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SPEED CONTROLLER FOR AEROPLANES.

APPLICATION FILED JAN. 29, 1914.

1,151,419.

Patented Aug. 24, 1915.

2 SHEETS—SHEET 1.

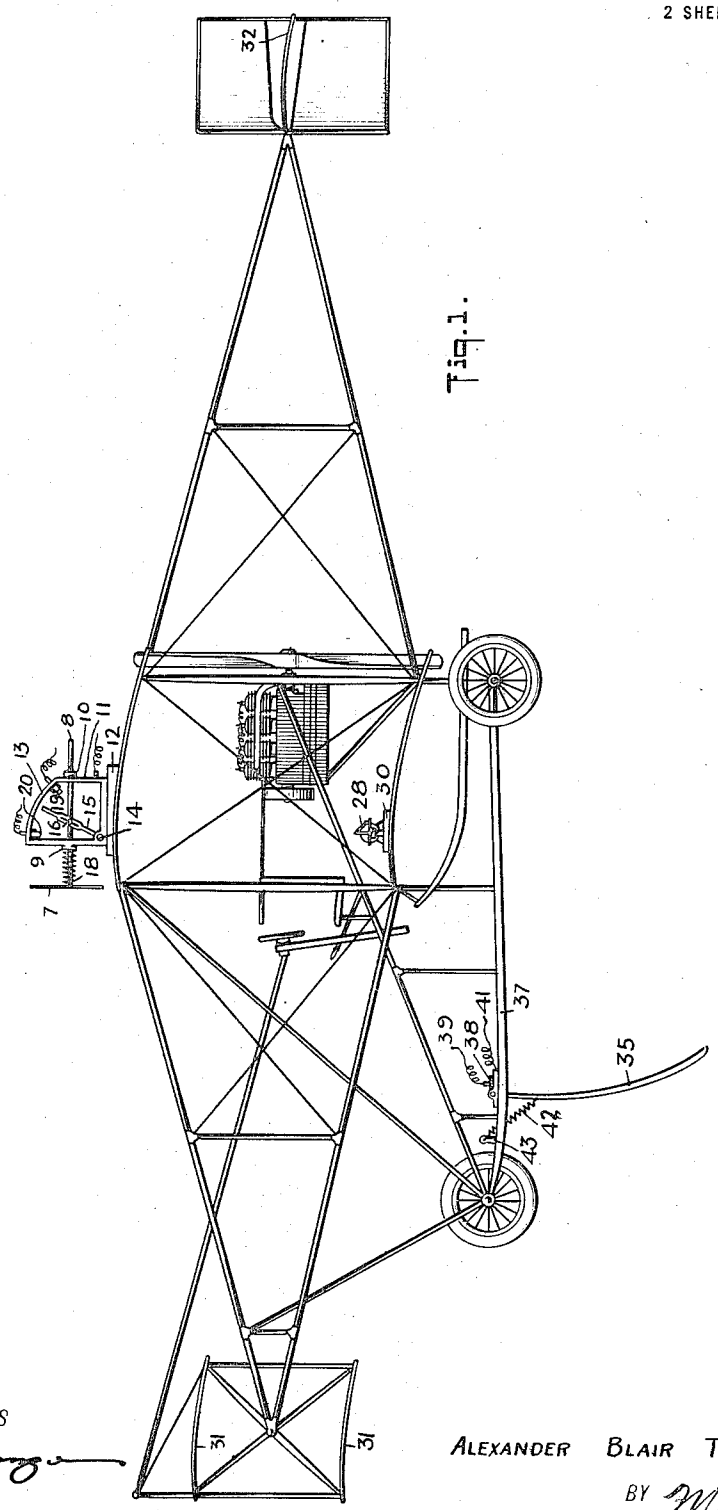



Fig. 1.

