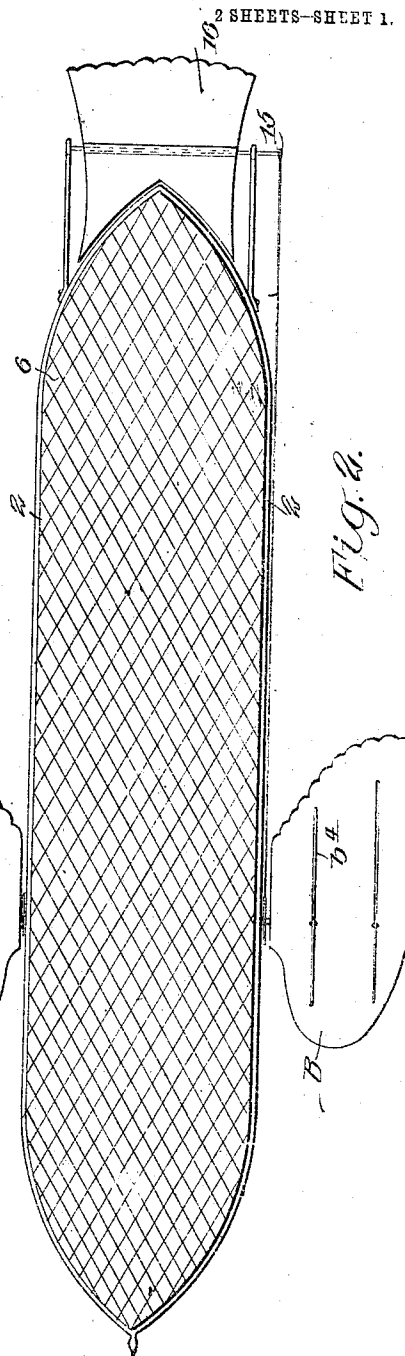
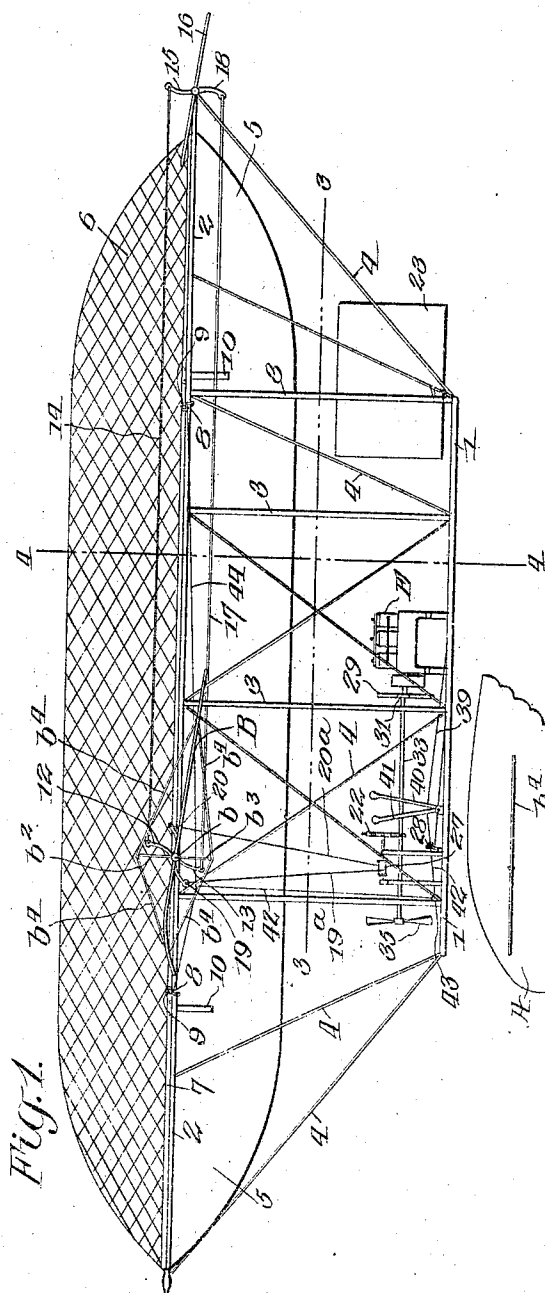


E. J. CRAWFORD.
 FLYING MACHINE.
 APPLICATION FILED DEC. 28, 1910.

1,005,941.

