

March 29, 1927.

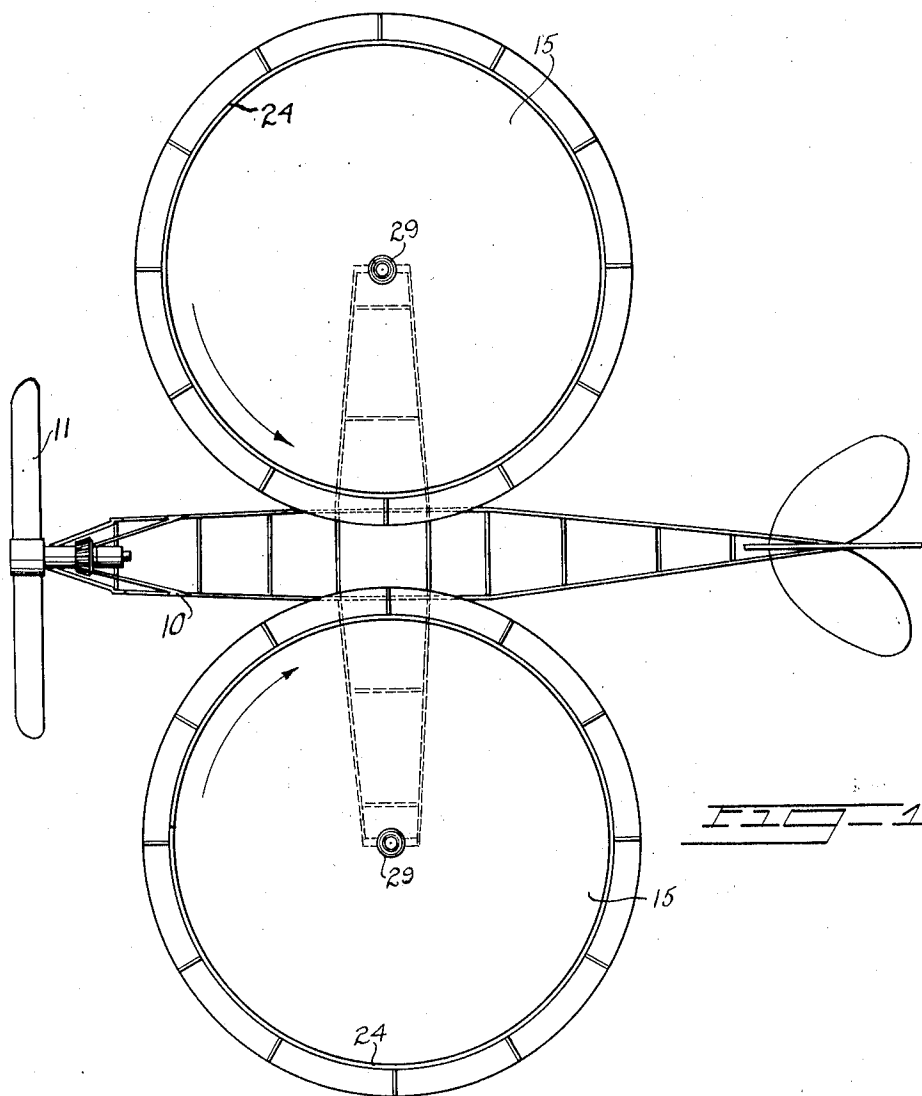
1,622,844

A. D. RAY

AEROPLANE

Filed April 22, 1926

3 Sheets-Sheet 1



Inventor

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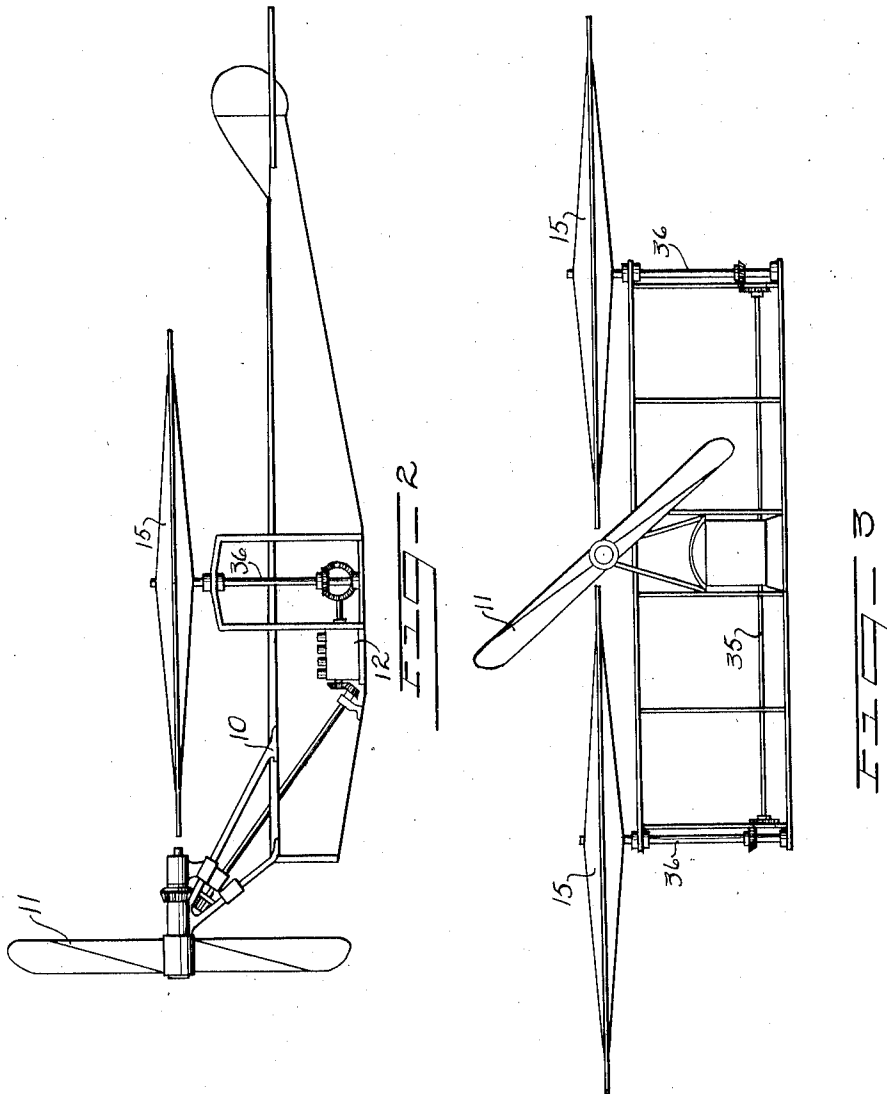
