

1,376,584.

F. M. RILLEAU.  
FLYING MACHINE.  
APPLICATION FILED JULY 12, 1917.

Patented May 3, 1921.  
3 SHEETS—SHEET 1.

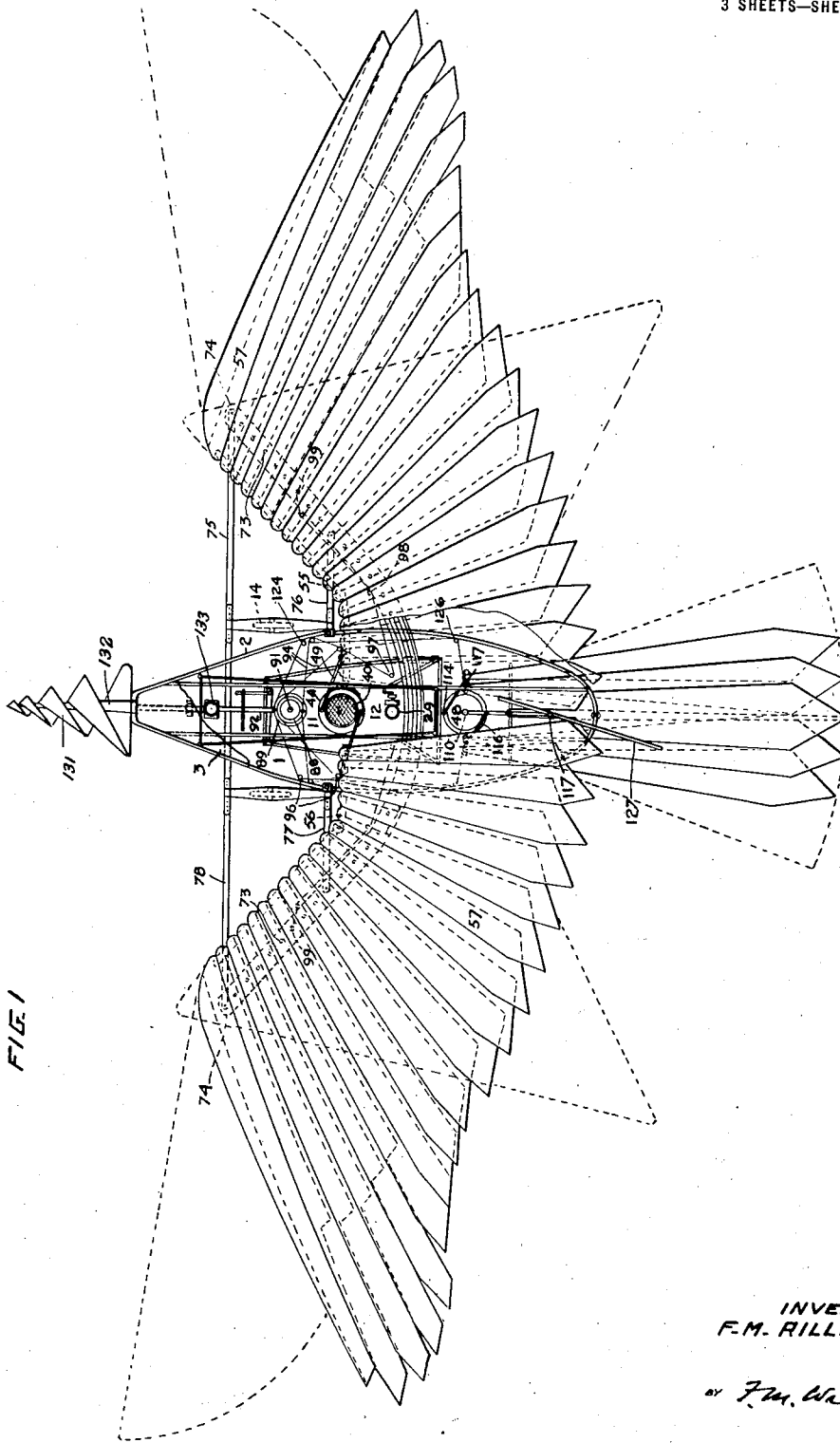


FIG. 1

INVENTOR  
F. M. RILLEAU

BY *F. M. Rilleau*

ATTY.