Patented Oct. 17, 1911.

2 SHEETS-SHEET 1.



WITNESSES:
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 EDGAR J CRAWFORD
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2 SHEETS—SHEET 2.

Fig. 3.

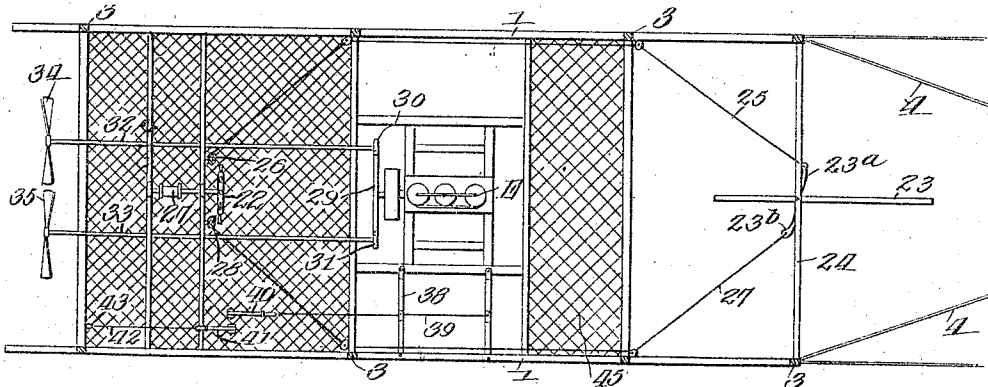


Fig. 4.

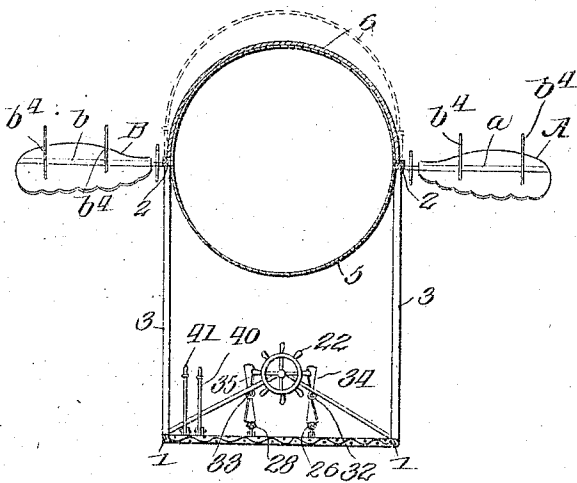


Fig. 5.

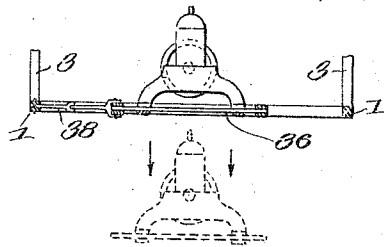


Fig. 6.

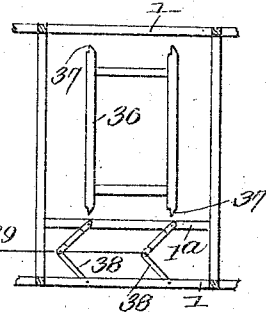


Fig. 7.

