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ELECTRICALLY OPERATED BALANCING MECHANISM FOR AEROPLANES.

APPLICATION FILED JAN. 25, 1911.

1,047,827.

Patented Dec. 17, 1912.

2 SHEETS—SHEET 1.

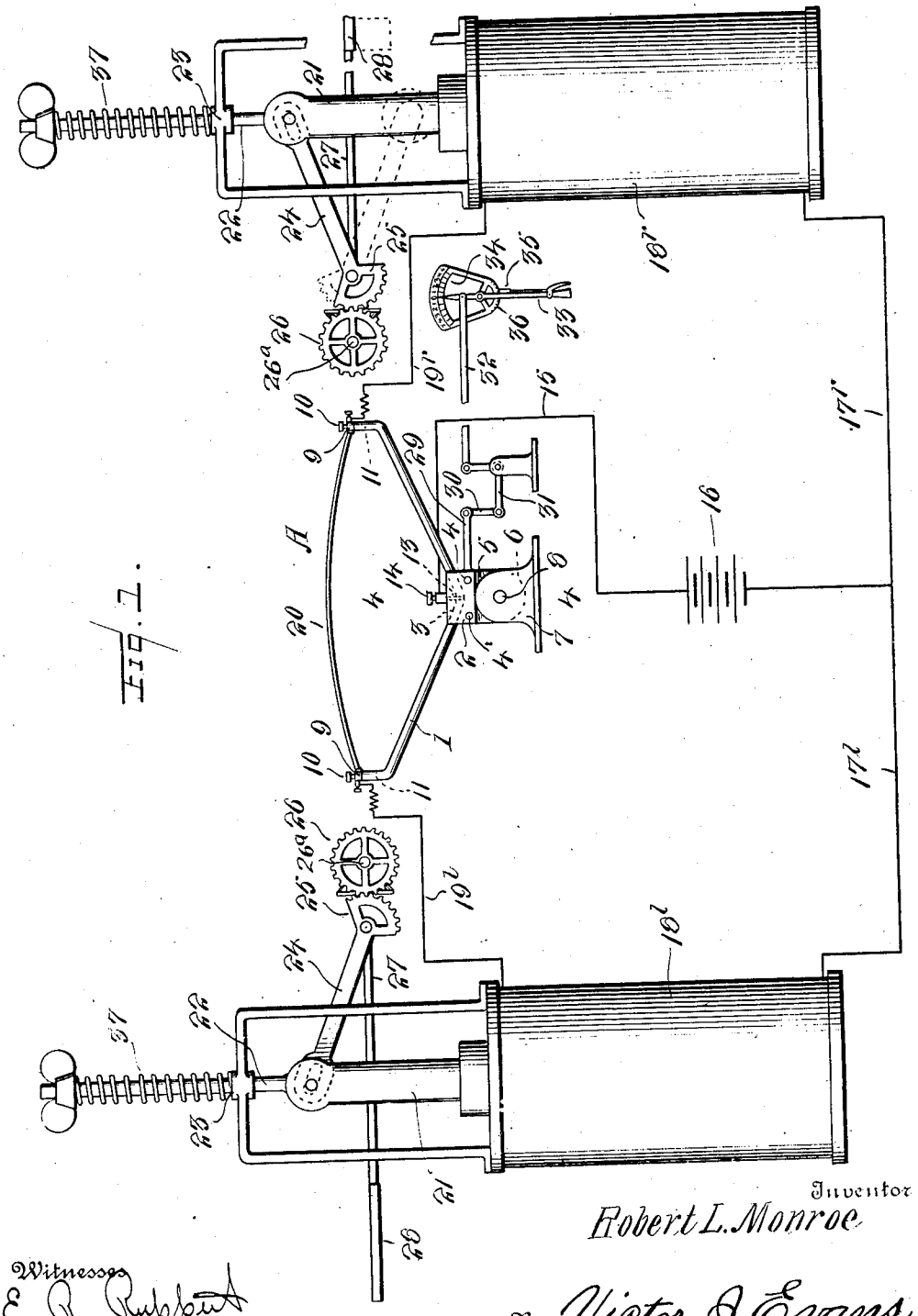

Fig. 1.

