

H. W. PIKE & R. E. JOHNSON.
STABILIZING MECHANISM FOR FLYING MACHINES.
APPLICATION FILED APR. 18, 1911.

1,012,006.

Patented Dec. 19, 1911.

2 SHEETS—SHEET 1.

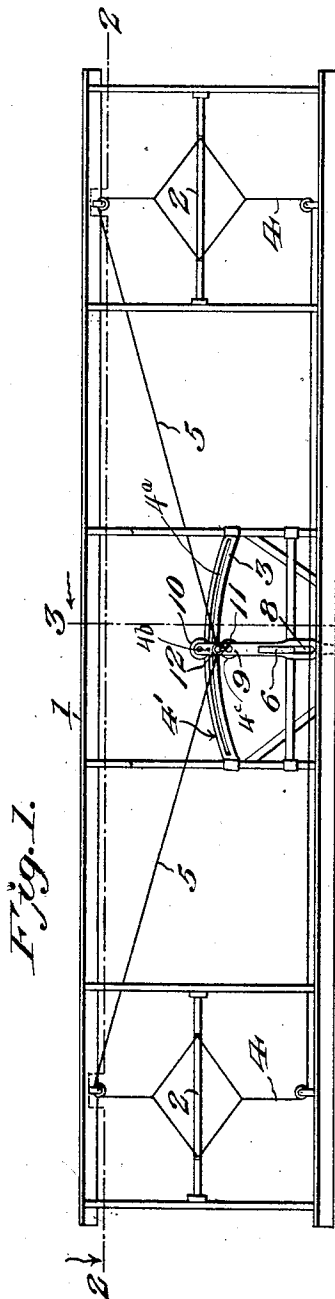
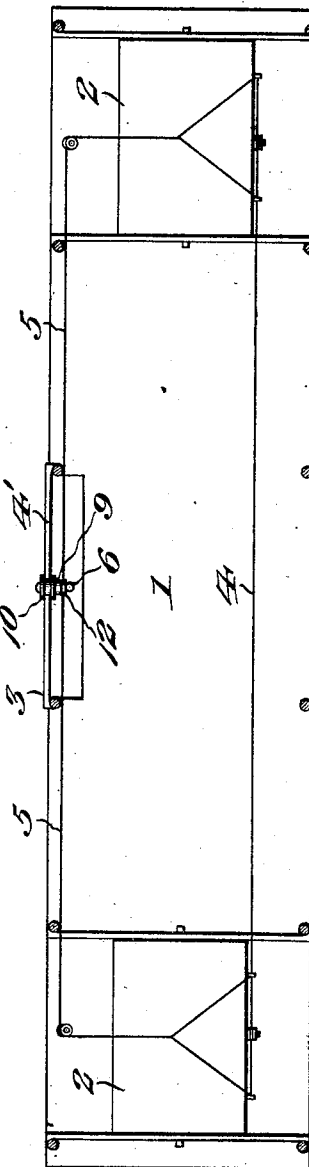


Fig. 1.

Fig. 2.



Witnesses

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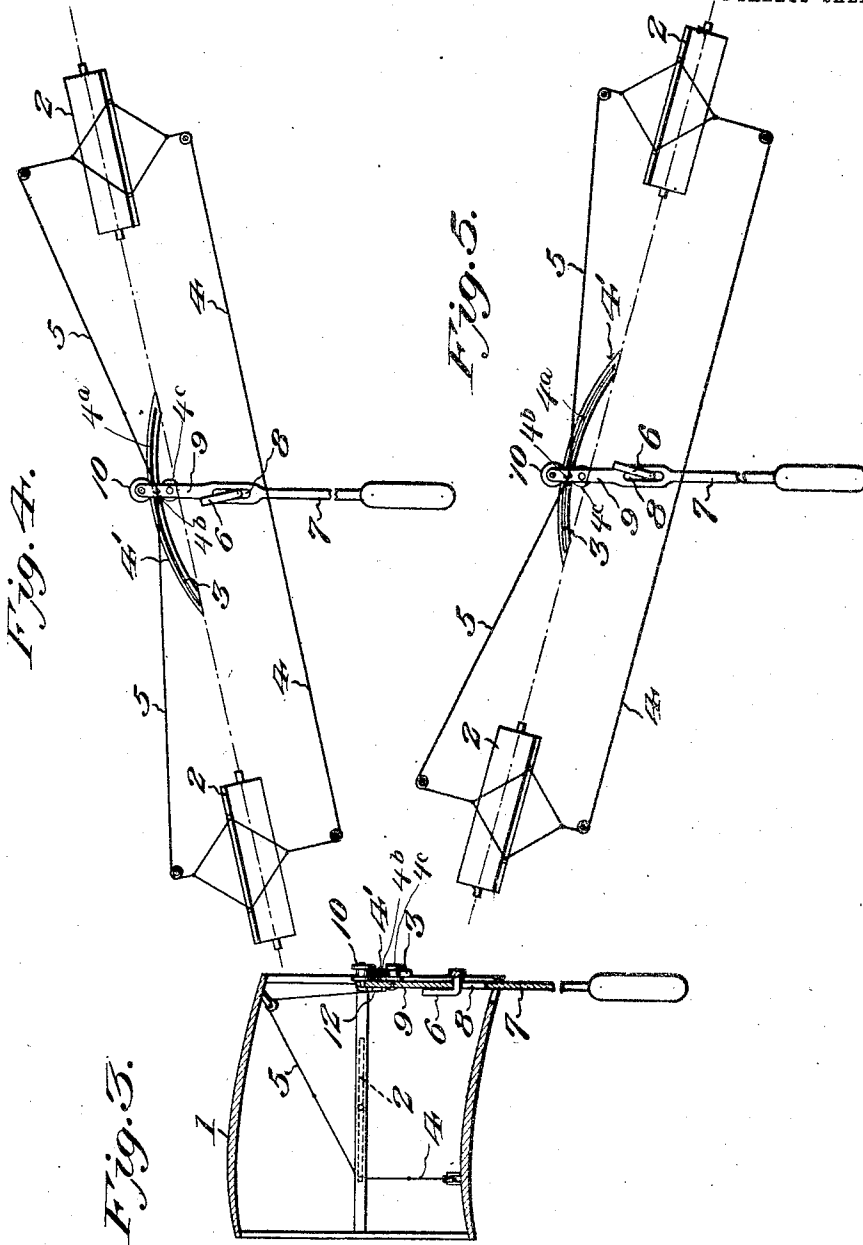
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UNITED STATES PATENT OFFICE.

