No. 846,830. PATENTED MAR. 12, 1907.

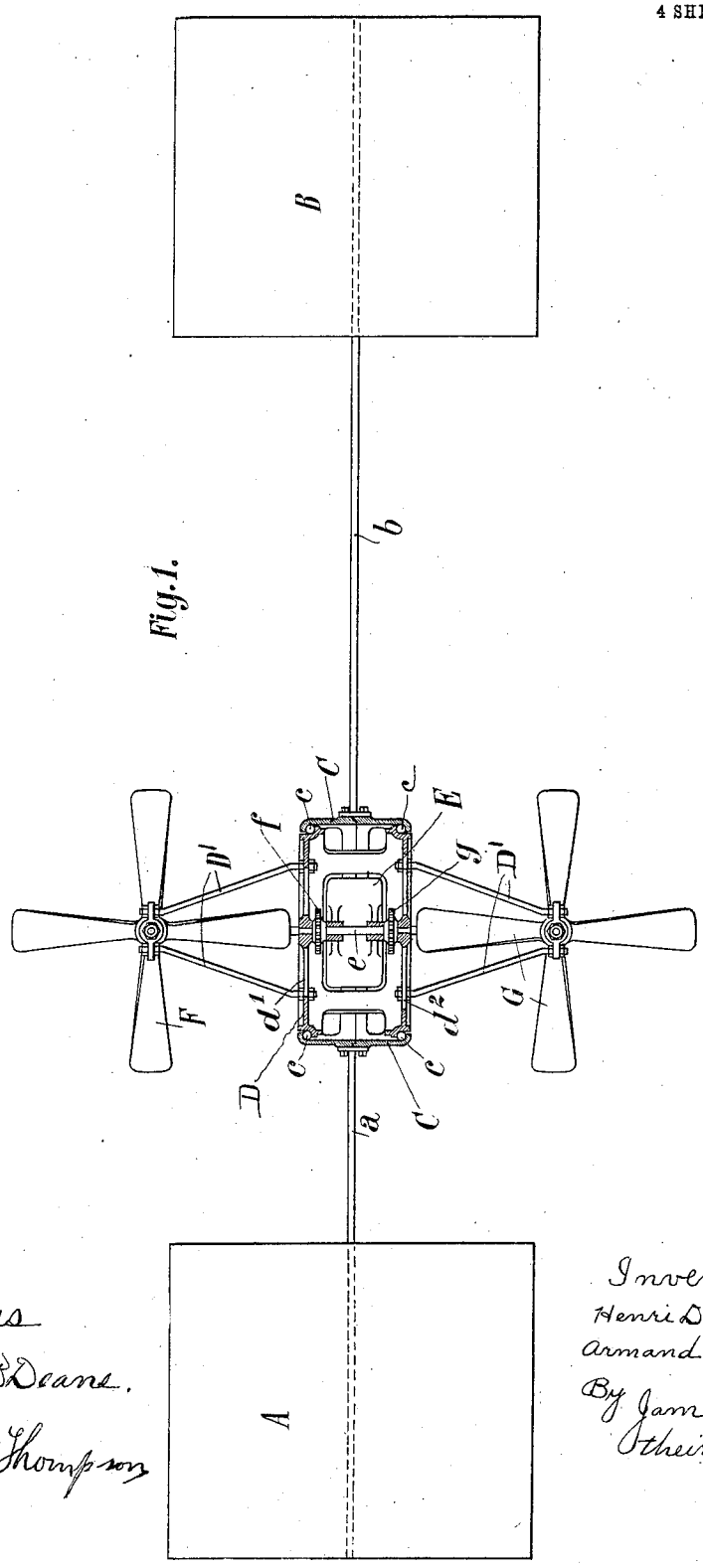
A. & H. DUFAUX.

AEROPLANE OR CRAFT FOR AERIAL NAVIGATION.

APPLICATION FILED FEB. 25, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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Michael Thompson

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their attorney.

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4 SHEETS—SHEET 2.

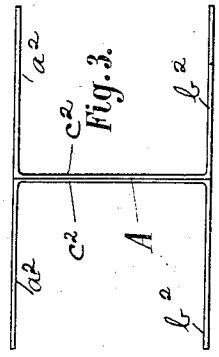

Fig. 3.

