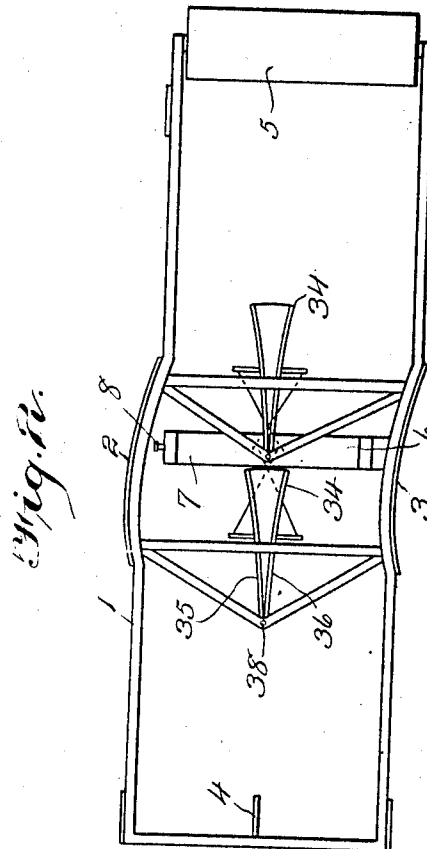
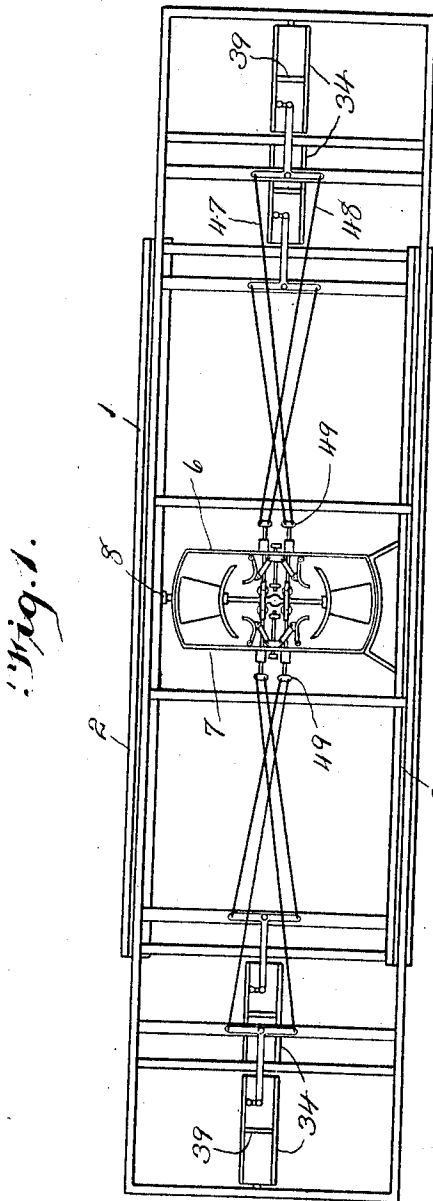


C. B. THOMAS.
 AUTOMATIC STABILIZER FOR AIR CRAFT.
 APPLICATION FILED MAR. 11, 1912.

1,051,783.

Patented Jan. 28, 1913.

