

W. S. HULL.
FLYING MACHINE.

APPLICATION FILED MAY 2, 1912.

Patented Nov. 11, 1913.

1,078,143.

2 SHEETS-SHEET 1.

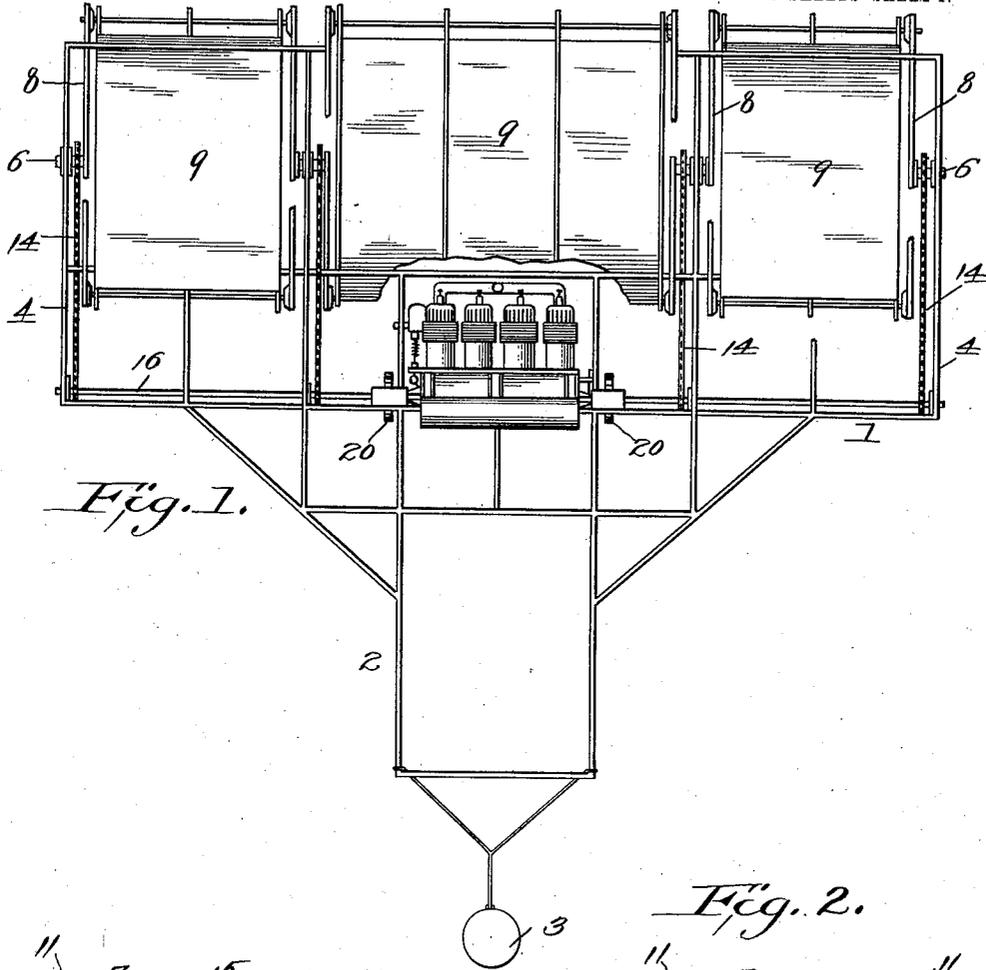


Fig. 1.

