

May 21, 1935.

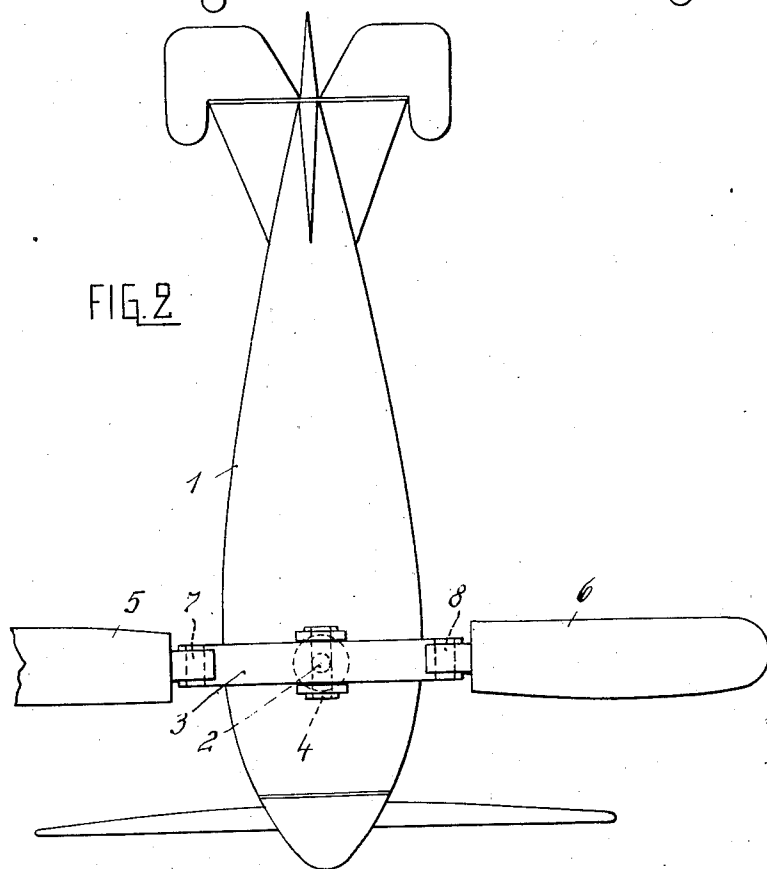
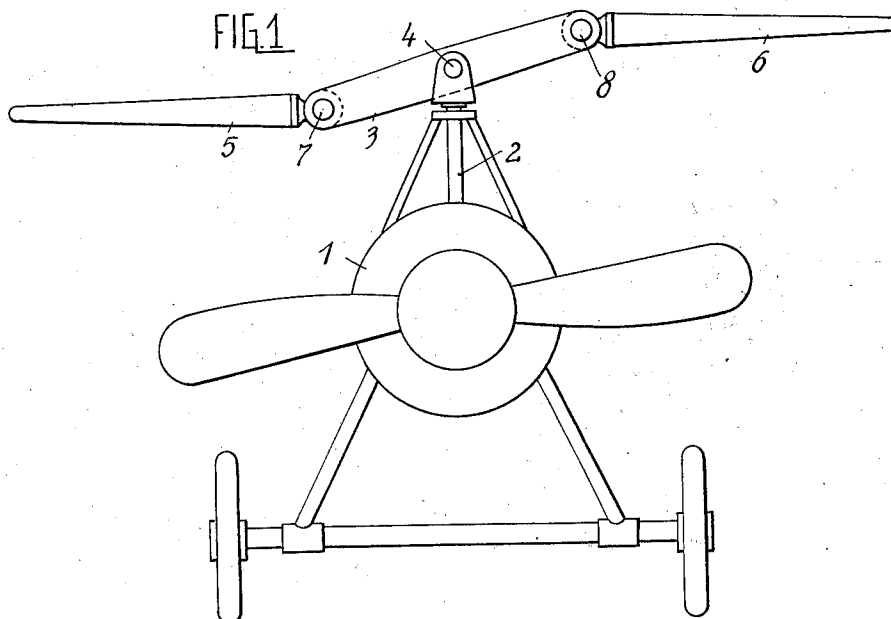
A. FLETTNER