4 SHEETS—SHEET 1.



Witnesses

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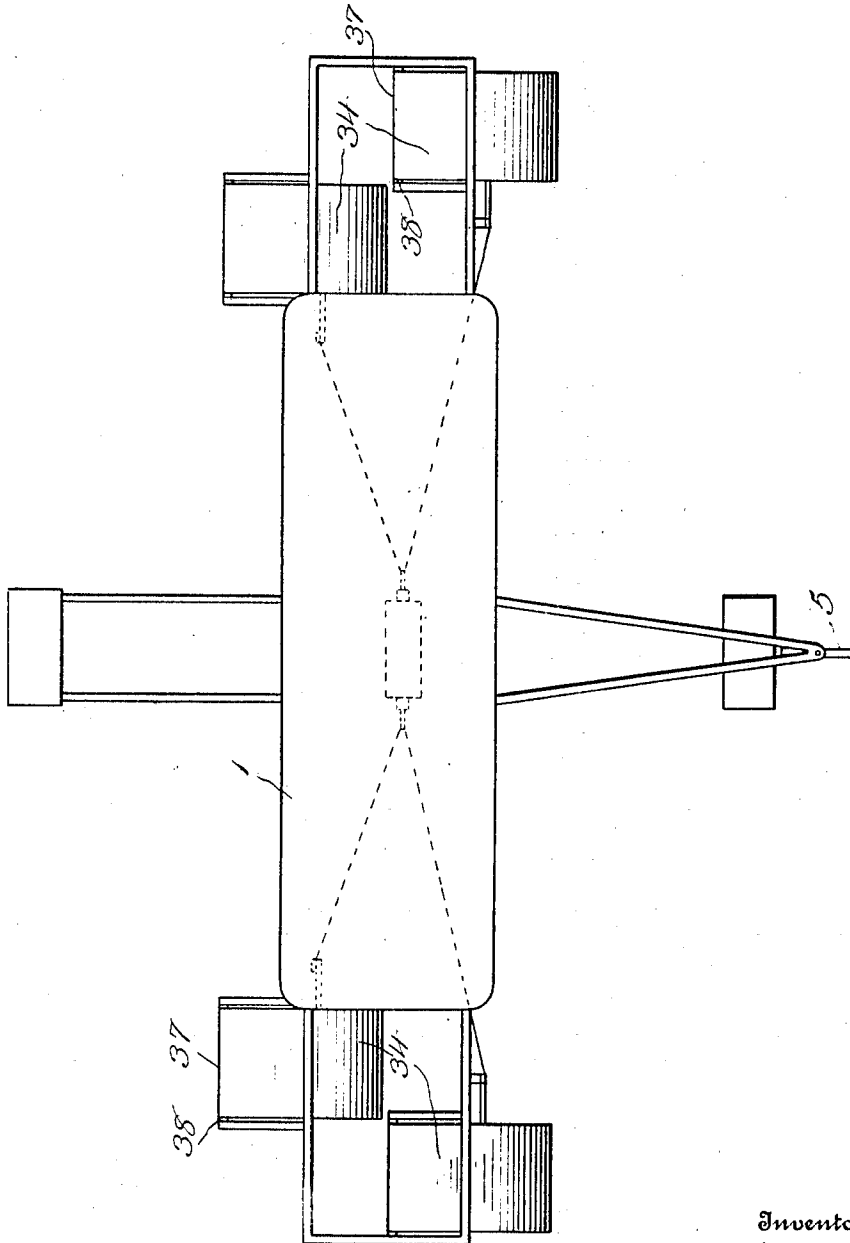
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4 SHEETS—SHEET 2.

Fig. 3.



