W. A. HUTSON.

AERODROME.

APPLICATION FILED FEB. 21, 1911.

1,007,445.

Patented Oct. 31, 1911.

3 SHEETS—SHEET 1.

Fig. 4.

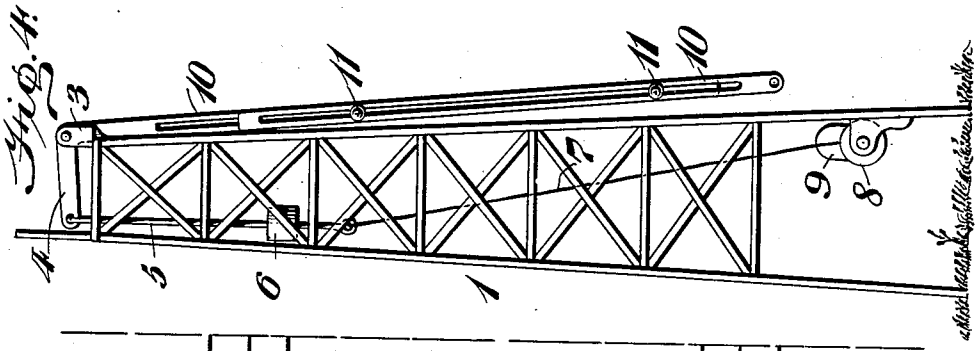
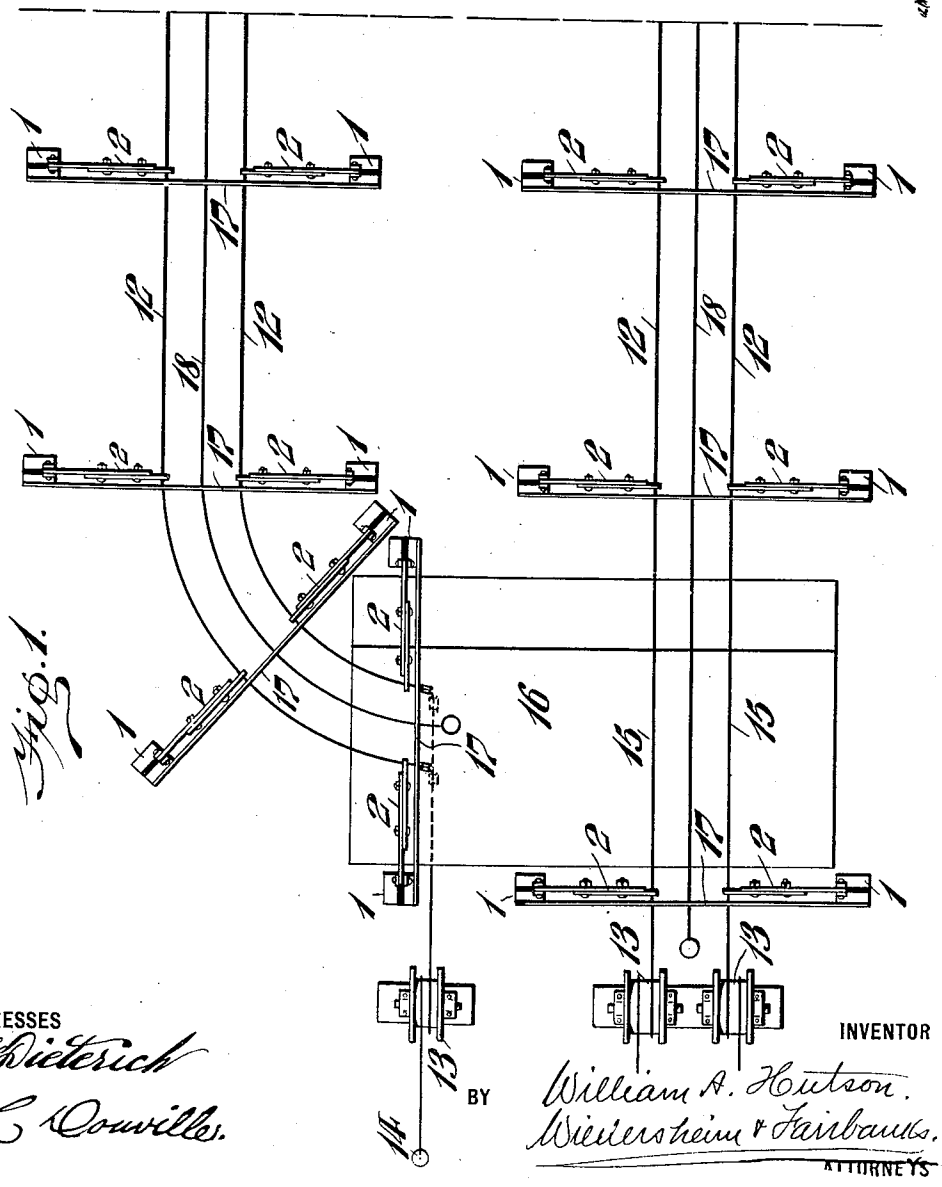