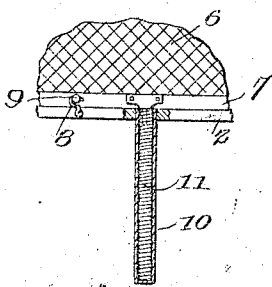
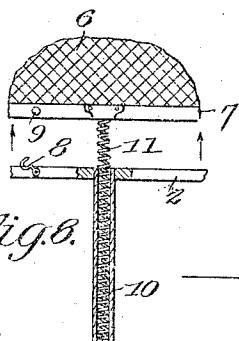


Fig. 8.



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UNITED STATES PATENT OFFICE.

EDGAR JOHN CRAWFORD, OF SEATTLE, WASHINGTON.

FLYING-MACHINE.

1,005,941.

Specification of Letters Patent.

Patented Oct. 17, 1911.

Application filed December 28, 1910. Serial No. 599,737.

To all whom it may concern:

Be it known that I, EDGAR J. CRAWFORD, a citizen of the United States, and a resident of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Flying-Machines, of which the following is a specification.

My invention relates to improvements in flying machines, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a lighter-than-air machine which is provided with a safety device so as to prevent a rapid descent which might injure the aviators. This safety device is in the nature of a parachute which may be shifted so as to sustain the flying machine so that its descent will be gradual.

A further object of my invention is to provide auxiliary sustaining devices in the shape of wings with means for tilting them to cause the device to ascend or descend.

A further object of my invention is to provide means for ridding the airship of the heavier parts, in case an accident occurs, thereby insuring a safe descent.

A further object of my invention is to provide novel forms of apparatus for accomplishing the objects specified above.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application in which—

Figure 1 is a side view of the flying machine, Fig. 2 is a plan view thereof, Fig. 3 is a horizontal section along the line 3—3 of Fig. 1, Fig. 4 is a section along the line 4—4 of Fig. 1, Fig. 5 is a detailed view showing the means for disengaging the engine from its support, Fig. 6 is a plan view of the supporting frame for the engine, Fig. 7 is a detailed sectional view showing a portion of the parachute lifting means in its normal position, and Fig. 8 is a view similar to Fig. 7 showing the lifting means in its operated position.

Referring now particularly to Fig. 1, I have shown therein a main frame consisting of the bottom members 1, the top members 2, the uprights 3, and the brace rods 4. In the upper part of this frame is a cigar

shaped gas bag or balloon 5. This balloon is designed to be filled with some light gas, such as hydrogen, and is the main lifting and sustaining element. Arranged to fit over the upper half of the balloon, and normally in close contact with it, is a parachute 6 of the shape shown in the drawings. This parachute has a frame 7 (see Figs. 7 and 8) around its lower edge which is arranged to lie immediately above the upper frame members 2 of the main frame. The frame 7 is arranged to be secured to the frame 2 by means of the hooks 8 on the frame 2 which engage the pins 9 and the frame 7 as shown in Figs. 7 and 8. In these figures it will be seen that there are hollow cylinders 10 which project downwardly from the frame members 2 and in which are carried spiral springs 11, the upper ends of which are secured to the frame 7. The purpose of these springs will be explained later. Toward the forward part of the machine are the side wings A and B. These wings are pivoted on the arms *a* and *b* (see Fig. 4). Each arm has projecting from it an upwardly extending brace member such as *b*², and a downwardly extending brace member *b*³, these brace members being connected with the wing proper by means of the inclined brace rods *b*⁴ as shown in Fig. 1. Secured to the rod *b* are the upper and lower arms 12 and 13, respectively. To the rod 12 is secured an upper link 14 which extends rearwardly and connects with an arm 15 on the rear elevating rudder 16. A lower link 17 extends from the arm 13 rearwardly and connects with the arm 18 on the elevating rudder 16. Secured also to the shaft or rod *b* are the arms 19 and 20 which are connected by the respective chords 19^a and 20^a with the windlass 21. The latter is manipulated by the hand wheel 22. Underneath the balloon proper at the rear of the frame is the rudder 23. As will be seen from Fig. 3, this rudder is pivoted on a cross member 24 and is provided with arms 23^a and 23^b. The former is connected by means of the flexible chord 25 to the foot lever 26, while the arm 23^b is connected by a chord 27 to the foot lever 28.