1,376,584.

F. M. RILLEAU.  
FLYING MACHINE.  
APPLICATION FILED JULY 12, 1917.

Patented May 3, 1921.  
3 SHEETS—SHEET 2.

FIG. 2

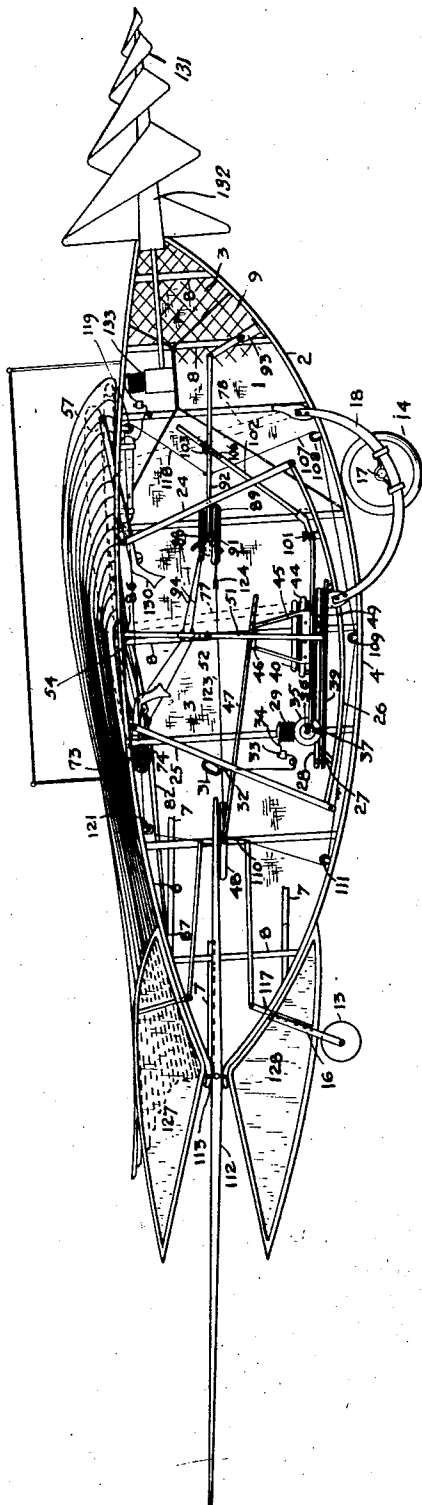
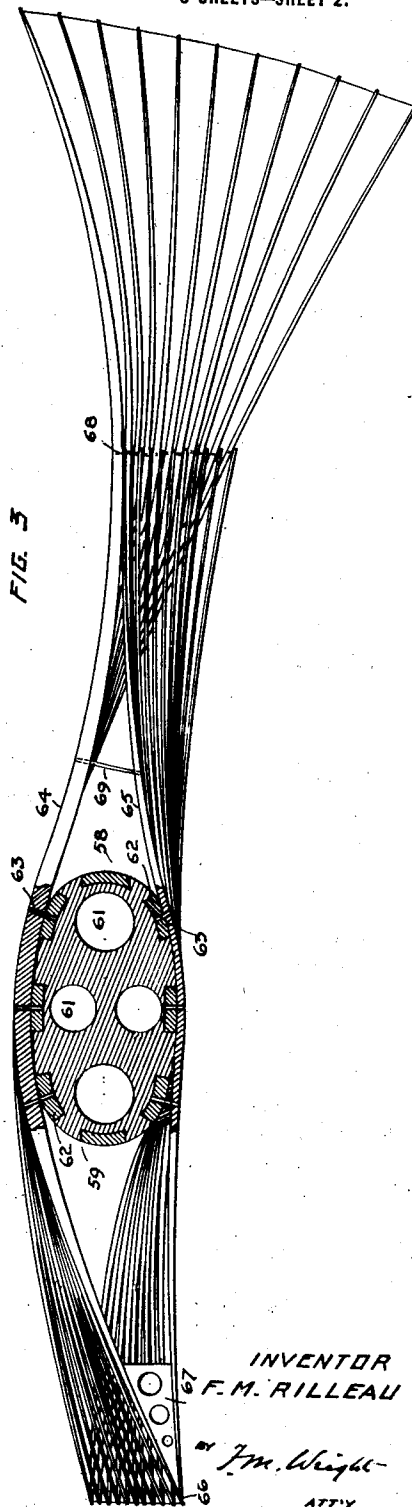