Fig. 1.



WITNESSES

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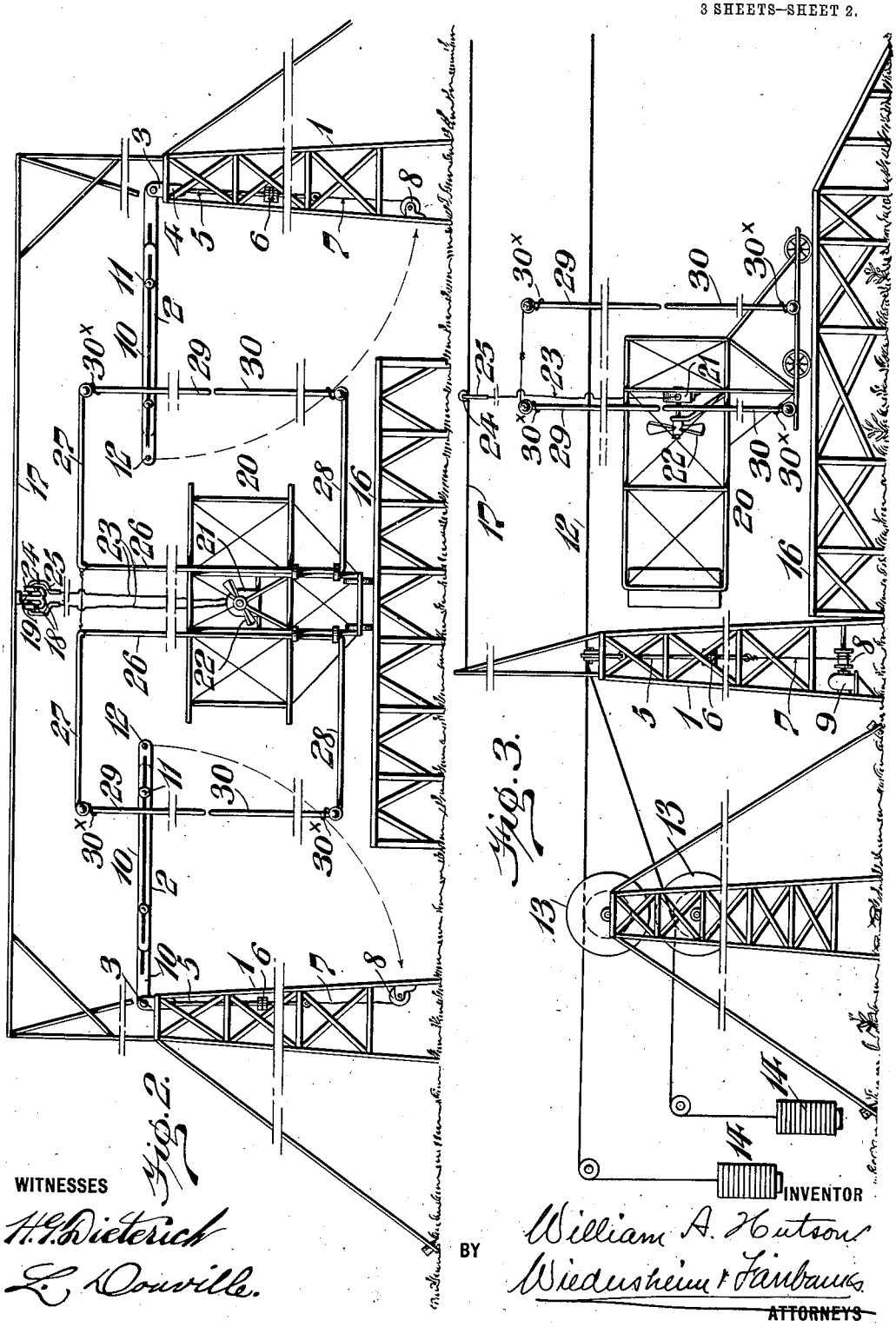

