

1,215,226.

Patented Feb. 6, 1917.
3 SHEETS—SHEET 1.

Fig. 4.

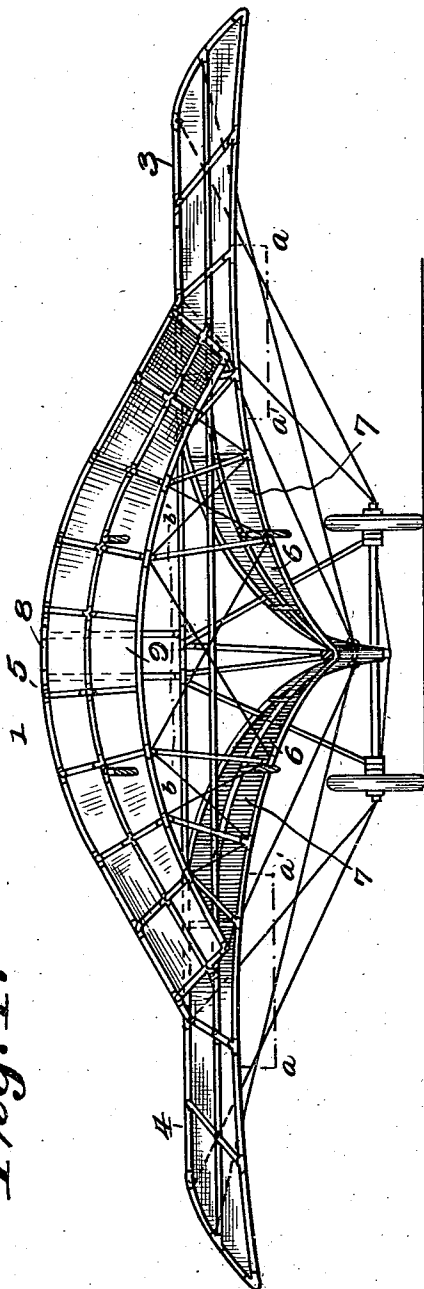
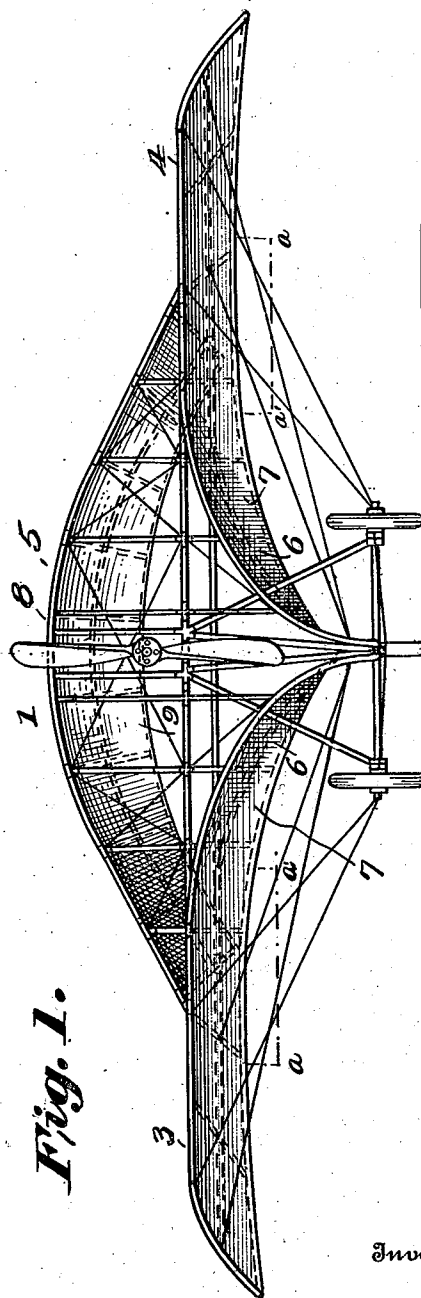


Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

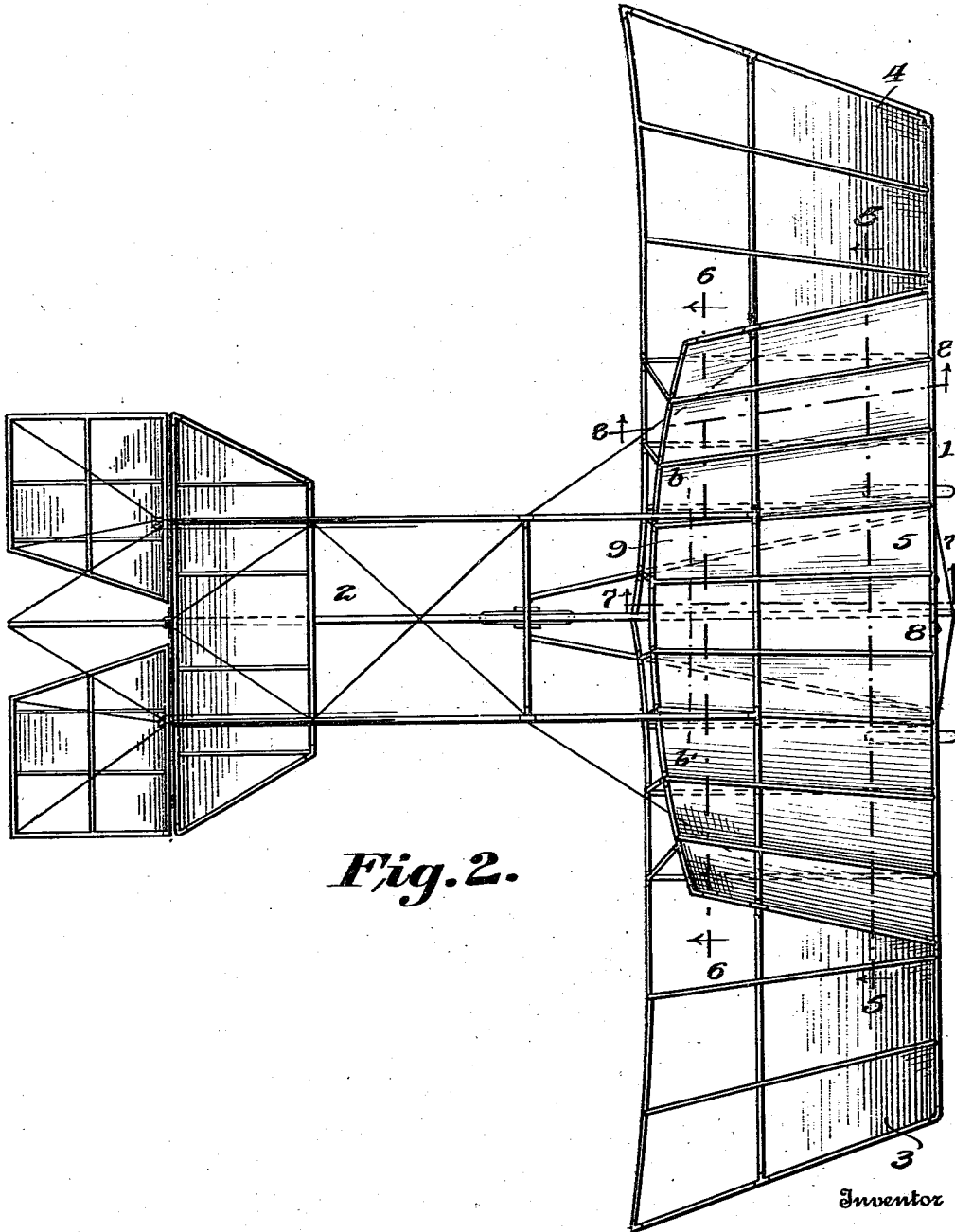


Fig. 2.

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3 SHEETS—SHEET 3.

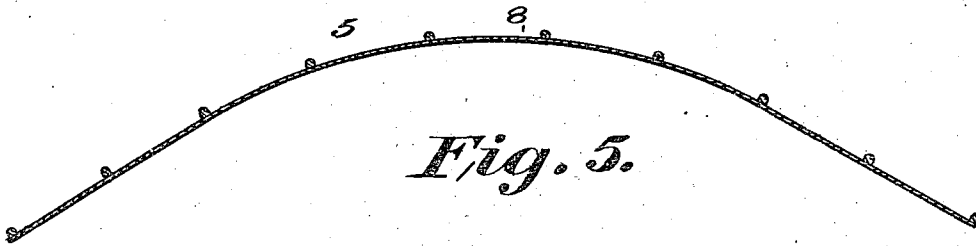


Fig. 5.