FIG. 3



INVENTOR  
F. M. RILLEAU  
BY *J. M. Wright*  
ATT'Y.

1,376,584.

F. M. RILLEAU,  
FLYING MACHINE.  
APPLICATION FILED JULY 12, 1917.

Patented May 3, 1921.

3 SHEETS—SHEET 3.

FIG. 4

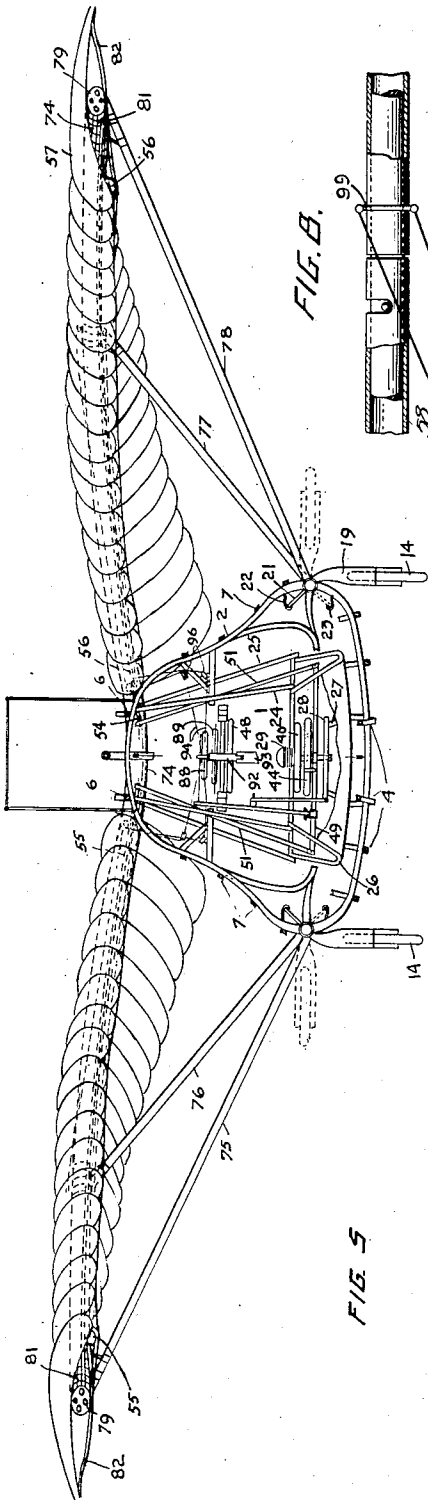


FIG. B.

