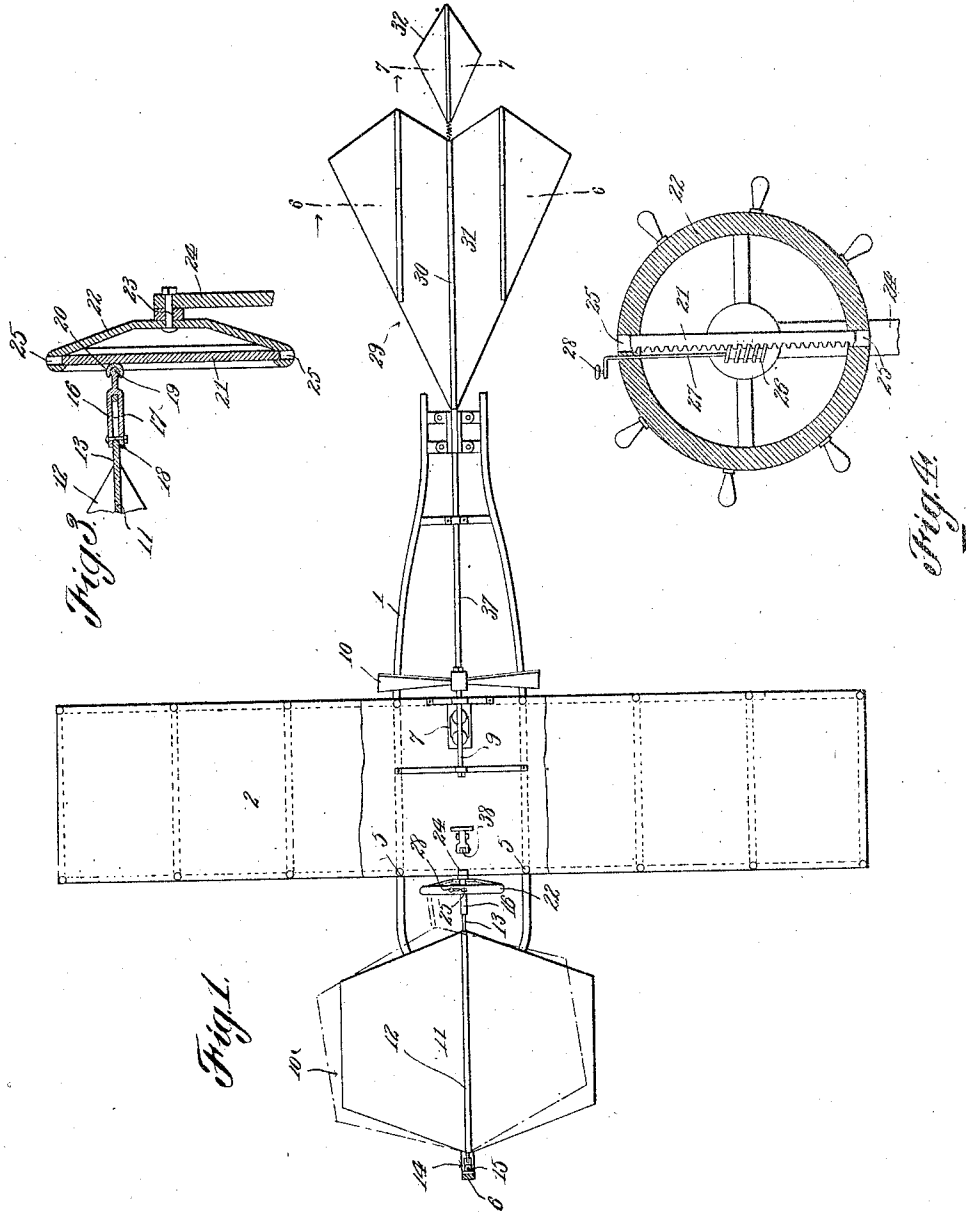


1,000,283.

D. W. MOORE.  
FLYING MACHINE.  
APPLICATION FILED JULY 23, 1910.

Patented Aug. 8, 1911.  
2 SHEETS—SHEET 1.