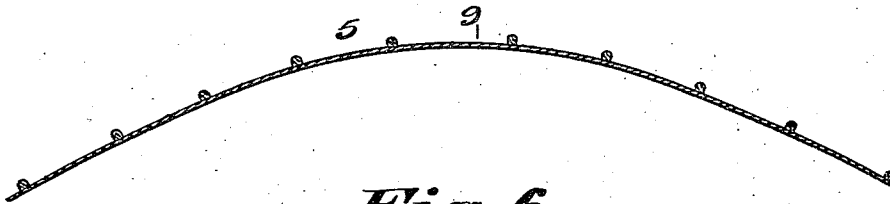


Fig. 6.

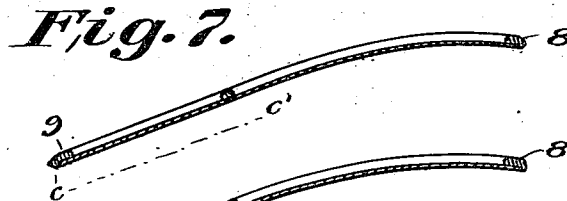


Fig. 7.

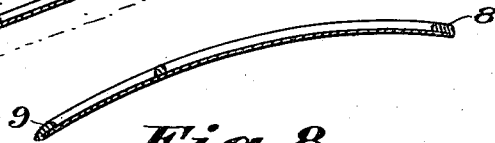


Fig. 8.

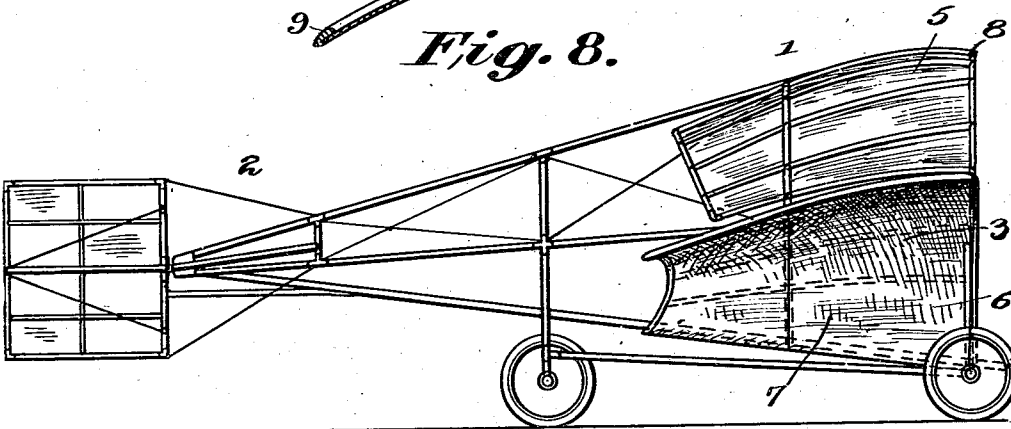


Fig. 3.

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UNITED STATES PATENT OFFICE.

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FLYING-MACHINE.

1,215,226.

Specification of Letters Patent.

Patented Feb. 6, 1917.

Application filed June 30, 1916. Serial No. 106,937.

To all whom it may concern:

Be it known that I, GEORGE M. WANEE, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to improvements in flying machines, and particularly to supporting surfaces for flying machines of the heavier-than-air class, the present invention being an improvement upon the type of supporting surface disclosed in my prior Patent No. 1,172,182, dated Feb. 15, 1916, embodying a lower plane composed of laterally extending wings and an upper hood-shaped plane projecting to equal degrees beyond its longitudinal center, which is arranged in line with the longitudinal center of the machine, over the wings of the lower plane.

