M. B. SELLERS.

FLYING MACHINE.

APPLICATION FILED JAN. 31, 1908.

927,289. **Patented July 6, 1909.**

4 SHEETS—SHEET 1.

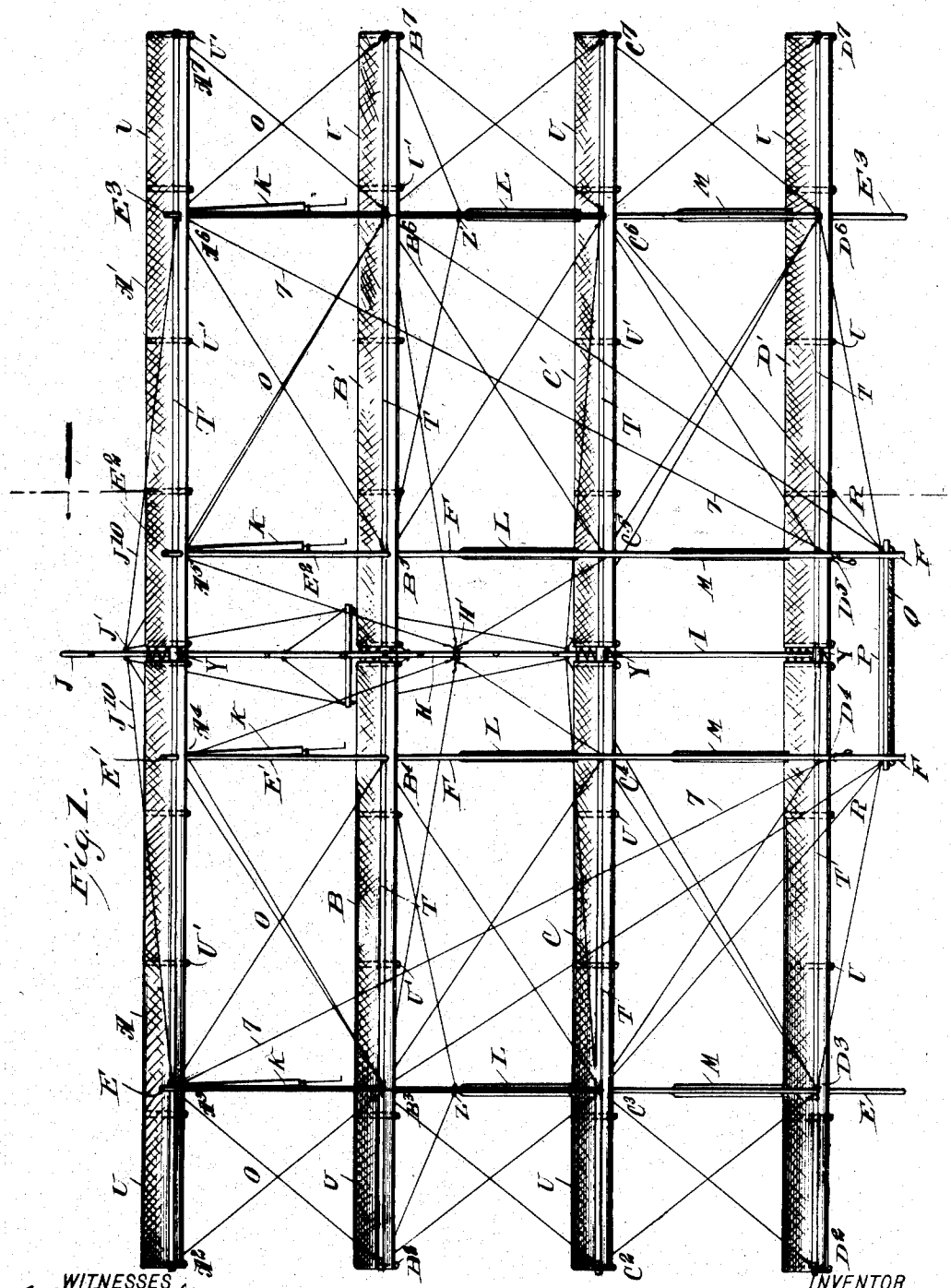

Fig. 1.