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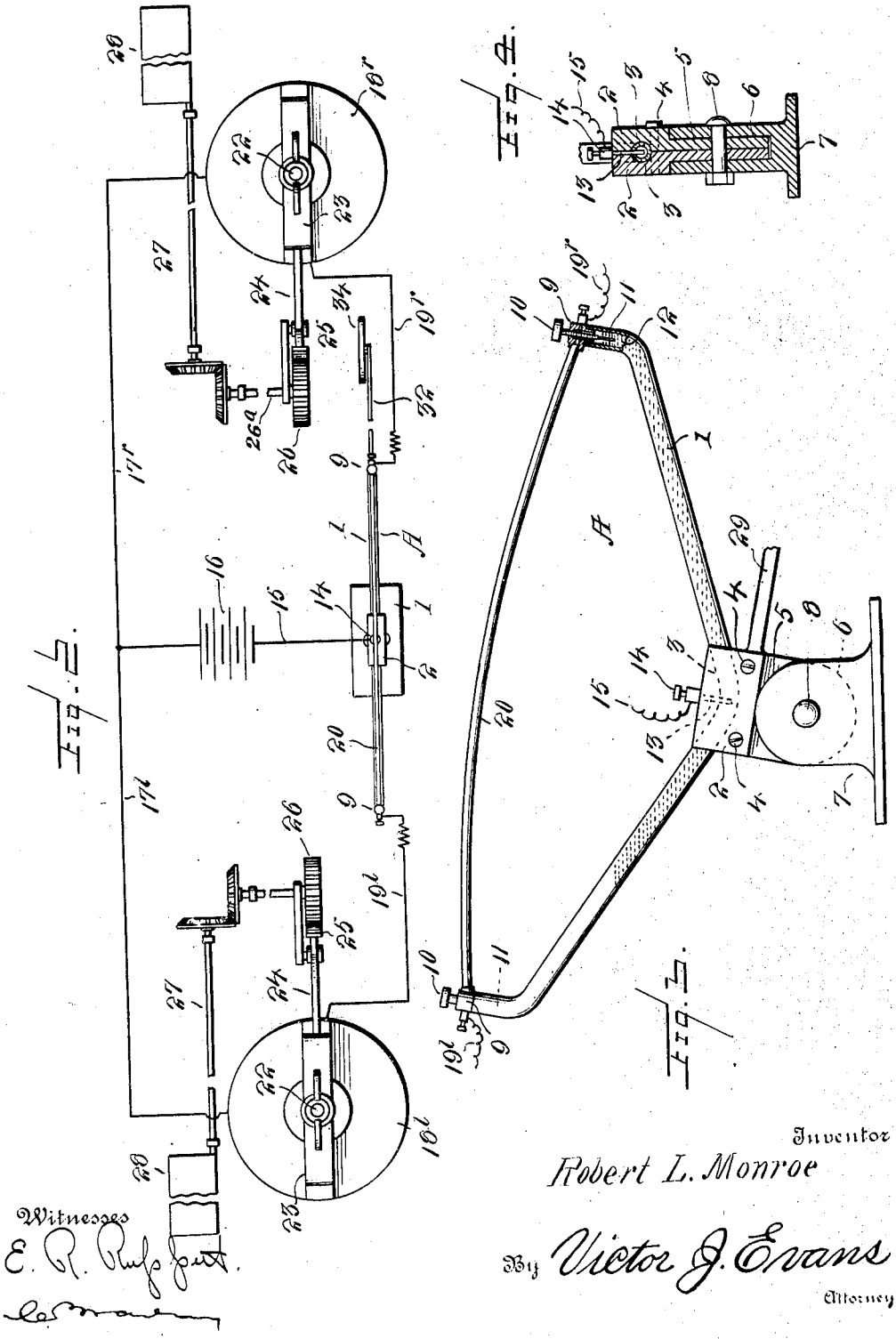

Fig. 4.