HARRY W. PIKE AND RENUS E. JOHNSON, OF OSCEOLA, NEBRASKA.

STABILIZING MECHANISM FOR FLYING-MACHINES.

1,012,006.

Specification of Letters Patent.

Patented Dec. 19, 1911.

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To all whom it may concern:

Be it known that we, HARRY W. PIKE and RENUS E. JOHNSON, citizens of the United States, residing at Osceola, in the county of Polk and State of Nebraska, have invented new and useful Improvements in Stabilizing Mechanism for Flying-Machines, of which the following is a specification.

This invention relates to automatic stabilizing mechanism for flying machines, the object in view being to provide simple and effective gravity-controlled means for operating stabilizing devices whereby the lateral stability of the machine may be maintained.

A further object of the invention is to provide stabilizing means of the pendulum-controlled type in which the tendency of the pendulum weight to oscillate after the machine is righted is prevented.

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

Figure 1 is a front elevation, showing the application of the invention to a biplane structure, the parts appearing in normal position. Fig. 2 is a sectional plan view on the line 2—2 of Fig. 1. Fig. 3 is a fore-and-aft section on the line 3—3 of Fig. 1. Figs. 4 and 5 are diagrammatic views, showing the movements of the parts when the machine tilts in opposite directions.

While in the present disclosure, for purposes of exemplification, we have shown the invention employed upon a biplane machine using ailerons for lateral stability, it is to be understood that we do not limit the invention to such application or to the control of ailerons arranged between superposed supporting surfaces. In the following description, we have for convenience employed the term "stabilizers" to designate and include ailerons, sliding or pivoted wing tips, warping tips or any other devices which are or may be used for lateral control.

Referring to the drawings, 1 designates the frame of the machine, and 2 the stabilizers. Arranged upon the machine at a suitable point between the stabilizers is a track rail support 3, provided with an upper

arcuate track surface 3' and arranged in a direction at right angles to the line of flight. As shown, the stabilizers are connected for movement in unison by sets of cords or wires 4 and 5 in such manner that when one stabilizer swings downwardly the other will swing upwardly and vice versa.

Arranged upon the support 3 below the track surface 3' is a pivot member 6, preferably in the form of a hook having an up-turned elongated bill. Mounted for pivotal movement upon the horizontal shank of this hook is a pendulum rod 7, having an elongated slot 8 through which the hook extends. The lower end of this rod projects below the frame of the machine and is of proper weight to be controlled by the action of gravity, so that the rod will maintain a perpendicular position when the machine tilts laterally in either direction.

The upper end of the rod is provided with a bracket 9 carrying a wheel or roller 10, or its equivalent, to run upon the track surface 3', whereby the pendulum rod is adapted to be elevated when the machine tilts laterally in either direction from the horizontal, owing to the increase in distance between the pivot point of the lever and the surfaces of the track over which the roller travels. A pin 11 projects from the front of the lever and receives a ring or coupling member 12, to which the ends of the controlling cords or wires 5 of the stabilizers are connected.