2,002,287

FLYING MACHINE

Filed Jan. 27, 1933

5 Sheets-Sheet 1



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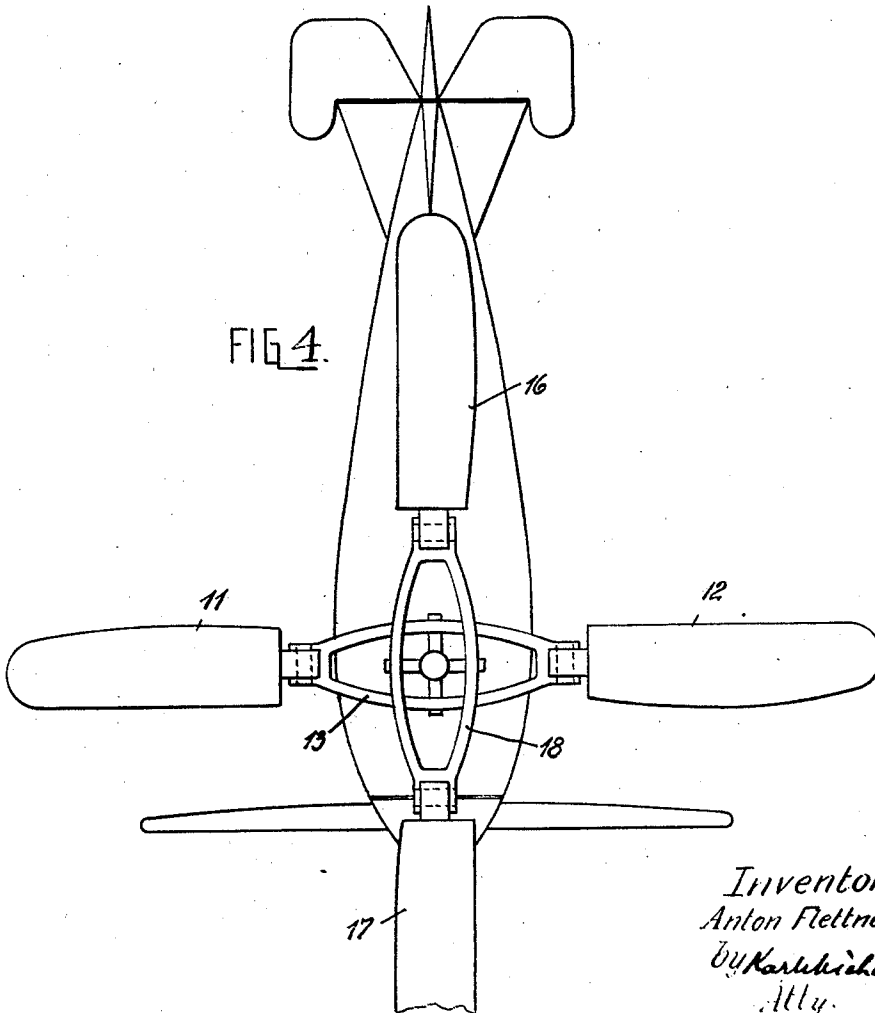
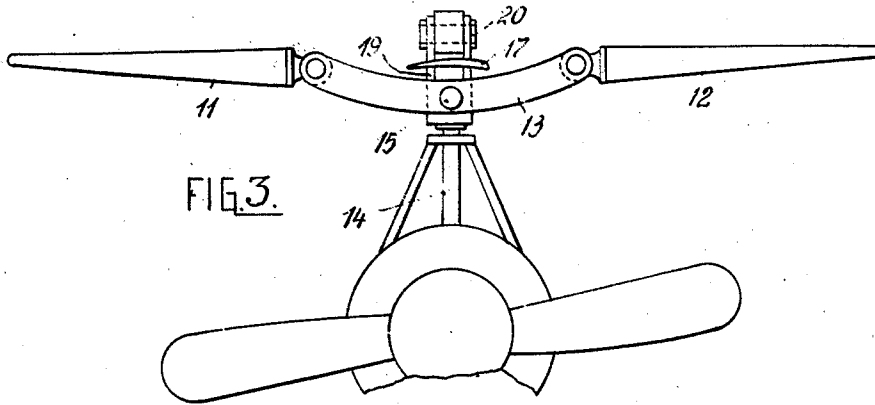
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FLYING MACHINE