Fig. 2.

Fig. 3.

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3 SHEETS—SHEET 3.

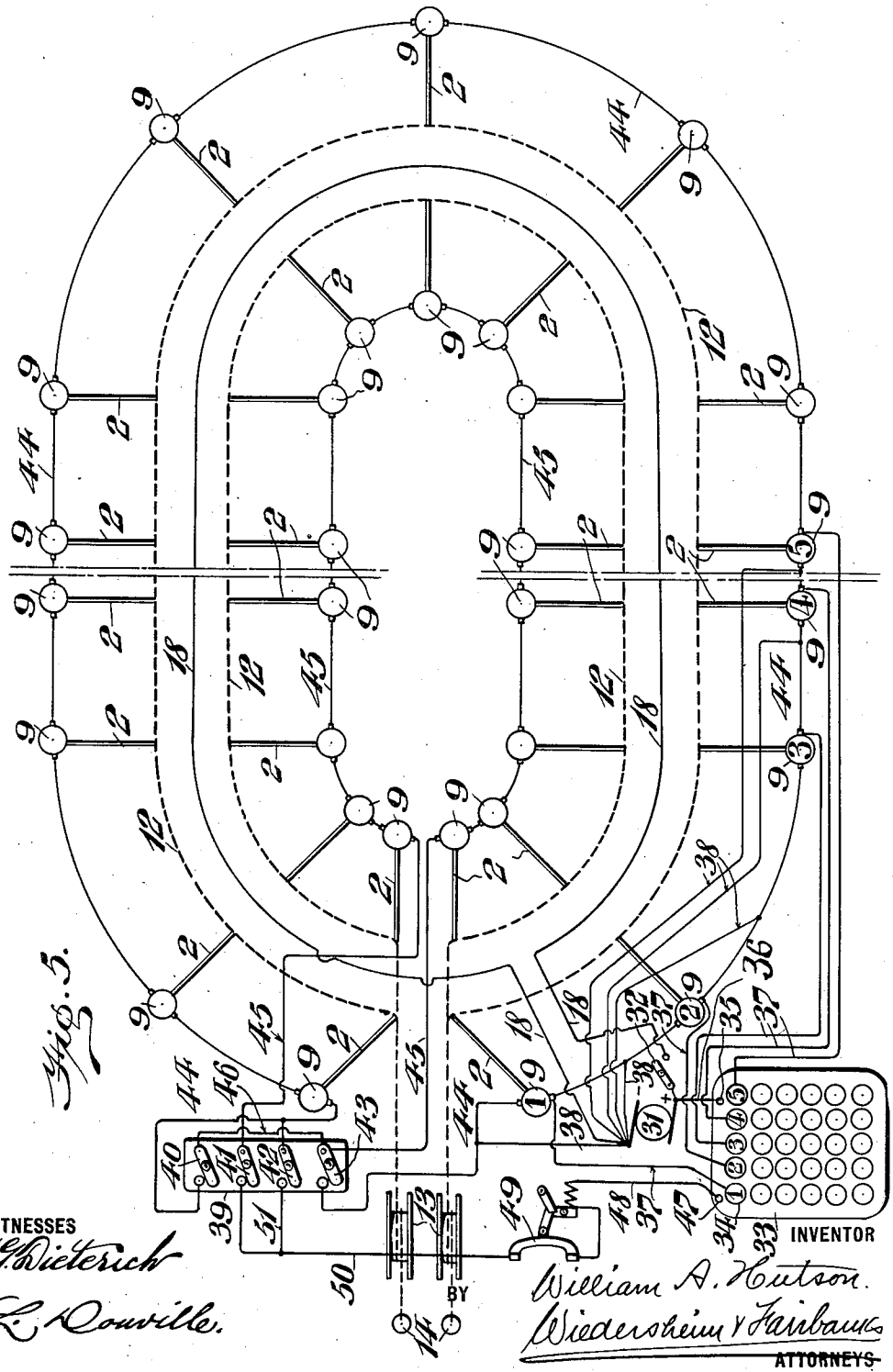

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILLIAM A. HUTSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO JAY H. KEELER, ONE-THIRTIETH TO GEORGE W. BRENN, ONE-TENTH TO JOSEPH G. GOFF, ONE-THIRTIETH TO JACOB B. GOTTLOB, AND TWO-THIRTIETHS TO CHARLES W. SHAW, ALL OF PHILADELPHIA, PENNSYLVANIA.

AERODROME.

1,007,445. Specification of Letters Patent. **Patented Oct. 31, 1911.**

Application filed February 21, 1911. Serial No. 609,987.

To all whom it may concern:

Be it known that I, WILLIAM A. HUTSON, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Aerodrome, of which the following is a specification.

My invention has for its object to provide an apparatus by means of which aerial navigation may be learned or performed by inexperienced persons without danger.

To this end, my invention consists of an aerodrome having an elevated guide-track and guide-frame upon the aeroplane encircling such track, whereby vertical and lateral movement of the aeroplane is restricted within certain limits, while at the same time the machine is entirely free in its flight.

It further consists of means whereby the elevation of such track may be controlled.

It further consists of means whereby the width of the track may be adjusted according to the width of the aeroplane.

It further consists of means whereby an aeroplane may be propelled by electricity propelled from a central source.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings, one form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a diagrammatic plan view of a portion of my improved aerodrome. Fig. 2 represents a transverse section of the track at the starting end of the same, showing an aeroplane on the starting platform. Fig. 3 represents a side elevation of the starting end of the aerodrome. Fig. 4 represents a side elevation of a mast and swinging arm which supports the track-cable. Fig. 5 represents a diagram illustrating the wiring for the electric motors operating the track-supporting arms and for supplying current to propel the aeroplane.