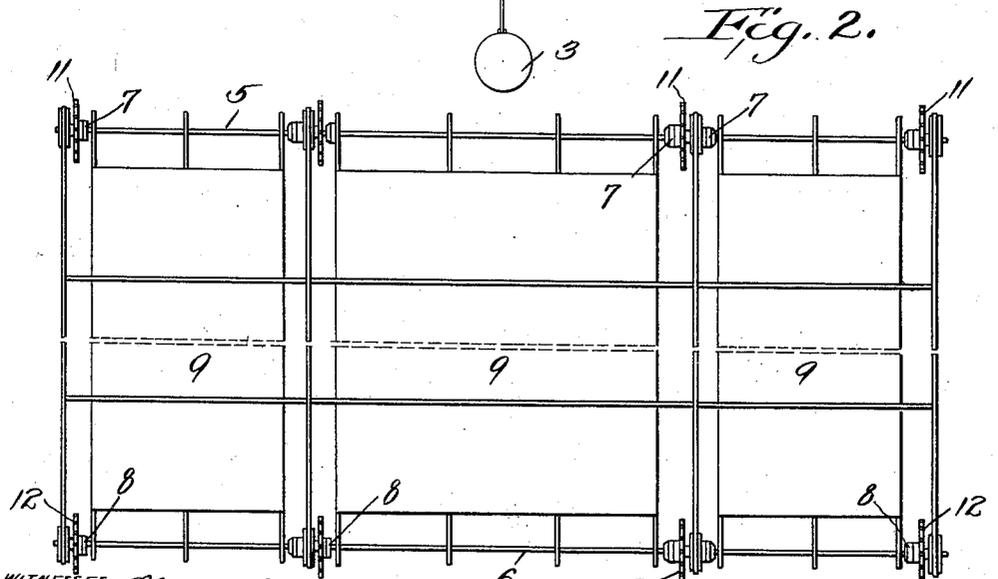


Fig. 2.

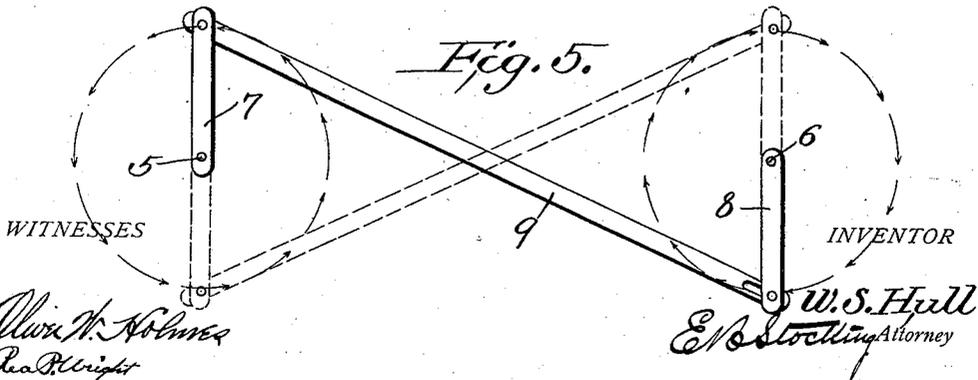
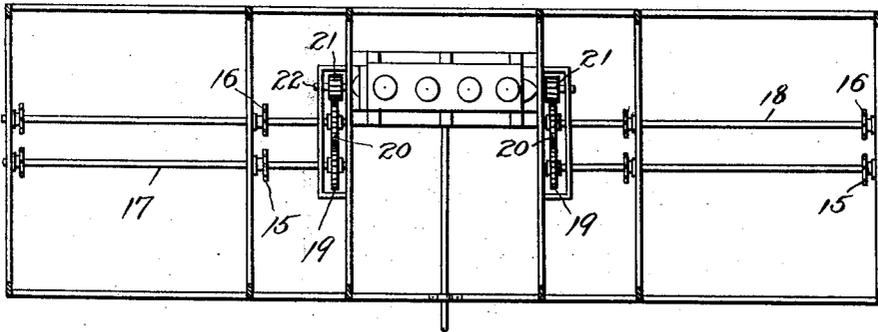
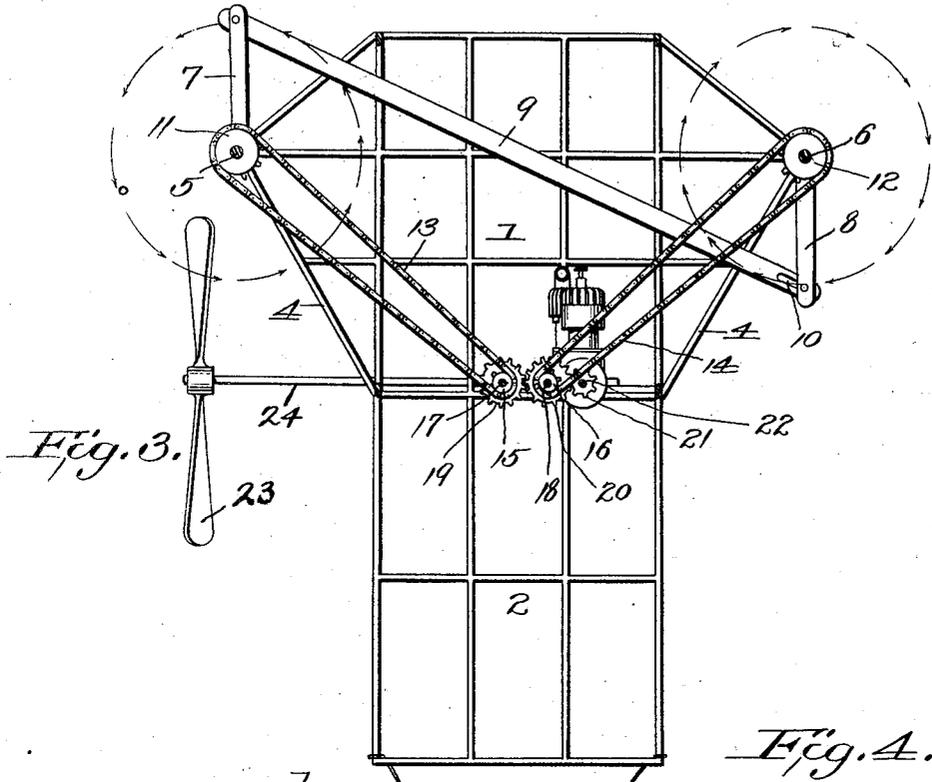
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3 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