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5 Sheets-Sheet 2



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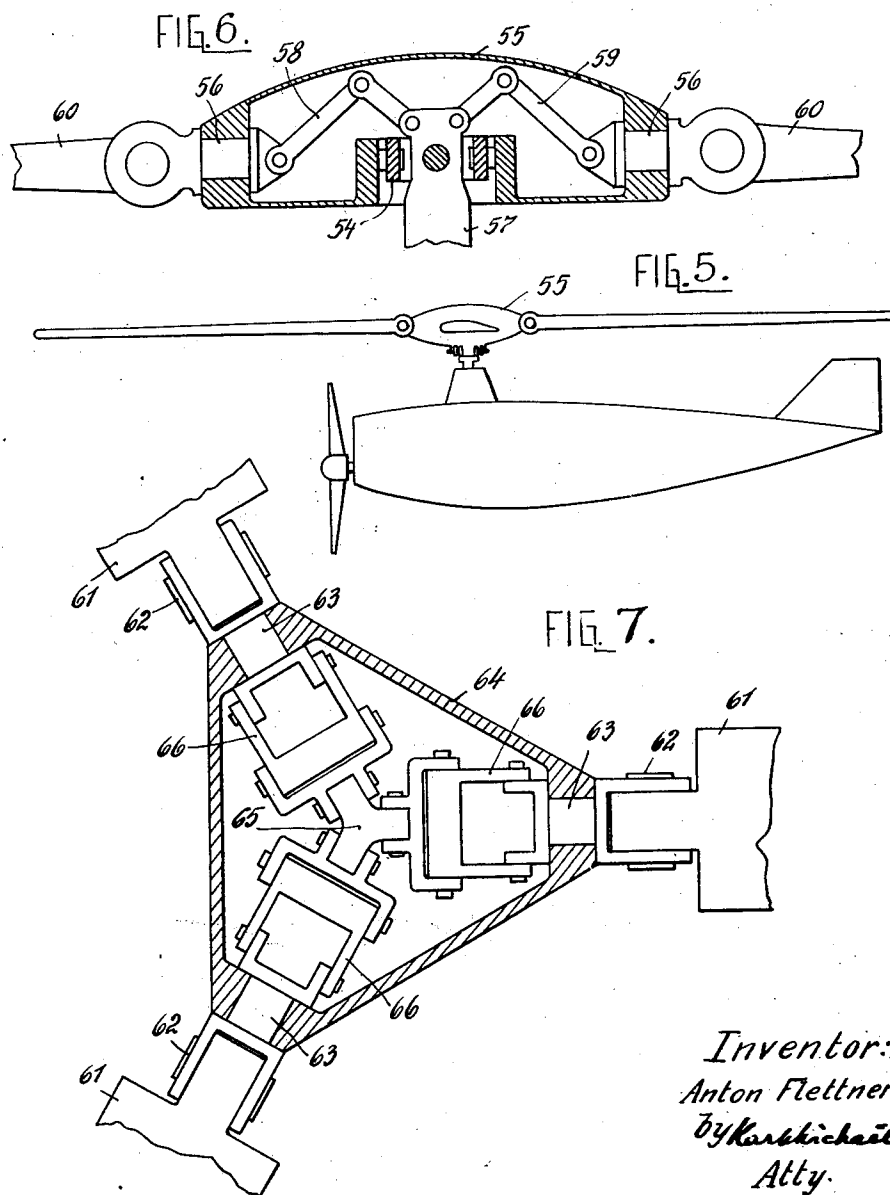
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FLYING MACHINE

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5 Sheets-Sheet 3



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2,002,287

FLYING MACHINE

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Fig. 8.

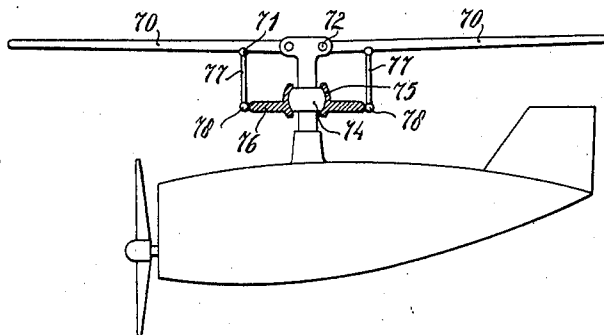


Fig. 9.