WITNESSES

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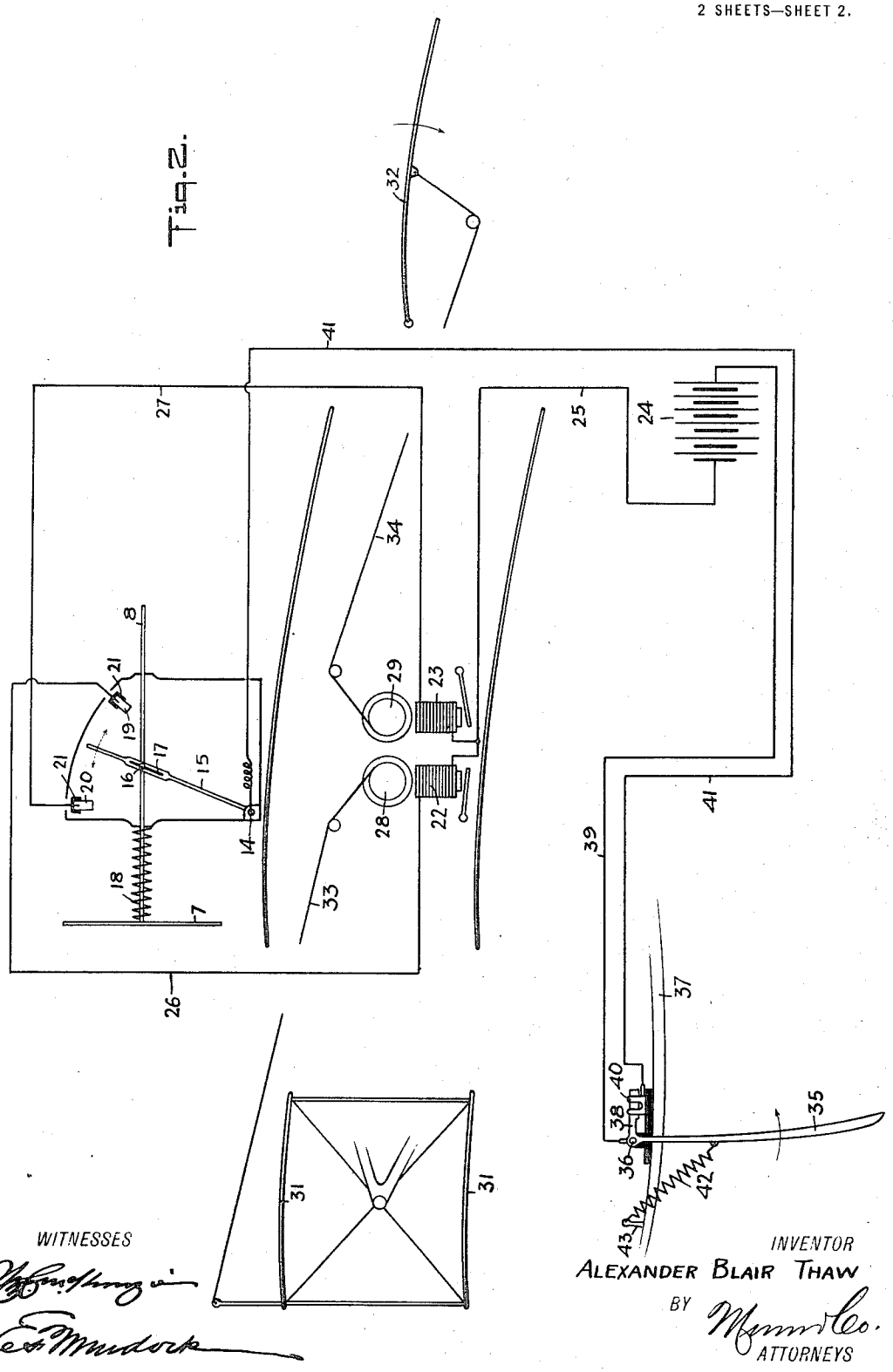
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2 SHEETS—SHEET 2.

Fig. 2.




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# UNITED STATES PATENT OFFICE.

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## SPEED-CONTROLLER FOR AEROPLANES.

1,151,419. Specification of Letters Patent. Patented Aug. 24, 1915.

Application filed January 29, 1914. Serial No. 815,207.

*To all whom it may concern:*

Be it known that I, ALEXANDER BLAIR THAW, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Speed-Controller for Aeroplanes, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide means for controlling within predetermined limits, the speed of an aeroplane; to provide automatic control; to augment or diminish the speed of an aeroplane; and to provide means for determining the action of the controller preliminary to landing.

*Drawings.*—Figure 1 is a side view of an aeroplane of conventional design having attached thereto a speed controller constructed and arranged in accordance with the present invention; Fig. 2 is a diagrammatic view, showing the arrangement and coöperative relation of the parts of the said speed controller and elements of the aeroplane directly affected thereby.

