A. J. BEAUREGARD.

FLYING MACHINE.

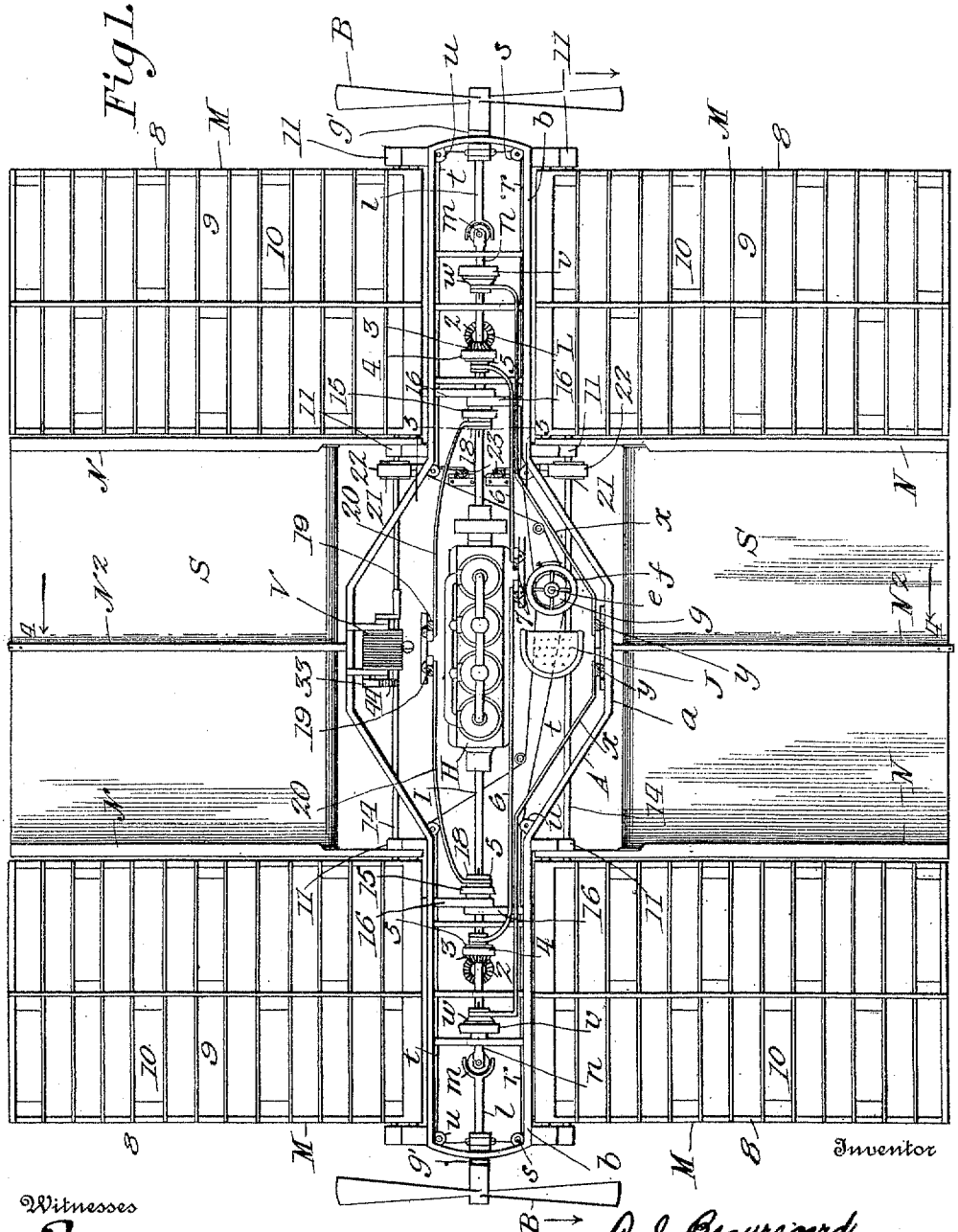
APPLICATION FILED SEPT. 30, 1910.

984,258.