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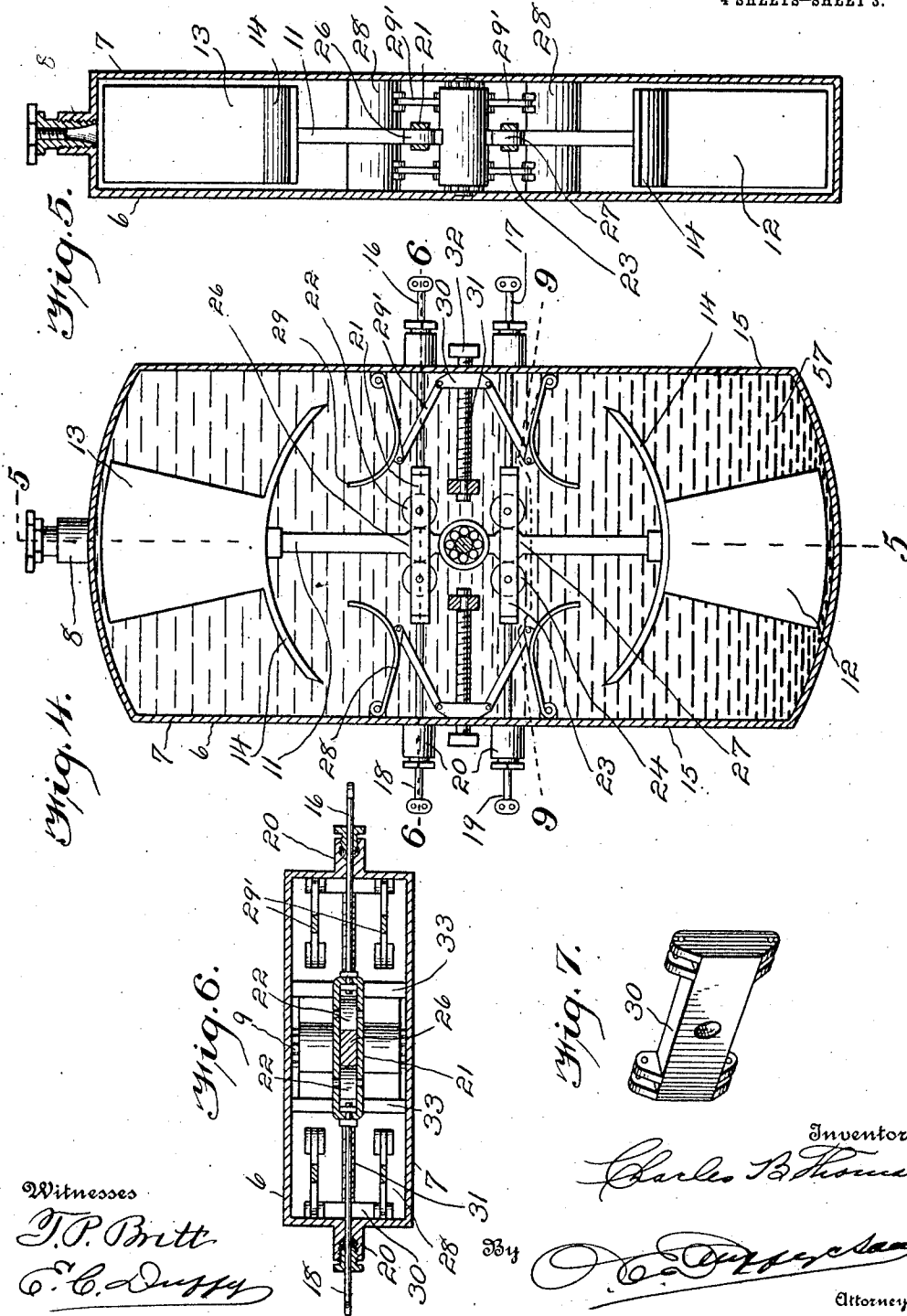
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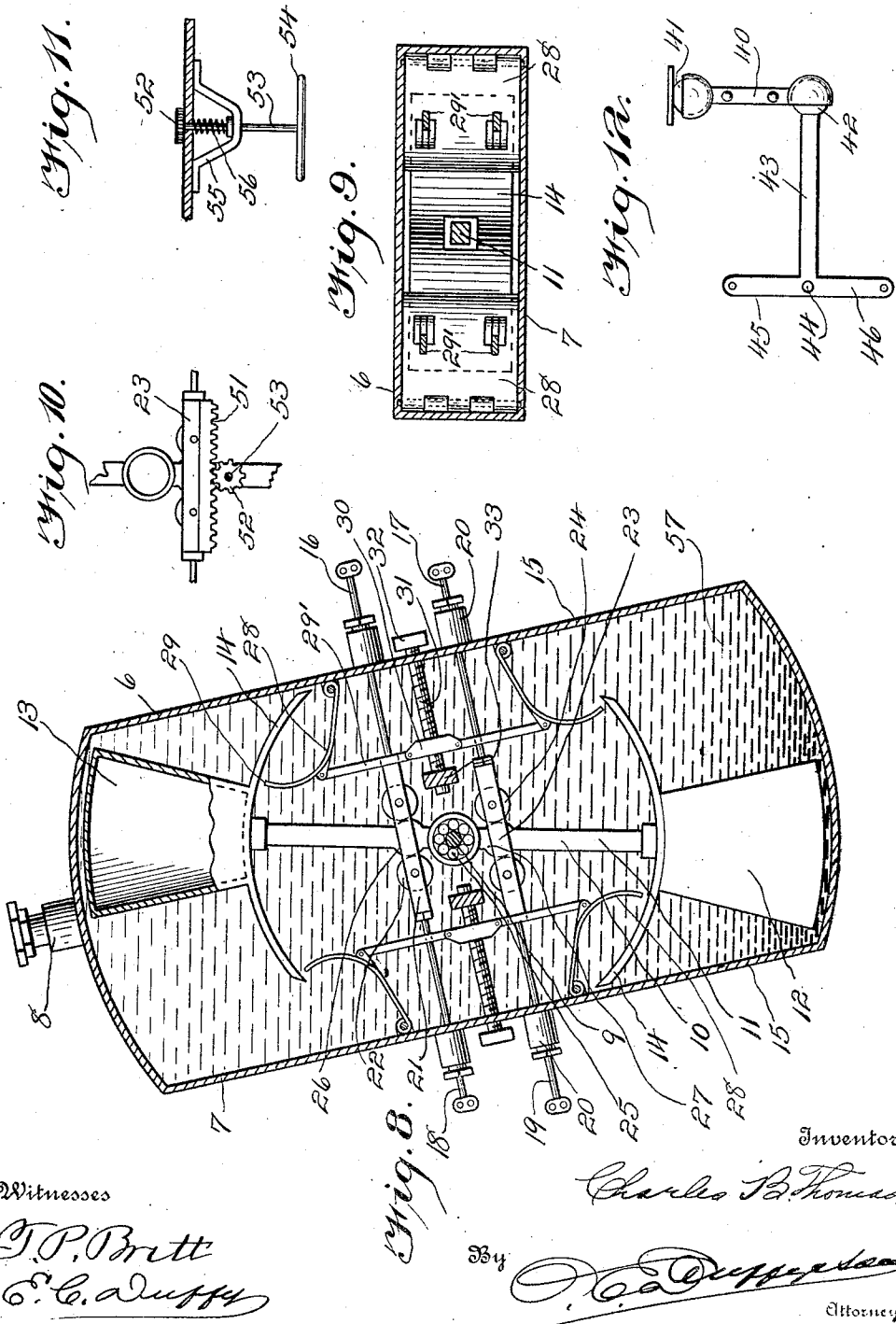
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC STABILIZER FOR AIR-CRAFT.