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings: The aerodrome is preferably laid out in the form of an ellipse or on an oblong plan having curved ends and straight sides. Girder or lattice masts or towers, 1, are arranged in opposed pairs on the plan of the aerodrome. Bars, 2, are pivoted between ears, 3, upon the upper ends of the masts, and have arms, 4, projecting at a right angle from their inner ends. Rods, 5, having weights, 6, secured upon them are pivotally connected to the ends of said arms, and cords or chains, 7, are attached to the ends of the rods and connected to drums, 8, journaled in the masts and actuated by electric motors, 9, which are controlled to cause the drums to revolve in either direction and to be held by suitable brake means all controlled by suitable controllers or switches at a central station or switch-board to be later described. The bars are preferably longitudinally adjustable, being composed of two longitudinally slotted bar-portions, 10, adjustably secured together by nutted bolts, 11. Cables, 12, are supported at the free ends of the pivoted bars, and are carried around the aerodrome parallel to each other. The ends of said cables are preferably carried around drums, 13, and have weights, 14, at their ends, which weights serve to keep the cables taut. It will thus be seen that two parallel guide-tracks are formed around the aerodrome. The parallel guide-tracks have at the starting point straight portions, 15, which are continued into the straight or substantially straight side portions of the main guide tracks. A platform, 16, is provided beneath the starting tracks, and extends to beneath a portion of the curved tracks upon which the aeroplane returns to its starting place. The

ends of the cables are carried downward and then out to the tension drums and weights, whereby a gap in the tracks is formed between the portions where the aeroplane stops and the straight starting portions. The tops of the masts are connected by means of bars, 17, which support trolley-wires, 18, beneath them, by suitable hangers, 19.

The aeroplane, 20, may be of any construction and type, but when it is used in connection with my aerodrome and for amusement purposes or in teaching beginners, I prefer to substitute an electric motor, 21, for driving the propeller, 22, for the usual internal combustion engine. Wires, 23, or other suitable flexible conductors are connected to the motor and to trolley-wheels, 24, journaled in a suitable frame, 25, to travel upon the trolley-wires.