The object of the present invention is to provide an improved construction of supporting surface of the character referred to, whereby a more efficient sustaining action is obtained, as hereinafter fully described.

In the accompanying drawing illustrating the invention,—

Figure 1 is a front elevation of a flying machine embodying my invention.

Fig. 2 is a top plan view of the same.

Fig. 3 is a side elevation of the machine.

Fig. 4 is a transverse section through the tail frame showing the supporting surface in rear elevation.

Figs. 5 and 6 are vertical transverse sections through the upper plane on lines 5—5 and 6—6 respectively.

Figs. 7 and 8 are vertical longitudinal sections through the upper plane on the lines 7—7 and 8—8 of Fig. 2.

In carrying my invention into practice, I provide a flying machine including a main frame 1, and a longitudinally and horizontally extending tail frame 2, which frames may be of any preferred or suitable construction. Any suitable type of launching and alighting gear, steering and stabilizing devices may be employed and are not herein shown, as the same constitute no part of the present invention. I may also employ any preferred type of propelling mechanism, none being shown in the present instance for the reason above stated.

The supporting surface of the machine comprises a pair of lower supporting planes

3 and 4, and an upper supporting plane 5. These planes may be of any preferred construction, and preferably consist of a suitable frame structure having a covering of fabric or other suitable material. The planes 3 and 4 have inner ends 6 which extend inwardly and downwardly on curved lines and intersect each other in converging relationship, said portions of said planes forming a tapering fin or keel and curved surfaces to prevent the machine from skidding and thereby maintain it on its course and also to act as lifting and stabilizing surfaces, as hereinafter fully explained. The body portions 7 of the respective planes 3 and 4 extend laterally to equal degrees beyond the sides of the machine and curve or incline upwardly and outwardly at a desired dihedral angle, to assist in securing lateral stability. From a point about midway of their length and inwardly toward their end portions 6 the planes 3 and 4 curve slightly at a downward and rearward angle, and from such intermediate point outwardly toward their tips the planes are curved to a gradually increasing degree outwardly, downwardly and rearwardly, the outer halves of the planes thus being helicoidally curved. It will be evident that as the lower planes are disposed at a dihedral angle, an effective degree of inherent lateral stability will be obtained and this is augmented to a material extent by the curvature of the portions 6, since, as the planes are also curved in a fore-and-aft direction, a gust of wind striking the body portion of either lower plane and tending to tilt said plane upwardly will, on following the line of the plane inwardly and rearwardly strike the portions 6 thereof and exert its pressure to right or restore the machine to a normal state of equilibrium. This is true of the balancing operation of both lower planes in maintaining lateral stability. By making the outer half of each plane helicoidally curved, and the inner half of the body of the plane materially flatter and with but a comparatively slight curve, a maximum lifting action is obtained along the outer rear portions of the planes and the air retained for a sustaining effect, but the air acting on such portions of the planes and flowing inwardly and rearwardly on converging lines is allowed to escape with greater freedom at the inner rear portions of the planes, thus overcoming the resistance

that would otherwise be caused by the choking of the air beneath the planes. By causing the air to travel beneath the planes on inwardly and rearwardly converging lines, the forces of these currents are balanced and neutralized by the curvature of the planes, as such currents approach the center of the machine, so that any tendency of the machine to tilt either longitudinally or laterally under variations of air pressures will be counteracted to a material extent by the equalizing of such pressures in their converging courses of flow.

The upper supporting plane 5 is longitudinally bowed or curved and has its central portion disposed above the inwardly and downwardly curved ends 6 of the planes 3 and 4, in the median vertical line of the machine, and the ends of said plane 5 thence extend outwardly and downwardly at a determined angle of inclination or degree of curvature and are connected at their extremities with the body portions of the planes 3 and 4 at points just beyond the fore-and-aft centers of the body portions of said planes 3 and 4. The upper plane 5 is curved or inclined in a fore-and-aft direction at a desired general angle of incidence, which is preferably the same angle of incidence as the lower planes 3 and 4, and the front or leading portion 8 of the plane 5 is set at a somewhat greater angle of inclination than the rear or trail portion 9 of said plane. The concaved side of the plane 5 faces downwardly and is disposed above the convexed upper surfaces of the planes 3 and 4, with its middle portion above the downwardly extending inner ends 6 of the said planes 3 and 4, at which point the chord of the fore or leading portion 8 of the plane 5 is of greatest depth, the plane 5 thus providing a substantially hood-shaped structure over the main portions 6 and 7 of the planes 3 and 4 and co-operating therewith to provide an air passage of greatest depth at the center and contracted between the juxtaposed surfaces of the superposed plane, as will be readily understood.

