E. H. ANDRAE.

STABILIZER FOR FLYING MACHINES.

APPLICATION FILED JAN. 28, 1911. RENEWED AUG. 1, 1912.

1,040,843.

Patented Oct. 8, 1912.

2 SHEETS—SHEET 1.

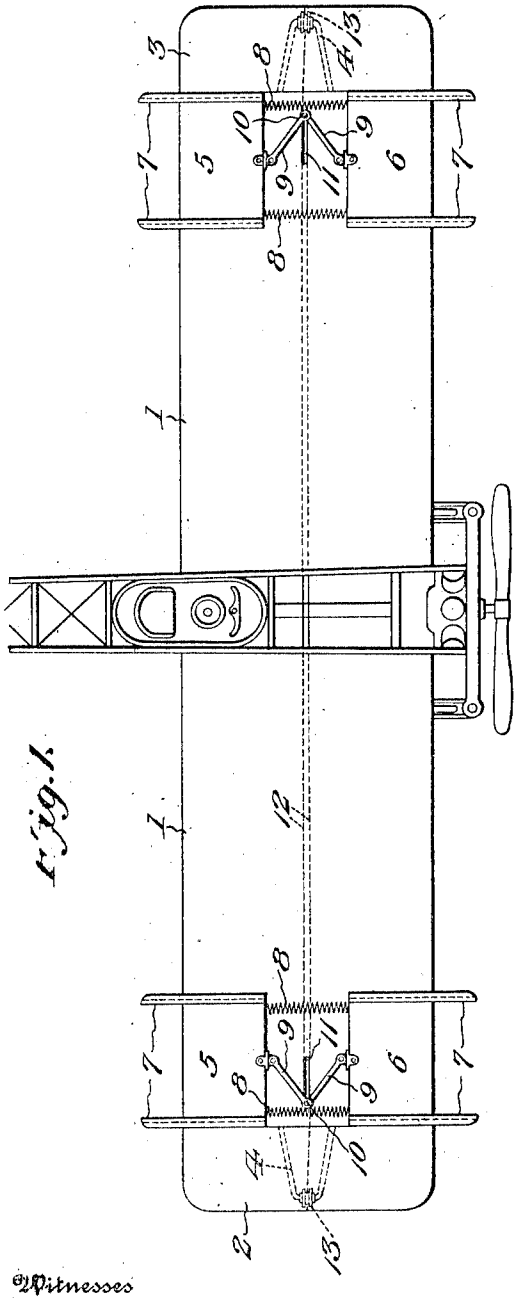

Fig. 1.

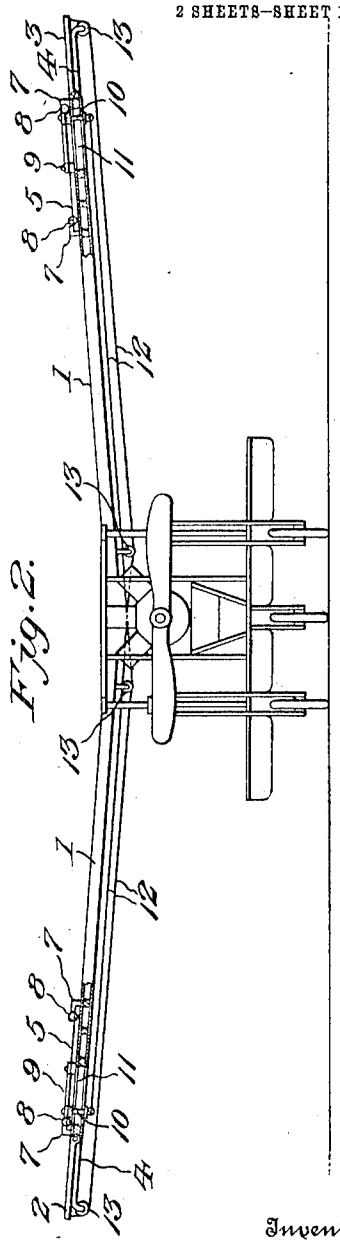

Fig. 2.