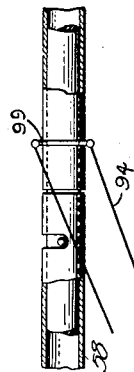


FIG. 5

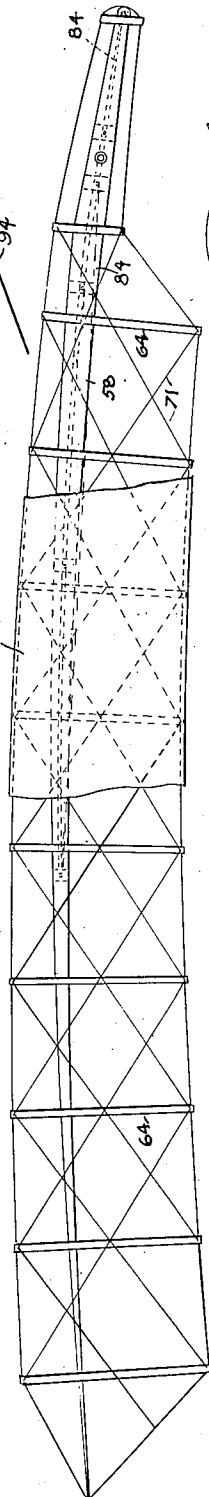


FIG. 7

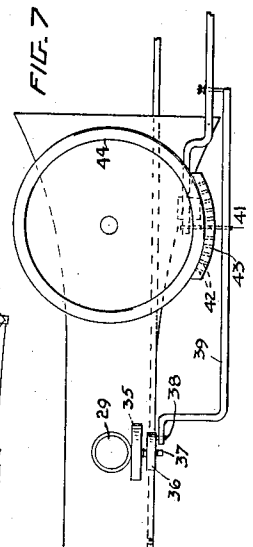
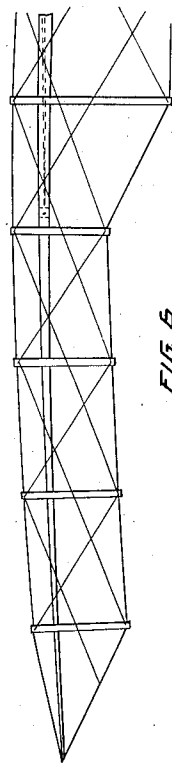


FIG. 6



INVENTOR  
F. M. RILLEAU

BY *J. M. Wight*

ATTY.

# UNITED STATES PATENT OFFICE.

FRANCIS M. RILLEAU, OF SAN FRANCISCO, CALIFORNIA.

## FLYING-MACHINE.

1,376,584.

Specification of Letters Patent.

Patented May 3, 1921.

Application filed July 12, 1917. Serial No. 180,083.

*To all whom it may concern:*

Be it known that I, FRANCIS M. RILLEAU, a citizen of France, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Flying-Machines, of which the following is a specification.

The present invention relates to improvements in flying machines, the object of the invention being to provide a machine of this character which, when once started and having attained a sufficient elevation, will continue its flight indefinitely without the exercise of any propulsive force, except when there is no wind in any direction.

A further object is to provide a machine which, under all conditions of wind and weather, will fly with a minimum amount of propulsive force.

A further object is to provide a machine which can be readily adjusted so as to obtain the requisite propulsive force for flight by causing it to glide through the air.

A further object is to provide a flying machine in which the sustaining means may also be used as propellers.

A further object is to provide a machine which will have great lifting power in proportion to its weight.

In the accompanying drawing, Figure 1 is a plan view of my improved machine in different positions, the wings and tail being shown in dotted lines; Fig. 2 is an enlarged longitudinal section thereof; Fig. 3 is a transverse section of a portion of a wing; Fig. 4 is a front end view thereof; Fig. 5 is a broken plan view of a portion of a wing; Fig. 6 is a broken plan view of another portion thereof; Fig. 7 is a broken plan view of a detail of the interior of the machine; Fig. 8 is a detail view illustrating the connection to certain feathers to turn the latter for steering purposes.