WITNESSES

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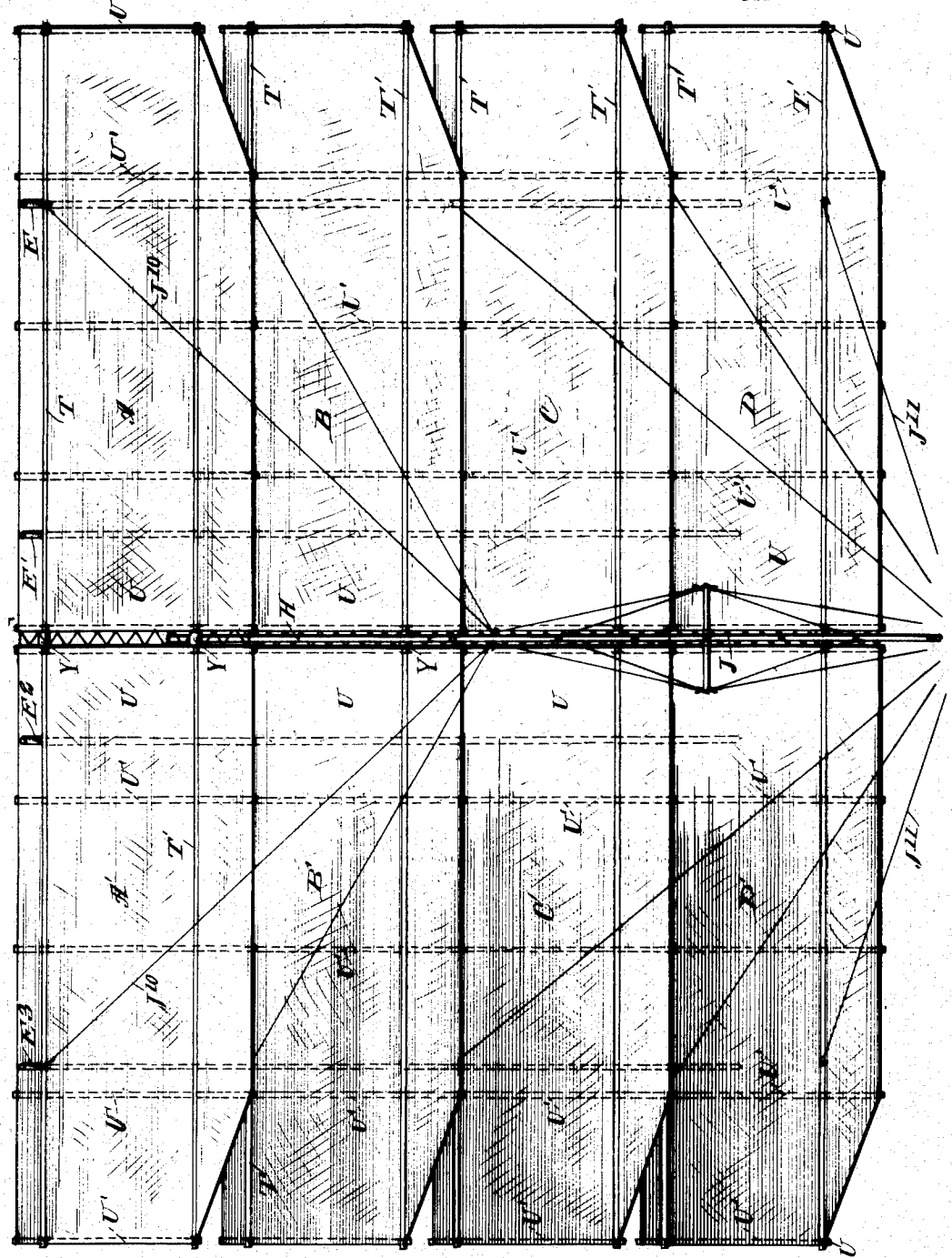

Fig. 2.