Patented Feb. 14, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

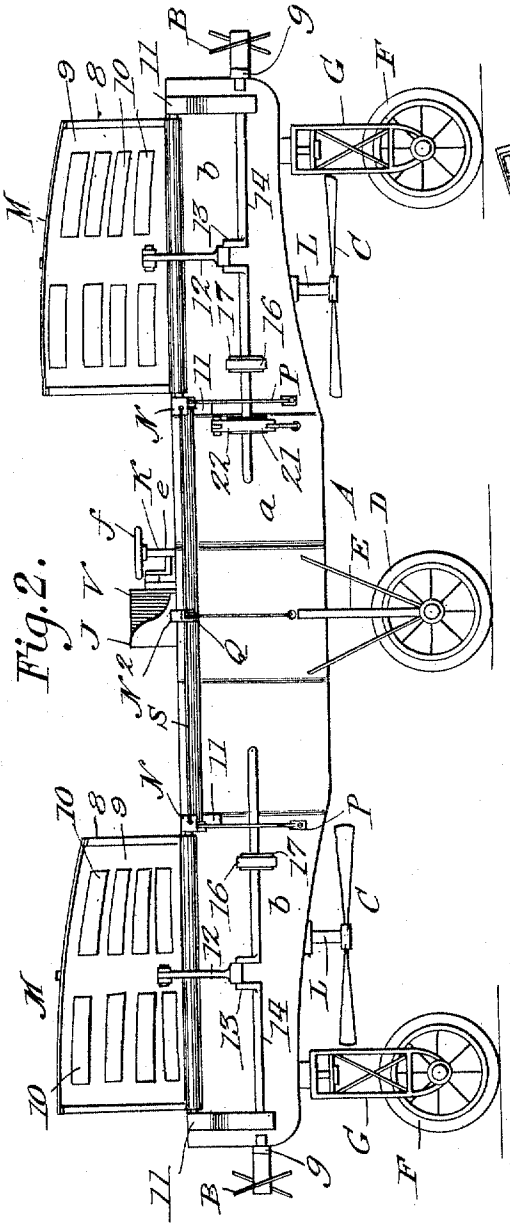

Fig. 2.

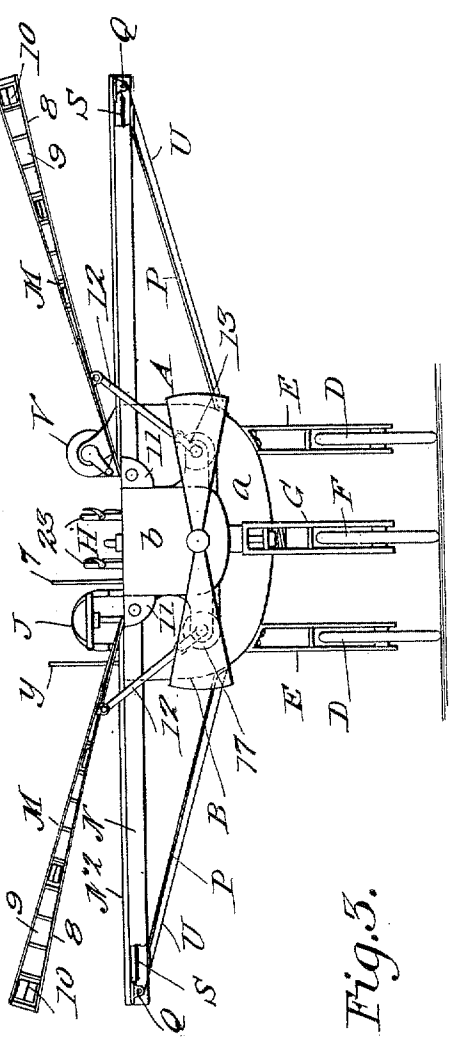

Fig. 5.

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3 SHEETS--SHEET 3.

Fig. 4.

