

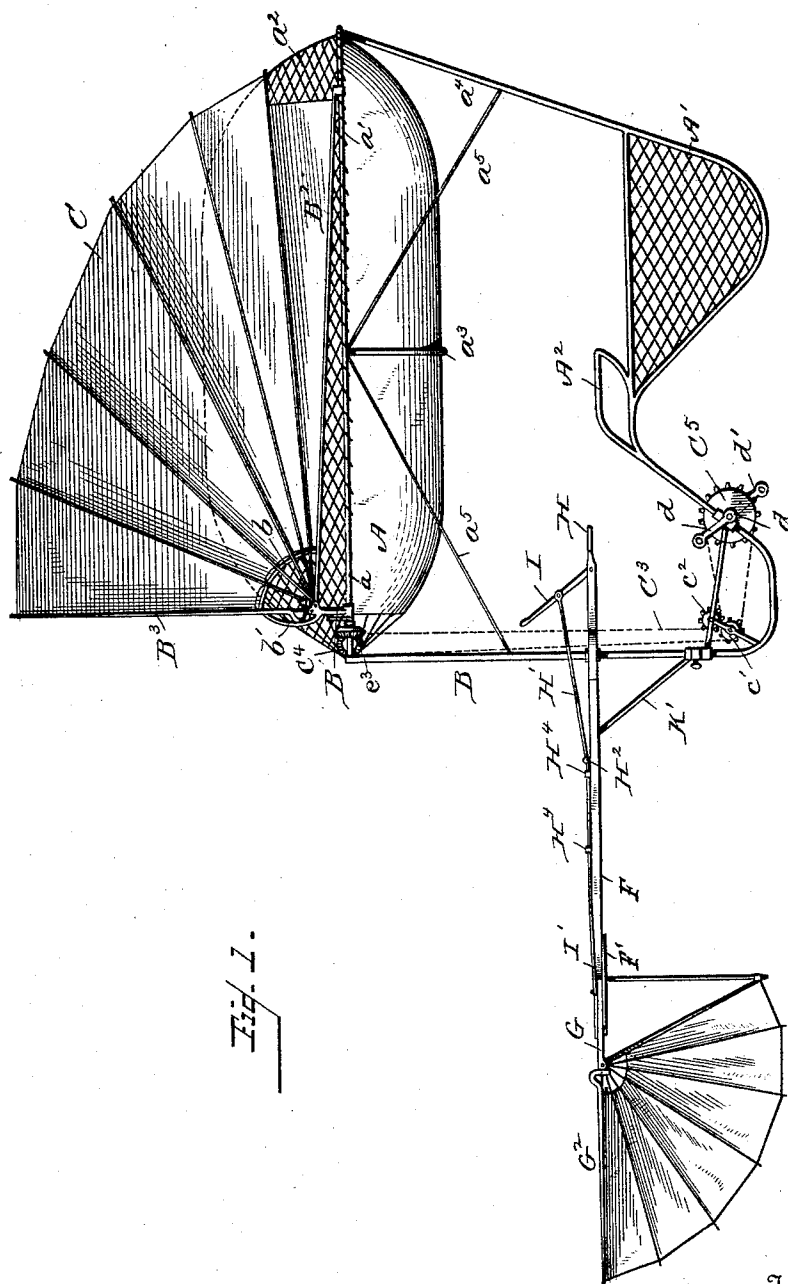
(No Model.)

5 Sheets—Sheet 1.

B. F. BARNES.
FLYING MACHINE.

No. 460,194.

Patented Sept. 29, 1891.



27.

Witnesses

"April 28.
"Sunday."

A. L. Hough

Inventor

Burr F. Barnes

By his Attorney

Franklin W. Hong

(No Model.)

5 Sheets—Sheet 2.

B. F. BARNES.
FLYING MACHINE.

No. 460,194.

Patented Sept. 29, 1891.