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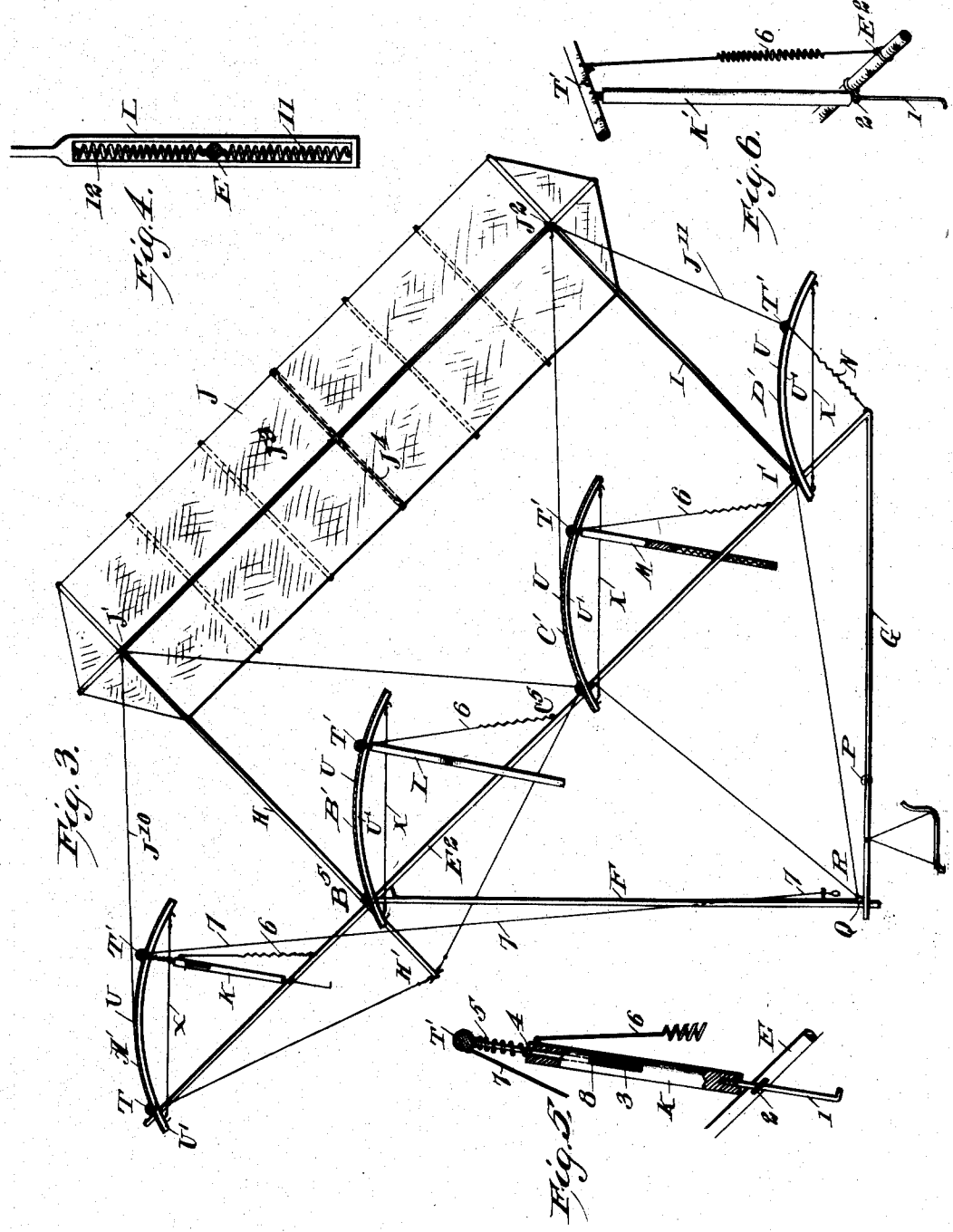

Fig. 3.