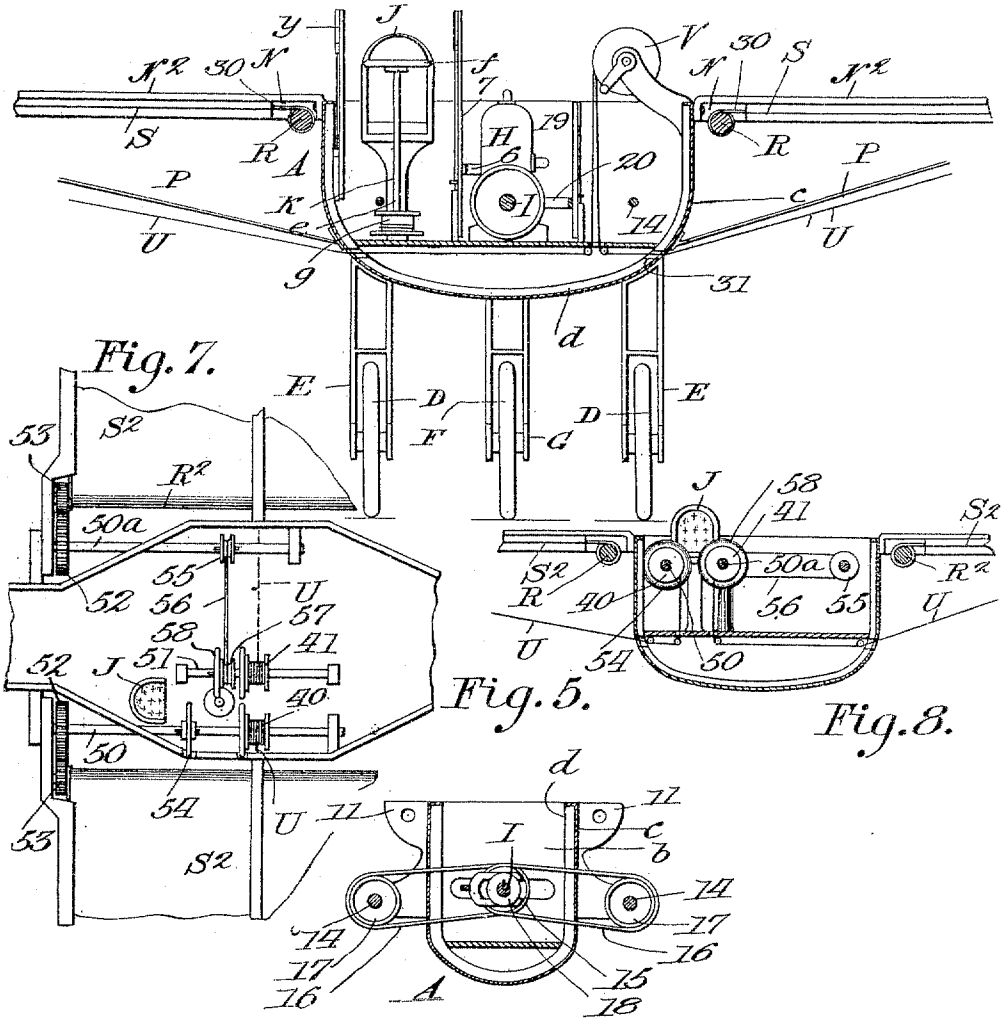

Fig. 7.

Fig. 5.

Fig. 8.

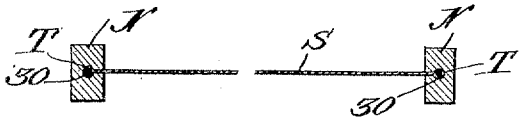

Fig. 6.

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FLYING-MACHINE.

984,258. Specification of Letters Patent. Patented Feb. 14, 1911.

Application filed September 30, 1910. Serial No. 584,753.

To all whom it may concern:

Be it known that I, ADELARD J. BEAUREGARD, citizen of the United States, residing at Woonsocket, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

My invention has to do with flying machines designed to carry one or a plurality of persons; and it has for one of its objects to provide a flying machine which is maintained in the air by force exerted perpendicularly against the atmosphere, and is therefore not liable to dip—*i. e.*, casually move downward or upward, when it passes from one air current into a stronger or weaker one.

Another object of the invention is the provision of a flying machine embodying means whereby the buoyancy and gliding capacity of the machine can be expeditiously and easily increased to a large extent in the event of the engine stopping from any cause, this with a view of enabling the machine to gradually fall or glide to the earth and make a safe landing.

Another object is the provision in a flying machine, of propeller and wings for raising the machine, propellers for moving the machine forward in the direction of its length, and means whereby the driver of the machine is enabled to conveniently control the first-named propellers, the wings, and the second-named propellers, each independently of the others.