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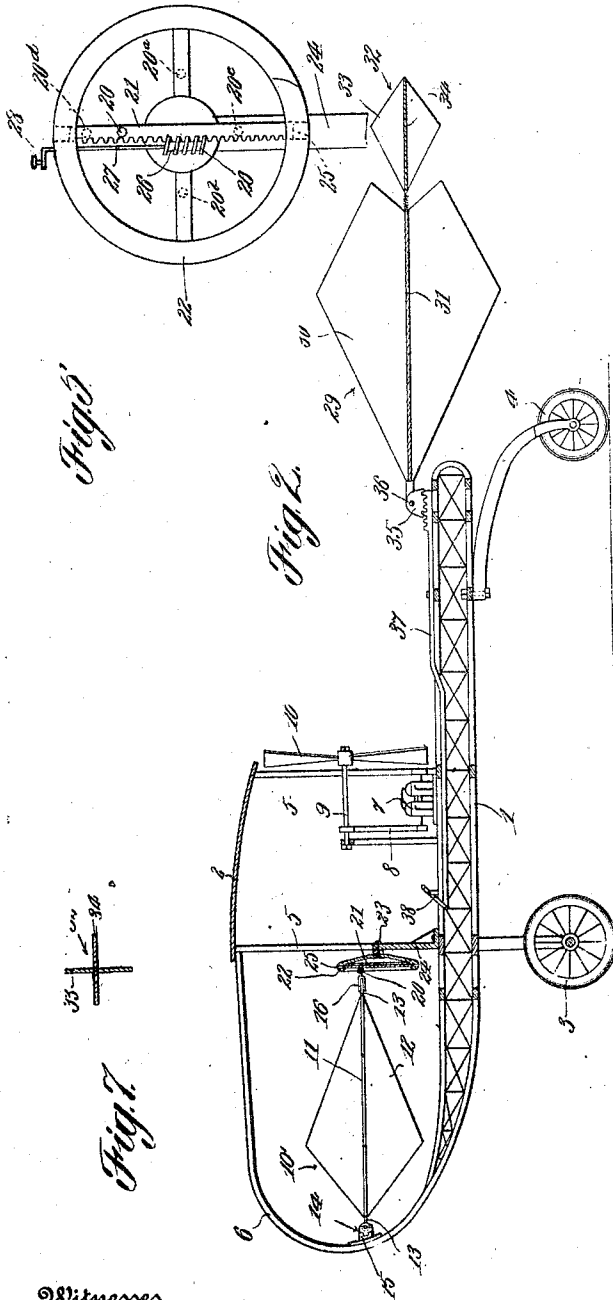


Fig. 1

Fig. 2



Fig. 7

Fig. 8

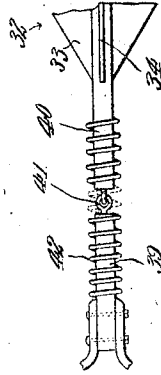


Fig. 9

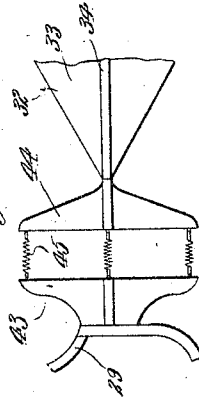
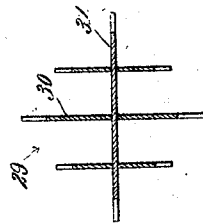


Fig. 10



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# UNITED STATES PATENT OFFICE.

DORUS WATT MOORE, OF FULTONVILLE, NEW YORK.

FLYING-MACHINE.

1,000,283.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed July 23, 1910. Serial No. 573,493.

To all whom it may concern:

Be it known that I, Dorus W. Moore, a citizen of the United States, residing at Fultonville, in the county of Montgomery and State of New York, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to flying machines of the aeroplane type, and particularly to mono-plane machines; the objects of the invention being to provide simple, reliable and efficient means for steering the machine both vertically and horizontally through the medium of a single steering device, and to provide a reliable tail balance for automatically maintaining the poise or balance of the machine.

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 top plan view of a flying machine embodying my invention, showing in dotted lines one position of adjustment of the steering rudder. Fig. 2 is a central, vertical longitudinal section through the machine. Fig. 3 is a central vertical section through the steering wheel. Fig. 4 is a vertical transverse section thereof. Fig. 5 is a front view of the steering wheel, illustrating in full and dotted lines the positions of the associated joint of the rudder in adjusting the latter for the different steering operations. Figs. 6 and 7 are vertical transverse sections through the tail balance on the lines 6—6 and 7—7 of Fig. 1. Fig. 8 is a detail plan view, showing the flexible connection between the frame and tail balance. Fig. 9 is a similar view, showing a modified form of tail balance connection.