*Description.*—As seen in the accompanying drawings, a vertically disposed plane 7 is rigidly mounted upon a slender shaft 8, which slides in bearings 9 and 10 divided in a frame 11. The frame 11 is mounted on a base 12 of any suitable construction, said base being shaped to rest securely on the upper surface of one or other of the carrying planes. The apparatus is preferably mounted on the upper carrying plane of a biplane. It will be understood that the location of the apparatus is optional, the single requirement being that the plane 7 should be freely exposed to the influence of the atmosphere through which the aeroplane is traveling.

The frame 11 is hollow centered and has a curved side 13, the curvature whereof is concentric with a pin 14 which forms a pivot for the pendulously mounted blade 15. The blade 15 is loosely connected to the shaft 8 by a pin 16, which pin is fixedly mounted on the said shaft and extends through a slot 17, formed lengthwise of the blade 15. The sliding connection thus provided, permits the shaft 8 to reciprocate and rock the blade 15 on the pin 14. The rocking of the blade 15 just mentioned, is effected by the pressure of the atmosphere on the plane 7, which tends to move the shaft 8 backward from the direction of flight of the aeroplane and by the spiral spring 18 which tends to move the plane 7 and shaft 8 connected therewith in the direction of flight. The plane 7 when unrestrained is capable of moving the shaft 8 to place the free end of the blade 15 in engagement with the electrically contact plugs 19 and 20 respectively.

The plugs 19 and 20 are provided with suitable insulation 21, electrically separating the plugs from the frame 11, which as shown in the diagram, Fig. 2, constitutes a common terminal for both of the circuits, in which the plugs 19 and 20 are embodied. In the said circuits are also incorporated, magnets 22 and 23, the magnet 22 being incorporated in the circuit with the plug 19 and the magnet 23 is incorporated in the circuit with the plug 20. A battery 24 is incorporated in both of the said circuits, the return wire 25 being also common to both circuits. The circuit wires 26 and 27 are individualized and are incorporated in the circuits having the plugs 19 and 20, respectively.

The numerals 28 and 29, as best shown in Fig. 2 of the drawings, are employed to indicate winding drums of a machine 30 carried on the aeroplane for operating the levitating planes 31 and the diving planes 32 situated at the forward and rear ends, respectively, of the aeroplane. The function of the drums 28 and 29 is to deflect the planes 31 and 32 respectively, so that the front or rear end of said aeroplane is lifted, due to the operation of said drums and the connecting cables 33 and 34. Any conventional means for operating the drums 28 and 29 is employed. Whatever the driving mechanism so employed for rotating the drums 28 and 29, said mechanism is actuated by the electro-active elements such as the magnets 22 and 23, which magnets, as shown in Fig. 2 of the drawings, are disposed in circuit with the plugs 19 and 20 respectively. In performing its function, the drum 28 is rotated when the magnet 22 is energized by the blade 15 engaging the plug 19. The rotation of the drum 28 is such as will uptilt the levitating planes 31. The function of the drum 29, on the other hand, is inaugurated when the magnet 23 is energized due to the blade 15 engaging the plug 20. The operation of the drum 29, through the intermediary of the cable 34, is to incline the diving plane 32 so that the tail end of the aeroplane is lifted.

The operation of the apparatus shown is

the drawing is as follows: When the aeroplane is proceeding through the atmosphere at the predetermined rate, the air pressure on the plane 7 partly compresses the spring 18 to retract the shaft 8 and the blade 15 connected therewith. The blade 15 is thereafter held as shown in the drawings, between the plugs 19 and 20. If for any reason, such as the stalling of the engine, the speed is reduced to a point threatening the safety of the aeroplane, the pressure is removed from the plane 7 and the spring 18 is permitted to advance the plane 7 and the shaft connected therewith until the blade 15 is moved into contact with the plug 20. This establishes the electric current embodying the magnet 23, which is energized to actuate the rotation of the drum 29 and thereby depress the diving plane 32 of the aeroplane, with which the said drum is connected. The aeroplane in diving backs up its speed until the forward pressure on the plane 7 compresses the spring 18, by moving the shaft 8 and blade 15 backward, said blade becoming disengaged on the plug 20. The aeroplane is now permitted to assume a level flight, this being provided for by the operation of the stabilizing machine, disclosed in the application, to which cross reference has been herein made. If on the other hand, while in flight, or while controlling the aeroplane to dive, the acquired speed approaches the point of danger, or becomes greater than permitted by the arrangement of the plug 19, then the pressure on the plane 7 further compresses the spring 18 and forces backward the said plane together with the shaft 8 until the blade 15 engages the plug 19. In this position, the circuit embodying the magnet 22 is established, energizing the said magnet and operating the drum 28 to draw upon the cable 33. The planes 31 are upwardly inclined to cause the aeroplane to take an upward flight. The effect of the upward flight is similar to that of the ordinary vehicle climbing a hill and tends to reduce the speed. The reduction of speed reduces the pressure on the plane 7 and the spring 18 is then permitted to move the said plane forward together with the shaft 8 and the blade 15, which now rests between the plugs 19 and 20, and permits the stabilizing mechanism to reëstablish and control the horizontal flight of the aeroplane.