WILLIAM S. HULL, OF JACKSON, MISSISSIPPI.

FLYING-MACHINE.

1,078,143.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed May 2, 1912. Serial No. 694,771.

To all whom it may concern:

Be it known that I, WILLIAM S. HULL, a citizen of the United States of America, residing at Jackson, in the county of Hinds and State of Mississippi, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in a lifting device for flying machines, and comprises a plurality of planes having an oscillatory and reciprocatory movement obtained by attaching each end of the plane to the arms of cranks, which when in motion are rotated in opposite directions in order to produce a motion to the planes which will obtain a lifting and a sustaining action upon the air.

Another object of my invention is to provide a novel form of lift comprising a lifting and sustaining surface, which will operate by direct pressure upon the air as the wing of a bird, as it has been found that a direct stroke against the air, of an instrument having a broad surface like the wing of a bird, will find more direct proportional resistance than any kind of a propeller.

In machines employing lifting planes as hereinbefore constructed, the main difficulty has been to perform the up-stroke in a manner not to react against the action of the down-stroke. I have overcome this difficulty and provide means so that there is no adverse resistance in the upward movement of the lift; the planes striking downwardly and gliding upwardly, each movement having the tendency to cause the machine to rise; the planes strike and glide alternately at each end, the front being reversed twice in each rotation in its upward glide, causing the lift to advance as well as to glide. The planes slide up an imaginary pivot in the center; the movement being the same as a see-saw sliding or rolling on the central bearing and in the direction of the rise, so as to obtain a continuous reciprocatory and oscillatory movement without shock.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings—Figure 1, is a front elevation of a flying machine showing the application of my improved lifting planes; Fig. 2, is a top plan view; Fig. 3, is a section taken on the line 3—3 of Fig. 1; Fig.

4, is a section taken on the line 4—4 of Fig. 1; and Fig. 5, is a detail view of the lift and manner of driving the same.

In the drawing 1 indicates a skeleton frame formed of any suitable material and of any configuration having a depending aviator's cage 2 from which extends a rod carrying a weight 3 for maintaining the machine in its proper equilibrium. The frame 1 is provided with front and rear extensions 4 in which are mounted a series of crankshafts 5 and 6, rotating in opposite directions as will be hereinafter fully described and provided with crank arms 7 and 8 to which are connected the forward and rear ends of lifting planes 9, which are preferably formed of light fabric, such as cotton, silk or the like, having ribs of wood or metal extending longitudinally from end to end, and provided with thwarts to stiffen the frame for the fabric.