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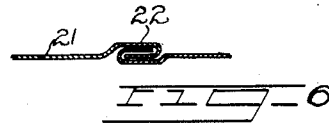
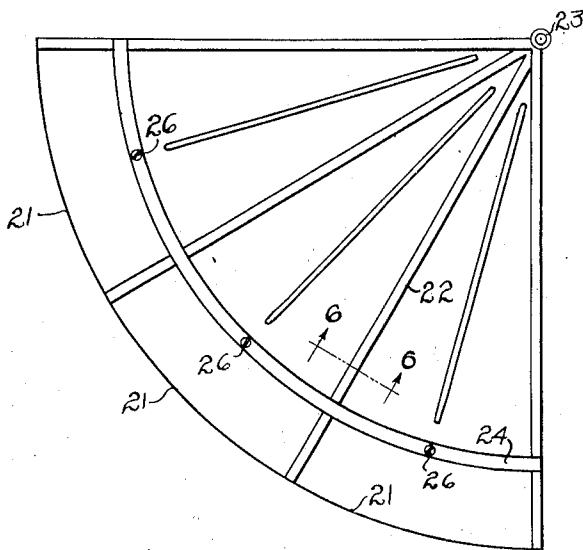
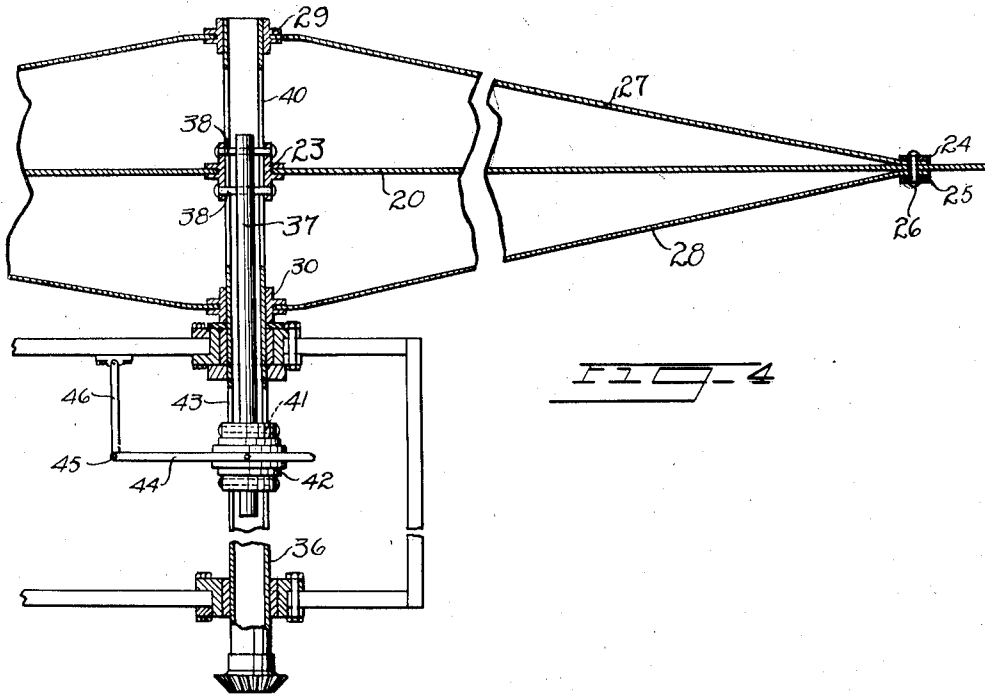
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UNITED STATES PATENT OFFICE.