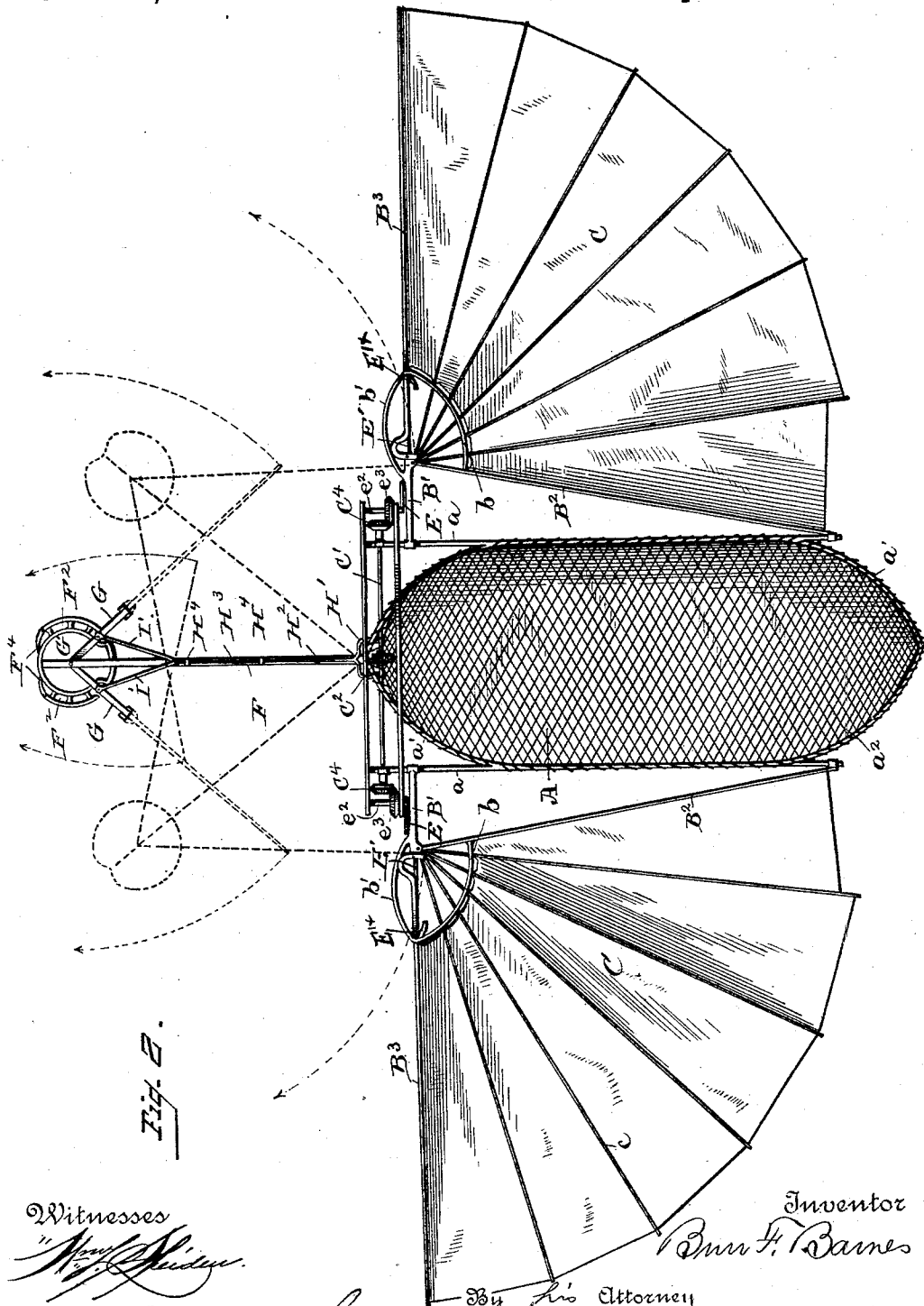


Fig. 2.