Two pairs of upright bars, 26, are secured to each side of the frame of the aeroplane and suitably braced together, and lateral frame-bars, 27 and 28, are respectively secured to the upper and lower ends of said upright bars and are suitably braced to rigidly project from opposite sides of the aeroplane. Bars, 29 and 30, are pivoted to the ends of the horizontal frame bars and have their ends meet at or about the middles of the vertical side-frames formed by the above-described bars. Springs, 30^x, are provided at the pivoted ends of the bars and serve to return them to their normal vertical position. The pivoted bars swing in planes parallel to the frame of the aeroplane and to that of its travel, only, and are rigid to lateral play. The trolley-wire is fed from a generator, 31, and a switch, 32, is provided in one terminal of the trolley-circuit to control the same.

To control the motors which swing the pivoted track-supporting arms, a switch-board, 33, is provided, having controllers, 34, similar to the controllers of an electric car or other motor, and connected to control the revolution of each motor and the stopping of the drum. The switch-board is connected at 35 and by a wire, 36, to one pole of the generator, and wires, 37, lead to one pole of each motor in each mast from each controller. Wires, 38, lead from the opposite pole of each motor to the opposite pole of the generator, so that the circuit of each motor may be individually closed to run the motor by the insertion of its corresponding controller. Five individual motor circuits, only, are illustrated in the diagram, Fig. 5, for the sake of clearness and to not encumber the drawing, but it is to be understood that each motor has its individually controlled circuit. A switch-board, 39, has four switches, 40, 41, 42 and 43. The motors of the outer series of masts are all connected in series by a wire, 44, and the motors of the inner series of masts are all connected in series by a wire, 45. One terminal of switch 40 is connected to one terminal of switch 43 by means of a wire, 46, and one terminal of the outer circuit 44 is connected to the opposite terminal of switch 40 and to the arm of switch 42. A socket, 47, or similar provision is provided on the switch-board 33, and may be connected by a cord or other connecting means to a socket at the point 35 where connection is made to one pole of the generator. Connection from socket 47 is made through a wire, 48, circuit breaker, 49, and wire, 50, to the contact of switch 41, and by a wire, 51, from the wire 50 to the contact of switch 42.

When it is desired to actuate all of the motors of the outer series of masts, connection is made with the pole of the generator from point 35 to point 47, which carries the current through wire 48, circuit-breaker 49, wires 50 and 51, switch 42, which is closed, to wire 44, around the series of motors, and back to the opposite pole of the generator through wire 38.

When it is desired to actuate all of the motors of the inner series of masts, connection is also made between points 35 and 47, to connect with one pole of the generator, whereupon the current passes through wire 48, circuit-breaker 49, wire 50, through switch 41, which is closed, around through wire 45 to all of the motors, and back through switch 43, which is closed, to the opposite pole of the generator.

When it is desired to operate both series of motors, switches 41 and 42 are closed, and connection is made from point 35 to point 47, when the current will pass through wire 48, circuit-breaker 49, wires 50 and 51, through switches 41 and 42 to the respective circuits 45 and 44, the former passing though switch 43, which is closed, and back to the generator, and the latter passing back through wire 38.

In this manner the motor of each mast may be individually controlled to actuate the pivoted lateral bar upon it, and either series of motors may be actuated, or both series may be simultaneously actuated.

In practice, the aeroplane is started from the starting platform, the lateral frames of the aeroplane having been placed over the two cables by swinging the pivoted outer bars to admit of such movement. When the aeroplane now moves forward under its starting impetus and the action of its propeller, the cables will prevent the aeroplane from unduly diverging from its course and, should it for some reason tend to drop, the upper lateral frame-bars 27 will catch on the cables and prevent the aeroplane from dropping to the ground. By means of the control of the laterally extending bars which

support the cables, an operator stationed by the switch-boards may lower or raise the bars and the tracks so as to accommodate the latter to the altitude or level in which the aeroplane flies. The pivoted vertical bars are sufficiently light and are freely pivoted, so that in the flight of the aeroplane such bars may swing on striking the cable-supporting arms without materially impeding the speed of the machine and immediately swing back to their normal positions. When the aeroplane arrives at the end of the tracks and above the platform, it is stopped and the swinging guide-bars admit of the aeroplane being removed from the tracks and pushed over and engaged by the tracks or cables of the straight starting portion of the aerodrome, when the machine may again be started for another flight.