Fig. 5.

Fig. 7.

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UNITED STATES PATENT OFFICE.

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ELECTRICALLY-OPERATED BALANCING MECHANISM FOR AEROPLANES.

1,047,827. Specification of Letters Patent. Patented Dec. 17, 1912.

Application filed January 25, 1911. Serial No. 604,633.

To all whom it may concern:

Be it known that I, ROBERT L. MONROE, a citizen of the United States, residing at Sioux City, in the county of Woodbury and State of Iowa, have invented new and useful Improvements in Electrically-Operated Balancing Mechanism for Aeroplanes, of which the following is a specification.

This invention relates to aeroplanes, and more particularly to means for controlling the operation of the auxiliary balancing planes located at the lateral ends of the main plane or planes.

The invention has for one of its objects to improve and simplify the construction and operation of balancing apparatus, so as to be reliable and efficient in use, of comparatively simple and inexpensive construction, and so designed as to be automatic in operation and at the same time capable of manual control.

Another object of the invention is the employment of an automatic circuit make and break device designed on the principle of a spirit level so that the tilting of the aeroplane will close one of two circuits, including electrical auxiliary plane-operating means, so that when one side of the airship drops, the auxiliary plane at such side will be thrown to a position to restore equilibrium.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a diagrammatic view of the balancing apparatus when the airship is in equilibrium. Fig. 2 is a plan view. Fig. 3 is a detail view of the circuit make and break device when in tilted position to throw one of the auxiliary planes into operation. Fig. 4 is a detail sectional view taken on line 4—4, Fig. 1.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, A designates the circuit-closing or make and break device which is located at the center of the airship and consists of a V-shaped tube 1 which is disposed in a vertical plane and has its length extending longitudinally of the main plane or planes of the airship so that the tube will tilt with the latter. This tube is clamped between two blocks 2 that have their meeting faces provided with grooves or seats 3 for receiving the elbow portion of the tube and these blocks are fastened together by bolts 4. On the holder formed by these blocks is a lug 5 which fits into the recess 6 of a base support 7 that is rigidly fastened on the frame of the airship, the tube holder and base being fastened together by a horizontally-disposed pintle 8 that has its axis extending transversely to the longitudinal axis of the main plane or parallel with the direction of travel. The ends of the tube 1 terminate in upstanding arms that are fitted with plugs or spurs 9, and passing through each plug is a screw 10 that has a platinum contact point 11 at its lower end which is adapted to be immersed in a current-conducting liquid 12 in the tube when the latter is tilted with the main plane or planes or tilted manually by the operator. The liquid in the tube is connected by a platinum wire or the like 13 to a binding post 14 on the tube holder, the wire extending through the holder and into the tube. This binding post 14 is connected by a wire 15 with one terminal of a source of current, such as a battery 16. The other terminal of the battery is connected by wires 17^r and 17^l with solenoids 18^r and 18^l, which operate the auxiliary balancing planes. Connected with the respective solenoids are wires 19^r and 19^l that lead to the screws or binding posts 10 at the right and left hand ends of the leveling tube 1. The quantity of liquid in the tube is such that when the latter is in balanced position, the contact points 11 will be out of current-conducting relation with the liquid, but as soon as the tube is tilted in one direction or the other, the liquid will engage the contact 11 at the lower end of the tube and close the circuit of one of the solenoids, and thereby bring into play the proper auxiliary balancing plane to restore equilibrium of the airship. A pressure-equalizing pipe

20 extends from one plug 9 to the other so that air can pass back and forth between the ends of the balancing tube.