Witnesses

Wm. H. Hough

A. L. Hough

Inventor

B. F. Barnes

By his Attorney

Franklin H. Hough

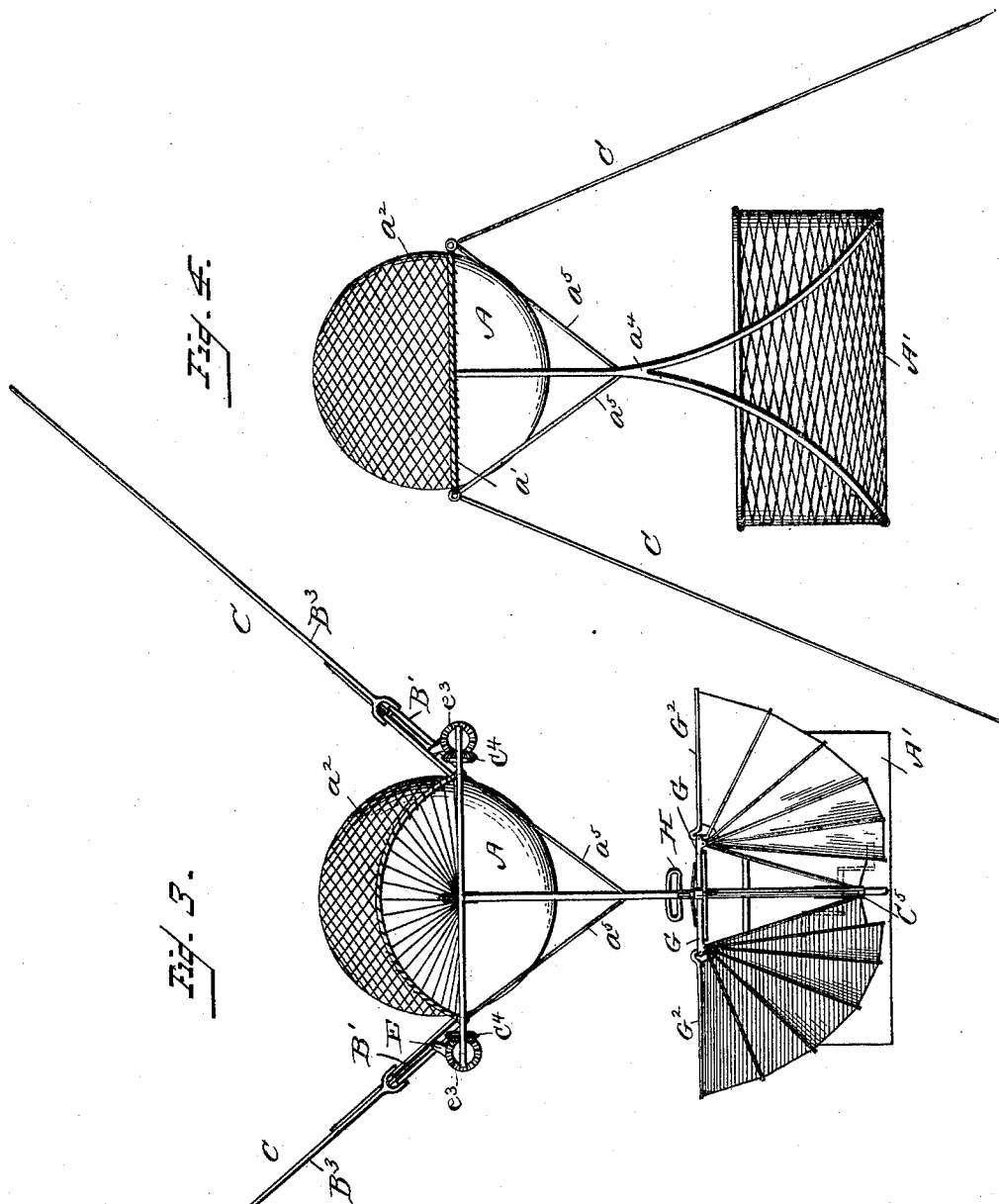
(No Model.)

5 Sheets—Sheet 3.

B. F. BARNES.
FLYING MACHINE.

No. 460,194.

Patented Sept. 29, 1891.