In my prior Patent No. 1,172,182, aforesaid, I have shown a supporting surface composed of upper and lower planes of the general structure herein disclosed, but in the patented structure the portions of the lower planes between the body portions of said planes and the downwardly curved inner ends of the planes are curved downwardly and rearwardly at a pronounced angle, which portions of the planes correspond with the portions indicated between the points $a-a'$ in the structure herein disclosed. As a result of such curvature in the patented structure an objection is encountered in that owing to the pronounced curvature of such portions of the planes the

inward and rearward flow of the currents of air on converging lines is resisted, with the effect of retaining the air beneath the lower planes to an undesirable extent. This objection is overcome in the present instance by flattening or decreasing the curvature of the portions of the lower planes between the points $a-a'$, and extending the outer portions of said planes on a helicoidal curve, by means of which the tendency of the air to flow inwardly and rearwardly is increased and the resistance of the inner portions of the planes to such flow of air decreased, with the result of preventing any retardation in the flow of the air and increasing the poise or stability of the planes in their flotation action.

In my aforesaid patented structure the upper plane also has the same general curvature in a fore-and-aft direction, the curve extending in a downward and rearward line, and as a result the curvature of the trail portion 9 of the plane tends to restrict the flow of air through the spaces between the converging portions of the planes 3, 4 and 5, with a result of causing the formation of currents or eddies between the planes which tend to disturb the stability. This objection is overcome, in the present construction, by flattening or decreasing the curvature of the extremities of the trail portion 9 of the plane 5, between the indicated points $b-b'$, with relation to the corresponding parts of the lead portion 8 of the plane 5, and by also flattening or decreasing the angle of incidence of the central rear part of the trail portion 9, between the indicated points $c-c'$, whereby the air flowing between the planes is caused by the diminished resistance to flow inwardly and rearwardly on converging lines, thus preventing the accumulation of an undue amount of air in the narrow spaces between the converging portions of the planes 3, 4 and 5 and the consequent choking of the air in such spaces. By also flattening the trail portion to different angles of incidence as set forth the tendency of the air to rebound from the trail surface of the plane and exert a depressing effect upon the lower planes is avoided in a reliable and efficient manner. By the construction and arrangement of the planes as herein disclosed the flying efficiency, as well as the poise of the machine is increased to a material degree, so that greater speed and the load carrying capacity are obtained without increase of surface area or propelling power over a structure such as disclosed in my prior patent.

I claim:—

1. A flying machine having a supporting surface comprising a pair of lower planes having downwardly and inwardly curved converging inner ends, and having their outer ends helicoidally curved in a down-

ward and rearward direction the intervening portions of the planes being curved downwardly and rearwardly to a lesser angle of incidence than the outer ends of said planes, and a hood-shaped upper plane
5 above the inner ends of the lower planes and its extremities connected with the body portions of the lower planes between the curved portions thereof, said upper planes having a
10 trail portion of less angle of incidence than its lead portion, and said trail portion having its central part of a less curvature than its extremities.

2. A flying machine having a supporting
15 surface comprising a pair of lower planes having concaved lower surfaces and convex upper surfaces, said lower planes having their inner ends disposed in proximity at the

median longitudinal line of the machine, and an upper plane longitudinally and
20 transversely curved and having its concaved side facing the convex upper surface of the lower planes, said upper plane having its central portion disposed above the inner
25 ends of the lower planes and its extremities connected with the lower planes at points adjacent to but beyond the fore-and-aft centers of said lower planes, the trail portion of the upper plane having a less angle of incidence than the lead portion of said plane,
30 and said trail portion of the upper plane having its central part of a less curvature than its extremities.

In testimony whereof I affix my signature.

GEORGE M. WANEE.