the main planes are moved forwardly, the supplemental planes are swung downwardly and vice versa.

5. In an airship of the aeroplane type, the combination with the downwardly converging main planes mounted on axes at their proximate ends located substantially at right angles to the plane of their sustaining surfaces, independent crank shafts connected with said planes for swinging the same toward the front or rear, a control lever connected with both of said crank shafts and movable to shift said planes simultaneously in the same direction or simultaneously in opposite directions, of supplemental planes pivoted on substantially horizontal axes, and connections intermediate said supplemental planes and crank shafts, whereby the supplemental planes will be deflected vertically in accord with the movements of the main planes toward the front and rear.

6. In an airship of the aeroplane type, the combination with the main frame, of the main planes projecting from opposite sides thereof, supporting shafts on which said main planes are mounted journaled in the frame at top and bottom respectively, braces extending from the top and bottom of said shafts outwardly to the respective planes, and a control lever connected with said planes for moving the same simultaneously in the opposite or in the same direction, of supplemental planes journaled at their inner ends in the frame on substantially horizontal axes, and controlled connections between said supplemental planes and lever.

7. In an airship of the aeroplane type, the combination with the main and supplemental planes, converging downwardly in their proximate ends, substantially vertical supporting shafts on which the main planes are mounted, and hinged bearings for the rear planes having axes substantially in line with the supporting surfaces of the planes, a control lever movable in two directions, and operating connections intermediate said lever and all of the planes, whereby by movement of the lever in one direction all of the planes will be simultaneously moved to effect a change in elevation and by a movement of the lever in the other direction the planes will be shifted to restore lateral balance or guide the machine toward the right or left.

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