1,051,783.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES B. THOMAS, a citizen of the United States, residing at Watts, in the county of Abbeville and State of South Carolina, have invented certain new and useful Improvements in Automatic Stabilizers for Air-Crafts; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to aerial navigation, but more particularly to a stabilizing device for aeroplanes, aerodromes, airships and the like, and the invention has for its object to provide a device for automatically maintaining the aircraft stable, and to automatically cause the aircraft to maintain its equilibrium and to ride with its plane or planes horizontal.

With this object in view the invention consists in the novel construction of the stabilizer and in the novel construction and arrangement of the stabilizing planes.

The invention further consists in certain other novel details of construction and in combinations of parts, all of which will be first fully described and afterward specifically pointed out in the appended claims.

Referring to the accompanying drawings: Figure 1 is a diagrammatic front elevation of a biplane illustrating the stabilizer in position thereon, the stabilizer being shown relatively large in order to better illustrate the construction and arrangement of the parts. Fig. 2 is a side elevation of an aeroplane illustrating the stabilizer in position therein. Fig. 3 is a top plan view of an aeroplane illustrating the position of the stabilizer and arrangement of the stabilizing planes. Fig. 4 is a longitudinal vertical sectional view through the stabilizer illustrating the construction and arrangement of the parts. Fig. 5 is a transverse vertical sectional view taken through line 5—5 of Fig. 4. Fig. 6 is a horizontal sectional view taken through line 6—6 of Fig. 4. Fig. 7 is a detail perspective view of the traveling nut arranged in the regulating apparatus of the stabilizer. Fig. 8 is a longitudinal vertical sectional view through the stabilizer illustrating the position of the same upon a

longitudinal tilting of the aircraft. Fig. 9 is a horizontal sectional view through the stabilizer taken on line 9—9 of Fig. 4. Fig. 10 is a fragmentary detail view of a construction which can be employed for operating the stabilizing planes manually. Fig. 11 is a fragmentary horizontal sectional view through the casing of the stabilizer illustrating the operating wheel for moving the stabilizing planes manually, and Fig. 12 is a detail elevation of the operating lever and the connecting link for the stabilizing planes.