1 indicates the hollow body or car of my improved flying machine. It consists of a frame 2 and a covering 3 of water tight fabric. The frame comprises longitudinal members 4 at the bottom of the frame, of which there may be six in number, longitudinal members 6 at the top of the frame, of which there may be two in number, longitudinal side members 7, of which there may be attached on each side of the frame four in number, and transverse members 8 con-

necting said longitudinal members, of which there may be eight in number. These members are all tied together by oblique ties 9 of cord or wire. The covering 3 covers the whole frame except that, in the top of the body, there are provided front and rear doors 11, 12.

When on the ground the body is supported by a central rear wheel 13 and two front wheels 14. The shaft of the rear wheel 13 is mounted in the lower ends of a forked stem 16, extending downward from the body. The shaft of each front wheel 14 is supported in bearings 17 secured in frames 18 in the forms of circular arcs. The greater part of each frame 18 is inclosed in an extension 19 of the water-tight canvas covering (Fig. 4), the joints of which coverings around the circular frame piece 18 are made water-tight by suitable rubber packing or the like. With this construction, therefore, the body is able to float on the water. In floating on water, however, the frames 18 are turned from a position in which they are depended vertically to a position in which they extend horizontally, and for this purpose they are provided with inward extensions 21 through the sides of the body, which can be maintained either in their vertical or in their horizontal positions by means of hooks 22, 23, secured to the inner sides of the wall of the body.

Suspended from the top of said body by front and rear pivoted hangers, 24, 25, is a curved support or floor 26, upon which is supported, by struts 27, a floor 28 upon which is supported a rear motor 29, preferably an internal combustion engine, supplied with fluid fuel from a tank 31 by a pipe 32 leading to a carbureter 33, and a pipe 34 leading from the carbureter to the internal combustion engine. Adjacent to the fly wheel 35 of said engine (Fig. 7) is a disk 36, which is adapted to be moved into engagement with the shaft of said engine by a shifter 37, movable in a direction parallel with said shaft. Said disk carries a wrist pin 38, which is connected to a link 39, which carries a pin 41, which is adapted to engage in one of a series of holes 42 in a segment 43 attached to a ring 44 below the aviator's seat 40. Said ring 44 is attached by a frame 45 to a ring 46, which is adjustably attached to a link 47, the rear

end of which is attached to a wheel 48, so that by the movement of the engine said wheel 48 is oscillated.

The lower ring 44 is connected at diametrically opposite points with links 49, the other ends of which are connected to levers 51 pivoted at intermediate points 52 to frame pieces 8 of the machine, the upper ends of said levers being connected to the ends of links 54, the other ends of which are connected to bars 55, 56, connected pivotally with the forward portions of what I term feathers 57. Thus, when said ring 44 is oscillated by the rotation of the engine, the forward portions of the feathers are also oscillated.

Each feather comprises a stem 58 which consists of thin elliptical disks 59, having cut therein, for the sake of lightness, holes 61, and having extending longitudinally across the edges thereof, rods 62, here shown as eight in number, three being at the top of said disks, three at the bottom, and one at each end.

To said rods are connected, as shown at 63, transverse upper and lower rods 64, 65, (Fig. 3) connected at their front ends, as shown at 66, and strengthened by interposed pieces 67. The rear ends of the lower rods are attached, as shown at 68, to intermediate portions of the upper rods 64. Said upper and lower rods are also connected by cords 69. All of these rods are connected with each other by oblique tie wires 71, and the frame thus formed is covered with light sheet material 72, such as silk or light canvas, to form a feather. The five outer feathers on each side are made of greater length than the inner feathers, and on this account the outer terminal portions of said outer feathers are reduced in width, as shown in Fig. 6.