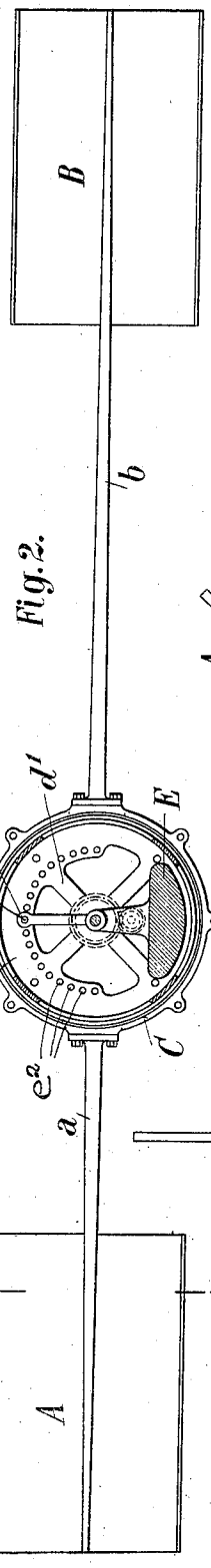

Fig. 2.

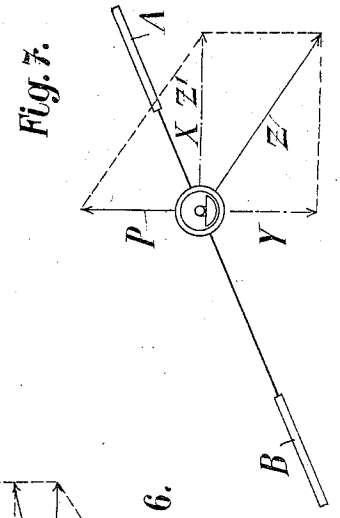

Fig. 7.

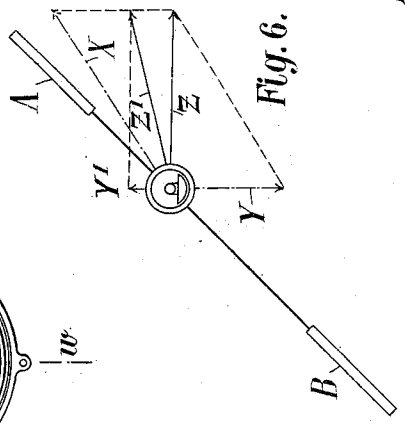

Fig. 6.

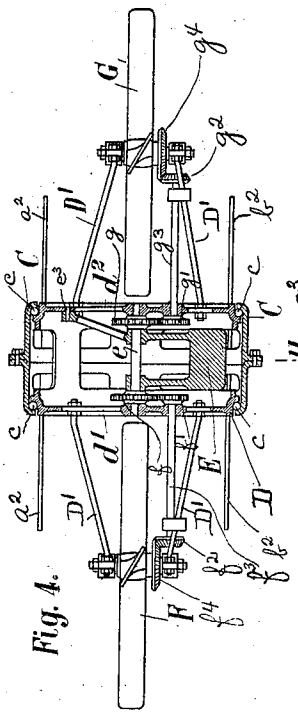

Fig. 4.

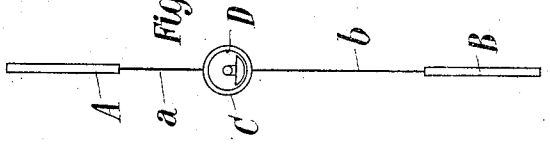

Fig. 5.

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4 SHEETS—SHEET 3.

