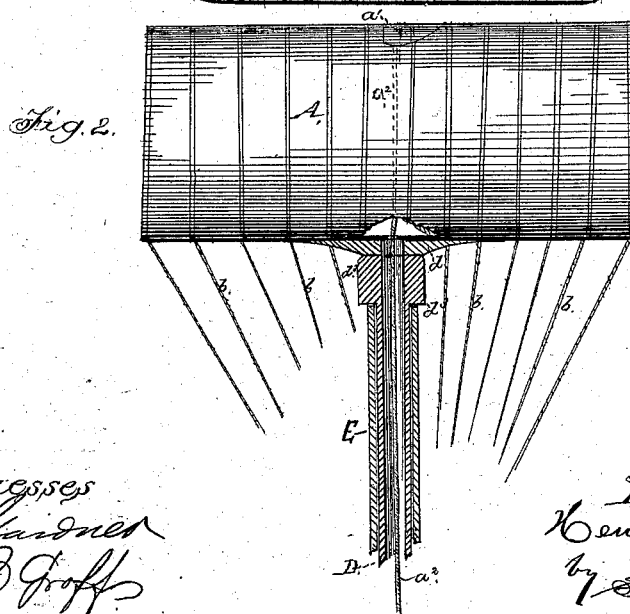
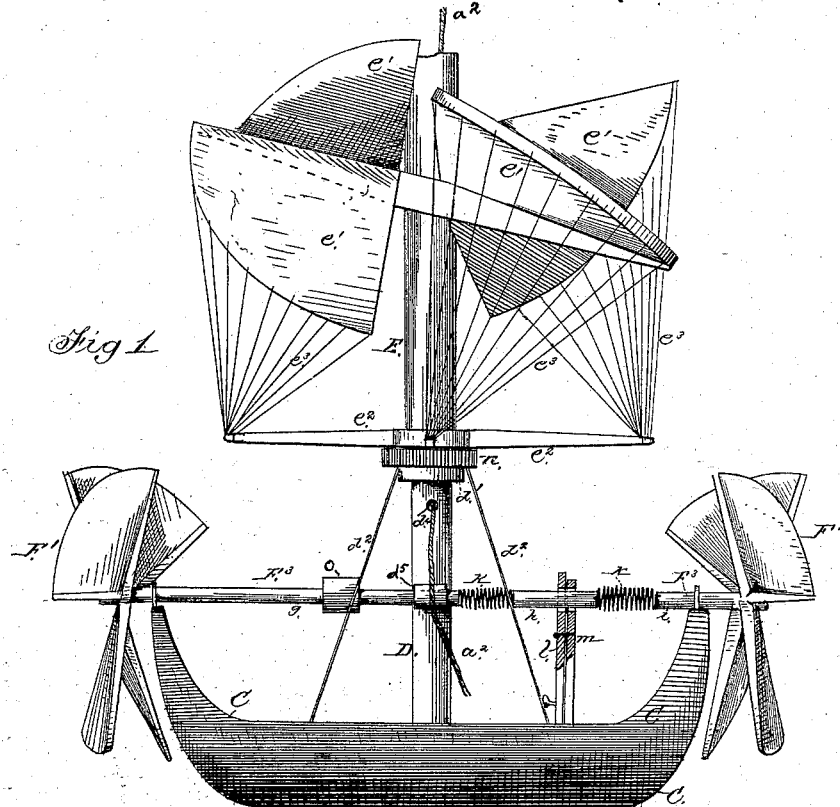


H. BADGLEY.  
Aerial Machine.

No. 214,546.

Patented April 22, 1879.



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# UNITED STATES PATENT OFFICE.

HENRY BADGLEY, OF FAIRFAX COURT-HOUSE, VIRGINIA.

## IMPROVEMENT IN AERIAL MACHINES.

Specification forming part of Letters Patent No. **214,546**, dated April 22, 1879; application filed October 1, 1878.

*To all whom it may concern:*

Be it known that I, HENRY BADGLEY, of Fairfax Court-House, in the county of Fairfax and State of Virginia, have invented certain new and useful Improvements in Aerial Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in flying-machines.

It consists, first, in pivoting or journaling a propeller-wheel upon the front end of the machine, whereby the machine can be made to move backward or forward, and a like propeller-wheel on the same shaft at the rear end of the machine, said shaft being in sections, so coupled that the rear propeller can be turned in any direction to move the machine in any desired direction; second, in combination with the above devices, a lifting-wheel and a balloon, all of which will be more fully described hereinafter.