Fig. 4.

Fig. 6.

Fig. 5.

WITNESSES

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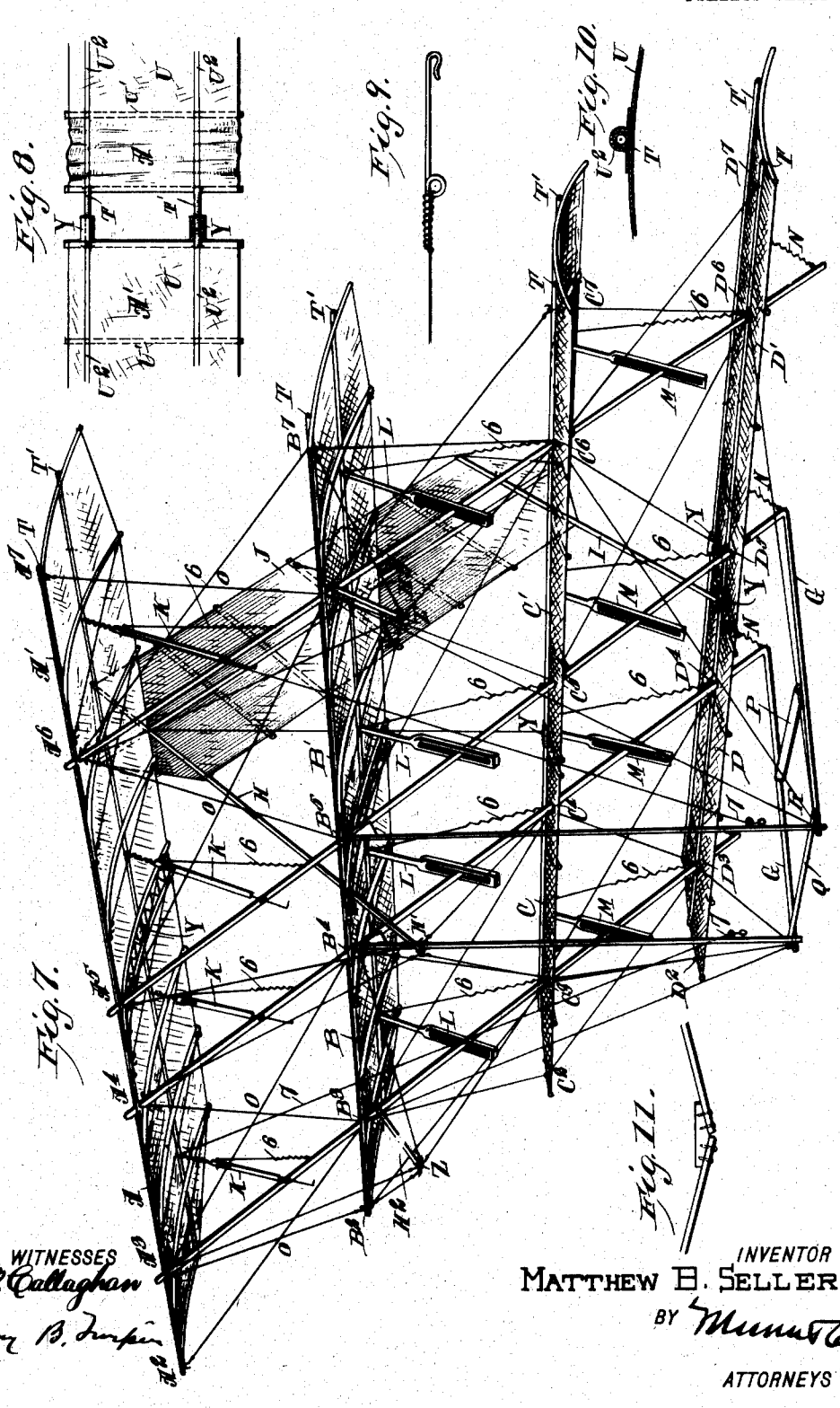

WITNESSES

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UNITED STATES PATENT OFFICE.

