

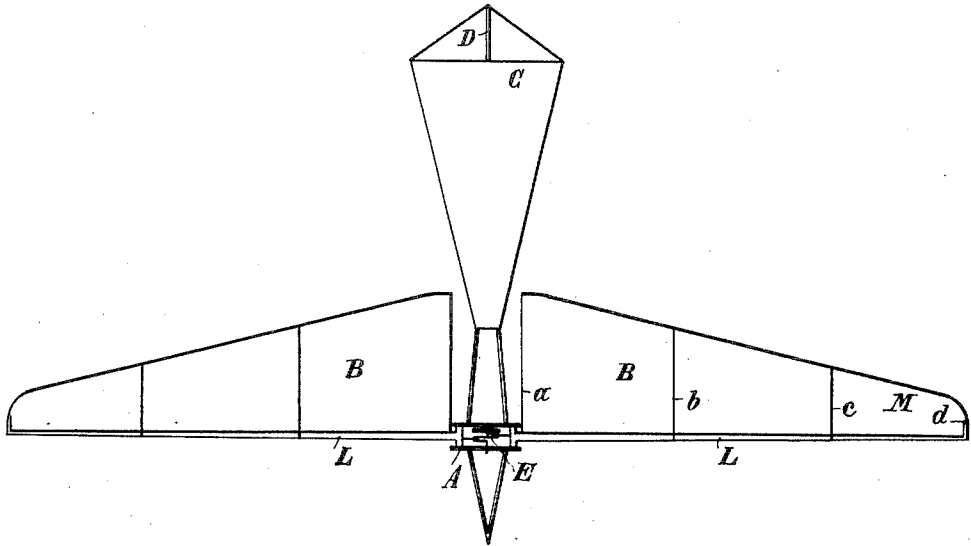
R. L. RIOUT.  
 FLYING MACHINE WITH FLAPPING WINGS.  
 APPLICATION FILED AUG. 7, 1911.

1,009,692.

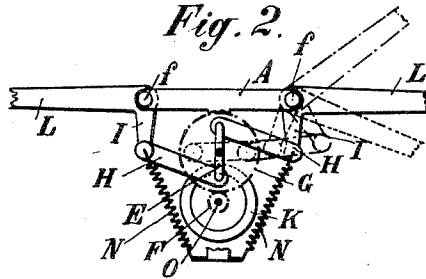
Patented Nov. 21, 1911.

2 SHEETS—SHEET 1.

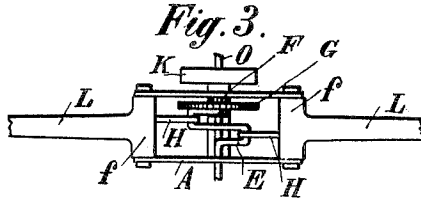
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



Witnesses.  
 Richard Bayer  
 Gustav Schlobover.

Inventor.  
 René Louis Riout

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2 SHEETS—SHEET 2.

Fig. 4.

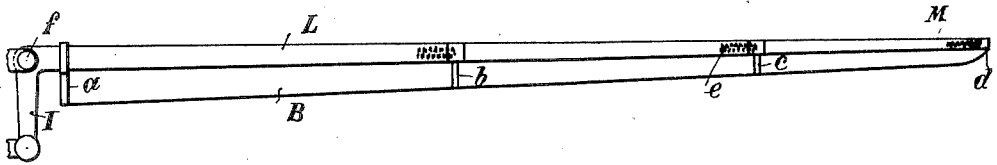


Fig. 5.

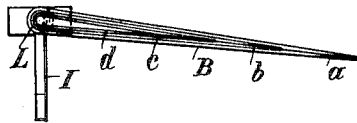


Fig. 6.

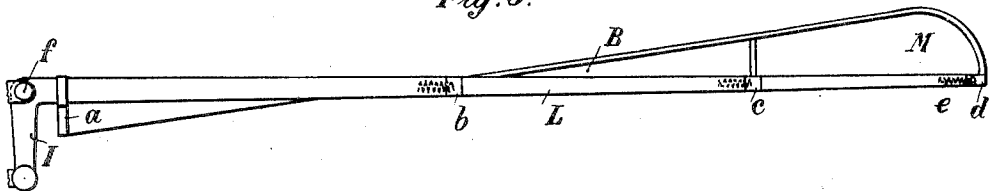
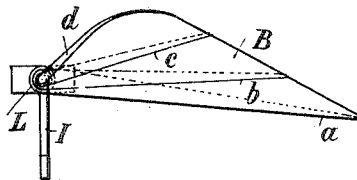


Fig. 7.



Witnesses.  
 Richard Bayer  
 Gustav Schlorcken.

Inventor.  
*Rene Louis Riout*

# UNITED STATES PATENT OFFICE.

RENÉ LOUIS RIOUT, OF PARIS, FRANCE.

