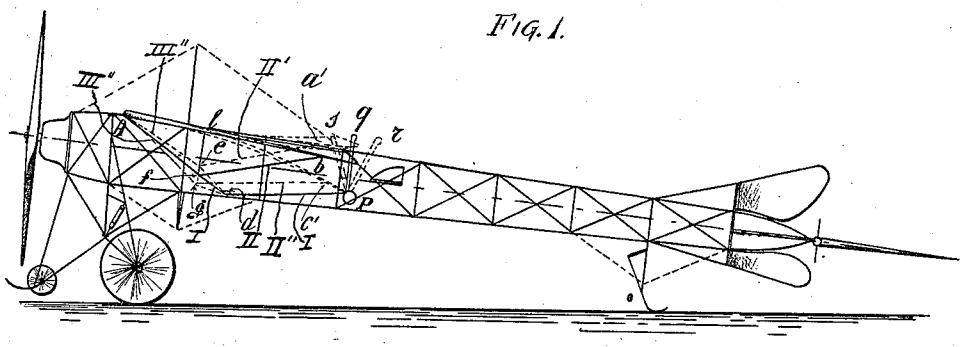
G. & U. ANTONI.

FLYING MACHINE.

APPLICATION FILED FEB. 11, 1911.

1,068,727. Patented July 29, 1913.

FIG. 1.



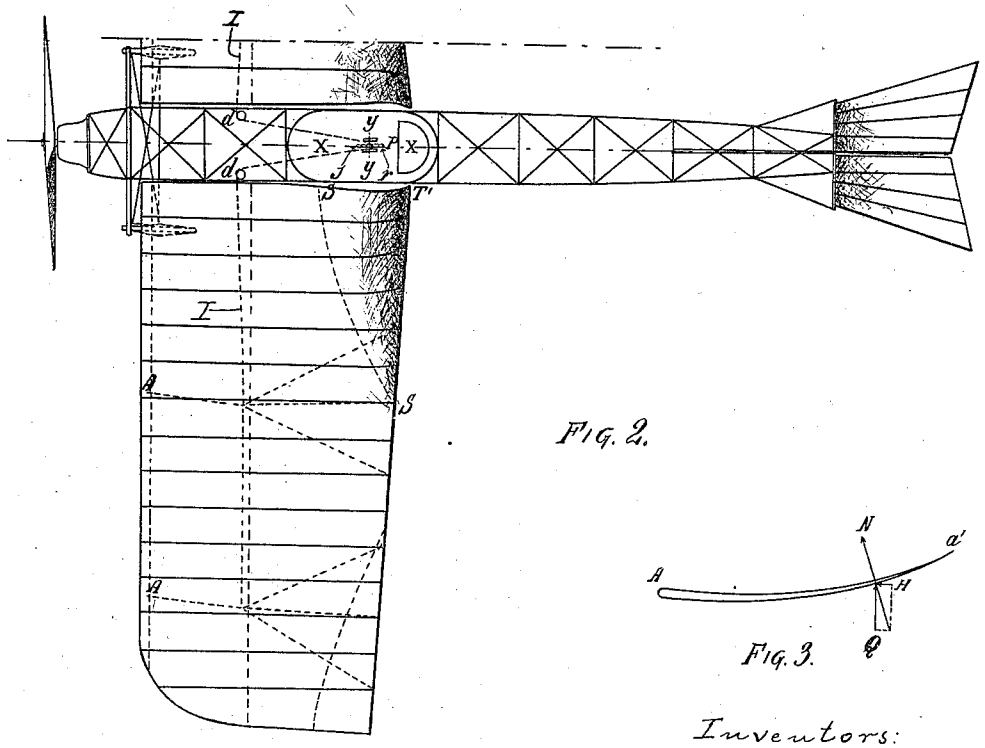


FIG. 2.

FIG. 3.

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FLYING-MACHINE.

1,068,727. Specification of Letters Patent. Patented July 29, 1913.

Application filed February 11, 1911. Serial No. 608,088.

To all whom it may concern:

Be it known that we, GUIDO ANTONI, draftsman, and UGO ANTONI, employee, subjects of the King of Italy, residing at No. 46 Via Vittorio Emanuele, Pisa, in the Kingdom of Italy, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention refers to improvements in the structure and control of the lifting surfaces or planes of aerial machines, such improvements being intended to confer upon them certain valuable properties connected with the equilibration and the propulsion of the machine.

