UNITED STATES PATENT OFFICE.

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AIR-NAVIGATING MACHINE.


To all whom it may concern:

Be it known that I, ERNEST MOLNAR, a citizen of Hungary, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Air-Navigating Machines, of which the following is a specification.

My invention relates to air navigating machines and the invention consists in a machine having a pair of wings with portions corresponding to feathers in the wings of birds and adapted to open and close rotarily according as the wing is on the down or up stroke, and both wings operate exactly alike and in unison, so that a description of one wing and its associated mechanism will serve for both.

In the accompanying drawings, Figure 1 is a perspective view of the machine. Fig. 2 is a plan view of one of the wings and its body connections with the wing open, as when it is on its up stroke and the feathers or vanes are rotated to edgewise position vertically. Fig. 3 is a plan view of the parts seen in Fig. 2 but considerably enlarged over the same and with the feathers or vanes of the wing closed, as in its down stroke. Fig. 4 is a sectional view on line 4—4, Fig. 5, looking to the left but showing the wing tilted up. Fig. 5 is a front elevation of a part of the machine showing the vanes spread at different angles to a horizontal plane. Fig. 6 is a front elevation of one side of the machine with the wing at the left in horizontal position therefrom and presumably on the up stroke as the vanes are open in full lines and are shown raised in dotted lines and about to be closed for descent of the wing. Fig. 7 shows the parts in full lines substantially when they are in dotted lines, Fig. 6, and Figs. 8 and 9 are details of the vane stems or shanks.

As thus shown the respective wings as such, one on each side, are represented by W, and each wing has a series of feathers or feather shaped vanes V. These vanes are substantially feather shaped like the feathers on a fowl and constitute wings of approximately butterfly shape in plan. Each vane has a stem or shank 2 of the requisite strength and slightly flexible in its outer portion, and any suitable webbing or ribbing can be used with said stems to extend more or less laterally therefrom and afford an outline skeleton to carry the aluminum or other thin covering 3. As to this covering it may be of any suitable light material whether metallic or other kind.

Each vane is rotatably mounted in a wing frame F of sector shape in the portion carrying said vanes and in which the said stems are radially disposed with axial rotation, or more definitely in the segmental portions J and J' thereof. Otherwise frame F has parallel sides and is pivotally mounted on the ends of the shaft S and adapted to swing thereon substantially half a full circle. That is, when the wings are raised as high as they will go they are in approximately perpendicular position, and when they are lowered or down they assume a substantially opposite position, thus describing about a half circle from one position to the other. The said vanes are each axially rotatable in frame F about a quarter turn, or from open to closed position, being open when they rise so as to cut the air and get back to closed carrying position as easily and quickly as possible for the down stroke when they are automatically closed and remain closed during the down stroke, as will presently be seen.

The machine has a rigid main frame B which of course is as light as consistent with the strength necessary for carrying the engine and the operating mechanism and such load as it may be built to carry, say one or more persons. Otherwise than for these particulars the said frame may have any suitable size and form, it being seen, however, that a passenger cage or carriage E is provided within this frame while there are runners G at the bottom thereof, and said runners may have wheels if preferred. A suitably constructed and arranged tail T is supported between said wings rearward.