Witnesses

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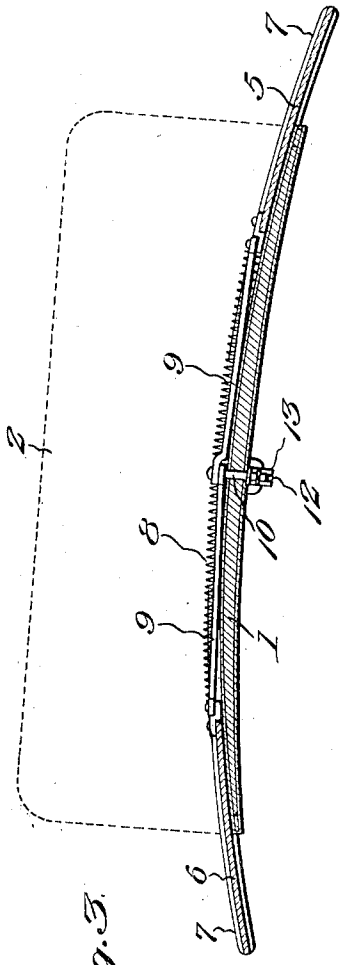

Fig. 3.

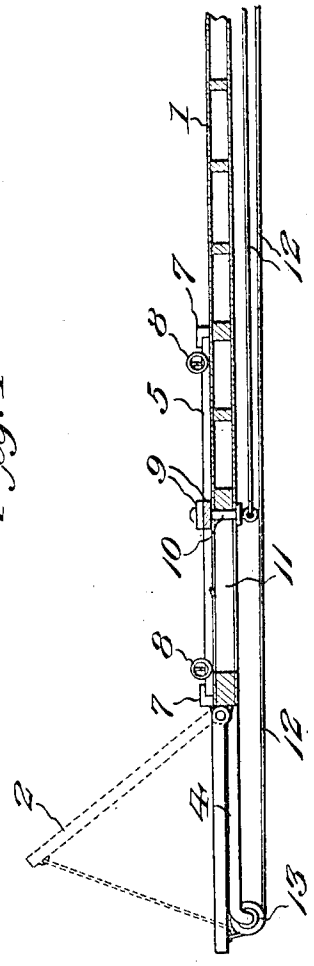

Fig. 4.

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STABILIZER FOR FLYING-MACHINES.

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To all whom it may concern:

Be it known that I, ERNST H. ANDRAE, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented new and useful Improvements in Stabilizers for Flying-Machines, of which the following is a specification.

This invention relates to stabilizers for flying machines, the object of the invention being to provide simple and effective means upon the lateral margins of a main plane or supporting surface operating automatically upon the lateral oscillation of the machine in either direction to restore it to a horizontal or balanced position.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a plan view of a main plane embodying the invention, showing the stabilizing wings or flaps in normal position. Fig. 2 is a longitudinal section of the same. Figs. 3 and 4 are, respectively, longitudinal and transverse sections through one end of the main plane, showing in full and dotted lines the wing tips in normal and turned up positions.

Referring to the drawing, 1 designates the main plane or supporting surface of a flying machine, which may be of any suitable construction and which is provided at its opposite ends with vertically movable tips or actuating flaps 2 and 3, extending from front to rear of said main plane. Each of these tips or flaps normally lies in the plane of the main plane and is hinged thereto for upward vertical movement and is limited in its downward movement by a stop bracket 4, which prevents its depression below the plane of the main plane.

Arranged upon each end of the main plane in proximity to each flap 2 or 3 is a pair of stabilizing wings or flaps 5 and 6, mounted for sliding movement in guideways 7 in a fore and aft direction, or transversely across the main plane. The inner ends of these wings are connected by contractile springs 8, whereby they are normally turned together so that their outer edges will lie flush or substantially so with the front and rear edges of the main plane, the said stabilizing wings thus normally forming part of the main plane and being unexposed to the action of the air.