Witnesses
[Signature]
A. L. Hough

Inventor
Burr F. Barnes
By *[Signature]* Attorney
[Signature]

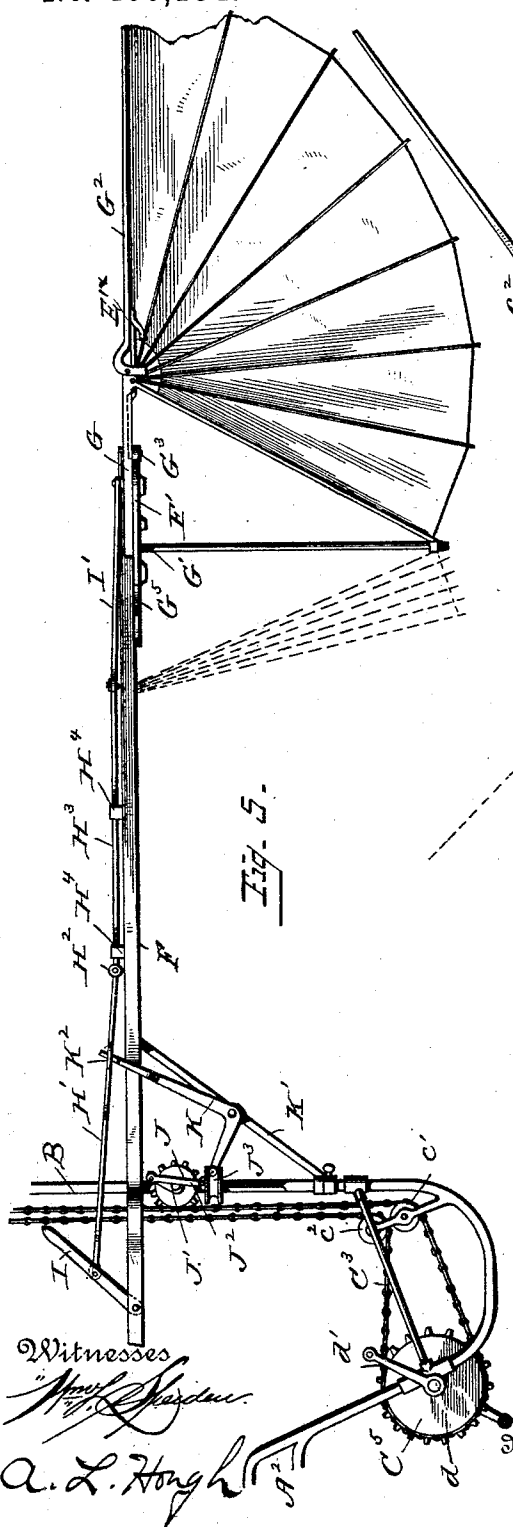
(No Model.)