Like numerals of reference indicate the same parts throughout the several figures in which;

1 indicates an aeroplane or aircraft of any design, arrangement or construction, it being of course understood that my invention is directed solely to the construction of the stabilizer and the arrangement of the stabilizing planes. In the drawings, however, I have illustrated a biplane having the usual supporting planes 2 and 3, the forward elevating planes 4 and rear guiding or rudder plane 5.

Conveniently arranged on the aircraft, and preferably centrally thereof, is the stabilizer 6, said stabilizer 6 comprising a liquid tight, preferably metallic, receptacle 7 having a filler plug 8, the receptacle being so constructed and arranged as to be filled with a non freezing liquid such as a heavy oil or a liquid of like or similar suitable consistency. However, I wish it to be understood that the character of the liquid within the receptacle 7 is entirely immaterial as far as this invention is concerned as I consider myself entitled to employ any liquid which by experiment is found to be best suited to a successful operation of the invention. It is quite essential that the receptacle 7 is entirely filled with liquid even to the complete filling of the filler cap so as to exclude all air from the receptacle.

Centrally pivoted within the receptacle 7 on a transverse shaft 9 is the gravity actuated regulating element 10, said gravity actuated regulating element 10 comprising a vertical staff 11 to which is connected at the bottom end thereof a weight 12 which is sufficient to operate the stabilizing wings in a manner which will be hereinafter fully described, while at the upper end of the vertical staff 11 is a hollow chamber 13 preferably containing a vacuum. It will appear

by referring to the drawings that connected under the vacuum chamber 13 and over the weighted portion 12 are curved elements 14, which elements 14 are arranged as shown in the drawings for a purpose which will be hereinafter fully described.

Entering the sides 15 of the stabilizing receptacle 7 are four horizontal movable rods, a pair of said rods entering each side of the receptacle 7, the rods entering one side of the receptacle 7 being indicated by the numerals 16 and 17, while the rods entering the opposite side of the receptacle 7 are indicated by the numerals 18 and 19. All of said rods, as will appear from the drawings are provided with suitable stuffing boxes 20, the upper rods 16 and 18 being connected together by a yoke 21 within which are mounted the two rollers 22, while the two lower rods 17 and 19 are connected together by a similar yoke 23 carrying similar rollers 24, the vertical staff 11 being mounted on ball bearings 25 and having in line with the rollers 22 and 24 suitable swells 26 and 27 located between the rollers 22 and the rollers 24 so as to maintain a close connection between the staff 11 and the rollers 22 and 24 during the operation of the device.

Pivoted on the sides 15 of the receptacle 7 are the regulators 28, said regulators 28 being curved as shown, the ends 29 approaching the curved elements 14 on the weight 12 and the vacuum chamber 13. Said regulators 28 are arranged in pairs as shown on each side of the receptacle 7 and are connected together by means of links 29', said links 29' being in turn connected to a traveling nut 30 which is threaded on the rotatable screw 31, said rotatable screw 31 having a head 32 extending through the side of the receptacle 7 so as to be operated from the outside of the stabilizing device, the inner ends of each of the screws 31 operating in a stud 33 located at the inner end of each of the screws 31 so as to maintain the said screws 31 in their proper position. It must be understood, however, that the screws 31 do not thread into the studs 33 but simply rotate therein, the threaded connection being between the screws 31 and the traveling nuts 30.

Referring now to Fig. 1 it will be seen that a plurality of stabilizing planes 34 are arranged at each side of the supporting planes 2 and 3, but it is to be clearly understood that the relative location of the stabilizing planes are not material to this invention as the said planes should be disposed on the air-craft at any point or points found most suited to the size, design and construction of the aircraft, the drawings illustrating the position of the stabilizing planes being therefore diagrammatic; and while I have illustrated four stabilizing

planes in the drawings it will become apparent from the specification that any suitable number of stabilizing planes can be operated by the stabilizer.