The wings 5 and 6 of each end of the main plane are pivotally connected at their inner ends with the normal inner ends of a pair of toggle levers 9, which levers, are pivotally connected at their outer ends to a pin 10 slidably mounted in a longitudinal guide slot 11 formed in the body of the main plane and projecting beneath the same. The lower end of the sliding pivot pin 10 associated with the stabilizing wings at each end of the main plane is connected by a cord or other flexible connection 12 with the tip 2 or 3 at the opposite end of the main plane, and extends beneath the main plane and over one or more suitable guide pulleys 13. The levers 9 connected with each pair of wings normally extend outward toward the adjacent tip in convergent relation, and are adapted to be drawn inward by the coacting cord 12 to lie in longitudinal alinement and in such extension action to slide the wings 5 and 6 outward beyond the longitudinal edges with the main plane for the stabilizing action.

From the foregoing description, it will be understood, that the wings tip at either end of the main plane and the stabilizing wings actuated thereby at the opposite end of the main plane are normally held retracted by the action of the springs 8 associated with said wings, and that both sets of tips and wings lie in such normal position when the machine is traveling horizontally or preserves its lateral balance. When, however, a gust of wind strikes the tip 2 or 3 at either extremity of the main plane and lifts the machine at that side, such tip will be automatically elevated by the air pressure and will draw upon the cord 10 connected therewith, thus projecting the sliding flaps 5 and 6 at the opposite end of the main plane, whereby the supporting surface at the elevated end of the main plane will be decreased and the supporting surface at the depressed end of the main plane increased, resulting in the automatic restoration to its normal lateral balance. It will, of course, be understood that the stabilizing wings at the elevated side of the machine remain unaffected during this action, thus preventing any increase of the area of the support-

ing surface at the side where the surface will be decreased for the stabilizing operation.

Having thus described the invention, I claim:—

1. In a flying machine, the combination of a main plane, upwardly movable wing tips at each end of the main plane, a pair of sliding stabilizing wings at each end of the main plane movable outwardly beyond the front and rear edges of said plane, means for holding each pair of stabilizing wings retracted, and an operating connection between the vertically movable tip at each end of the main plane and the sliding stabilizing wings at the opposite end of said main plane.

2. In a flying machine, the combination of a main plane, upwardly movable wing tips at the opposite ends of said main plane, outwardly movable stabilizing wings at each end of the main plane arranged to slide across said plane to be projected beyond the front and rear edges thereof, means for normally holding each pair of stabilizing wings retracted, operating devices for projecting the same, and a connection between the operating devices of the stabilizing wings at each end of the main plane and the wing tip at the opposite end of said main plane.

3. In a flying machine, the combination of a main plane, fore and aft movable stabilizing elements at each end of the main plane, means for holding the same normally retracted, an actuating member at each end of the main plane movable upward under air pressure, and a connection between the actuating member at each end of the main plane and the stabilizing element at the opposite end of the main plane for projecting the latter upon the upward movement of the former.

4. In a flying machine, the combination of a main plane, wing tips hinged to the opposite ends of the main plane for upward movement under air pressure, a pair of sliding stabilizing wings at each end of the main plane normally lying within the confines of said plane and adapted for movement beyond the front and rear edges thereof, means for normally holding said stabilizing wings retracted, toggle levers for projecting each pair of stabilizing wings, and a connection between the toggle levers of the stabilizing wings at each end of the main plane, and the hinged wing tip at the opposite end of the said main plane.

5. In a flying machine, the combination of a main plane, wing tips hinged to the opposite ends of the main plane for upward movement under air pressure, a pair of sliding stabilizing wings at each end of the main plane normally lying within the confines of said plane and adapted for movement beyond the front and rear edges thereof, springs for normally holding each pair of stabilizing wings retracted, toggle levers for projecting each pair of stabilizing wings, and a connection between the toggle levers of the stabilizing wings at each end of the main plane, and the hinged wing tip at the opposite end of the said main plane.

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

ERNST H. ANDRAE.

Witnesses:
L. B. CLARK,
C. W. STEWART.