It will be understood that the operation of the present mechanism will be coincident with what is termed, landing. The desired slow speed of the aeroplane preliminary to landing, will have the effect that the spring 18 is permitted to move the blade 15 to engage the plug 20. The set of the plane 32 causes the aeroplane to dive and it is to overcome this effect on the approach of the aeroplane to the ground that I provide an antenna 35. This in its embodiment, as shown in the drawings, is a pending arm, pivotally mounted upon a pin 36 supported on the skid bar 37 of the aeroplane frame. The antenna 35 has an electric switch knife blade 38, forming one terminal of the branch wire 39. The opposite terminal is the blade 40 at the end of the wire 41, which is the common return wire connected to the frame 11 incorporating the blade 15.

It will be seen that when in the approach of the aeroplane to the ground, the end of the antenna 35 engages the ground, it is moved in the direction shown by the arrow connected therewith in Fig. 2 of the drawings, resulting in lifting the blade 38 from the blade 40 and thus opening both the circuits in which the magnets 22 and 23 are incorporated. This action suspends the operation of the speed controller.

To hold the antenna 35 in the lowered position, I provide a spring 42. The spring 42 is anchored to a short standard 43, the upper end whereof is above the line of the pin 36 and the point of attachment of the spring to the antenna. Therefore when the antenna is lifted to approximately the level of the bar 37, the pull of the spring 42 maintains the antenna in raised position. Thus after the antenna 35 engages the ground, the use of the speed control mechanism is discontinued. Also by the operation of the spring 42, the employment of the speed control mechanism is suspended to permit the aeroplane to get away from the ground. It is after the flight has commenced and when the normal speed has been attained that the antenna 35 is depressed below the bar 37 and the spring 42 moves it to the abandoned position shown in the drawings and engages the switch blades 38 and 40.

Claims:

1. A controller as characterized, comprising a yielding air-pressed plane; operating mechanism for the balancing members of an aeroplane; a plurality of electro-mechanical devices for selectively actuating said operating mechanism; a plurality of electric circuits, each embodying one of said devices; a plurality of electric switch members controlling said circuits, one of said switch members being connected with said yielding plane; and a controlling switch for said electro-mechanical devices embodying a movable contact member disposed to be engaged by the ground when landing said aeroplane.

2. A controller as characterized, comprising a yielding air-pressed plane; operating mechanism for the balancing members of an aeroplane; a plurality of electro-mechanical devices for selectively actuating said operating mechanism; a plurality of electric circuits, each embodying one of said devices; a plurality of electric switch members con-

trolling said circuits, one of said switch members being connected with said yielding plane; a controlling switch for all the circuits of said electro-mechanical devices; and an antenna operatively disposed in advance of an aeroplane to engage a supporting medium preliminary to making a landing thereon.

3. A controller as characterized, comprising a yielding air-pressed plane; operating mechanism for the balancing members of an aeroplane; a plurality of electro-mechanical devices for selectively actuating said operating mechanism; a plurality of electric circuits, each embodying one of said devices; a plurality of electric switch members controlling said circuits, one of said switch members being connected with said yielding plane; a controlling switch for all the circuits of said electro-mechanical devices, an antenna operatively disposed in advance of an aeroplane to engage a supporting medium preliminary to making a landing thereon; and means for holding said antenna in out of service position after being moved by contact with said supporting medium.

4. A controller as characterized, comprising a diving plane; automatic means for operating said diving plane; and means for discontinuing the operation of said automatic means, said last-mentioned means embodying a member for engaging the ground when the body of the aeroplane is approaching the same.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDER BLAIR THAW.

Witnesses:

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PHILIP D. ROLLHAUS.