The stabilizing planes 34, as will appear from Fig. 2, comprise two curved planes 35 and 36, said planes meeting at their forward ends 37 at which point the said planes are pivoted at 38, while the curved portions of the planes 34 diverge as shown in the drawing in order to present a better angle to the air for the purpose of acting thereon; and it will appear from Fig. 1 that a vertical longitudinal partition 39 is arranged in each of the stabilizing planes 34 between the planes 35 and 36. Arranged between the planes 35 and 36 of each stabilizing plane, and preferably in the manner as shown in the drawings, is a link 40 (Fig. 12) having a ball connection 41 between the said link and the stabilizing plane 34, said link having a similar ball connection 42 with the operating lever 43, said operating lever 43 being pivoted at 44 and having the vertical arms 45 and 46 for connection with the operating wires 47 and 48 which pass to the ends 49 of the operating rods 16, 17, 18 and 19. From an inspection of Fig. 1 it will be seen that as many wires as is desired can be connected to the said operating rods which in turn can be connected to as many levers 43 as is necessary in order to properly stabilize the aircraft.

Referring now in Figs. 10 and 11 it will be seen that the stabilizing planes 34 can be operated by manual means controlled by the aviator, the construction provided for this purpose being to arrange on the lower yoke 23 which connects the rods 17 and 19 a rack 51, which rack 51 meshes with a pinion 52 mounted on a revolvable shaft 53 which passes through the front of the receptacle 7, said revolvable shaft 53 having on its outer end a steering wheel or other element 54 for the purpose of rotating the shaft 53; said shaft 53 passes through the brace 55 while a coil spring 56 is interposed between the brace 55 and the front of the receptacle 7, said spring normally holding the pinion 52 in position shown in Fig. 11 which is out of mesh with the rack 51. Whenever therefore it is desired to operate the stabilizing planes manually the wheel 54 and shaft 53 are pushed inwardly in order to mesh the pinion 52 with the rack 51 and when the pinion is thus in mesh rotation of the wheel 54 will move the lower operating rods 17 and 19 in one direction and the upper operating rods 16 and 18 in the opposite direction for the purpose of altering the angularity of the stabilizing planes 34.

Having thus described the several parts of this invention its operation is as follows: The stabilizer and stabilizing planes being arranged as shown in the drawings, and the

receptacle 7 being filled with a suitable liquid, the weighted end 12 of the staff 11 causes the said staff to assume a vertical position within the stabilizer while the hollow chamber 13 at the upper end of the staff 11 tends to float in the liquid 57 in the receptacle 7 to assist in maintaining the staff 11 in a vertical position. Upon lateral movement of the aircraft the stabilizer assumes a position shown in Fig. 8, and as it is essential that the movement of the vertical staff 11 be positive, and as it is essential that all fliriting or oscillation of the staff 11 be prevented, the regulators 28 have been provided which operate in the following manner: The receptacle 7 being filled with a suitable liquid as hereinbefore explained the regulators 28 can be caused to approach the curved elements 14 on the staff 11 or can be caused to be retracted away from the said curved elements by means of rotation of the screws 31. As the weighted element 12 and the hollow chamber 13 assume the position within the stabilizer as shown in Fig. 8 it is necessary that the liquid surrounding the said elements 12 and 13 be disposed and moved in order to allow the staff 11 to maintain a vertical position upon a tilting of the stabilizer. As the regulators 28 are caused to approach the curved elements 14 on the staff 11 the passage for the movement of the liquid is restricted which causes the said weighted element 12 and hollow chamber 13 to move slowly and prevents a fliriting or oscillation of the staff 11 after the said staff has assumed its vertical position. In order, however, to cause the staff 11 to move more quickly the regulators 28 are retracted away from the curved elements 14 on the staff 11 in the manner as shown in Fig. 4 so as to increase the passage for the liquid in a manner which will be at once apparent from an inspection of the drawings. By means of this construction the vertical staff 11 can be regulated to a very fine degree so as to operate the stabilizing planes instantly, or can be regulated so as to move slowly, it being of course understood that the proper adjustment can only be effected by careful experiment; while it must also be understood that the position of the regulators 28 will depend in a large measure upon the character of the liquid within the stabilizer.