In Figs. 1 and 3 I have shown the engine at E. This engine is provided with a friction disk 29, arranged to engage the friction disks 30 and 31. (see Fig. 3) upon the respective shafts 3 and 33, the former bearing the propeller 34 and the latter the propeller 35, which turn in opposite directions.

The mounting of the engine is an important feature. It will be noticed that there is a supporting frame 36 (see Fig. 6) having tongues 37 at the four corners arranged to enter openings in one of the bottom members 1 on one side and a slidable member 1^a on the other. The slidable member 1^a is connected by the toggle joints 38 in such a manner that when the latter are pulled by means of the chord 39 the slidable member 1^a is moved outwardly thereby permitting the frame 36 and the engine E to drop clear of the machine, this being permitted by the frictional drive for the shafts 32 and 33. In order to operate the toggle joints 38, I provide the lever 40 to which the chord 39 is attached. A lever 41 is also provided and to this lever is attached a chord 42 (see Fig. 1) which runs under a pulley 43 (see Fig. 3) and thence upwardly and connects with a chord 44 extending between the hooks 8 toward the front and rear ends of the device.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. In order to add lightness to the device I provide a floor of netting 45. When all is in readiness the engine is set going and the propellers, as stated, revolve in opposite directions and tend to propel the device forwardly. The hand wheel 22 is turned so as to cause the wings A and B and the rear tail or wing 16 to assume an inclined position, thereby elevating the device. The device is steered to the right and to the left by manipulating the foot levers or pedals 26 and 28. The turning of the hand wheel 22 in the opposite direction will cause the machine to descend. It will be seen that the wings A and B, as well as the tail member 16, constitute sustaining as well as guiding members.

In case of an emergency, such as the bursting or ripping of the gas bag which might cause the precipitous descent of the machine, the operator can pull the lever 41. This will cause the hooks 8 to become detached from their pins 9 whereupon the springs 11 will push the parachute upwardly above the balloon, as indicated by dotted lines in Fig. 4. The air can now get between the parachute and the balloon and acts as a sustaining medium for the parachute, thus preventing the precipitous

downward movement of the balloon. In case this should not be sufficient, the operator can push forwardly on the lever 40 thereby bringing the toggle joints into the positions shown in Fig. 6 and releasing the supporting frame 36 of the engine, whereupon the engine will fall free from the frame thereby lightening the load carried by the balloon and parachute.

I am aware that other forms of the device based upon the same principle might be made, but I consider as my own all such modifications as fairly fall within the spirit and the scope of the invention.

I claim:

1. In a flying machine, a gas bag, a frame therefor, a parachute above said gas bag and normally in close contact therewith, a series of springs carried by said frame, housings therefor, said springs being connected at one end to said parachute and being normally compressed within said casings, and means carried upon said frame for releasing said springs and thereby projecting said parachute away from said gas bag.
2. In a flying machine, a gas bag, a frame therefor, a parachute above said gas bag and normally in close contact therewith, a series of springs carried by said frame, housings therefor, said springs being connected at one end to said parachute and being normally compressed within said casings, a series of hooks on said frame for holding said parachute and means carried by said frame and including a lever and flexible connections from said lever to said hooks for actuating the latter to release the springs thereby causing the projection of the parachute away from the gas bag.
3. In a flying machine, a gas bag, a main frame secured thereto, an engine carried by said frame, propellers connected with said engine for driving the machine, and means for permitting the engine to drop from the main frame, means comprising a supporting frame, means including a slidable member for holding said supporting frame in place, a toggle joint connected with said slidable member, and means for moving said toggle joint to cause a movement of said slidable member away from said supporting frame.

EDGAR JOHN CRAWFORD.

Witnesses:

CHAS. PETROVITSKY,
JOHN JUDY.