Any suitable mechanism may be employed for operating the auxiliary planes of the airship. In the present instance, each solenoid has a core 21 which moves vertically and has a stem 22 sliding in a guide 23 fastened to the top of the solenoid. Connected with each core is a lever 24 that has a segmental gear 25 meshing with the pinion 26. This pinion turns a shaft 26^a in gear with a shaft 27 that extends outwardly to the ends of the airship and carries an auxiliary plane 28 shown in edge view, Fig. 1. When the solenoid is drawn downwardly, the shaft 27 turns in a direction to throw the auxiliary plane thereon to the dotted line position with the result that the air currents operating on the tilted auxiliary plane will change the position of the airship and restore equilibrium.

In order to manually control the auxiliary planes for turning to the right or left, the tube 2 is provided with an arm 29 that has its outer extremity connected by a link 30 with a bell crank lever 31. This lever is connected by a rod 32 with a controlling lever 33, which is normally held in a central position with respect to a scale 34, the controlling lever being provided with a latch 35 that engages a fixed sector 36. When the controlling lever is in the position shown, the leveling tube 1 is horizontal so that the circuit of neither solenoid will be closed, this being the position of the parts when the airship is perfectly balanced and sailing on an even keel. Should the airship tilt to the right, the liquid in the tube 1 would shift so that a circuit would be closed consisting of the battery 16, wire 17^r, solenoid 18^r, wire 19^r, contact point 10, liquid 12, binding post 13, and wire 15. The core of the right solenoid would be drawn downwardly, and as the result, the auxiliary plane at the right of the machine would be tilted downwardly to the dotted line position, Fig. 1. The effect would be to restore the airship to equilibrium and cause the liquid 12 in the tube 1 to recede from the contact 11, thereby opening the circuit and allowing the solenoid core to return to normal position. The parts may be returned to normal position by any suitable means, such as a spring 37 on each rod 23 of the solenoid core. In case it is desired to turn to the right, the operator throws the controlling lever 13 to the right to cause the left hand end of the leveling tube 1 to be lowered for bringing the liquid therein into engagement with the left contact 11. The circuit of the solenoid 18^l to the left of the center of the machine will now be energized, with the result that the left hand auxiliary plane will be swung downwardly. This raises the left hand end of the airship so that the operator can steer the machine to the right. In steering to the left, obviously, the controlling lever 23 is turned to the left to bring into operation the right hand auxiliary plane.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, is:—

1. In an aeroplane, the combination of auxiliary balancing planes, solenoids provided with spring retracted cores, gearing between the cores of the solenoids and the respective balancing planes, electrical circuits in which said solenoids are included, a make and break device for closing the circuit of either solenoid, said device comprising a V-shaped liquid containing tube having its ends higher than the middle or vertex portion of the tube, means pivotally supporting said tube at its middle or vertex portion, and contacts in the ends of the tube forming part of said circuits and arranged to be immersed in the liquid therein when the tube tilts.

2. In an aeroplane, the combination of auxiliary balancing planes, solenoids provided with spring retracted cores, gearing between the cores of the solenoids and the respective balancing planes, electric circuits in which said solenoids are included, a make and break device for closing the circuit of either solenoid, said device comprising a V-shaped liquid containing tube having its ends higher than the middle or vertex portion of the tube, contacts in the ends of the tube forming part of said circuits and arranged to be immersed in the liquid therein when the tube tilts, means pivotally supporting said tube at its middle or vertex portion, and means for manually tilting the said tube.

3. In an aeroplane, the combination of auxiliary balancing planes, solenoids provided with spring retracted cores, gearing between the cores of the solenoids and the respective balancing planes, electric circuits in which said solenoids are included, a make and break device for closing the circuit of either solenoid, said device comprising a V-shaped liquid containing tube having its ends higher than the middle or vertex portion of the tube, contacts in the ends

of the tube forming part of said circuits and arranged to be immersed in the liquid therein when the tube tilts, an equalizing connection between the ends of the tube, means pivotally supporting said tube at its middle or vertex portion, and means for manually tilting said tube.

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

ROBERT L. MONROE.

Witnesses:
B. P. VAN SICKLE,
ALBERT BERGESON.