W. I. TWOMBLY.

AEROPLANE.

APPLICATION FILED MAR. 31, 1911

1,112,731.

Patented Oct. 6, 1914.

2 SHEETS—SHEET 1.

Fig. 2.

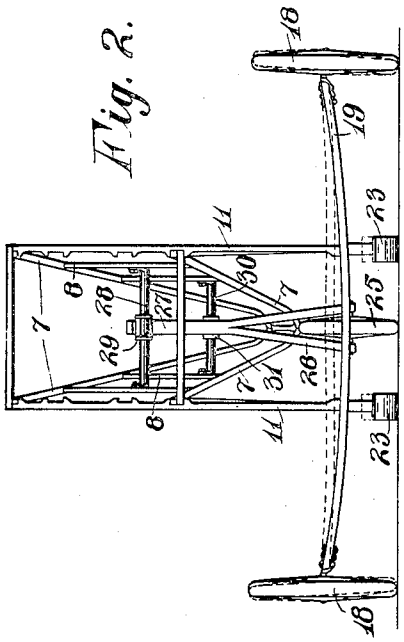
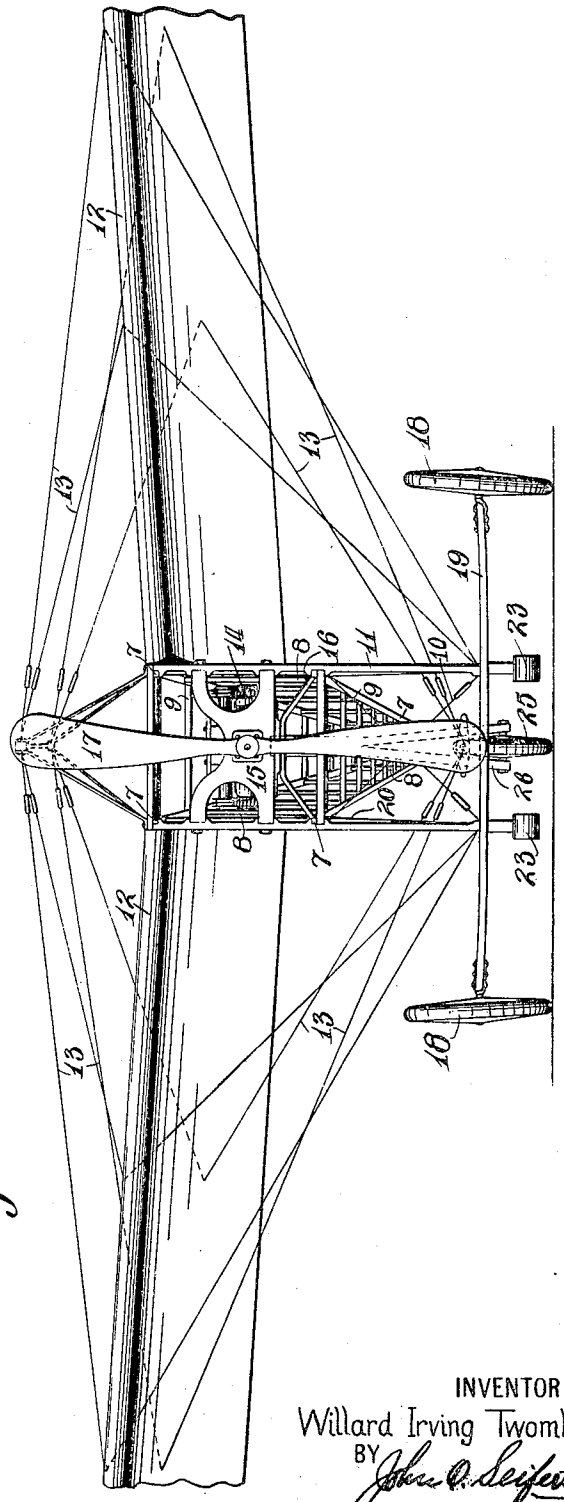


Fig. 1.