My invention will be best understood by reference to the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings: Figure 1 is a plan of the flying machine constituting the best practical embodiment of my invention of which I am cognizant. Fig. 2 is a side elvation, and Fig. 3, a front elevation of the machine. Fig. 4 is a broken transverse section, taken on the line 4—4 of Fig. 1, looking in the direction indicated by the arrow. Fig. 5 is a detail transverse section taken on the line 5—5 of Fig. 1, looking in the direction indicated by arrow. Fig. 6 is a detail section showing one of the buoyancy-increasing planes hereinafter specifically referred to. Figs. 7 and 8 are detail views illustrative of an alternate construction specifically referred to at the end hereof.

Similar letters and numerals designate corresponding parts in all of the views of the drawings, referring to which:

A is the body of the machine. The said body A comprises an intermediate portion *a* and comparatively narrow end portions *b*, and is preferably formed of canvas or other thin and strong material *c* stretched over and suitably fastened to an appropriate skeleton frame work *d*, as shown in Figs. 4 and 5. The ends of the intermediate portion *a* of the body are tapered to the points where they merge into the narrow end portions *b*, and from this it follows that when moved endwise the body as a whole will offer but little resistance to the air. It will also be noted here that the body A has the characteristics of a boat hull, and that, therefore, in the event of the machine accidentally dropping in a body of water, the said body will contribute materially to the floatability of the machine as a whole and will lessen the liability of the same sinking.

Arranged at the ends of the body A are vertically-disposed propellers B designed for use in moving the machine in the direction of its length through the air, and located in vertical alinement with the comparatively-narrow end portions *b* of the body are horizontally-disposed propellers C. These propellers C are preferably, though not necessarily, positioned below the body portions *b*, as shown, instead of above said body portions.

D D are wheels mounted in hangers E fixed to the body portion *a*, and F F are wheels mounted in hangers G which are swiveled to the body portions *b'*. The said wheels serve to support and facilitate movement of the machine on the ground, and the hangers G of the wheels F are connected in a swiveled manner to the body portions *b*, as stated, in order that the machine can be conveniently guided when moved on the ground.

H is an engine of conventional or any other suitable type that is mounted in the intermediate portion *a* of body A.

I is a longitudinal-central main shaft, mounted in suitable bearings in the body A and permanently connected with the engine so as to derive motion therefrom.

J is a driver's seat arranged by preference

in the body portion *a* at one side of the engine H.

K is steering mechanism suitably mounted in front of and adjacent the seat J and comprising a shaft *e*, a wheel *f* fixed on said shaft, and a drum *g* also fixed on the shaft, Fig. 1.

The before mentioned propellers B are fixed on the outer ends of shafts *l* which are mounted to move laterally with sliding bearings *g'* in the end portions of the body A, and the said shafts *l* are connected through universal joints *m* with countershafts *n* through the medium of which the shafts *l* and the propellers B are rotated from the main shaft I, as hereinafter described.

By reference to Fig. 1, it will be noted that the sliding bearings *g'*, which loosely receive the shafts *l*, are connected by cables *r*, which pass around sheaves *s*, to the drum *g* on the shaft *e*, and that the shafts *l* are also connected with the drum *g* by cables *t* which pass around sheaves *u*. It will also be noticed that the arrangement of the cables *r* and *t* relative to the drum *g* is such that when the drum is turned in one direction both propellers B will be moved through the medium of the cables *r* toward the right-hand side of the machine, while when the drum is turned in the opposite direction, both propellers B will be moved through the medium of the cables *t* toward the left-hand side of the machine. By the described synchronous lateral movements of the shafts *l* carrying the propellers B, the machine can be effectually guided while in flight.

I prefer the means described for synchronously moving the propellers B toward the same side of the machine, but do not desire to be understood as confining myself to the same, inasmuch as other appropriate means may be employed for the purpose without involving departure from the scope of my claimed invention.

When the propellers B are utilized to move the machine over the ground, the machine may be steered by moving the shafts *l* laterally; the wheels F in that case readily accommodating themselves to the direction in which the machine is guided.