MATTHEW B. SELLERS, OF BALTIMORE, MARYLAND.

FLYING-MACHINE.

No. 927,289. Specification of Letters Patent. Patented July 6, 1909.

Application filed January 31, 1908. Serial No. 413,511.

To all whom it may concern:

Be it known that I, MATTHEW B. SELLERS, a citizen of the United States, and a resident of the city of Baltimore and State of Maryland, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention is an improvement in flying machines and consists in certain novel arrangements and combinations of parts as will be hereinafter described and claimed.

In the drawings, Figure 1 is a front elevation of my invention when used as a gliding machine. Fig. 2 is a plan view thereof. Fig. 3 is a sectional side elevation. Figs. 4, 5 and 6 show the devices by which I secure a regulation or control of the machine. Fig. 7 is a perspective view (seen from front and side) of the machine. Fig. 8 is a detail view illustrating the means connecting the spars and for securing the cover of the wing. Fig. 9 shows the coupling bar used to connect the wires. Fig. 10 is a detail sectional view of the casing. Fig. 11 is a detail view of the knee block used to connect the spars when the wings are placed at a dihedral angle.

My invention relates to that class of flying machines in which the weight is supported by the air impinging on one or more surfaces, inclined at a small angle of incident and in motion relative to the air, whether this motion is produced by the movement of the air, or by gravity, or by a propelling mechanism. When the motion is produced by gravity, the machine is known as a gliding machine; and I illustrate and describe my invention in that form, (because the simplest); but I do not confine myself to its use in that manner; as it is equally suitable as a power driven machine.

The object of this invention is to produce a better arrangement of surfaces and framing; better stability, and control. In this invention I arrange the surfaces in steps, the highest surface being in front. This arrangement of the surfaces gives greater efficiency than any other, but it is difficult to devise a frame for this particular grouping of surfaces, which shall be light, sufficiently strong and rigid; and have small wind resistance. My invention accomplishes this; and also offers facility for the application of the regulating device to be described.

When a sudden gust strikes a compound aeroplane or when its speed is accelerated, it tends to tip up in front; and this tendency can be overcome by moving the center of gravity forward; or by diminishing the angle of incident of the planes, and especially the forward plane or planes. Now my method of increasing stability is to construct the planes or wings so they are held in their normal position till the pressure on them exceeds a predetermined amount, when they tip up. Their action being independent; any one wing which receives an excess of pressure will tip up; and where there is no excess of pressure there will be no change. Furthermore, when desired the operator may depress the rear of a wing by pulling on a cord or by some other well known device.

In the form of the device here shown are four aeroplanes A, A′, B, B′, C, C′, D, D′, each consisting of two so-called wings A and A′ joined at the center by suitable couplings. Each wing A, Fig. 8, is arched from front to rear and comprises two spars T and T′, and a covering U having transverse ribs U′ fastened thereto, the covering having pockets U^2 into which the spars are slid in erecting the wing as here shown. The ribs are held in a bowed form by the span wires X, this wing construction being claimed in my Patent No. 886,159, issued April 28, 1908, on an application No. 385,323, filed July 24, 1907. These four wings are supported by four transverse inclined struts E, E′, E^2, E^3 which are suitably fastened to the front ribs T of the respective wings where they cross said ribs. The rear spars T′, form no part of the framework but are free except as supported by the devices K, L, M, N, hereafter described. The frame formed by the spars T and struts E etc. is braced by the diagonal tie wires O, O, etc., and is supported in an inclined position by the posts F, F, and the base rails G, G, connected at their front end by the bar Q. Stay wires R, R, connect the juncture of parts Q and G with the six lower spars T at points near the crossing of the struts E, E′, etc. The post H fastened to the spar B, B, at H′ and the post I fastened at I′, carry the spine J^3 at the points J′ and J^2 and support the covering J^3 forming a fin J. This fin is not absolutely necessary for all operations of the machine and I do not confine myself to this form but I find it very convenient with a gliding machine as it is not in the way, prevents sheering, and makes the machine face the relative wind. Stay wires run from the point J′ to points E, E^3, B^3, and B^6 and from J^2 to C^3, C^6 and D^3, D^6. From the point H′