All of said feathers are pivoted, as shown at 73, upon a frame piece 74 extending transversely across the flying machine and supported by oblique struts 75, 76, 77, 78, and also by the central frame. This frame piece 74 is constructed in like manner as, but on a larger scale than, the stem 58 of each feather, that is to say, it is composed, at suitable intervals, of thin elliptical disks 79, the edges of which are connected by transversely extending rods 81. Each main, or upper, feather passes over the upper side of this frame 74, while a supplementary or lower feather 82, constructed like the upper feather, passes under and in contact with the under side of said frame 74, and both upper and lower feathers are pivoted to said frame at 73. A wire 84 is attached to the front end of each feather, also to the under side of the frame at a point 86 and also to a point 87 in the rear portion of the feather. Both the upper rods 64 and the lower rods 65 are made of light wood, and are therefore yield-

ing enough to give the feathers the desired elasticity, the cord connections 69 enabling the lower and the upper portions of a feather to approach each other under the influence of air pressure. The pressure of the air currents against the under side of each feather, either in ascending or descending, causes the flexible rear portion of the feather, behind the main frame, to bend upward and automatically propel the ship forward, it being apparent that an upward pressure on said upwardly and rearwardly inclined portions will impart a forward impulse to the machine.

There are two steering wheels 88 and 89, one above the other, supported upon a shaft 91 extending upwardly and transversely across the end of a lever 92 pivoted at its front end upon a frame piece 93 attached to the frame 1 of the air ship. Attached to the opposite sides of the upper wheel 88 are two wires 94, which extend past direction pulleys 96, to pulleys 97, and then extend around pulleys 98, and are attached respectively to ends of a rod 99, on each side, pivoted to the frame piece, which rod is attached to the sixth feather from the end, so that said feather can turn about its axis with the movements of said wires. Thus either feather can be turned about its axis independently of the other so as to cause the air ship to turn, or both can be turned at the same time so as to cause the air ship to stop.

Connected to the forward end of the swinging frame 45, as shown at 101, is a rod 102 which passes through a loop 103 attached to a lever 92 and may be adjustably connected to said lever by a series of holes 106 in said rod. This arrangement acts as a stabilizer, for, if the forward part of the air ship tilts downward, then the swinging frame swings upwardly and causes the lever 92 to swing upwardly. For attached to said lever 92 is a cord 107 passing around pulleys 108, 109, 111, and connected to the lower end of the axle 110 of the wheel 48, to which wheel is attached the front end of an elevating rudder 112, pivoted at 113 at the rear end of the body frame, so that the rear portion of said elevating rudder is raised thereby, tending to raise the front end of the air ship. The axle 110 of the wheel 48 is suspended by pivots 114 attached to the front ends of arms 116, the rear ends of which are attached to the front ends of shafts 117. Conversely, should the front portion of the air ship unduly tilt upward, then, in like manner, by means of a cable 118 passing around pulleys 119, 121, in the upper portion of the body and attached to the upper end of the axle 110 of the wheel 48, the front end of the rudder is caused to ascend and the rear end to descend, thereby de-

pressing the front portion of the air ship and counterbalancing its tendency to rise. If the aviator wishes to dispense with the automatic stabilizing device, he disconnects the rod 102 either from the swinging frame or from the lever 92 so as to leave said lever free to be moved by hand.

Around the lower wheel 89 extends a cable 123 which extends around pulleys 124, 126, and is attached to opposite sides of the wheel 48 so that by pulling the cable 123 on one side of the wheel 48, said wheel will be moved to one side of the air ship and the portion of the upper direction rudder 127, in front of the upper shaft 117, will move in the same direction as the wheel, while the rear portions of both upper and lower direction rudders 127, 128, turning with shafts 117, will move in the opposite direction, and thus cause the ship to be directed horizontally.

130 indicates guns projecting forwardly and rearwardly respectively of the air ship and in position to be fired by the aviator.

For initial propulsion of the flying machine there is provided a propeller 131, extending forwardly from the front end of the flying machine, and having a shaft 132 operated by an engine 133, which may be of any suitable character.

To enable access to be conveniently had to the wings and upper part of the flying machine, there is provided a central frame 134 having a longitudinally extending shaft 137.