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

1. A stabilizing device for aircraft comprising a plurality of stabilizing planes pivoted to the aircraft, a stabilizer disposed on the aircraft, said stabilizer comprising a liquid tight receptacle, a weighted staff pivoted within said liquid tight receptacle, the weighted portion on the staff being at the

lower end thereof, a hollow chamber arranged on the upper end of the said staff, said liquid tight receptacle being adapted to be filled with liquid in such manner that the said hollow receptacle will tend to float therein while the weighted portion of the staff will maintain the said staff in a vertical position within the liquid, the said weighted portion and the said hollow chamber being each provided with a curved element, a regulator arranged within the liquid tight receptacle at each side thereof, said regulator having pivoted members, means acting thereon for causing said pivoted members to approach the said curved elements on the said staff and to be retracted therefrom, reciprocating members passing through the sides of said stabilizer and in engagement with the said staff, the whole arranged in such manner that the said reciprocating members are moved by the said staff, and means connecting said reciprocating members with the said stabilizing planes for altering the angularity of said stabilizing planes in relation to the planes of the said aircraft, substantially as described and for the purposes set forth.

2. A stabilizing device for aircraft comprising a plurality of stabilizing planes, a stabilizer disposed on the aircraft, said stabilizer comprising a liquid tight receptacle, an element pivoted in said liquid tight receptacle having a weight at the lower end thereof and a hollow chamber at the upper end thereof, said liquid tight receptacle being designed to be filled with liquid in such manner that the said hollow chamber will tend to float therein, means for regulating the passage for the liquid within the said liquid tight receptacle upon movement thereof, and means for effecting connection between the said stabilizing planes and the said pivoted element within the said liquid tight receptacle for moving the said stabilizing planes upon movement of the said liquid tight receptacle, substantially as described and for the purposes set forth.

3. A stabilizing device for aircraft comprising a plurality of stabilizing planes, a stabilizer disposed on the aircraft, said stabilizer comprising a liquid tight receptacle, a weighted element pivoted therein, said liquid tight receptacle being designed to be filled with liquid, means for regulating the passage of the liquid within the said liquid tight receptacle upon movement of the said liquid tight receptacle, and means for effecting connection between the said stabilizing planes and the said weighted element to move the said stabilizing planes upon movement of the said liquid tight receptacle.

4. A stabilizing device for aircraft comprising a plurality of stabilizing planes, a stabilizer disposed on the aircraft, said stabilizer comprising a liquid tight receptacle,

said liquid tight receptacle being designed to be filled with liquid, a weighted element pivoted within the liquid tight receptacle and adapted to operate within the liquid therein, said liquid being arranged within the liquid tight receptacle for the purpose of retarding the action of gravity upon the said weighted element upon movement of the said liquid tight receptacle, means for regulating the passage of the liquid within the liquid tight receptacle around the said weighted element, and means for effecting connection between the said stabilizing planes and the said weighted element within the liquid tight receptacle in such manner as to move the said stabilizing planes upon movement of the said liquid tight receptacle.

5. A stabilizing device for aircraft comprising a stabilizing plane, a stabilizer arranged on the aircraft, said stabilizer comprising a liquid tight receptacle designed to be filled with liquid, a weighted element pivoted within the said liquid tight receptacle and adapted to be surrounded by the liquid within the said receptacle, means for regulating the passage of liquid around the said weighted element in such manner that the action of gravity upon the said weighted element will be retarded, and means for connecting the said stabilizing plane with the said weighted element within the said

liquid tight receptacle to move the said stabilizing plane upon movement of the said liquid tight receptacle.

6. A stabilizing device for aircraft comprising a stabilizing plane, a stabilizer arranged on the aircraft, said stabilizer comprising a liquid tight receptacle, a weighted element pivoted within the said liquid tight receptacle, said liquid tight receptacle being designed to be filled with liquid in such manner that the said weighted element will be surrounded by the said liquid, means for regulating the passage of liquid around the said weighted element in such manner as to retard the action of gravity on the said weighted element, means for connecting the said stabilizing plane with the said weighted element in such manner as to move the said stabilizing plane upon movement of the said liquid tight receptacle, and means for moving the said weighted element manually in such manner that the movement of the said weighted element will be communicated to the said stabilizing plane.

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

CHARLES B. THOMAS.

Witnesses:

WM. J. NEALE,
C. HUGH DUFFY.