Now, having the wings W operatively mounted in a natural position and relation in respect to the body frame B, the attachment of said wings proceeds from shaft S as will presently be seen. The said shaft S is fixed and carries the two loosely mounted gears R and T which are provided with the arms 8 and 8', respectively, said arms being adapted alternately to engage with a portion of the wing frame, whereby the same is successively raised and lowered. A sprocket wheel G is mounted on a counter-shaft S' and geared and arranged to make power connections with the engine shaft S, and a miter gear 5 is fixed on each end of
said shaft S'. The two other miter gears, 6 and 7, are loosely mounted on shaft S' as just described and both mesh in gear 5 from opposite sides, one to raise the wings and the other to lower them, to make carrying or beating strokes. The gear 6 has to do with the raising of the wings, which is an idle movement so far as buoyancy or carrying is concerned, but the change is so quickly made and the active stroke of the wings is so effective that the result of the complete action as it is repeated is like the corresponding action of the wings of a bird. The net effect of the operation is substantially equivalent to what a continuous down stroke would be. This works out through said gears 5, 6 and 7 as follows: Thus, assuming that the wings are down out of action they are raised by means of the lift finger 8 rigid with said gear 6 and adapted to reach beneath a slide 9 on the frame F in position to be engaged on its bottom side by said finger and whereby the said wing is carried upward under power to a vertical position. As the wing approaches this latter position a pair of outwardly and downwardly curved horns 10 come beneath the edge of said slide and press it back far enough to release lift finger 8 therefrom, Fig. 7. As this occurs the wing is instantly tripped or released from the lift mechanism and comes under the power of gear 7 and its depressing finger 8', Fig. 3, which engages on the top of slide 9' corresponding in every detail with slide 9 in construction and operation, and both of which are slidably mounted on a cross webbing or portion of wing frame F. Finger 8 is released by the action of horn 10 while horn 10' beneath releases finger 8' when the wing reaches the end of its down stroke and then it is free to be engaged again by the lift finger 8 and raised, and so on successively. Thus the wings are under constant power one way or the other and alternately as to the up and down strokes. Both the gears 6 and 7 and arms 8 and 8' respectively at the sides thereof revolve continuously in appropriate direction under power delivery through gear 5, as above described, and horn 10' below releases slide 9' as horn 10 releases slide 9. All the foregoing parts are alike as to both wings. The said slides 9 and 9' have springs 9' to press them back to normal position when released from the horns 10 and 10', and the fingers 8 and 8' have spring pressed portions 9', Fig. 7, which project beyond the finger proper and really make the engagement with said slides 9 and 9'.

This is in order to ensconce the contact with said slides.

Now, as the wings rise to what may be termed stroke position they are designed to open by a quarter rotation of their vanes 3, and to effect this result at the right time as well as to restore the vanes again to a horizontal position I employ two arms, 12 and 12', respectively, but built in one piece as shown and extending outward in curved lines into position to trip said vane controlling mechanism in each up and down movement successively. Thus, each wing is provided with a vane controlling segment 14, Fig. 3, having short radial projections m at its outer edge engaging in open slotted lugs or projections m, Fig. 8, on the shanks of the vane stems 2. The said segments extend between the two segments f and f' on the wing frame F. One of the outer vanes has a shank or stem 2' extending through the front segment f into segment f' and a short lever o, Fig. 3, is fixed rigidly in the outer end of said shank 2' and adapted to be engaged by said arms 12 and 12' alternately in the extremes of movements of the wing up and down. Hence when the wing is down and being raised by finger 8 the arm 12' with its hook end will engage lever 6 and rotate the said vane shank or shaft 2' and this will communicate a quarter turn to all the other vanes to an open position, such change occurring through a swinging movement of segment 14 on its pivot arm 15. In fact the raising of the wings alone will have the tendency to open said vanes or feathers 9, and said vanes also tend naturally to assume the closed or horizontal position on the down stroke, but to make sure of this the arm 12 is adapted to engage the projection o, which positively closes the vanes as the wing starts to descend. Opening and closing of the wings thus occurs automatically and positively as a necessary effect in the operations, and the hooks at the ends of said arms 12 and 12' alike engage arm o in both positions. The closing action for the vanes is shown in dotted lines in the upper portion of Fig. 6.

Now, having the machine provided with power driven wings and operating parts as described, it is of course desirable to have complete control of the wings for movements in the air, so that they can be manipulated for steering or flight, and by which the elevation and directions of travel can be changed. For example, to fly in a circle a certain position or position of the wings is required which differs from the requirements of a direct flight, and to rise or descend requires still other and different positions and manipulations of the wings. To these ends the wing controlling mechanism on each side is supported on a separate substantially rectangular open work frame D carried in part on shaft S' by means of a 125 yoke 90 sleeved on shaft S' at its middle, Figs. 4 and 6, and having arms rigid with the ends of said frame D inside, so that said frame is rotatable on said shaft as a center of rotation and support and in its segment-
tally shaped side bearings 30, Fig. 4. Levers L extend downward from the said frames D into controlling position by the operator from his seat and through these he can give any desired deflection, tilt or other movement to either wing separately that a desired direction or change of flight may require. All the mechanism having to do with the operation of the wings is mounted in or upon the said frames D. Suitable means confine said frames D rotatably in respect to or on main frame B, and said frames have each a slot 22 in one end and a set screw through same in frame B to set or fix frame D in any desired position if this be preferred. Otherwise the said slot affords a limited free movement of frame D and the screw helps to confine the frame on frame B as described. A tilted position of frame D is shown in Fig. 4. The tail T of course serves the usual function for steering and buoyancy and cooperates with the wings in flight.