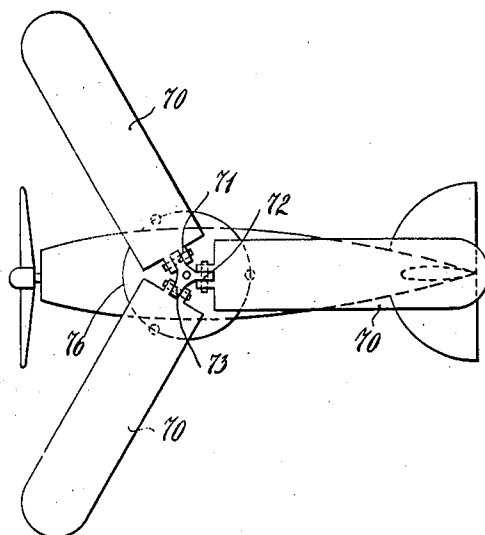
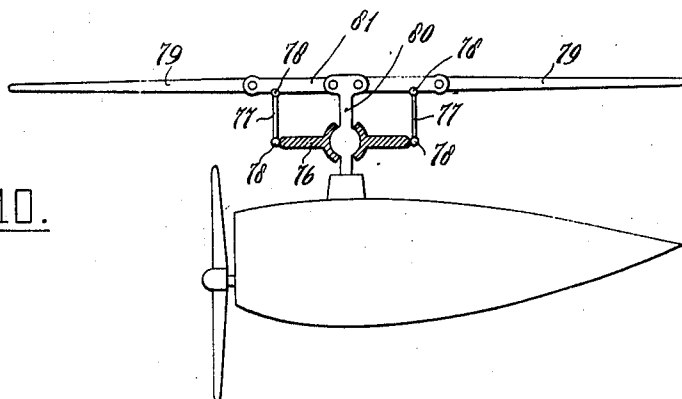


Fig. 10.



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2,002,28

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FIG. 11

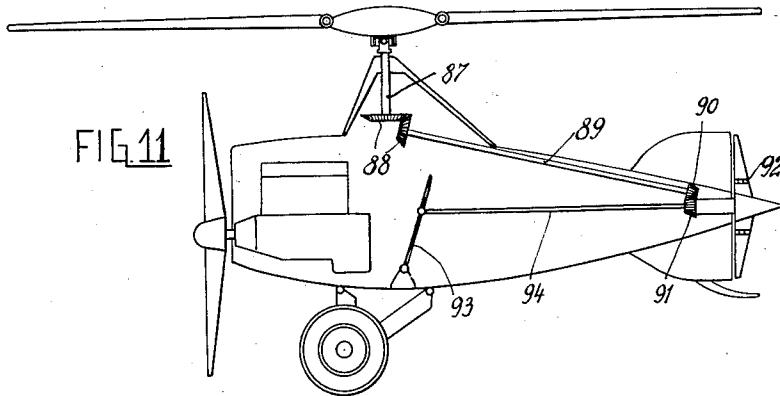
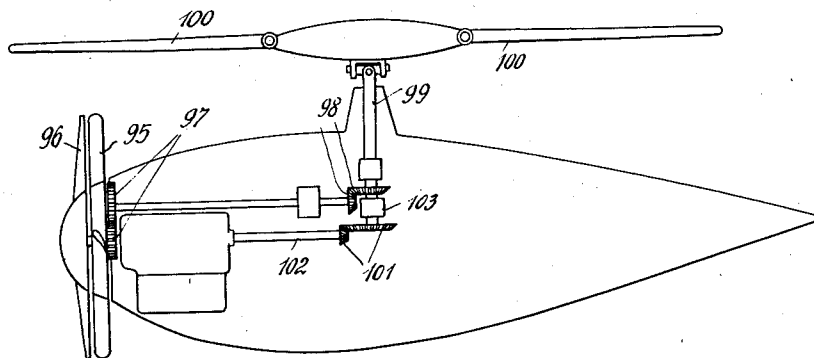


FIG. 12.