In connection with planes of aerial machines it has been proposed to warp one end of the plane upward or downward at the will of the operator to vary the stability while other known aeroplanes have included a substantially flat supporting surface slightly inclined upward toward the tips or rearward extremities, the supports of the planes being bent to retain this permanent curvature.

According to the present invention a portion of one end of the plane in proximity to the rear edge is permanently warped to a curvature which is constant throughout, the other end of such rear surface being flexible and adapted to be warped at the will of the operator.

An embodiment of the invention is illustrated in the accompanying drawing, in which:

Figure 1 is a side elevation of an aeroplane equipped with the improved lifting surfaces or planes; Fig. 2 is a plan view thereof; and Fig. 3 is a diagrammatic section of one of the planes in a position parallel to the direction of flight, showing the form the plane would automatically take, should the engine be brought to rest and the aeroplane left to itself.

The results above referred to are obtained as follows:—When the aeroplane is at rest, the planes are completely flat throughout their surfaces with the exception of the rear portion limited by the dotted line S S, which portion is warped and turned upward. The permanent warp of a portion of the rear surface of the plane at the inner side, (S S T′), secures the absolute longitudinal stability of the machine and prevents it from being overturned. As is well known, the adoption of the aerocurves or curved planes, enables a greater reduction to be made in the necessary lifting area, than if a flat surface is employed. In order to take the above property into account, the lifting planes constructed according to the present invention are provided not only with the portions S S T′ which are warped under any working conditions, but are also capable of being deflected and curved downward on their rear side, for instance from A*b*, Fig. 1, to A*b*′, (same figure), when the aeroplane is either starting or running at its normal speed. In Fig. 1 the contour A*b*′ represents the section in the direction of motion of the lifting planes when so warped and curved downward throughout their extent with the exception of the upwardly warped portions (S S T′), above referred to.

Owing to the flexibility of the planes the degree of curvature thereof may be varied so as to accommodate the same to the amount of the load to be lifted, whereby it is possible to increase the lifting power of the machine without changing the engine.

Should the engine be brought to rest in any way, the equilibrium of an aeroplane fitted with the flexible lifting surfaces according to this invention would not be in any way affected, as the flexible surfaces would assume by themselves an upwardly directed curvature as shown at A*a*′, (Figs. 1 and 3, owing to their flexibility and the pressure exerted thereon by the surrounding air. This would not only insure the equilibrium of the machine, but also supply it with a horizontal propelling force H, (Fig. 3), the latter being the horizontal component of the normal action N of the surrounding air on the upwardly curved lifting surface A*a*′. The combined action of the horizontal component H and the vertical component Q secures the gradual descent of the aeroplane along a path slightly inclined to the horizon, when the engine stops.

While the portions S S T′ are permanently warped upwardly, the curvatures corresponding to the different conditions of equilibrium and lift above referred to are obtained by means of a handle *q* controlled by the pilot. The lever *q* is connected by means of a wire cable I, or the like, which runs on pulleys *d*, P, and is connected to the end *f* of a wooden or other support or stay *f*′, the upper end *l* being pivotally connected to the plane A*l b*. Two ties, preferably steel, and numbered II and III respectively, con-

nect the end *f* of the stay with the points A and *b* of the plane A*lb*.

In the position of rest, the plane A*lb* takes up the position shown in full lines. In the position of descent, (when the engine is stopped), the plane will be turned upward by the upward air pressure and will take up the position A*la'* indicated in dotted lines, the lever *q* taking up the position *s* of its own accord. The stay moves to the position *el* and the ties to the positions II' and III' respectively.

When the aeroplane is starting or running in a normal course, the plane A*lb* should be deflected and curved downward to take up the position A*lc'*. To effect this the lever *q* must be moved to the position *r*, when the stay will move to the position *lq* and the ties II'' and III'' respectively. To any position of the lever *q* intermediate between *q* and *r* will correspond a variable degree of downward curvature of the lifting surface which will take a position intermediate between A*lb* and A*lc'*.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

In an aerial machine, a lifting plane which is stiff along its front edge and has a part of its rear edge toward the inner end thereof flexible upward and downward and warped into an upward curve.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

GUIDO ANTONI.
UGO ANTONI.

Witnesses:
ZILIPPA LOURA,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."