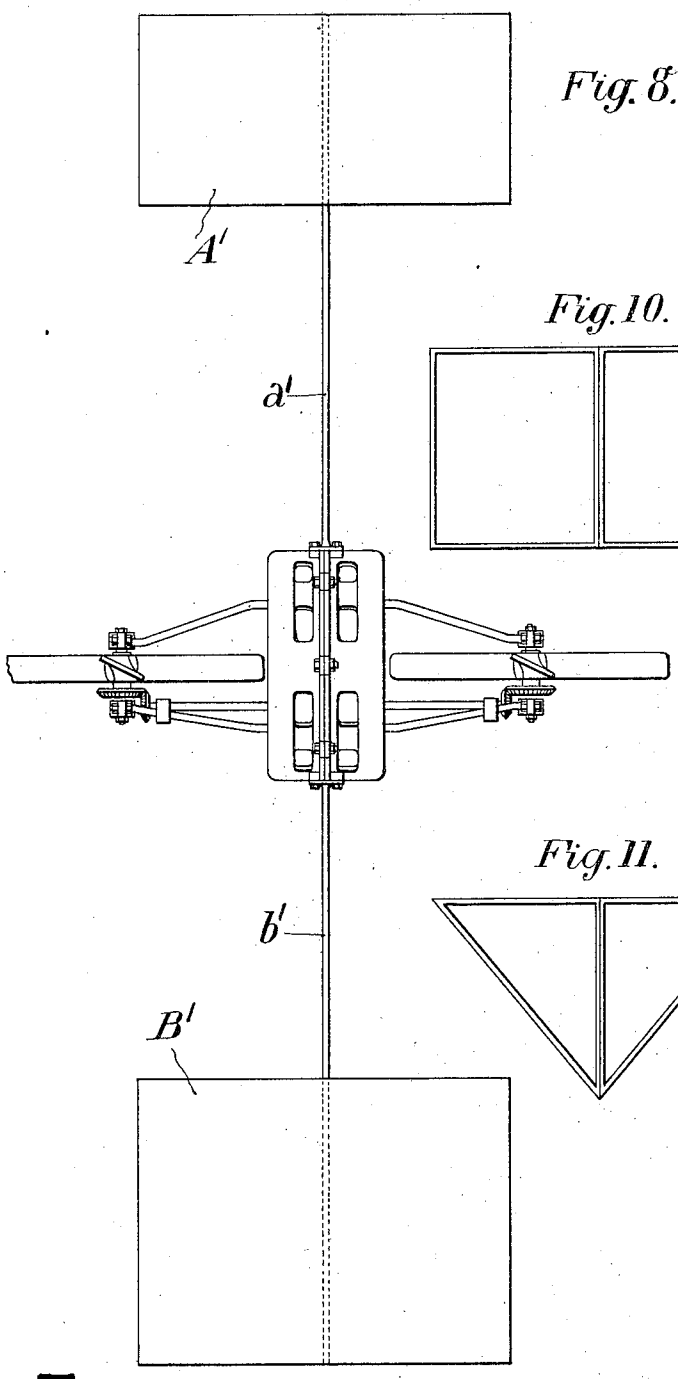

Fig. 8.

Fig. 10.

Fig. 11.

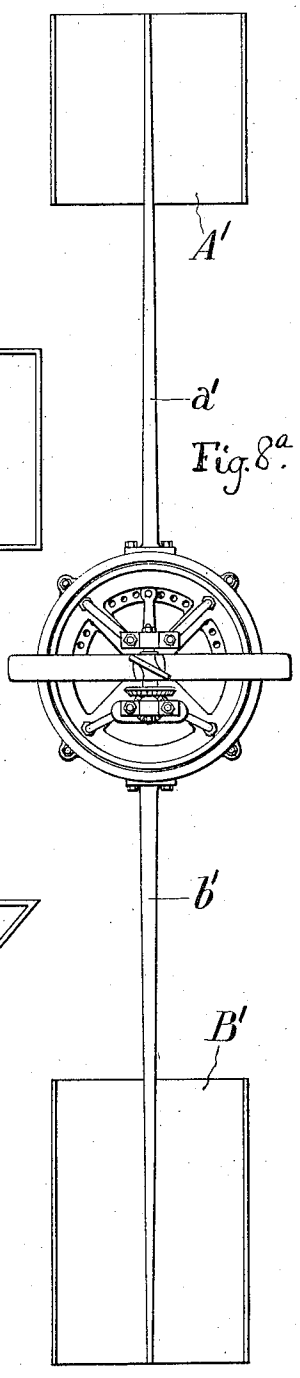

Fig. 8a.

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4 SHEETS—SHEET 4.