5 Sheets—Sheet 4.

B. F. BARNES.
FLYING MACHINE.

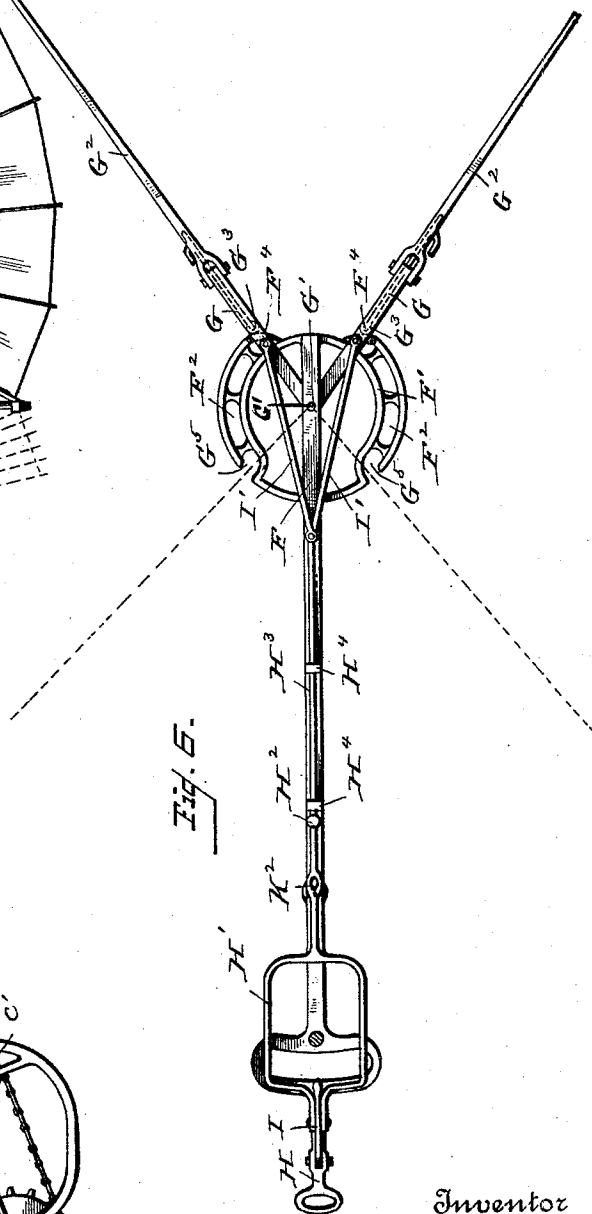
No. 460,194.

Patented Sept. 29, 1891.



Witnesses

"Wm. L. Gardner."



Inventor

Burr F. Barnes

Attorney

Franklin D. Hough

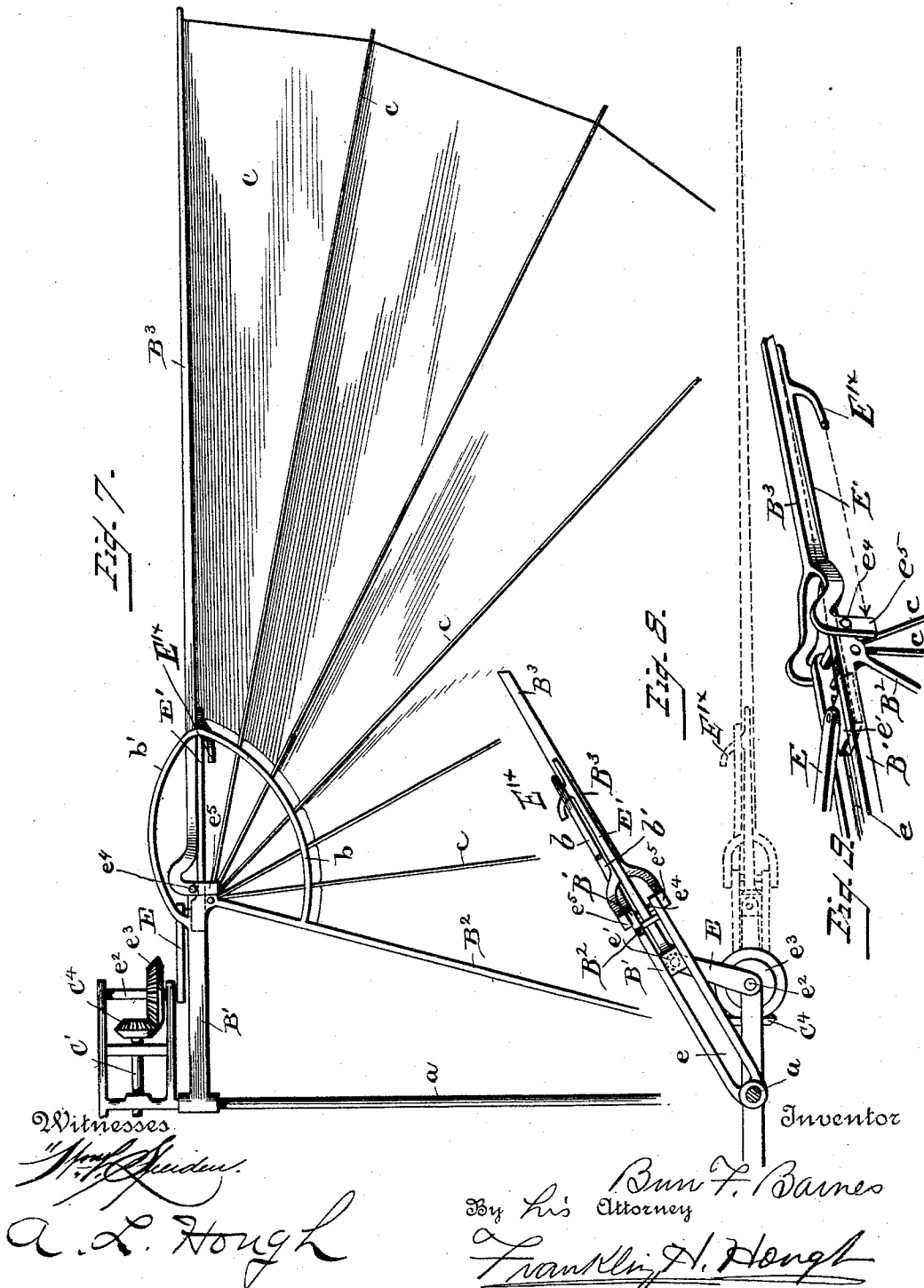
(No Model.)