In the accompanying drawings, in which similar letters indicate corresponding parts, Figure 1 is a side elevation, showing the working parts of my machine. Fig. 2 is a side elevation, showing the balloon and stay-rods, also the supporting-shaft, &c., in section.

A represents a balloon of any desired shape, size, or construction, but which should have a lifting capacity sufficient to almost lift the machine, together with a small engine or other motor, and at least one person in it, thus leaving very little for the lifting-wheel to do. By thus giving the balloon such a lifting power all the more force may be applied to driving the machine back and forth and from side to side.

Secured to the under side of this balloon, by means of suitable light strong rods or braces *b*, is a boat or frame of any desired construction or material, for the support of operators and driving machinery.

An upright hollow shaft, *D*, is secured to the bottom of the boat at its lower end, and to the balloon by a plate, *d*, or other suitable means, at its upper end, thus providing an ad-

ditional stay or connection between the balloon and the boat. This shaft has a shoulder *d'*, around its central part, and to this shoulder are secured stays *d''*. The lifting-wheel *E* is fitted onto the upper part of the shaft *D* and rests on the shoulder *d'*, and is prevented from sliding upward on the shaft *D* by the shoulder *d''*.

The lifting-wheel is preferably composed of a hollow cylinder, *E*, leaves or parts *e'*, arms *e''*, and stay-cords *e'''*, connecting the arms *e''* with the leaves *e'*; also, the outer edge or side of the leaves may extend downward about six inches, to prevent the air from slipping off, all together providing a wheel of great strength and durability.

To the bottom of cylinder *E* is secured a cog-wheel or pulley, *n*, for applying the power, which will operate the lifting-wheel and cause the machine to ascend or descend at any desired speed without waste of gas, or the use of sand-bags or other ballast for that purpose.

To prevent the balloon from bursting from the pressure of gas at great altitudes, a small valve, *a'*, is placed in the top of the balloon, which the upward pressure of the gas keeps closed. A small cord, *a''*, is attached to the under side of the valve *a'*, and passes down through the balloon, and thence through the hollow upright shaft *D*, and out through a small hole, *d'*, in shaft *D*. The valve may be opened by simply pulling the cord, thus letting out sufficient gas to prevent the balloon from bursting; then the cord is released, and the pressure of the gas closes the valve again.

I will now describe the devices for propelling the machine forward and backward and for steering the same: *F'* is a propeller-wheel at the front end of the machine, and *F''* the steering-wheel at the rear end, both of which may be of any desired construction or material, and both are secured to the same horizontal shaft, *F'''*. This shaft runs the whole length of the boat, and rests in bearings on the front and rear ends of the boat, and also in a bearing, *d''*, on the upright shaft *D*.

Shaft *F'''* is made in three sections, *g* *h* *i*, which are connected with each other by strong coiled springs or other flexible couplings *k* *k*. The section *h* of the shaft rests in a bearing in the end of a lever, *l*, which is pivoted to a

support, *m*. By operating the lever on its pivot, the section *h* of the shaft is carried from side to side, which the flexible couplings will admit without changing the continuous revolution of the entire shaft together, and which will change the direction of the steering-wheel, and thereby steer the machine in any desired direction with greater facility than any device heretofore used.

It is obvious that the power from the engine or other motor may be applied to a pulley or gear, *o*; also, that when the power is applied, both the wheels *F*<sup>1</sup> and *F*<sup>2</sup> will be operated to propel the machine forward and backward, as desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The lifting-wheel composed of parts *E*,

*e*<sup>1</sup>, *e*<sup>2</sup>, and *e*<sup>3</sup>, substantially as and for the purpose set forth.

2. A balloon having a valve, *a*<sup>1</sup>, in its top, in combination with hollow shaft *D* and cord *a*<sup>2</sup>, said shaft being firmly secured to the boat *C* and the balloon, all substantially as and for the purpose set forth.

3. The propeller-wheel *F*<sup>1</sup> and steering-wheel *F*<sup>2</sup>, in combination with shaft *F*<sup>3</sup>, composed of sections *g h i* and flexible couplings *k k*, part *h* being operated by the lever *l*, all substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

HENRY BADGLEY.

Witnesses:

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