The countershafts *n* are provided at their inner ends with suitable clutch-members *v* which are fixed thereon, while the main shaft I is equipped at its ends with complementary clutch members *w* splined on or otherwise adapted to turn with the main shaft and move thereon in the direction of the length thereof. The clutch members *w* are connected through bars *x* with hand levers *y* located adjacent the seat J, and hence it will be observed that when the engine H is in operation, the driver is enabled to start or stop each propeller B independently of the other, as occasion demands.

The before mentioned propellers C have for their office to raise the machine in the air, and they may therefore be properly denominated altitude propellers. Said propellers C are carried by upright shafts L, journaled in suitable bearings in the body A, and the said upright shafts L are provided at their upper ends with beveled gears 2 which are intermeshed with beveled gears 3 fixed to clutch members 4 that are loosely mounted on the main shaft I. Splined or otherwise mounted on the main shaft I to turn therewith and move endwise thereon are clutch members 5 complementary to the members 4, and the said clutch members 5 are connected through bars 6 with hand levers 7 located within convenient reach of the driver's seat J. Thus it will be manifest that with the engine H in operation, the driver can conveniently start or stop either altitude propeller C independently of the other. The clutches intermediate the main shaft I and the shafts L may be and preferably are variable-speed clutches of known type, this in order that one of the propellers C may be operated at a greater or less speed than the other as required by the number and location of the persons carried in the body A, and also in order that the propellers C may be entirely stopped when the desired altitude is reached or may be driven at the rate of speed necessary to maintain the machine at such altitude while headway is being gained under the action of the propellers B. I would also direct attention here to the fact that rotation of the propellers C while the machine is being moved forward by the propellers B serves to prevent dipping or sudden downward movements of the machine when it is intersecting adjacent air currents of different velocities and power.

M M are wings arranged in fore and aft pairs, and designed when actuated to assist the propellers C in raising the machine in the air, and in preventing the objectionable dipping before referred to. The said wings respectively comprise a suitable frame 8, and a covering 9, of silk, canvas or other suitable material, on said frame, which covering is provided with valves 10, designed to close when the wing is moved downward so as not to lessen the lifting capacity of the wing, and to open when the wing is moved upward and in that way lessen the liability of the wing impeding the rise of the machine. I would also have it understood that I prefer to curve each wing downward and forward and to gradually merge the curved portion into a straight portion as said curved portion approaches the center of movement of the wing, Figs. 2 and 3, this being advantageous since it enables the wing when oscillated to exert a pulling force.

The frames 8 of the four wings M are pivotally connected in suitable manner with

bearings 11 on the body A, and said frames are also connected through pitmen 12 with cranks 13 on countershafts 14. The countershafts 14 are designed to be driven from the main shaft I through the medium of clutch members 15 loose on the main shaft I, suitable drive-belts 16 intermediate said clutch members 15, and wheels 17 fixed on the countershafts 14, and clutch members 18 splined on or otherwise suitably connected to the main shaft I and designed to be moved into and out of engagement with the clutch members 15 to start and stop the oscillation of the wings. The clutch members 18 are designed to be conveniently moved into and out of engagement with the clutch members 15 through the medium of the hand levers 19 and the bars 20 intermediate said levers and the clutch members 15. On the countershafts 14 are fixed band wheels 21, and arranged on the said band wheels are brake bands 22 which are suitably connected at their outer ends with the body A, and have their inner ends connected to hand levers 23. The said hand levers may be adjustably fixed by detents (not shown) thereon coöperating with fixed segmental racks (also not shown). Consequently when the clutch members 18 are disengaged from the clutch members 15, and the levers 23 are swung inward to tighten the brake bands 22 on the band wheels 21, and are adjustably fixed, the countershafts 14 and the wings M connected therewith are securely held against movement. From this it follows that the driver of the machine can conveniently secure the wings M in various positions when the driving connections between the main shaft and said wings are interrupted.

I prefer to employ the means shown and described for controlling the transmission of motion from the main shaft I to the propellers B and C and the wings M, and for braking or holding the said wings against movement, but I do not desire to be understood as confining myself to the same, as other means may be employed for the purpose without affecting my claimed invention.