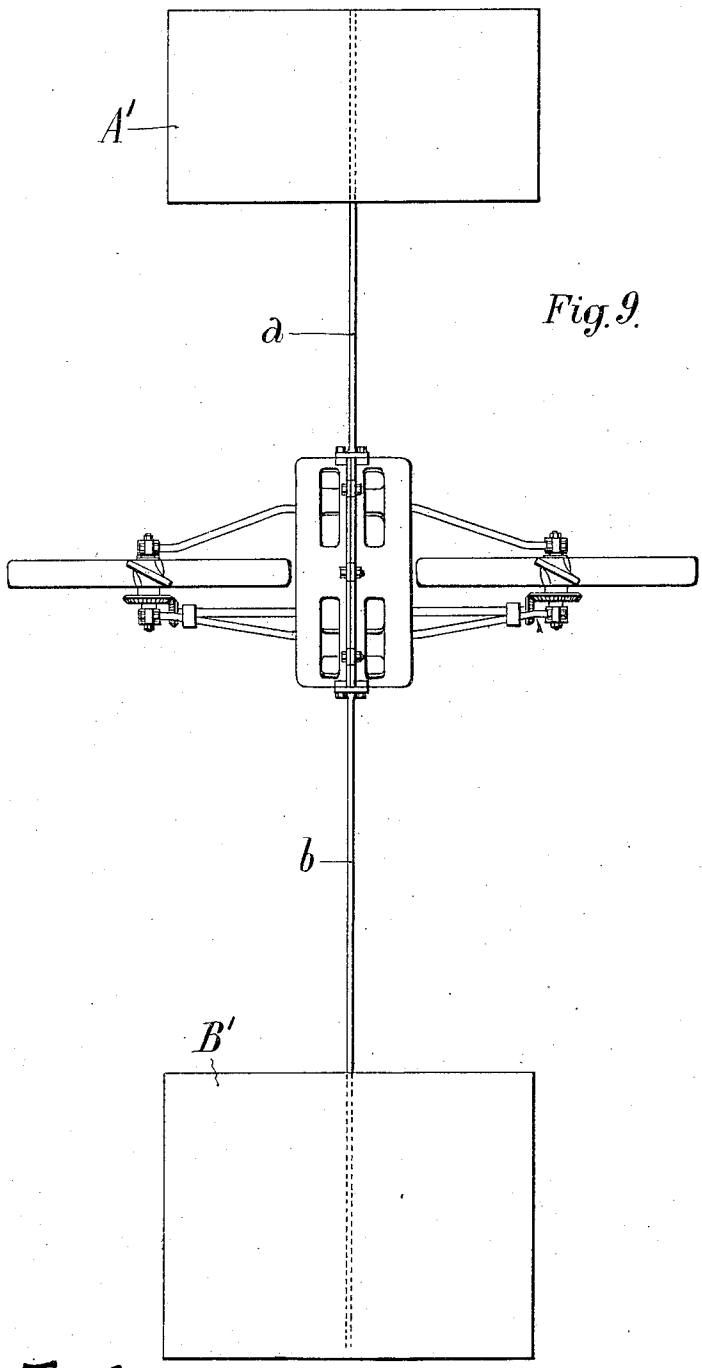

Fig. 9.

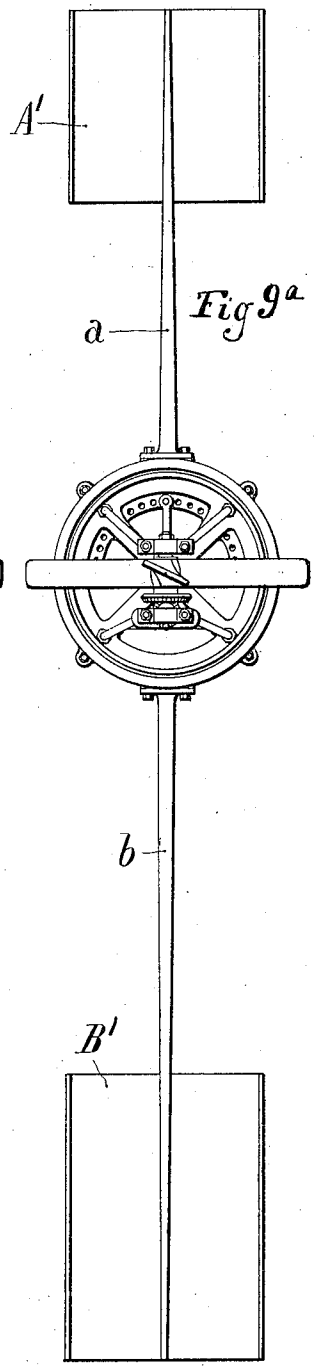

Fig 9a

Witnesses:
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Armand Dufaux
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by their Attorney
James Hamilton

UNITED STATES PATENT OFFICE.

ARMAND DUFAUX AND HENRI DUFAUX, OF GENEVA, SWITZERLAND

AEROPLANE OR CRAFT FOR AERIAL NAVIGATION.

No. 846,830. Specification of Letters Patent. Patented March 12, 1907.

Application filed February 25, 1905. Serial No. 247,395.

To all whom it may concern:

Be it known that we, ARMAND DUFAUX and HENRI DUFAUX, both constructors, residing at Geneva, Switzerland, have invented certain new and useful Improvements in and Relating to Aeroplanes or Crafts for Aerial Navigation, of which the following is a specification.

Our invention relates to improvements in mechanism used in aerial navigation; and an object of our invention is to provide a highly-efficient machine of this type susceptible of being easily directed and controlled.