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AEROPLANE.

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The principal object of the present invention is to utilize in a flying machine, the principle of buoyancy which enables a thin tin pie plate to be carried a remarkable distance whenever it is thrown with a whirling action into the air. By using this principle of buoyancy I provide mechanism which assists in propelling the machine in a forward direction, which will facilitate rising, and landing, and enable the machine to hover in a more expeditious manner.

I carry out the above objects by replacing the wings of a flying machine with disc-like members, which are adapted to be rotated while the machine is in motion. In the preferred form, I employ two such discs and mount one on each side of the propeller. The discs are each mounted to rotate upon a vertical axis and embody cone shaped members, the central horizontal planes of which are substantially in the same plane as the axis of the propeller. The discs are arranged to be rotated in opposite directions, wherefor the spent air or back pressure from the forward propeller is utilized to assist in rotating the discs. To assist further in operating the flying machine I make the rim of each disc adjustable in a vertical direction and provide means for selectively adjusting the position of the rim. For example, while the machine is in forward flight the rims may be retained in horizontal position and while rising or gliding downwardly the rims may be either raised or lowered respectively.

In the drawings Fig. 1 is a plan view of a flying machine embodying my invention; Figs. 2 and 3 are side and front elevations respectively of the machine shown in Fig. 1; Fig. 4 is a vertical section through one of the operating discs; Fig. 5 is a plan view showing a part of the disc with the upper and lower covers removed and showing the diaphragm construction; Fig. 6 is a section taken on a plane indicated by the line 6-6 in Fig. 5.