This apparatus may be employed as an amusement device, carrying one or more passengers around the aerodrome without risk of injury by a fall of the machine, or the apparatus may be used as a teaching apparatus of flying without danger to the pupil. While I prefer, at the beginning of teaching pupils or when the apparatus is used as an amusement device, to utilize electric propulsion for the aeroplane, it is evident that an aeroplane propelled by the force of an internal combustion machine, such as ordinarily used, may be equally as well fitted to fly on this aerodrome. By employing electricity as the propelling power, I can considerably lighten the aeroplane, by dispensing with the engine, gasolene and water tank, thus admitting of the machine carrying the additional weight of the guide-frames. Besides its use as an amusement device and as an apparatus for teaching aeronautics, the device is useful for trying out new constructions of flying machines, without risk to life and limbs, as the guide-frames may be applied to any construction of flying machine. As the lateral bars which support the tracks are longitudinally adjustable, the tracks may be adjusted at varying distances apart, to accommodate aeroplanes having different widths of frame. It will, of course, be understood that the guide-tracks are not intended for normally supporting the aeroplane when in flight, but to merely prevent it from diverging from its normal path, laterally and vertically, and that the aeroplane is self-supporting.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In apparatus of the character stated, an elevated guide track, an aeroplane, means for propelling the same, and a vertical guide on the side of said aeroplane, normally out of contact with said track but constructed to engage the same to limit the lateral movement of the aeroplane.

2. In apparatus of the character stated, a pair of elevated guide tracks, an aeroplane, means for propelling the same, and vertical guides on the sides of said aeroplane normally out of contact with said track but constructed to engage the same to limit the lateral movement of the aeroplane.

3. In apparatus of the character stated, an elevated guide-track, an aeroplane, means for propelling the same, and a guide upon the aeroplane and having a horizontal and a vertical guide-limb respectively extending above and to the outer side of said guide-track.

4. In apparatus of the character stated, an elevated guide-track, an aeroplane, means for propelling the same, and a rectangular guide-frame extending laterally from the aeroplane to surround the guide-track.

5. In apparatus of the character stated, a pair of elevated guide-tracks, an aeroplane, means for propelling the same, and rectangular guide-frames projecting from opposite sides of the aeroplane and surrounding the guide-tracks but normally out of contact with the same.

6. In apparatus of the character stated, a series of masts, lateral bars upon such masts, a guide-track supported upon said bars, an aeroplane, means for propelling the same, and a guide upon said aeroplane constructed with a horizontal limb above the guide-track and a vertical limb at the side of said track and pivoted to yield to the lateral bars in a plane parallel to that of the travel of the aeroplane.

7. In apparatus of the character stated, a series of masts, lateral bars pivotally supported upon such masts, means for swinging such bars in a vertical plane, a guide-track supported upon said bars, an aeroplane, means for propelling the same, and a guide upon said aeroplane constructed with a horizontal limb above the guide-track and a vertical limb at the side of said track and pivoted to yield to the lateral bars in a plane parallel to that of the travel of the aeroplane.

8. In apparatus of the character stated, a series of masts, lateral bars upon such masts, a guide-track supported upon said bars, an aeroplane, means for propelling the same, and a rectangular guide-frame upon the aeroplane and surrounding the track and having one vertical side-bar pivoted to yield to the lateral bars in a plane parallel to that of the travel of the aeroplane.

9. In apparatus of the character stated, two parallel series of masts, lateral bars pivotally supported upon said masts to project into the space between the series of masts, means for swinging said bars in a vertical

plane, a guide-track supported in said bars, an aeroplane, means for propelling the same, and guide-frames on opposite sides of the aeroplane to surround said guide-rails and having side-members pivoted to swing in planes parallel to the travel of the aeroplane to yield to the lateral bars as they pass them.