In place of the fabric the web of the lift may be made of any light material such as paper, composition or any other suitable material and the end ribs of the lift become the connecting members for the two companion crank arms. Each lift comprises side bars which are pivotally connected to the rear cranks and have a sliding and pivoted connection with the forward cranks which is obtained by slotting the side bars as shown at 10. The cranks are driven at exactly the same rate of speed, and as they rotate in opposite directions, the distance of the two cranks is constantly changing which is compensated for by slots in the side bars of the planes. The cranks at the forward end having nothing to do with the driving of the lift but simply raise and lower it at the proper time; the other cranks forming the driving means. The respective shafts 5 and 6, carry sprocket wheels 11 and 12 over which sprocket chains 13 and 14 carried by sprocket wheels 15 and 16 secured on the respective drive shafts 17 and 18, which are driven by the meshing gears 19 and 20, in opposite directions. The respective pairs of driving shafts are driven by pinions 21 carried by the engine shaft 22 which is mounted on a suitable platform in the lower portion of the main frame 1, over the aviator's cage.

In the drawing, I have shown a machine with three lifts, all connected with the same crank shafts; but the cranks arranged so that the throw of the two outside ones

are set opposite on the shaft from the center cranks which gives a simultaneous down-stroke and up-glide at each side of the machine reverse to the central plane, thereby
 5 steadying and balancing the machine. While I have shown and described three lifting planes, any number may be employed, and the size and shape may be changed in order to meet the demand, as in
 10 large machines, the number of lifts will be increased and connected to cranks with throws so arranged on the shaft that each plane will be connected at a different arc of the circle described by the rotation of the
 15 crank.

The cranks are shown with the continuous runs with three throws for each run and all of the chains at one end of the lifts are connected to one shaft and all at the other end
 20 are connected to the other shaft, but the shafts can be cut so that each lift can be connected with the crank throws independent of each other. It will also be seen that each end of the lift rotates in a complete
 25 circle, yet on account of their rotating in reverse directions, there is never any pressure on the upper surface of the lift, and there is never any time during the rotation in which the lower surface is not actively
 30 pressing downwardly directly against the air. When one end is gliding upwardly it is acting on the air like a kite, and the other end at the same time strikes downwardly causing a compounding of two resisting currents of air upon the lower surface of the
 35 planes.

Any suitable construction of propelling means may be employed for driving the machine forwardly and in the drawing, I
 40 have shown a propeller 23 extending outwardly from the rear of the machine carried

by a propeller-shaft 24, which is driven by suitable driving means from the motor.

I claim:

1. In a flying machine, the combination 45 with a frame, having forward and rear extensions, of crank shafts mounted in said extensions, driving shafts, a driving connection between said crank shafts and driving shafts, a power plant for driving said driv- 50 ing shafts, and planes having the respective ends connected to the crank arms of said shaft, one end of each plane being pivotally connected and the other pivotally and slidably connected to the respective cranks. 55

2. In a flying machine, the combination with a frame having a depending aviator's cage, crank shafts arranged in pairs at the front and rear of said frame, lifting and sustaining planes pivotally connected to the 60 rear crank shafts and pivotally and slidably connected to the front shafts, sprockets carried by said shafts, drive shafts arranged centrally of said machine, sprockets carried by said drive shaft, sprocket chains 65 passing over said sprockets, meshing gears carried by said drive shaft, and a driving pinion meshing with said meshing gears.

3. In a flying machine, the combination with a frame, crank shafts arranged in pairs 70 at the front and rear of said frame, lifting and sustaining planes pivotally connected to the rear crank shafts, said planes having slotted slide bars for pivotally and slidably connecting the planes to the front crank 75 shafts.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM S. HULL.

Witnesses:

E. J. SPENGLER,
 S. O. YOUNG.