on the post H wires run to points A^4, A^5, B^3, B^6, C^4 and C^5. The posts at the crossings B^3 and B^6 have stay wires running from their ends to B^2, B^4, A^3, C^3 and B^5, B^7, A^6, C^6, respectively. These connections are shown in Fig. 1 of the drawings. In fastening the various wires to their staples the hooked coupling rod, shown in Fig. 9, is used, this rod is described and claimed in my Patent No. 886,159, issued April 28, 1908, on an application No. 385,323 filed July 24, 1907, and before referred to. In this construction of coupling rod, it will be noticed the coupling rod is bent between its ends forming an eye and having a shank beyond on the said eye, and a line wire is extended around the shank and through the eye and around the same and then wound around the shank toward the extremity thereof and twisted at the said extremity of the shank around the line wire and thence twisted back around the shank and wire and passed through the loop or eye and around the same as more fully illustrated and described in my patent above referred to.

I have here shown a machine with four surfaces. I do not, however, limit myself to that number as it is evident a greater or less number can be used. In the power driven machine a movable rudder of any suitable well known design may be added. Figs. 4, 5, and 6 show different forms of the regulating device. That shown in Fig. 5 is preferably used on the upper wings (this figure showing it as seen from the side of the machine and as shown also at K, in Fig. 3). A guide bar 1 projecting down from the lower end of the rod K slides freely in the loops 2 on the strut E. The upper end of the rod K has a concentric bore, and a slot at 3 intersecting said bore, and the rod 4 slides at the lower end freely in the bore; but its motion is limited by the lateral bend 8 at its lower end. The upper end of rod 4 is suitably fastened to the spar T′ and it is forced out to its limit and held there by the spring 5. The spring 6 extending from the upper end of the rod K, to the strut E resists the lift of the wing and holds the rod K down against the loop 2. When, however, the pressure on the wing exceeds the tension at which the spring is adjusted, the spring yields and the wing is allowed to tip up thus diminishing the angle of incident automatically. Furthermore, a cord 7 (see Fig. 3) is attached to the spar T, and is led in any suitable manner to a point convenient to the operator and attached to any suitable lever or handle; in the drawing it is shown attached to a ring; it must however, be slack. When the operator desires he may depress the wing or portion thereof by pulling on this cord. It will be seen that here the automatic and the voluntary regulation are independent (or rather do not interfere with each other). Fig. 6 shows the same device as Fig. 5 except that the "voluntary regulation" is omitted and the spring 6 is attached directly to the spar T′.

Fig. 4 shows another form of the regulating device used on this machine. The fork L straddles the strut E and is fastened at its upper end to the spar T′. The springs 11 and 12 hold the fork and the wing in the desired position and the auxiliary spring 6, Fig. 3, together with the spring 12 resists the lift of the wing. This device, while accomplishing the same result as the one before described, does it in a different manner; and it is used on this machine, and is here described, because it has been found peculiarly applicable to the lower wings; while the other device was found more suitable for the upper wings.

Owing to want of room in this machine the lowest aeroplane is supported by the stays from the point J^2 to the point I, etc. and the springs N balance the lift of the wing D the action being the same as before described.

It will be seen that as the curvature of the wing is maintained by the span wires X; this yielding or tipping does not change the curvature but only the angle at which the wind strikes the wing, and in this sense the wing may be said to be practically rigid. The automatic regulation may be applied to any, or all of the wings as desired; also the voluntary regulation; and where the regulating device is not used, the wing is supported by a post or stay.

In using the machine as a glider, the operator stands between the rails G, grasping the posts F, and supporting the rear of the machine by the padded bar P which rests on the small of his back. When the proper velocity is acquired, the operator's weight is supported by the bars G resting under the arms. A swinging seat may be used when desired, as shown in Fig. 3.