Referring to the drawings, 1 designates the main frame of the machine on which is suitably mounted the main flotation or supporting plane 2. The frame is provided with one or more front wheels 3 turning on fixed axes and a rear laterally swinging wheel 4, whereby the machine is adapted to run along the surface of the ground in launching and landing and to be steered laterally on the ground surface through the pivotal movements of the wheel 4. The plane 2 is shown as carried by standards or uprights 5 which may be suitably connected and braced, the

front standards being shown in the present instance stayed from the forward portion of the frame by a curved brace 6. On the frame is mounted a motor 7 which communicates motion through a drive belt or chain 8 to a shaft 9 carrying a rotary propeller 10, which elements may be of any desired construction and arrangement.

At the front of the machine is arranged a normally substantially horizontal steering rudder 10, comprising connected horizontal and vertical planes 11 and 12, operating by their right angular arrangement to oppose resistance to either lateral or vertical deflection of the machine from a straight course of travel. These planes are preferably kite-shaped, but may be of any suitable form. They are connected to a central rod or stem 13 pivoted at its forward end to swing vertically upon a bracket or coupling member 14 which in turn is hinged or pivoted for a horizontal swinging movement to a bracket or coupling member 15 secured to the brace or stay 6, thus forming a universal joint to permit the rudder to swing freely both vertically and horizontally.

The rear end of the stem 13 is slidably and pivotally mounted in the yoke portion of a coupling member 16, being provided for such purpose with a longitudinal slot 17 through which passes a pin or bolt carried by said member 16, said connection permitting the rear end of the rudder to move in arcs of different radii in its various adjustments. The coupling 16 is formed with a partially spherical head 19 mounted to turn freely in a socket 20 carried by a rack bar 21 supported upon a steering wheel 22, thus forming a universal joint connection between the rear end of the rudder and said steering wheel.

The wheel 22 is vertically disposed and turns upon a pivot bolt 23 carried by a suitable supporting standard 24. The front portion of this wheel is concaved to receive the bar 21 which extends diametrically across the same and has its ends fitted to slide in guideways 25 formed in the rim of the wheel. Meshing with the teeth of the rack bar is a worm gear 26 carried by a shaft 27 journaled on the wheel and having a crank handle 28 by which it may be turned to slide the bar longitudinally in either direction across the face of the wheel. When the rudder is in normal position for

straight horizontal flight the bar 21 is vertical and the universal joint connection 19 and 20 disposed above the center of the wheel. By turning the wheel the position of said universal joint relative to the center of the wheel may be varied in a circular path concentric with the axis of rotation to adjust the rudder to different positions for steering the machine vertically and horizontally.

The different positions of the universal joint 19—20 are illustrated in dotted lines in Fig. 5, from which it will be understood that upon turning the wheel a quarter revolution to the aviator's left the joint will be shifted to the position 20<sup>a</sup>, thus swinging the rudder to cause the left side of its horizontal plane to present the greater angle of incidence for steering the machine to the right. When the wheel is turned a corresponding degree from its normal position to the position designated 20<sup>b</sup>, the rudder will be shifted so that the right side of its horizontal plane will present the greater angle of incidence to steer the machine to the left. By turning the wheel from its normal position a half revolution to shift the joint to the lowest position designated 20<sup>c</sup>, the rear end of the rudder will be lowered, so that the horizontal plane thereof will be disposed so that its lower surface will present the greater angle of incidence to steer the machine in an upward direction. By adjusting the rack bar to elevate the joint from its normal position to the position designated 20<sup>d</sup>, the rear end of the rudder will be elevated, so that the upper surface of the horizontal plane of the rudder will present the greater angle of incidence for steering the machine in a downward direction. It will thus be seen that the machine may be steered in all directions by means of a single rudder, which, it will be understood, may also be adjusted to any of the intermediate positions named to simultaneously steer the machine in either direction laterally and in either direction vertically and to vary the angle of incidence presented by the rudder in any of its positions of adjustment, as desired. The pivotal slip-joint connection between the stem 13 and coupling member 16, which may be termed a lengthening and shortening joint, allows and compensates for variations in the distance between the front and rear universal joints of the rudder in the movement of the rear end of the rudder in different arcs as a result of the arrangement of the rear joint eccentric to the axis of the steering wheel as will be readily understood.