My invention is shown in connection with a flying machine having a fuselage 10 on which a propeller 11 is rotatably mounted and is suitably connected to a motor indicated at 12. In place of the usual wings I employ preferably two disc-like members 15 each of which is mounted for rotation upon a vertical axis on one side of the propeller axis. The discs are arranged to be rotated by the motor 12 and are adapted to be actuated at a relatively high rate of speed and

to be selectively controlled so that one may rotate if desired at a faster rate of speed than the other disc. The combined area of the discs is substantially equal to that required for wings while the mechanism for rotating the discs is so arranged that they rotate in opposite directions. The disc-like rotatable members are preferably fabricated so as to make them strong yet light in weight. To this end each member has a diaphragm 20 which normally is disposed in a horizontal plane and is arranged to be moved vertically at the center with reference to the machine frame, in order to warp or deflect the peripheral portion and thereby to assist in rising or landing. The diaphragm, as shown in Fig. 5, is fabricated from segmental shaped sections of radially ribbed light sheet metal 21 which are joined along the radial edges as by an interlocking connection 22. These sections are attached near the center to a flanged sleeve 23 and are further attached near the outer edge to clamping rings 24 and 25 by securing members 26. The joint 22 allows slight relative motion between the sections whenever the center is raised or lowered with reference to the frame.

The diaphragm, as indicated in Fig. 4, is enclosed by an upper casing 27, and a lower casing 28, each of which is substantially conical in shape, and which may be made of fabric material, such as that usually employed for aeroplane wing construction. The outer peripheral portion of each cover is shown as being clamped to the diaphragm by the rings 24 and 25 while the central or inner portions are shown as being clamped to collars 29 and 30 respectively.

To rotate the discs, I have indicated a cross shaft 35 which is operatively geared to the motor and in turn is geared at each end to vertical shafts 36. These last mentioned shafts as shown in Fig. 4 are hollow and have a rigid connection with the collars 29 and 30 and a splined connection with the sleeve 23. This splined connection allows the central part of the diaphragm to be raised or lowered with reference to the shaft for warping the diaphragm, and thereby tilting that portion which projects beyond the rings 24 and 25.

To shift the sleeve 23, I have shown a rod 37 within the shaft 36. The upper end of the rod is rigidly connected as by securing members 38 to the sleeve through a slot

40 in the hollow shaft. The lower end is connected through securing members 41 to a sleeve 42 through a slot 43 in the hollow shaft. A yoke 44 pivotally mounted at 45 to a link 46 illustrates a means for shifting the sleeve 42, and thereby for shifting the center of the diaphragm vertically with reference to the frame.

In the preferred form the rotatable wing members are so mounted that a horizontal plane passing through the axis of the propeller also passes through the mid-portion of the members. Moreover, the discs are arranged to be rotated in opposite directions, and adjacent portions are therefore arranged to travel in the same direction. The direction of rotation then is such that the adjacent portions rotate in the same direction as the current of air which is set into motion by the propeller. In this way the propeller assists in rotating the discs.

If desired, I may employ a clutch (not shown) for disengaging one shaft 36 from the motor independently of the other and thereby allowing one disc to rotate at a higher rate of speed than the other for assisting the machine while banking on a curve. Moreover, if desired the warping of the discs may be accomplished independently or jointly to facilitate to a further degree the handling of the machine.

A flying machine embodying my invention is exceptionally advantageous in that the

whirling discs have a gyroscopic effect which functions to maintain the machine in equilibrium while flying in a horizontal direction. An additional advantage is the fact that the peripheral portion may be raised or lowered with reference to the central portion. This enables the machine to hover at a greatly reduced speed, and facilitates rising and landing by enabling such operations to be accomplished at a reduced rate of speed.

Having thus described my invention, I claim:

1. An aeroplane wing embodying a rotatable hollow member having a diaphragm adjacent the central portion thereof, the diaphragm projecting beyond the marginal edges of the hollow portion and being movable with reference thereto.

2. In an aeroplane, the combination with a propeller, of a pair of disc-like rotatable members, each having the axis thereof extending substantially at a right angle to the axis of the propeller, and being so positioned that a horizontal plane passing through the axis of the propeller also passes through the mid-portion of each member, means for rotating said members in opposite directions, and means for warping each of said members adjacent the marginal edges thereof.

In testimony whereof, I hereunto affix my signature.

ALBERT D. RAY.