5 Sheets—Sheet 5.

B. F. BARNES.
FLYING MACHINE.

No. 460,194.

Patented Sept. 29, 1891.



UNITED STATES PATENT OFFICE.

BURR FRANK BARNES, OF CIRCLEVILLE, OHIO.

FLYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 460,194, dated September 29, 1891.

Application filed February 3, 1891. Serial No. 380,078. (No model.)

To all whom it may concern:

Be it known that I, BURR FRANK BARNES, a citizen of the United States, residing at Circleville, in the county of Pickaway and State of Ohio, have invented certain new and useful Improvements in Flying-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in flying-machines; and it has for its objects among others to provide an improved device of this character which shall be simple, cheap, light in construction, durable, and certain in its operation, and which may be easily raised or lowered and guided in its movements through the air with little outlay of power. I employ a balloon to assist in raising the machine, the ends of the balloon being preferably pointed, so as to offer as little resistance as possible to its movement through the air. I provide raising and lowering wings and guiding-wings, which are under the complete control of the person in charge. I have devised means for closing or feathering, as it were, the raising and lowering wings, so that they will offer the minimum of resistance to their return movement after having exerted their power in moving the device.

The machine is designed, primarily, to be operated by the hands and feet of the operator; but I have made provision for its propulsion by electricity—a storage-battery, for instance.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The novelty in the present instance resides in the peculiar combinations and the construction, arrangement, and adaptation of parts, all as more fully hereinafter described, shown in the drawings, and then particularly pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, which, with the let-

ters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a side elevation of my improved flying-machine. Fig. 2 is a plan of the same. Fig. 3 is a front view with the raising and lowering wings shown up. Fig. 4 is a rear view with the wings down. Fig. 5 is a side elevation of the steering mechanism and a portion of the mechanism for operating the raising and lowering wings. Fig. 6 is a plan of the steering mechanism. Fig. 7 is a plan of a portion of one of the lifting-wings, showing also a portion of its operating devices. Fig. 8 is an edge view of the wing shown in Fig. 7. Fig. 9 is an enlarged perspective detail of the slide-arm and its co-operating parts.

Like letters of reference indicate like parts throughout the several views.

Referring now to the details of the drawings by letter, A designates a balloon, which may be of any known form and construction, but preferably of that shown, wherein the ends are pointed, so as to enable it to travel through the air with the greatest speed and offer as little resistance as possible. Its capacity will of course vary according to the use to which the machine is to be put.