In the device here shown the wings are arched. I may however employ plane surfaces in the application or embodiment of my invention.

I claim—

1. An apparatus substantially as herein described, comprising a series of superposed aeroplanes arranged in step form with the several surfaces each in advance of the next lower one, a series of transversely inclined struts connected to the front portions of the respective wings, rearwardly extending posts, a spine carried by said posts, a fin supported by said spine, stay wires between the rearwardly projecting posts and the inclined struts, and yielding supports for the rear edges of the several wings whereby to secure an automatic regulation thereof, and means coöperating with said yielding supports

whereby to secure a controlled regulation of the rear edges of the wings, all substantially as and for the purpose set forth.

2. An apparatus substantially as described, comprising a plurality of superposed aeroplanes arranged in step form advancing successively from the lower to the upper aeroplane and an inclined truss supporting said aeroplanes and consisting of inclined transverse struts connected to the front edges of the said aeroplanes, and means staying the said inclined struts, and yielding supports for the rear portions of said aeroplanes whereby the latter may be tilted upwardly at their rear edges under abnormal pressure.

3. An apparatus substantially as described, comprising a plurality of superposed aeroplanes arranged in step form and advancing successively from the lower to the upper aeroplane, and inclined transverse struts extending across the front edges of the aeroplanes secured thereto, and suitably stayed.

4. An apparatus of the aeroplane type, comprising a series of practically rigid wings arranged in stepped form and advancing successively from the lower to the upper one, yielding devices independent of said wings and permitting the rear edges thereof to automatically tilt up, and means for positively depressing such rear portions of the wings.

5. In an apparatus substantially as described, the combination with an aeroplane yieldingly supported at its rear edge, of a spring for holding said edge from downward movement under normal pressure, a spring for permitting said edge to yield upwardly under abnormal pressure and means for positively depressing such edge of the plane substantially as set forth.

6. The combination with an aeroplane adapted to yield upwardly at its rear edge and the frame of a support between said yielding rear edge and the frame, comprising a rod and a bar movable relatively to each other, a spring normally extending said parts, and means for depressing the rear edge of the aeroplane in opposition to said spring substantially as set forth.

7. The combination with an aeroplane and a frame bar of a yielding support between said frame bar and plane and comprising a rod or bar extending in both directions beyond the frame bar, and springs on opposite sides of the frame bar and actuating the yielding support.

8. The combination of an aeroplane, a frame bar, a rod having a longitudinal bore at its upper end and an extending bar at its lower end, a guide on the frame bar for such extending bar, a rod or bar movable longitudinally in the bore of the first named bar and connected at its upper end with the aeroplane, and a spring between the aeroplane and the said first named bar, substantially as set forth.

9. An apparatus substantially as described, comprising a series of aeroplanes arranged in step form and advancing successively from the lower to the upper plane, and a frame supporting said aeroplanes and comprising a series of inclined struts extending across and secured to the front edges of the several aeroplanes, base bars extending forwardly from the lower ends of the inclined struts, posts extending between the said base bars and the inclined struts, and devices interposed between the inclined struts and the rear edges of the aeroplanes for supporting the same substantially as set forth.

10. The combination in an apparatus substantially as described of a series of aeroplanes arranged in step form and advancing successively from the lower to the upper plane, a series of inclined struts extending across the front edges of the several aeroplanes and secured thereto, devices supporting the rear edges of the aeroplanes from the said struts, a fin or keel in rear of the aeroplanes, posts supporting the same from the inclined struts, and stay devices for bracing the keel supporting posts in position, substantially as set forth.

11. The combination in an apparatus substantially as described, of a series of aeroplanes arranged in step form and advancing toward the upper plane, and a frame supporting said aeroplanes and having base bars and a cross bar between the base bars and adapted to bear against the back of the operator, substantially as set forth.

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Witnesses:
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S. C. SELLERS.