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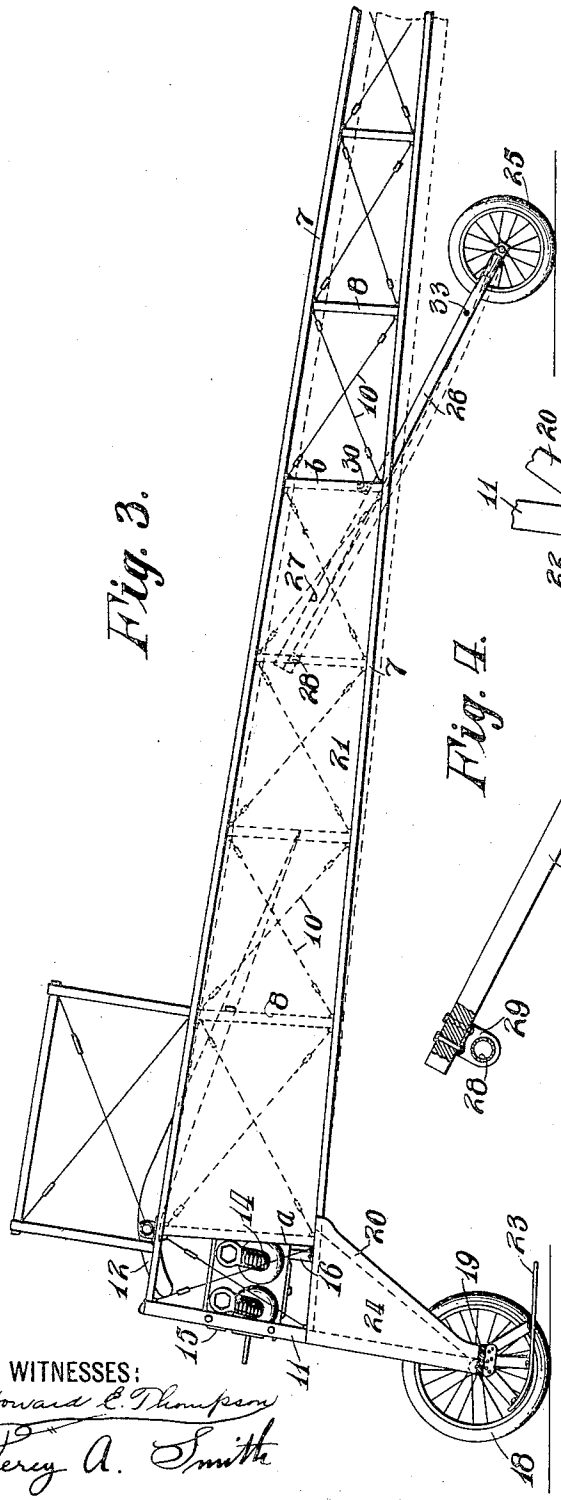


Fig. 3.

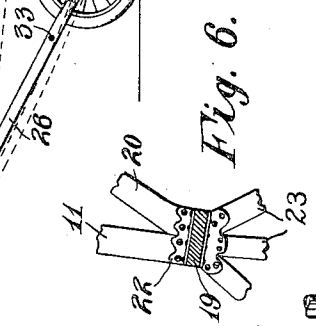


Fig. 6.

Fig. 4.

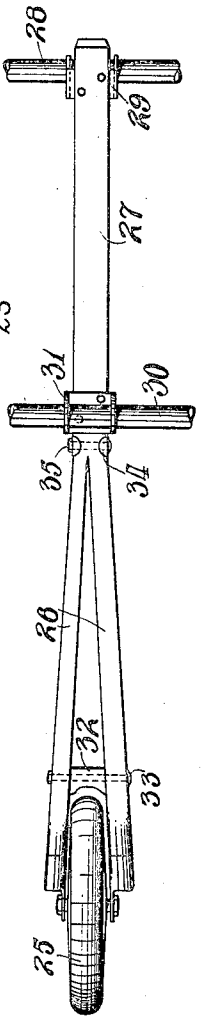


Fig. 5.

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AEROPLANE.

1,112,731. Specification of Letters Patent. Patented Oct. 6, 1914.

Application filed March 31, 1911. Serial No. 618,061.

To all whom it may concern:

Be it known that I, WILLARD IRVING TWOMBLY, a citizen of the United States, residing in the borough of Manhattan, in the city, county, and State of New York, have invented new and useful Improvements in Aeroplanes, of which the following is a specification.

This invention relates to flying machines or aeroplanes, and it is the object of the invention to provide improved means to facilitate the starting and alighting, and to improve and simplify the construction whereby to decrease to a minimum the head resistance of the aeroplane when in flight.

In carrying out my invention, I have shown the same in connection with a monoplane, although it will be obvious that the invention is applicable to aeroplanes of different construction, such as biplanes or dirigible flying machines, without departing from the scope of the invention.

The embodiment of my invention illustrated in the drawings comprises a pair of resilient members, which are in the nature of spring boards, one extending transversely of the framework with wheels at the extremities thereof, the forward end of the aeroplane being supported on said member by standards forming a part of the framework. Skids are connected to said resilient member in such position that they will normally be out of contact with the ground when the aeroplane is at rest on the ground or starting, but as the aeroplane alights and said resilient member is sprung from the shock of the main frame when the wheels come in contact with the ground, the skids will engage with the ground and serve as a brake to retard the movement of the aeroplane. The other resilient member is connected at one end to the framework with a wheel at the free end thereof to support the rear end of the aeroplane upon said wheel.