It will be seen, particularly with reference to Figs. 2, 3 and 4, that the feathers are of a warped or twisted shape, and from Figs. 1 and 2 it appears clearly that the feathers are disposed obliquely with reference to the longitudinal axis of the machine, the feathers of different wings being of opposite slant. It will be understood that all those feathers the front ends of which are connected with the same stabilizing bar 55 or 56 will be rocked at the same time about their pivots 73 when such bar is moved by the mechanism described above.

I claim:

1. In a flying machine, a frame piece extending across the machine, a series of feather-like sustaining devices pivotally attached to said frame piece on each side of the machine on vertical axes, an engine carried by the flying machine, and means operated by said engine for simultaneously oscillating said sustaining devices.

2. In a flying machine, in combination with a body, means connected with said body for attaching thereto sustaining devices, a series, on each side of the machine, of sustaining devices pivotally connected to the said means and spreading out rearwardly from their front ends, and means, on each side of the flying machine, for tilting a device about its own axis.

3. In a flying machine, in combination with a hollow body, a frame suspended from said body, and swinging therein, an aviator seat and a motor carried by said frame, a reciprocating link operated by said motor, a frame extending adjacent to said seat and connected with said reciprocating link, a link adjustably secured to said frame, a wheel connected to said last-named link, sustaining devices extending rearwardly from said body and pivotally supported thereon, and means connected with said wheel and with said sustaining devices whereby said sustaining devices are oscillated by the movement of said wheel.

4. In a flying machine, in combination with a hollow body, a frame suspended from said body, and swinging therein, an aviator seat and a motor carried by said frame, a reciprocating link operated by said motor, a frame extending adjacent to said seat and connected with said reciprocating link, a link adjustably secured to said frame, a wheel connected to said last-named link, sustaining devices extending rearwardly from said body and pivotally supported thereon, means connected with said wheel and with said sustaining devices whereby said sustaining devices are oscillated by the movement of said wheel, wheels for supporting said body, frames supporting said wheels and extending from said body, and watertight coverings for said frames.

5. In a flying machine, in combination with a hollow body, a frame suspended from said body, and swinging therein, an aviator seat and a motor carried by said frame, a reciprocating link operated by said motor, a frame extending adjacent to said seat and connected with said reciprocating link, a link adjustably secured to said frame, a wheel connected to said last-named link, sustaining devices extending rearwardly from said body and pivotally supported thereon, means connected with said wheel and with said sustaining devices whereby said sustaining devices are oscillated by the movement of said wheel, wheels for supporting said body, frames supporting said wheels and extending from said body and pivotally connected therewith so as to be able to extend therefrom either vertically or horizontally.

6. In a flying machine, in combination with a hollow body, a frame suspended from said body, and swinging therein, an aviator seat and a motor carried by said frame, a reciprocating link operated by said motor, a frame extending adjacent to said seat and connected with said reciprocating link, a link adjustably secured to said frame, a wheel connected to said last-named link, sustaining devices extending rearwardly from said body and pivotally supported thereon, means connected with said wheel and with

said sustaining devices whereby said sustaining devices are oscillated by the movement of said wheel, wheels for supporting said body, frames supporting said wheels and extending from said body and pivotally connected therewith so as to be able to extend therefrom either vertically or horizontally, and means for supporting said frames either in a horizontal or in a vertical position.

7. In a flying machine, in combination with a hollow body, a frame suspended from said body, and swinging therein, an aviator seat and a motor carried by said frame, a reciprocating link operated by said motor, a frame extending adjacent to said seat and connected with said reciprocating link, a link adjustably secured to said frame, a wheel connected to said last-named link, sustaining devices extending rearwardly from said body and pivotally supported thereon, means connected with said wheel and with said sustaining devices whereby said sustaining devices are oscillated by the movement of said wheel, and means for engaging or disengaging said motor at will from said mechanism.

FRANCIS M. RILLEAU.