I claim:

1. In aerial machines, a machine having wings at its sides provided with individually rotatable vanes and means to operate said wings comprising a supporting shaft for each wing and arms operatively mounted on each shaft adapted to act successively and give strokes to said wings in combination with means to axially rotate the said vanes to open position in their upward stroke and to close the same on their downward stroke.

2. An aerial machine with wings at its sides provided each with radially disposed vanes having axially rotatable ribs, in combination with means to rotate said vanes to open position on the up stroke and to closed position on the down stroke comprising a pivotally mounted segment 14 for each wing operatively engaged with said ribs, and means to oscillate said segment.

3. A machine to navigate the air having a pair of pivotally mounted wings and a separate shaft on which each wing is mounted, two gears on each of said shafts for each wing and one of said gears having an arm to raise the wing and the other an arm to depress the wing and produce a stroke.

4. A machine as described having a pair of wings consisting each of separate rotatable vanes and frames in which said vanes are mounted, a shaft on which said frame is pivoted, and power driven arms on said shaft adapted to engage said wings successively and produce a flying movement.

5. A flying machine having a main frame, a pair of wings and frames carrying the said wings pivotally mounted at the sides on said main frame, in combination with power driven mechanism to vibrate said wings comprising a supporting shaft for each wing, and means on said shafts to produce vibrations of said wings successively in opposite directions, said means comprising arms adapted to engage said wings alternately.

6. An aerial machine having flying wings supported on fixed pivots, in combination with means to actuate said wings comprising a shaft for each wing and two gears on each shaft adapted to receive driving power, and means operatively connected with said gears respectively and adapted to engage said wings successively and positively move the same in opposite directions.

7. An aerial machine having a wing on each side and means to actuate the same comprising a fixed shaft for each wing and means on said shaft to raise and lower said wings comprising a plurality of gears and means therewith to vibrate the wings, and means adapted to reverse the movements of the wings located at the ends of their strokes and further adapted to throw one and then the other of said gears into action.

8. A machine adapted to fly having wings provided each with a rigid frame at its base and rotatable vanes mounted in said frames, power actuated means to raise and lower said wings comprising a shaft wherein each wing frame is pivoted, gears on each shaft and arms thereon to raise and lower the wings, and means at the end of each stroke of a wing to reverse its movement.

9. An aerial machine having wings constructed each with a series of radially disposed feather-like vanes, a wing frame in which said vanes are individually rotatable, and means to rotate said vanes to open and closed positions successively comprising a sector shaped part having projections operatively engaged with said vanes and pivotally mounted on said wing frame, and means to actuate said sector in opposite directions alternately.

10. An aerial machine having wings consisting each of radially disposed feather vanes, rotatably mounted each upon its own axis, an arm adapted to carry each wing upward on its idle stroke and means to rotate said vanes axially to open position as said arm begins to raise said wing, said means comprising a laterally swinging yoke provided with means engaging each of said vanes.

11. An aerial machine comprising a main frame, side frames mounted on the sides of said main frame on a fixed axis and adapted to be tilted and a flying wing mounted on each side frame, in combination with means on said main frame adapted to cause said wings to vibrate comprising a supporting shaft mounted on each side frame and separate devices thereon adapted to reach each wing and actuate the same successively in opposite directions.

12. An aerial machine having a main
5. A frame, side frames adapted to be turned edgewise in said main frame, shafts mounted in said side frames, wings pivotally mounted on said shafts and arms mounted on said shafts adapted to successively raise and lower said wings.

13. An aerial machine having flying wings with rigid frames at their base and slidable plates thereon, a shaft and projections fixed to rotate on said shaft and adapted to engage said plates, and means to press said plates back out of engaging relation with said arms at the respective ends of the strokes of said wings.

14. In aerial machines, flying wings having rigid base frames, a shaft and separate driven gears rotatable thereon and an arm fixed to rotate with each gear and adapted to operate said wing frame alternately in opposite directions.

15. An aerial machine having flapping wings at its sides provided each with individually rotatable vanes radially arranged and means operatively connecting said vanes to turn the same collectively to open and closed position comprising a rotatable shaft having a lateral projection at its outer end and fixed means adapted to engage said projection upon each flapping stroke of the wings.

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

Witnesses:
HENRY BARNES,
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