In the drawings, illustrating the principle of our invention and the best mode now known to us of applying that principle, Figure 1 is a plan view of our new aeroplane. Fig. 2 is an elevation of the same partly in sectional view. Fig. 3 is a sectional view on line *y z*, Fig. 2. Fig. 4 is a sectional view on line *u w*, Fig. 2. Figs. 5, 6, and 7 are diagrams showing parallelograms of forces under different conditions hereinafter explained. Figs. 8, 8^a, 9, and 9^a illustrate modifications hereinafter referred to; and Figs. 10 and 11 show modified forms of wings.

The drum D is encircled by a cylindrical casing C, between which and the drum D are interposed antifriction-balls *c*, which serve to make the casing C freely rotatable around the drum D. Mounted in bearings in the side walls d' d^2 of the drum D is a shaft *e*, which is driven by a motor of any suitable type. (Shown at E.) The motor E is freely suspended from the shaft *e*, about which it swings in the manner of a pendulum. The side wall d^2 of the drum D is provided with a series of apertures e^2, and the motor E is provided with an arm e'. By passing a pin e^3 through a hole in the upper end of the arm e' and any one of the apertures e^2 the angular position of the motor E with respect to the drum D may be determined. To the side walls d' d^2 of the drum D are secured braces D′, which serve to support the propellers F and G, which may be any suitable type. The propeller F is driven by the gear *f*, fast upon the shaft *e*, and connected, through the pinions f' f^2 and the shaft f^3, with the gear f^4, fast upon the shaft of the propeller F. In an entirely similar way the propeller G is driven from the shaft *e* by the gears *g* g^4, pinions g' g^2, and shaft g^3. (See Fig. 4.)

To the casing C are attached arms *a*-*b*, of unequal length, each of which carries at its free end a wing, (marked A and B, respectively.) Each wing is made up of the planes a^2, b^2, and c^2, which form a frame of double-T section. In the preferred form (shown in Figs. 1, 2, and 3) the wings are of equal area or surface; but, as shown in Figs. 8, 8^a, 9, and 9^a, the wings may be of unequal area. Furthermore, the wings may be of the form shown in Fig. 10 or of that shown in Fig. 11. Again, while in forms shown in Figs. 1, 2, 9, and 9^a the arms *a* and *b* are of unequal length they may be of equal length, as shown at a' b', when the area of one wing, as of B′, exceeds the area of the other or of A′. (See Figs. 8 8^a.)

In Figs. 1, 2, and 4 the center of gravity of the motor E is shown vertically beneath the shaft *e*, and the shafts of the propellers F G are shown as vertical; but the angular position of the propeller-shafts may be inclined to the vertical by disengaging the arm e' from the side wall d^2 of the drum D and rotating the latter.

Referring now to Fig. 5, the position of the arms *a* and *b* are vertical, no lateral currents prevailing. The wing B lies below the wing A, since the arm *b* is longer than the arm *a*. By rotating the drum D let the shafts of the propellers F and G be so inclined to the vertical that by their rotation they exert upon the apparatus a force the magnitude and direction of which are represented by the length and direction, respectively, of the line X in Fig. 6, while the line Y by its length and direction represents the weight of the apparatus. The resultant of these two forces X and Y is *z*. In this we have not taken into account the effect of the air-pressure upon the wings A B. Suppose now that by the effect of air-currents the wings A and B are made to take the position shown in Fig. 6 and that the upward pressure of the air upon the wings is represented by Y′, the resultant of the forces Y′ and Z is z', Fig. 6.

In Fig. 7 the position of the wings is that due to an air-pressure, the lifting effect of which is represented by the line P, equal and opposite to the line Y, which represents the weight of the apparatus. Under this assumed condition and the further condition that the shafts of the propellers F and G are assumed to be horizontal the full effort of the

propellers F and G is realized in driving the apparatus in the lateral direction of the resultant z' of Fig. 7.

What we claim is—

In a mechanism of the character described, a drum; a shaft rotatably mounted therein; a motor mounted in said drum, for driving said shaft, said motor being free to swing around said shaft after the manner of a pendulum; an arm for swinging said motor about said shaft; means for securing said arm in adjusted position to said drum; propellers carried by said drum and driven by said shaft; a casing outside of said drum and free to rotate thereon; and wings carried by said casing.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ARMAND DUFAUX.
HENRI DUFAUX.

Witnesses:
E. MERTELMENE,
HORACE LEE WASHINGTON.