In the drawings accompanying and forming a part of this specification, Figure 1 is a front elevation of a monoplane with my improvements applied thereto, a portion of the planes being broken away. Fig. 2 is a front elevation of the main frame with my improvements applied thereto, showing the positions they assume when the aeroplane is alighting, and in dotted lines the normal position or when the aeroplane is at rest upon the ground. Fig. 3 is a side elevation of a monoplane, partly broken away, with my improvements applied thereto showing in dotted lines the positions the rear resilient member and the rear of the main frame assume when the aeroplane alights. Fig. 4 is a side elevation of a portion of the resilient member in the rear to illustrate the means to secure the same to the frame. Fig. 5 is a plan view of the rear resilient member and the means to secure it to the main frame; and Fig. 6 is an enlarged sectional detail to illustrate the manner of securing the front resilient member to the frame.

Similar characters of reference designate like parts throughout the different views of the drawings.

As already stated, in the drawings I have shown my invention in connection with a monoplane having a longitudinal fuselage or main framework substantially rectangular in shape and tapering toward the rear, consisting of spars 7, uprights or standards 8, cross bars 9 and the braces or stay wires 10, with the bottom and sides covered with a suitable fabric 21 for substantially the distance from *a* to *b*. The forward ends of the spars 7 are secured to uprights or standards 11 whereby the forward end of the aeroplane is supported, for a purpose to be hereinafter set forth. The planes 12 are secured in suitable position to the main frame to extend laterally therefrom and retained in position by stay wires 13. The tail of the aeroplane carries the usual rudder and elevating plane (not shown) to control the aeroplane. The motor or engine 40 is supported in the forward end of the framework by means of a hanger 15, which may form a part of the engine frame, secured to the standards 11 and a brace or bracket 16 fastened to the lower spars 7 and upon which the engine rests. The propeller 17 is fixed to the power shaft of the motor in front of the main frame.

The forward end of the aeroplane when on the ground is supported upon a pair of wheels 18 by means of a resilient member 19 extending transversely of the frame, the said resilient member being in the nature of a spring board of suitable material, to the ends of which the spindles or axles upon which the wheels revolve are secured. The standards 11 and a pair of rigid braces 20 rest upon and are connected to the resilient

member 19 centrally thereof by means of cleats or brackets 22, (Fig. 6) so that the ends of said member 17 will project from the sides of the body of the aeroplane. Skids 23 are connected to the bottom of the resilient member 19 opposite the ends of the standards 11 and in such position that when the aeroplane is in normal position upon the ground they will be out of contact therewith, as shown in Figs. 1 and 3 and will not interfere with the starting of the aeroplane. The member 19 is inclined from the front edges to the rear edges, or relatively to the line of flight, and as the aeroplane is propelled through the air tends to lift and maintain itself in the air, not adding any weight to be lifted by the planes. A suitable covering 24 (Fig. 3) may be provided for the space between the standards 11, braces 20 and the bottom of the frame to materially assist in the stabilizing or lateral balancing of the aeroplane.

The rear of the aeroplane when on the ground is supported upon a wheel 25 carried within a forked portion 26 of the free end of a second resilient member, which is also in the nature of a spring board of suitable material, connected to the framework in a plane parallel with the latter and inclining relatively to the line of flight. The member 27 is secured to the framework by means of a bar 28 extending transversely between and rigidly connected to a pair of standards 8, a bracket 29 secured to the member 27 near the end has a pair of downwardly projecting ears with perforations through which the bar 28 passes so that the end of member 27 rests upon said bar. A second bar 30 extends transversely between and is rigidly connected to a second pair of standards 8, in the present instance the standards succeeding the standards to which the bar 28 is secured, so that the same will rest upon the member 27, as shown in Fig. 3, a second bracket 31 similar to the bracket 29 being provided except that the ears project upwardly with the bar 29 passing through the perforations therein. The end of the member 27 to which the wheel 25 is connected is forked by making a saw cut therein and then spreading or forcing it apart, a wedge 32 held in place by a bolt 33 maintaining the ends in the spread position, and a clamp 34 and bolt 35 preventing any further spreading.