10. In apparatus of the character stated, a series of masts, lateral bars pivotally supported upon such masts, means for swinging such bars in a vertical plane, individual means for separately controlling each of such bar-swinging means, a guide-track supported upon said bars, an aeroplane, means for propelling the same, and a guide-frame upon the aeroplane and surrounding the track and having a vertical side-member pivoted to yield to the lateral bars in a plane parallel to the travel of the aeroplane.

11. In apparatus of the character stated, two parallel series of masts, lateral bars pivotally supported upon such masts to swing in vertical planes transverse to and in the space between said series of masts, means for swinging such bars, individual means for separately controlling each of such bar-swinging means, guide-tracks supported by the bars, an aeroplane, means for propelling the same, and guide-frames upon opposite sides of the aeroplane and surrounding the tracks, and each having a vertical side-member pivoted to yield to the lateral bars in a plane parallel to the travel of the aeroplane.

12. In apparatus of the character stated, two parallel series of masts, lateral bars supported upon said masts to project transversely to and in the space between said series of masts, guide-tracks supported by said bars, an aeroplane, means for propelling the same, and rectangular frames secured to the sides of said aeroplane and each having its outer side composed of two bars meeting at their ends and hinged respectively at the upper and lower end to swing in a plane parallel with the travel of the aeroplane and providing with means for returning them to normal position.

13. In apparatus of the character stated, an elevated guide-track, an aeroplane, a guide-frame upon the same and extending around the track, a propeller upon the aeroplane, a motor for driving the same, a trolley wire parallel to the track, a generator for feeding such wire, and a trolley upon the wire and flexibly connected to the motor.

14. In apparatus of the character stated, a series of masts, lateral bars pivotally supported upon the same, means for swinging such bars in a vertical plane, a guide-track supported in said bars, an aeroplane, means for propelling the same, a guide-frame extending around such track and secured to the aeroplane, means for individually controlling the bar swinging means, and means for simultaneously actuating such means.

15. In apparatus of the character described, two parallel series of masts, lateral bars pivotally supported upon such masts to swing in vertical planes transverse to and in the space between said masts, means for swinging such bars, guide-tracks supported upon said bars, an aeroplane, guide-frames upon the same and extending around said tracks, means for individually actuating the bar-swinging means, means for simultaneously actuating each series of bar-swinging means, and means for simultaneously actuating both series of bar-swinging means.

16. In apparatus of the character stated, an elevated guide track, an aeroplane having means for propelling and steering the same, and means upon said aeroplane constructed to extend around said guide track to engage the same within vertical and lateral limits.

17. In apparatus of the character stated, an elevated guide-track, an aeroplane having means for propelling and steering the same, and means upon said aeroplane constructed to extend around said guide track to be normally out of contact with and to engage the same within vertical and lateral limits.

18. In apparatus of the character stated, a flexible guide-track, supporting means for the same, and positively actuated means for adjusting the position of such supporting means.

19. In apparatus of the character stated, a flexible guide-track, means for supporting said track, and positively actuated means for vertically and laterally adjusting said track.

20. In apparatus of the character stated, a flexible guide-track, bars supporting said track, and positively actuated means for vertically and laterally moving and adjusting said bars.

21. In apparatus of the character stated, an elevated guide-track, an aeroplane, having means for propelling and steering the same, and a guide-frame upon said aeroplane extending around said track and normally out of contact with the same.

22. In apparatus of the character stated, a pair of elevated guide-tracks, an aeroplane having means for propelling and steering it, and guide-frames upon said aeroplane and extending around such guide-tracks but normally out of contact with the same.

23. In apparatus of the character stated, a pair of elevated guide-tracks, an aeroplane having means for propelling and steering it, means for vertically and laterally adjusting the tracks, and guide-frames upon said aeroplane and extending around said tracks but normally out of contact with the same.

24. In apparatus of the character stated, a flexible guide-track, supporting means for

the same, means for adjusting the position of such supporting means, an aeroplane having means for propelling and steering it, and means upon said aeroplane constructed to engage said guide-track within vertical and lateral limits.

25. In apparatus of the character stated, a flexible guide-track, supporting means for the same, and means for individually or collectively actuating such supporting means.