When the machine is traveling horizontally in flight, and is completely balanced in a lateral direction, the roller rests upon the central portion of the track surface and the upper end wall of the slot 8 in the pendulum rod rests upon the shank of the pivot hook. In this position of the machine the stabilizers are, of course, in a neutral position, and the cords or wires 5 are drawn normally taut.

When the machine tilts laterally in either direction, the pendulum rod, through the force of gravity retains its perpendicular position, but its upper end is caused to have a relative movement on the track surface in the direction toward the uptilting side of the machine, whereby the cord or wire 5

connecting the rod with the stabilizer at the downtilting side of the machine is drawn upon to swing said stabilizer upward. This operation causes the stabilizer at one side of the machine to be moved in one direction and the stabilizer at the opposite side of the machine to be moved in the reverse direction, for restoring the lateral balance, and at the same time the relative change in position of the rod on the track surface causes said rod to be elevated, whereby on the restoration of the machine to a horizontal position the rod will slide downward on its pivot. The same operation ensues when the machine tilts in the reverse direction, except that the rod and stabilizers move in the reverse directions to that above described; the rod being in a similar manner elevated and sliding back to normal position when the machine is righted. This elevating and lowering motion of the rod in the tilting of the machine is permitted by the slot and pin or slip joint connection 6 and 8 between the same and the support 3, by which on each successive relative tilting and upward travel of the rod and the subsequent return of the parts to normal position, the tendency of the rod to swing laterally is converted into a downward sliding motion of the rod through the force of gravity by which such lateral tilting motion is prevented. Hence, the return of the rod to normal position will be easy and gradual, any tendency of the rod to lateral swinging motion through centrifugal force overcome in banking the machine on making a turn, and oscillation of the stabilizers through such movements of the rod upon the righting of the machine prevented, the advantages of which will be apparent. It will, of course, be understood that under some conditions it is desirable to hold the rod from movement to prevent operation of the stabilizers when the machine moves out of lateral balance, in which event actuation of the stabilizers may be avoided by manually holding the rod in fixed position. The rod also may be employed as a lever under normal conditions for controlling the stabilizers.

50 The track rail 3 is preferably provided with a slot 4^a to receive a retaining pin 4^b, which is adapted to hold the wheel or roller 10 in contact with the track and prevent it from jumping off the track when the machine is subjected to jolts or vibrations. A retaining wheel or roller 4^c may be mounted upon the pendulum rod to engage the under side of the track for the same purpose. Either one or both of these retaining devices may be employed, as desired. The pendulum rod is preferably constructed of two sections united by a hinge or other joint 8^a, so as to allow the track and upper portion of the rod to tilt in a fore and aft

direction with the machine without affecting the pendulum weight.

Having thus described the invention, we claim:—

1. In a flying machine, stabilizers, an arcuate guide, a pendulum, a member carried thereby and traversing said guide, connections between said pendulum and the stabilizers, and a pivotal support for the pendulum adapted to permit the same to have vertical shifting motion.

2. In a flying machine, stabilizers, a pendulum pivoted for relative lateral swinging and vertical sliding movements, connections between the pendulum and stabilizers, a track support, and a guide member carried by the pendulum to traverse said track support.

3. In a flying machine, stabilizers, a pendulum pivotally mounted upon the machine for relative lateral swinging and vertical shifting movements, a curved track support extending on an arc eccentric to the pivotal support of the pendulum, connections between the pendulum and stabilizers, and a guide member on the pendulum and traversing said track support.

4. In a flying machine, stabilizers, a pivot member upon the machine, a pendulum rod mounted to swing laterally upon said pivot member and to slide vertically thereon, connections between the pendulum rod and the stabilizers, and means for elevating the rod on each actuating movement and permitting descent thereof upon return of the parts to normal position.

5. In a flying machine, stabilizers, a pivot member upon the frame of the machine, a transversely extending track above said pivot member, a pendulum rod mounted to swing laterally and slide vertically upon said pivot member, a guide upon said rod to traverse said track, and connections between the rod and the stabilizers.

6. In a flying machine, stabilizers, a pendulum pivotally mounted on the machine for relative lateral swinging and vertical sliding movements, a track support having a pair of guide portions, connections between the pendulum and stabilizers, a member on the pendulum traversing one of said guiding surfaces of the track support to effect the vertical shifting movements of said pendulum, and a guiding member on the pendulum traversing the other guiding surface of the track support to prevent displacement of the first-named guiding member.

7. In a flying machine, a gliding structure, stabilizers mounted thereon, a hook-shaped pivot member upon the gliding structure having its bill directed upward, a pendulum extending above and below said pivot member and formed with a longitudinal

nally slotted portion receiving and engaging
the shaft of said pivoted member, a curved
arcuate support upon the gliding structure
above the pivot member, a guide roller upon
5 the upper end of the pendulum traversing
said support, and guiding means between the
pendulum and track support for preventing
displacement of said roller.

In testimony whereof we affix our signatures in presence of two witnesses.

HARRY W. PIKE.
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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."