In Figs. 1 and 3 the aeroplane is in position of rest upon the ground, with the skids 23 out of engagement with ground and the resilient member or spring board 19 slightly flexed or sprung from the weight of the aeroplane. When in this position the axles of the wheel 18 are slightly inclined owing to the manner of the connection to the member 19, the wheels assuming the positions indicated in Fig. 1. These are substantially the positions the parts will also assume when starting and during flight. In alighting when the wheels 18 engage with the ground the shock of the weight of the aeroplane will flex or spring the resilient member 19 from the dotted to the full line position in Fig. 2 and thereby cushioning or absorbing the shock, the wheels 18 assuming the positions shown in full lines in said figure and revolving on a horizontal axis. As the member 19 is flexed or bent the skids 23 are forced against the ground thereby serving as a brake to retard the forward movement of the aeroplane. After the shock of the aeroplane by the wheels 18 coming in engagement with the ground is overcome by the resilient action of the member 19, the parts will again resume the positions shown in Fig. 1, and the aeroplane will gradually come to a stop as it rides over the ground. Simultaneously with the action of the resilient member 19 as the aeroplane alights and the rear wheel 25 comes in contact with the ground the shock of the main frame will cause the resilient member 27 to flex or spring to substantially the position shown by the dotted lines in Fig. 3 thereby cushioning the rear position of the aeroplane.

From Fig. 1 it will be observed that the forward end of the aeroplane is entirely supported by means of the standards 11 upon the resilient member 19, which is also in the nature of a resilient axle for the wheels 18, thereby materially reducing the number of parts to resiliently mount the aeroplane upon the wheels and decreasing to a minimum the head resistance of the aeroplane when in flight.

Variations may be resorted to within the scope of my invention.

Having thus described my invention, I claim:

1. In an aeroplane, the combination of a substantially rectangular framework; a pair of upright standards at the forward end and forming a part of the framework; a spring board extending transversely of and upon which the standards are fixed to support the forward end of the framework so that the ends of the spring board project out from the sides of the framework; wheels connected to the outer ends of said spring board; skids secured below said spring board; a second spring board fixed at one end to the framework in the rear of the first spring board and inclining relative to the line of flight to support the rear of the framework; and a wheel carried at the free end of said latter board.

2. In an aeroplane, the combination with the main frame, of starting and alighting means, comprising a pair of supporting standards at the front of and forming a part of the main frame; a resilient member ex-

tending transversely of the main frame and upon which the standards are secured so that the frame will rest upon said member centrally thereof, said member being inclined relative to the line of flight; wheels at the outer ends of said resilient member; skids connected to the bottom of said member so that they will be normally out of contact with the ground, but as the aeroplane alights and the resilient member is sprung from the shock of the main frame when the wheels come in contact with the ground, forcing said skids upon the ground to serve as a brake to retard the movement of the areoplane.

3. In an aeroplane, the combination with the main frame, of starting and alighting means, comprising a pair of supporting standards at the front of and forming a part of the main frame; a resilient member extending transversely of the main frame and upon which the standards are secured so that the frame will rest upon said member centrally thereof with the ends extending beyond the sides of the main frame, said member being inclined relative to the line of flight; wheels at the outer ends of said resilient member; skids connected to the bottom of said member so that they will be normally out of contact with the ground, but as the aeroplane alights and the resilient member is sprung from the shock of the main frame when the wheels come in contact with the ground, forcing said skids upon the ground to serve as a brake to retard the movement of the aeroplane; a second resilient member connected at one end to the main frame to incline downward relative to the line of flight; and a wheel connected to the free end of said second member.

4. In an aeroplane, the combination with the framework, of a resilient member extending transversely of and upon which the forward end of the aeroplane is supported; wheels at the outer ends of said resilient member; skids carried by said member so that they will be normally out of contact with the ground; a second resilient member having a forked end connected to the framework in an inclined position relative to the line of flight; a wheel connected to said member within the forked portion; and means to connect the second resilient member to the framework, comprising a cross-bar rigidly connected to the framework with one end of said resilient member resting upon and secured thereto, and a second cross-bar rigidly connected to the framework; said latter bar secured to and resting upon the said resilient member whereby to support the rear of the aeroplane.

5. In an aeroplane, the combination with the framework, of a pair of supporting standards at the front of and forming a part of the framework; a resilient member extending transversely of the main frame and upon which the standards are secured so that the forward end of the aeroplane will be supported upon the same; wheels at the outer ends of said resilient member; skids carried by said member so that they will be normally out of contact with the ground; a second resilient member connected to the framework in the rear of the first resilient member in an inclined position relative to the line of flight, said member having a forked end; a wheel connected to said member within the forked portion; and means to connect the second resilient member to the framework, comprising a member extending transversely of and rigidly connected to the framework, with one end of said resilient member resting upon and secured thereto, and a second member extending transversely of and rigidly connected to the framework; said latter member secured to and resting upon the resilient member whereby to support the rear of the aeroplane.

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