26. In apparatus of the character stated, a flexible guide-track, movable supporting means for the same, means for actuating such supporting means, and centrally located means for individually or collectively operating such actuating means.

27. In apparatus of the character stated, a flexible guide-track, means for supporting the same, means for actuating such supporting means to vertically and laterally adjust the track, and centrally located means for individually or collectively operating such actuating means.

28. In apparatus of the character stated, a flexible guide-track, means for supporting the same, electric motors for moving and adjusting such supporting means, and a centrally located switch-board controlling said motors individually or collectively.

29. In apparatus of the character stated, a flexible guide-track, means for supporting the same, motors connected to move and adjust such supporting means, and centrally located controlling means for such motors.

30. In apparatus of the character stated, an elevated flexible guide-track, means for adjusting the elevation of the same, an aeroplane having means for propelling and steering the same, and means upon said aeroplane constructed to engage said guide-track within vertical and lateral limits.

31. In apparatus of the character stated, a series of masts, bars pivoted upon such masts to swing in a vertical plane, means for swinging such bars, a flexible guide-track supported upon said bars, an aeroplane having means for propelling and steering it, and means upon said aeroplane constructed to engage the guide-track within vertical and lateral limits.

32. In apparatus of the character stated, a series of masts, bars pivoted upon such masts to swing in a vertical plane, means for swinging such bars, a flexible guide-track supported upon said bars, an aeroplane having means for propelling and steering it, and means upon said aeroplane constructed to be normally free from and to engage said track within vertical and lateral limits.

33. In apparatus of the character stated, two elevated guide-tracks, an aeroplane having means for propelling and steering it, and means upon opposite sides of said aeroplane and constructed to extend around and to be normally free from said tracks and to engage the same when the aeroplane diverges within predetermined vertical and lateral limits from its normal path.

34. In apparatus of the character stated, two parallel elevated and flexible guide-tracks, means for adjustably supporting the same, and centrally located means for controlling such supporting means individually or collectively.

35. In apparatus of the character stated, two parallel elevated and flexible guide-tracks, means for adjustably supporting the same, motors connected to actuate such adjustable supporting means, and centrally located controlling means connected to such motors to operate the same individually or collectively.

36. In apparatus of the character stated, two parallel elevated and flexible guide-tracks, means for adjusting the elevation of said tracks, an aeroplane having means for propelling and steering it, and means upon opposite sides of said aeroplane and constructed to be normally out of contact with said guide-tracks and to engage said tracks when the aeroplane diverges within predetermined vertical and lateral limits from its normal path.

37. In apparatus of the character stated, two parallel elevated guide-tracks, an aeroplane having means for propelling and steering it, and guides upon opposite sides of said aeroplane and constructed to extend around said guide-tracks to be normally out of contact with the same and to engage them when the aeroplane diverges within predetermined limits from its normal path.

38. In apparatus of the character stated, a guide-track, a trolley wire parallel with the same, a generator feeding such wire, an aeroplane, a motor upon the same, a propeller driven by said motor, a trolley upon said trolley wire and connected to said motor, and a guide upon the aeroplane and extending around said guide-track to be normally out of contact with the same and to engage it when the aeroplane diverges from its normal path.

39. In apparatus of the character stated, two parallel guide-tracks, a trolley-wire between and parallel to the same, a generator feeding such trolley wire, an aeroplane, a motor upon the same, a propeller driven by said motor, a trolley upon the trolley-wire and connected to said motor, and guides upon opposite sides of said aeroplane and spanning said guide-tracks to be normally out of contact with the same and to engage them when the aeroplane diverges within predetermined limits from its path.

40. In apparatus of the character stated, an elevated guide-track, means for adjusting the elevation of said track, a trolley-wire

parallel to said track, a generator feeding said trolley-wire, an aeroplane, a motor upon the same, a propeller driven by said motor, a trolley upon the trolley-wire, expansible and contractible flexible connection between said trolley and the motor, and a guide spanning the guide-track to be normally out of contact with the same and to engage it when the aeroplane diverges within predetermined limits from its path.

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Witnesses:
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N. BUSSINGER.