For the support of the various parts I provide a light yet strong frame, and for this purpose I preferably employ aluminum, which I have found to embody sufficient strength for the purpose and, as is well known, is very light. This frame B is of substantially the form shown best in Fig. 1 in side elevation and in plan in Fig. 2. It has parallel bars or rods a , to which are connected the hoisting-wings, and between which is supported the oval or other form of support a' for the balloon, as seen in Fig. 2, to which the said balloon is secured in any suitable manner, being shown as provided with a netting a^2 and a support a^3 , extending transversely beneath the balloon and connected with the vertical bars a^4 by the brace-rods a^5 . (See Fig. 1.) The lower portion of this frame is suitably braced and forms a support for the operating parts of the device, and it is provided with a luggage receptacle or basket A' and a seat A^2 for the operator. This luggage receptacle or basket is arranged toward the rear end of the device below the balloon and serves in a

measure to counterbalance the other parts. The seat for the operator is substantially in the central line of the machine, as shown.

C are the hoisting-wings, two in number, one arranged upon each side at the forward end of the balloon, as seen best in Fig. 2. Each of these wings is supported and operated in the following manner: Sleeved on the parallel rods a are the arms B' , which extend at right angles to said rods, and provided with the curved portions b' and circular portion b , which connects with the arm B^2 , which connects the arm B' with the rear end of the rod a , as seen best in Fig. 2.

B^3 is the wing-arm, pivoted at its inner end to the outer end of the arm B' , as seen at e^4 , and the wing-arm and the arm B^2 are connected by the material constituting the wing, which may be of any suitable material adapted to the purpose and strengthened by suitable ribs c , as seen in Figs. 1 and 2, which are guided in their movement through the guide formed by the circular portions supported from the arm B' .

The hoisting-wings are operated in the following manner: Suitably journaled in the frame B forward of and on a lower plane than the seat is the crank-shaft d , to which are secured the pedals d' , of any known or preferred construction. Centrally on this crank-shaft is a sprocket-wheel C^5 , which derives its motion through the motion of the pedals, which are arranged convenient to the feet of the occupant and are designed to be revolved thereby, and from this sprocket-wheel motion is conveyed to a shaft C' , supported in the frame and carrying a sprocket-wheel C^2 , over which and over the sprocket-wheel C^5 passes the sprocket-chain C^3 , which is caused to move in a vertical path by the guide sprocket-wheels c' and c^2 , which are carried by shafts journaled in the frame and arranged as shown in Figs. 1 and 5. Motion is thus imparted to the shaft C' , and on opposite ends of this shaft are the bevel-pinions C^4 , as seen best in Fig. 2. The rods or arms B' are slotted, as shown at e in Fig. 8, and in this slot works a block e' , to which is connected one end of the crank-arm E , which is carried by the shaft e^2 at right angles to the shaft C' , and carrying a bevel-pinion e^3 , meshing with the bevel-pinion C^4 on the shaft C' , as seen in Figs. 2 and 7. These shafts e^2 are journaled in suitable parts of the main frame, as seen in Fig. 2. When the pinions C^4 turn, the crank-arms, which are connected with the blocks above described, cause the said blocks to slide in their ways or slots. These blocks each carry a slide-arm E' , which works through suitable guides, as seen in Fig. 8. The wing-rod works on the pivot e^4 and is extended, as at e^5 , beyond its pivot, as seen in Fig. 7, for a purpose which will hereinafter be apparent. The arm E' has its free end turned at substantially a right angle, as seen in Fig. 8. When the slide-arm is sliding out, its free end throws out the wing-rod and opens the wing. When the

wing is down, the slide-arm is drawn in and the bent end or hook E'^x strikes the point e^5 and closes the wing. Thus the wings are closed after each stroke, so as to offer as little resistance as possible to their movement as they move to make a new stroke. This movement is caused through the working of the pedals and is automatic and requires no attention on the part of the operator, except to keep the pedals in motion. The wings are designed to be made of a size and weight proportioned to the amount of labor required of them and the weight which it is desired to carry by the machine or the weight of the operator.

It now remains to describe the propelling and steering mechanism, and particular reference is called to Figs. 1, 5, and 6.