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UNITED STATES PATENT OFFICE

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FLYING MACHINE

Anton Flettner, Berlin, Germany

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In Germany February 2, 1932

10 Claims. (Cl. 244—19)

My invention relates to flying machines and more especially to that kind of machines in which a wing or wings of the single lever type rotating about a substantially vertical axis, in which the fuselage is suspended, supports and/or lifts the craft.

In the flying machine according to the present invention the wings are articulated to a balance member, rotatably mounted on the fuselage, in such manner as to be capable of substantially vertical oscillatory movement independently of the vertical components of the movements of the balance member itself.

In the drawings affixed to this specification and forming part thereof a number of flying machines embodying my invention are illustrated diagrammatically by way of example.

In the drawings

Figs. 1 and 2 are end view and plan view, respectively, of a machine in which two wings are articulated to a balance beam pivoted to the vertical shaft.

Figs. 3 and 4 are similar views of a machine having two pairs of wings connected with the shaft in a similar manner.

Fig. 5 is a side elevation of a craft having its wings articulated to a kind of swash plate, the wings being moreover connected to the shaft by other means.

Fig. 6 is a vertical section of such a connection drawn to a larger scale, and

Fig. 7 is a plan view thereof, showing the leverage as applied to a three-wing structure.

Figs. 8 and 9 are an elevation and plan view, respectively, of a craft the wings of which are articulated to the shaft, but made interdependent by a swash arrangement of a different kind.

Fig. 10 is an elevation showing a modification of the arrangement illustrated in Figs. 8 and 9, and

Fig. 11 is an elevation partly in longitudinal section of a craft having the wing shaft connected to an impeller wheel mounted to the rear of the fuselage.

Fig. 12 illustrates a modification of the arrangement last shown, in which the impeller is mounted directly behind the propeller.

Referring to the drawings and first to Figs. 1 and 2 1 is the fuselage and 2 is the vertical shaft mounted last shown. 3 is a balance beam or double-armed lever pivoted to the top end of shaft 2 at 4 so as to be able to oscillate in vertical direction. To the ends of the lever 3 are articulated the wings 5 and 6 at 7 and 8 for free independent vertical oscillation.

Supposing the wings to rotate in clockwise direction wing 6 rotating counter to the flying wind will be lifted as shown in Fig. 1 and its point of articulation 8 will be lifted correspondingly, being capable of turning about point 4. In consequence thereof the point of articulation 7 of wing 5, which is rotating substantially in the direction of the flying wind, will be depressed together with the wing itself, the centrifugal forces, which act on the two wings, tending to counteract the movement of the balance beam 3.

In Figs 3 and 4 is shown a craft having its wings arranged substantially as shown in Figs. 1 and 2. However, here four wings are provided, two diametrically opposite wings being connected with each other by being articulated to a balance beam. The wings 11 and 12 are articulated to the ends of a balance beam 13 pivoted to the vertical shaft 14 at 15. The other pair of wings 16, 17 are articulated to the ends of a balance beam 18 pivoted to the forked end 19 of the shaft at 20.

In the modification illustrated in Figs. 5 and 6 the balance beam is pivoted to the top end of the shaft by means of a universal joint 54, thus playing the rôle of a swash member. The balance beam 55 has the form of a casing in the rim portion of which are loosely mounted journals 56. The inner ends of the journals are connected to the top end of the shaft 57 by links 58, 59 which prevent the journals 56 from turning relative to the shaft, so that the wings 60 articulated to the journals 56 are prevented from oscillating in other than vertical direction, while the casing 55 constituting the balance beam is free to oscillate in any desired direction relative to the shaft.

Fig. 7 is a horizontal section illustrating the arrangement of the wings, journals, connecting links and swash casing as designed in the case where three wings are provided. Here the wings 61 are articulated by means of horizontal pins 62 to the journals 63 which are embraced by the swash casing 64 and connected to the shaft 65 by pairs of links 66, 67. The arrangement of the wings and the casing 65 relative to the shaft is exactly the same as described with reference to Figs. 5 and 6.

Another kind of swash arrangement is shown in Figs. 8 and 9, where three wings 70 are shown as being articulated to the shaft at 71, 72, 73. 74 is a spherical segment mounted on the shaft and 75 is a ring formed with an inner spherical surface which bears on the surface of the spherical segment 74, thus forming a universal joint. The ring 75 forms the hub of a disc 76, being

at its periphery connected with the wings 70 by means of rods 77, the connection between the rods 77 and the wings and disc, respectively, being made by universal (ball) joints 78.