The machine is provided with an automatic rear rudder or tail balance for preserving its stability and maintaining its fore and aft and, to a large extent, its lateral equilibrium. This device comprises a

main rudder member 29 formed of vertical and horizontal planes 30 and 31 and a relatively smaller rear or trail rudder member 32 similarly formed of vertical and horizontal planes 33 and 34. The planes of both rudder members are preferably kite-shaped, the vertical planes serving to prevent lateral deflection of the rear end of the machine from a straight course, while the horizontal planes adapt the rudder to resist tilting motion of the machine in a fore and aft direction.

The front end of the rudder member 29 carries a toothed segment 35 pivotally mounted at 36 upon the rear end of the frame 1, the teeth of said segment meshing with the toothed rear end of a rack bar 37 slidably mounted in guides and adjustable to swing the rudder member vertically to vary its angle of inclination to the machine. The forward end of the sliding rack bar is connected with a lever 38 under the control of the aviator and which may be locked in adjusted position in any suitable manner.

The rear end of the rudder member 29 is notched to receive the forward end of the rudder 32, the projecting front and rear ends of the stems 39 and 40 of the respective rudders being connected by a universal joint 41 to permit the rudder 32 to swing both vertically and laterally and thus act as an automatic stabilizer to limit to a certain extent deflection of the machine from its line of travel either vertically or laterally. A coiled spring 42 surrounds the stems 39 and 40 and operates to yieldingly support the rudder member 32 when not supported by the pressure of the air, as when the machine is not in flight. It will thus be understood that the rudder member 29 is relatively fixed from movement and operates by the resistance of its planes to maintain the equilibrium of the machine, while the rudder member 32 has freedom of universal movement under the pressure of the air currents to increase the efficiency of the balancing action.

In the modification shown in Fig. 9 the frames of the respective rudders 29 and 32 are provided with cross pieces 43 and 44 which are connected by a series of coiled springs 45 which yieldingly support said rudder member 32. This connection may be sufficiently flexible to permit the rudder member 32 to sag when the machine is at rest, the rudder member being forced up to normal horizontal position and supported by the pressure of the air when the machine is in flight.

Having thus described the invention, I claim:—

1. A flying machine embodying a frame, a main supporting plane carried thereby, propelling mechanism, a front horizontal rudder composed of vertical and horizontal planes universally jointed at its forward end

to the frame, and a steering wheel to which the rear end of said rudder is universally jointed eccentric to the axis of said wheel.

2. A flying machine embodying a frame, a main supporting plane carried thereby, propelling mechanism, a front horizontal rudder composed of vertical and horizontal planes universally jointed at its forward end to the frame, a vertically arranged steering wheel, and an adjustably mounted member on the wheel to which the rear end of said rudder is universally jointed eccentric to the axis of said wheel.

3. A flying machine embodying a frame, a main supporting plane carried thereby, propelling mechanism, a front horizontal rudder composed of vertical and horizontal planes universally jointed at its forward end to the frame, a vertically arranged steering wheel, a support extending diametrically across the wheel and to which the rear end of the rudder is universally jointed eccentric to the axis of said wheel, and means for adjusting said support.

4. A flying machine embodying a frame, a main supporting plane carried thereby, propelling mechanism, a front horizontal rudder composed of vertical and horizontal planes and universally jointed at its forward end to the frame, a vertically disposed steer-

ing wheel, a coupling universally jointed to said wheel eccentric to its axis, and a sliding pivotal connection between said coupling and the rear end of said rudder.

5. In a flying machine, the combination of a frame, a main supporting plane mounted thereon, propelling mechanism, and a stabilizer supported by and projecting from the rear end of the frame and comprising front and rear members each embodying vertical and horizontal planes, the rear member being yieldingly supported for universal motion upon the front member.

6. In a flying machine, the combination of a frame, a main supporting plane mounted thereon, propelling mechanism, a stabilizer supported by and projecting from the rear end of the frame and comprising front and rear members each embodying vertical and horizontal planes, the rear member being yieldingly supported for universal motion upon the front member, and means for vertically adjusting said stabilizer to vary its angle to the line of flight.

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

DORUS WATT MOORE.

Witnesses:

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WILLIAM B. ISBODY.