F is a rod or arm supported on the front vertical portion of the main frame and carrying at its front end a cam-wheel F' , as seen best in Fig. 6. This wheel has two cam-paths F^2 , one upon each side and each open at the rear end, but closed at the front end by a pivoted gate or latch F^4 , as seen in Fig. 6. G are arms pivoted at G' on the same center on this arm F , as seen also in Fig. 6, and to these arms G are pivoted the propelling-wing arms G^2 , which are similar to the hoisting-wings and are provided with similar means for closing them, the sliding arm in this instance, however, being operated through its traveling in the cam-paths of the wheel F' , the inner end of the sliding arm being provided with a roller G^3 , as shown by dotted lines in Fig. 6. As the wings are giving the stroke the rollers operate upon the outer track or path, as seen in Fig. 6, and the slide-arm is thrown out, so as to hold the wing open; but as it travels back the roller falls through the opening G^5 into the inner path or groove and pulls the sliding arm inward, so that it no longer holds the wing, but allows it to close. When it reaches the end of the inner path, the pivoted gate or latch opens and allows the roller to pass out, and on the return movement the sliding arm is thrown out and the wing opened and there held. The arm F is pivoted on the vertical front portion of the frame and is adapted to be moved from right to left, as desired, by the hand-lever H .

The propelling-wings are operated as follows: I is a hand-lever pivoted near the inner end of the arm F , as seen best in Fig. 1, and to this lever is pivotally connected the yoke H' , as seen in Fig. 6, which has a swivel-joint connection at H^2 with the sliding rod H^3 , which passes through suitable boxes or guides H^4 on the arm F , as seen in Figs. 5 and 6. The forward end of this rod H^3 is pivotally connected with the arms G by the rods I' , both being connected to the rod H^3 by the same pivot, as seen in Fig. 6. It will readily be seen that by pushing this lever forward and back the propelling-wings will be caused to move, so as to beat the air and impart motion to the machine. The operator can guide

the machine with one hand and propel it with the other, thus having the device completely under control.

I may sometimes employ a storage-battery for operating the several parts.

Various modifications in detail may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

10 In Fig. 5 I have shown a different means of operating the propelling-wings. In this figure J is a sprocket-wheel carried by a suitable shaft suitably journaled and adapted to have its teeth engage the sprocket-chain C³. J' is
15 a crank operated by this sprocket-wheel and connected by the link or arm J² with a head J³, which is free to reciprocate on the vertical portion of the frame, being prevented from revolving thereon in any suitable manner—as,
20 for instance, by squaring the shaft or vertical portion, as seen in Fig. 5. K is a bell-crank lever pivoted at its elbow to the brace-rod K', and having one end pivotally connected with this head and the other connected with the
25 forward part of the yoke, the latter being preferably provided with a hole K², as seen in Fig. 6, for the reception of the free end of the arm of the bell-crank lever, as seen in Fig. 5. When this form is employed, the hand-lever
30 I is dispensed with, the propelling-wings being operated from the sprocket-chain.

What I claim as new is—

1. In a flying-machine, the combination, with the pedals and the wings, of the sprocket-wheels on the pedal-shaft and on the wing-shaft and chain, the sprocket-wheel intermediate said sprocket-wheels, the teeth of which engage said chain, the slidable collar J³, connected with a crank on the intermediate sprocket-wheel, and the pivoted bell-crank lever connected with said collar and with the propelling-wings, as set forth.

2. In a flying-machine, the combination, with the pedals and the wings, of the sprocket-wheels and chain, the intermediate sprocket-wheel, the teeth of which engage said chain, the slidable collar J³, connected with a crank on the intermediate sprocket-wheel, the pivoted bell-crank lever connected with said collar, and the sliding rod having an opening engaging one arm of the said lever, substantially as and for the purpose described.

3. The combination, with the hoisting and propelling wings, of the sprocket-chain and mechanism for operating the hoisting-wings, and the interposed bell-crank lever receiving its motion from the sprocket-chain and operating the propelling-wings, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

BURR FRANK BARNES.

Witnesses:

J. B. BARNES,

WILLIAM BRANNAN.