When the operator in the body A wishes to raise the machine straight up from the ground, he starts the engine H and then establishes the connections between the main shaft I and the shafts L, and the connections between the main shaft and the countershafts 14, whereupon the propellers C will be rapidly rotated and the wings M will be oscillated, and the machine as a whole carried upward in the air. I would also have it understood that the propellers C alone may be actuated to raise the machine, and that when deemed expedient the machine may be driven forward and raised at the same time by simultaneously actuating the traveling propellers B, the altitude propellers C and the wings M from the main shaft I. When the machine is raised by the altitude propellers C or by said propellers C with the assistance of the wings M, and the desired altitude is reached, the wings M, if in operation, are stopped, and the speed of the propellers C is lessened, while the propellers B are put in operation to move the machine forward in the air; the machine then being steered by moving the shafts *l* laterally as before described. I would further have it understood that while the machine is being moved forward as described in the foregoing either the altitude propellers C or the wings M or both may be actuated, if necessary, to prevent downward movement of the machine and the dipping before referred to. It will be appreciated, however, that the wings M when at rest and especially when in a horizontal position, serve as planes and in that way tend to prevent downward movement of the machine while the propellers B are in operation.

The wings M of the forward pair are separated by intervening spaces from the wings M of the rear pair, and in the said intervening spaces are arranged my novel devices for affording increased buoyancy and lessening the liability of a destructive fall in the event of the engine stopping. The said devices respectively comprise frame-bars N N^2 located between fore and aft wings and fixed at their inner ends to the body A, inclined stays P connected to said bars N N^2 and the body A, a pulley Q carried at or near the outer end of the intermediate bar N^2, a roller R mounted between the inner portions of the bars N, a flexible curtain or plane S, of canvas or other suitable material, that is normally wound on the roller R and has the outer ends of its enlarged edge portions 30 normally disposed in the inner ends of the retaining channels T in the bars N (see Figs. 4 and 6), and a cord U connected to the outer end of the curtain S and passed outward and around the pulley Q and then back and through an aperture 31 in the body A, Fig. 4. The curtain S is disposed below the frame bar N^2 as shown in order to enable said bar to prevent upward movement or swelling of the intermediate portion of the curtain. The cables U of the two curtains or planes S are passed around suitable guides in the body A, and are preferably connected to suitable means for taking up the same, such, for instance, as a cranked drum V mounted in the body A and designed to be held against retrograde rotation by the coöperating pawl 33 and ratchet 44 shown in Fig. 1; the pawl being connected to one of the bearings of the drum V, and the ratchet being fixed with respect to the said drum.

In the event of the engine stopping while the machine is in flight, the driver applies

the brakes described to adjustably fix the wings M, and then turns the drum V to take up the cords or cables U and thereby draws the curtains S outward in the frame bars N and under the frame bars N^2 until the curtains extend from the body A to the pulleys Q. With the curtains S secured in the extended position, the buoyancy of the machine in the air is greatly increased, and consequently the machine is enabled to float and glide in safety to the earth notwithstanding the idleness of the engine.

While I have shown and described one form of my invention, it is to be understood that I am not limited to the details or the form or relative arrangement of parts disclosed, but that extensive modifications may be made therein, without departing from the spirit thereof. For instance I do not desire to be understood as confining myself to the specific means shown and described for controlling the transmission of motion from the engine to the several working parts, this for the reason that when deemed expedient separate handles can be used to control the altitude propellers C, and all of the other working parts—*i. e.*, the propellers B and wings M can be operated together under the control of one handle.

To provide for rolling up the curtains or flexible planes as well as drawing the same outward, I have devised the construction shown in Figs. 7 and 8 which construction can be used in lieu of that shown in Figs. 1–6 in the discretion of the manufacturer. By reason of the said construction, when the curtains are spread to the full extent and the machine gravitates more rapidly on one side than on the other, the operator can then draw the highest curtain inward to the extent necessary to enable that side to fall faster and in that way can level the machine.