5 The modification illustrated in Fig. 10 differs from that shown in Figs. 8 and 9 in that the wings 79, instead of being articulated to the shaft 80 direct, are pivotally connected to it by means of links 81, which are in turn coupled
10 with the disc 76 (shown also in Fig. 8) by means of rods 77 and universal joints 78.

In the flying machine illustrated in Fig. 11 the shaft 87, to which the wings are here shown as being articulated for instance in the manner
15 illustrated in Fig. 6, is positively connected with an impeller wheel 92 by means of cog wheels 88, an intermediate shaft 89 which has a cog wheel 90 mounted on its rear end, which meshes with another cog wheel 91 mounted on the
20 shaft of the impeller 92, which is driven either by the air current created by the rotating propeller or by the relative wind. Obviously this impeller, if driven by the propeller wind, before the craft has been started, will impart rotation
25 to the shaft 87 and the wings articulated to it. During flight the relative wind may cause rotation of the impeller, thereby imparting a certain impulse to the wings also.

The pitch of the blades of the impeller 92
30 can be adjusted as required by a hand gear 93 and connecting rod 94.

Fig. 12 illustrates a modification of the arrangement shown in Fig. 11, the impeller 95
35 being here mounted directly to the rear of the propeller 96 on a hollow shaft (not shown) embracing the propeller shaft and by means of a train of gear wheels 97, 98 is capable of rotating the shaft 99 carrying the wings 100. This shaft being operatively connected by means of
40 cog wheels 101 with an extension 102 of the engine shaft can be positively driven by the engine if the coupling 103 is thrown in.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:—

1. Flying machine comprising in combination a
50 fuselage, a balance member mounted on said fuselage for rotatory and free rocking motion and wings articulated to said balance member for free oscillatory movement relative to said member.

2. Flying machine comprising in combination
55 a fuselage, a balance beam mounted on said fuselage for rotatory and free rocking motion and wings articulated to said balance beam for free oscillatory movement relative to said beam.

3. Flying machine comprising in combination a

fuselage, a swash member mounted on said fuselage for rotatory and free tumbling motion and wings articulated to said swash member for free oscillatory movement relative to said member.

4. Flying machine comprising in combination a
5 fuselage, a swash member mounted on said fuselage for rotatory and free tumbling motion, wings articulated to said swash member for free oscillatory movement relative to said member, and means for preventing movement of said wings in
10 planes other than the planes containing the axis of rotation of said swash member.

5. Flying machine comprising in combination a
15 fuselage, a vertical shaft extending upwardly from said fuselage, a balance member mounted on said shaft for rotatory and free rocking motion, and wings articulated to said balance member for free oscillatory movement relative to said member.

6. Flying machine comprising in combination a
20 fuselage, a vertical shaft extending upwardly from said fuselage, a swash member mounted on said shaft for rotatory and free tumbling motion and wings articulated to said swash member for free oscillatory movement relative to said member.
25

7. Flying machine comprising in combination a
fuselage, a vertical shaft extending upwardly from said fuselage, a swash member mounted on
30 said shaft for rotatory and free tumbling motion, wings articulated to said swash member, an impeller associated with said fuselage and means for transmitting power from said impeller to said shaft.

8. Flying machine comprising in combination a
fuselage, a vertical shaft extending upwardly
35 from said fuselage, a swash member mounted on said shaft for rotatory and free tumbling motion, wings articulated to said swash member, an impeller mounted at the tail end of said fuselage, and means for transmitting power from said im-
40 peller to said shaft.

9. Flying machine comprising in combination a
fuselage, a vertical shaft extending upwardly from said fuselage, wings articulated to said shaft
45 for free motion, a propeller rotatable about a horizontal axis, an impeller to the rear of and close to said propeller, and means for transmitting power from said impeller to said shaft.

10. Flying machine comprising in combination
a fuselage, a vertical rotatable shaft extending
50 upwardly from said fuselage, a swash member mounted on said shaft for oscillation in all directions, journals extending radially to said shaft, links connecting said journals with said shaft and preventing rotation of said journals relative
55 to said shaft, and wings articulated to said journals for oscillation about axes extending at an angle to the journal axes.

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