FLYING-MACHINE WITH FLAPPING WINGS.

1,009,692.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed August 7, 1911. Serial No. 642,783.

To all whom it may concern:

Be it known that I, RENÉ LOUIS RIOUT, a citizen of the French Republic, residing at Paris, France, have invented certain new and useful Improvements in Flying-Machines with Flapping Wings, of which the following is a specification.

This invention relates to flying machines with flapping wings and automatic deformation which is characterized by the special construction of the driving mechanism and by the special construction of the wings producing the propulsion and the vertical raising of the apparatus.

In the accompanying drawings the preferred form of construction of the apparatus is shown.

Figure 1 is a plan view of the apparatus. Figs. 2 and 3 represent respectively in front view and in plan view, the driving mechanism for the flapping motion of the wings. Figs. 4 and 5 show in front view and in an end view respectively, one of the wings in the gliding position. Figs. 6 and 7 show the same wing in the propelling position.

The apparatus essentially consists of an arm A upon which at  $f$  the wings B are articulated, said arm being prolonged at the front and rear end tapering parts in order to diminish the resistance of the air against the propulsion of the apparatus. The stability of the machine is insured by the tail G serving as horizontal rudder, and further by a vertical rudder D.

The mechanism carried by the frame A and serving for the transmission of the revolving motion produced by the motor is transformed into a reciprocating motion of the wings and consists of a crank shaft E driven through the intermediary of a toothed wheel gearing F—G and having its crank displaced at  $180^\circ$  the one to the other. This crank shaft drives two connecting rods H articulated upon the arms I of the wings. The effort of the connecting rods H acts always in opposite positions so that the reaction is annulled which is caused by the weight and the inertia of each wing so that a balanced movement is obtained. A fly wheel K turning with great angular speed driven through the intermediary of convenient transmissions, insures the regularity of the movement of the wings.

The stiffening frame of the wings is composed of a front frame member L upon which the transverse members  $a, b, c, d$ , are

mounted. The first transverse member  $a$  nearest to the frame, is fixed with regard to the member L, the other cross transverse members being articulated upon the same. The upward movement of said articulated transverse members  $b, c, d$ , is limited by stops so that the movement of the successive transverse members increases up to the end member M where the movement is the greatest. The deformation of the surface of the wings regulated by these transverse members is proportional to the speed for which the apparatus is regulated. Springs E arranged in the hollow frame member L serve for returning the movable members to the gliding position (Figs. 4 and 5) when the wing is raised, said members having been pushed upward during the descent or during the propulsion of the apparatus, the lifting movement being produced by the resistance of the air (Figs. 6 and 7). With flying machines of smaller size, for the fly wheel K strong springs N are substituted which bring the wings back to their normal position for compensating the lifting effect caused by the gliding of the machine (Fig. 2). Said springs can further be used together with the fly wheel in order to obtain better results.

The operation of the machine is as follows: The movement from the motor is transmitted to the crank shaft E by means of the shaft O and the reducing gearing F—G. The crank shaft actuates the connecting rods A and consequently the wings which execute a flapping motion, the extreme positions of said wings being indicated in Fig. 2 by dotted lines and mixed lines respectively. Starting from the position indicated in dotted lines (the beginning of the raising motion) the transverse members of the wing frame are returned to the normal position through the action of their springs, the wing will displace itself with the apparatus in the horizontal direction, so that owing to its inclination it is submitted to the action of the air whereby the lifting motion is continued without considerable resistance until the position of the wings indicated in mixed lines (beginning of the descent) has been reached. In descending, the wing by its vertical speed creates under itself a pushing effort, whereby the frame members  $b, c, d$ , are pushed back until they butt against their stops so that they adopt the position shown in Figs. 6 and 7, when all the energy is utilized for the propulsion and for the lift-

ing until the wing having returned to its normal position the cycle described begins again.

I claim:

- 5 A flying machine with flapping wings and automatic deformation, comprising in combination with the body of the machine the wings consisting of a hollow front frame member and one fixed longitudinal frame member near the body, and of a certain number of frame members articulated to said front frame member, springs located in the hollow front frame member for maintaining the articulated longitudinal frame members in their normal position, the mechanism for effecting the flapping motion of the wings consisting of a crank shaft driven
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- 15

from the engine and having its cranks displaced at 180° the one with regard to the other, connecting rods hinged with the one end to said cranks and the other end to the fixed arms of the wings so that the two connecting rods always act in opposite directions, stops for the articulated longitudinal frame members of the wings to limit the deformation of the wings through the resistance of the air, substantially as described and shown and for the purpose set forth.

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In witness whereof I have hereunto set my hand in the presence of two witnesses.

RENÉ LOUIS RIOUT.

Witnesses:

RICHARD BAYER,  
H. C. COXE.