I prefer in the alternate construction shown in Figs. 7 and 8 to separately move the curtains S^2 outward through the medium of cables U similar to those shown in Figs. 3 and 4, and drums 40 and 41 upon each of which one of the cables U is designed to be wound; the said drums being provided with hand wheels, as illustrated. Thus when the drum 40 is rotated in proper direction one cable U will be taken up thereon and the curtain S^2 at the right-hand side of the machine will be drawn outward, while when the drum 41 is rotated in proper direction the other cable U will be taken up on the same and the curtain S^2 at the left-hand side of the machine will be drawn outward. The drum 40 is loosely mounted on a shaft 50 arranged adjacent the right-hand curtain roller R^2, and the drum 41 is loosely mounted on a suitably supported shaft 51 arranged at the opposite side of the seat J, with reference to the shaft 50. A shaft 50^a is located adjacent the left-hand curtain roller R^2, and the shafts 50 and 50^a are connected with the rollers R^2 through the medium of intermeshed spur gears 52 and 53 on the shafts and rollers, respectively. It will also be noted that the shaft 50 has a hand wheel 54 fast thereon. By turning this hand wheel 54 in proper direction the operator is enabled to turn the adjacent roller R^2 so as to wind the right-hand curtain S^2 on said roller, and in that way draw said curtain inward to the extent necessary to accomplish the purpose before stated. The shaft 50^a has fast upon it a drum 55 which is connected by a suitably guided cord 56 with a drum 57 that is fixed on the shaft 51 and is provided with a hand-wheel 58. By turning the said drum 57 in proper direction to take up the cord 56 thereon, the drum 55 and the shaft 50^a are rotated, as is also the left-hand roller R^2, the latter serving to roll up and draw in the left-hand curtain S^2 to the extent desired or necessary.

It will be gathered from the foregoing that the devices for moving the curtains S^2 outward, as well as the devices for moving said curtains inward, are arranged adjacent the driver's seat J and within convenient reach of the driver.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

1. In a flying machine, the combination of a body, horizontally-disposed propellers connected and arranged in vertical alinement with the body, an engine in the body, driving connections intermediate the engine and said propellers, vertically-disposed propellers located at opposite ends of the body and movable toward and from the sides of the machine, driving connections intermediate the engine and said vertically-disposed propellers for rotating the latter, means for synchronously moving said vertically-disposed propellers toward the same side of the machine, fore and aft pairs of wings hinged to the body at opposite sides thereof; the wings of the forward pair being separated from the wings of the rear pair by intervening spaces, driving connections intermediate the engine and the wings for oscillating the latter, means for adjustably fixing the wings with respect to the body, means movable outward from the body in said intervening spaces for increasing the buoyancy of the machine, and means for moving the buoyancy-increasing means.

2. In a flying machine, the combination of a body, horizontally-disposed propellers connected and arranged in vertical alinement with the body, an engine in the body, driving connections intermediate the engine and said propellers, vertically-disposed propellers located at opposite ends of the body and movable toward and from the sides of the machine; driving connections intermediate

the engine and said vertically-disposed propellers for rotating the latter, means for synchronously moving said vertically-disposed propellers toward the same side of the machine, wings hinged to the body at opposite sides thereof, driving connections intermediate the engine and the wings for oscillating the latter, and means for adjustably fixing the wings with respect to the body.

3. In a flying machine, the combination of a body, fore and aft pairs of oscillatory wings hinged to opposite sides of the body; the wings of the forward pair being separated by intervening spaces from those of the rear pair, means for actuating the wings, means for adjustably fixing the wings with respect to the body, frames rigid with the body and extending laterally outward therefrom and arranged in the said spaces between the fore and aft wings, planes reinforced by said frames and arranged in said spaces between the fore and aft wings and adjustable laterally to the body, and means for adjusting said planes.

4. In a flying machine, the combination of a body, an engine therein having a main shaft, wings hinged to opposite sides of the body, driving connections intermediate said main shaft and the wings; said connections comprising clutches and means for operating the same, brakes for adjustably fixing the wings when the said driving connections are interrupted, countershafts, clutches intermediate the main shaft and the countershafts, means for operating said clutches, laterally swinging shafts guided in the ends of the body, universal joints connecting said laterally swinging shafts and the countershafts, means for synchronously moving the laterally-swinging shafts toward the same side of the machine, vertically-disposed propellers fixed on the laterally swinging shafts and arranged adjacent the ends of the body, horizontally-disposed propellers arranged in vertical alinement with the body, and driving connections intermediate the main shaft and said horizontally-disposed propellers, said driving connections comprising suitable clutches and means for controlling the same.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ADELARD J. BEAUREGARD.

Witnesses:
EVELYN W. SPAULDING,
EDGAR L. SPAULDING.