W. S. HULL.

TOY AERONSTATS.

No. 190,591. Patented May 8, 1877.

Fig. 1.

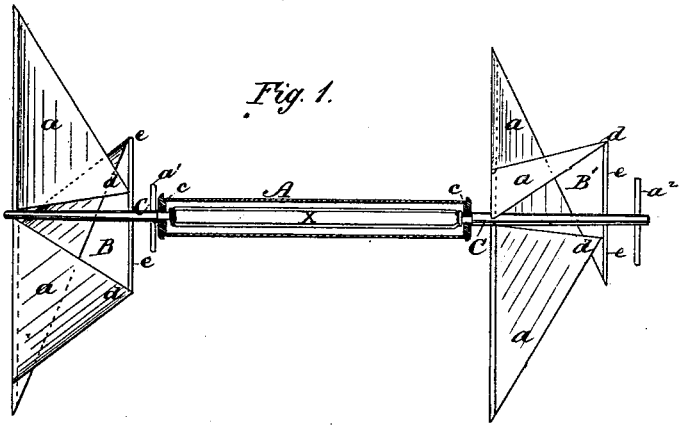


Fig. 3.

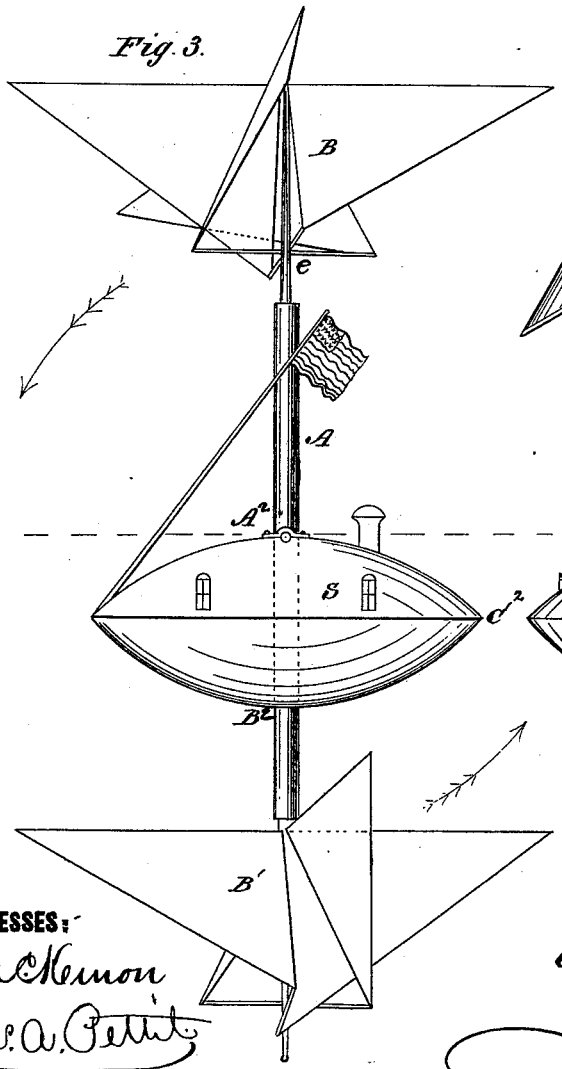


Fig. 2.

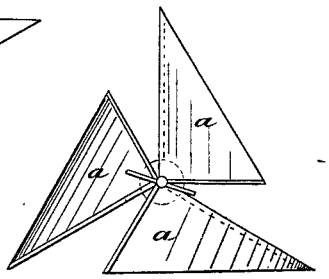
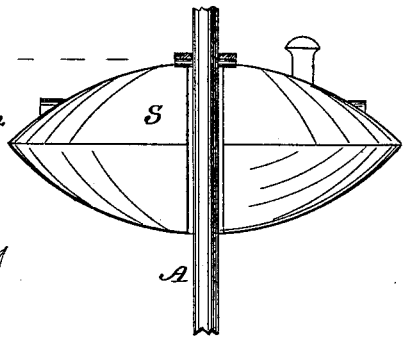


Fig. 4.



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IMPROVEMENT IN TOY AEROSTATS.

Specification forming part of Letters Patent No. **190,591**, dated May 8, 1877; application filed November 7, 1876.

To all whom it may concern:

Be it known that I, WILLIAM S. HULL, of the county of Hinds and State of Mississippi, have invented a new and Improved Aerostat; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a sectional side view of the toy aerostat; Fig. 2, an end view. Figs. 3 and 4 are views showing the aerostat upon a large scale, with a car attached.

My invention relates to a novel construction of aerostat, the same being designed to be used either in miniature form as a toy, or upon a larger scale, with steam or other suitable motive power, as a flying-machine. The improvement consists in the construction and arrangement of two propellers at opposite ends of a tubular frame, the said propellers being arranged to rotate in opposite directions, and constructed each of a series of right-angled triangular blades or pans, having one side at right angles to the rotating shaft, and their larger and rear acute angles deflected away from the shaft and supported upon independent projecting arms or bars, as hereinafter more fully described.

In the drawing my aerostat is represented in Fig. 1 as arranged for a toy. It consists of a tubular frame, A, made lightly, of stiff paper or other suitable material, and provided at each end with a series of fans or blades, forming propellers, B B^1, which are arranged to revolve in opposite directions. These propellers are constructed of one, two, three, or four right-angled triangular blades or fans, *a*, which are attached to a central shaft, C, revolving in bearings *c* in the ends of the hollow frame. One side of each of these fans is arranged at right angles to the shaft C, while their larger or rear acute angles *d* are deflected away from the said shaft, and are supported upon independent arms *e* projecting from the said shaft C. The fans of the upper and lower propeller are deflected to opposite sides of the shaft, so as to adapt them to rotate in opposite directions and still urge the aerostat in the same course. The angle made by the hypotenuse of the fans with its front edge is, preferably, about that shown in the drawing; but I do not limit myself to the same, as it may be varied without departing from the invention.

With the form of propeller constructed as thus described I am enabled to secure a much greater lifting effect with a smaller expenditure of driving-power than I have been able to obtain by any other construction; and it is therefore best adapted to the purposes of my invention, whether employed as a toy or a flying-machine. By locating the propellers also at the opposite ends of the frame, and as far apart as possible, there is less slip or loss of motive effect from the action of one propeller upon the other than can be obtained in any other way, the diminution of said slip being in proportion to the increased distance between the said propellers.

For driving the propellers I have connected the two shafts carrying the propellers by means of strips X of elastic india-rubber, which not only hold the propeller-shafts firmly in their bearings at the ends of the tubular frame, but, when twisted by any suitable means, supplies, in untwisting, the necessary power for driving the two propellers for elevating the aerostat in the air.

For winding up the toy any suitable means may be employed, but, as shown, the two propeller-shafts are provided with cross-pins a^1 a^2, the first of which, a^1, is held in the left hand, while the second, a^2, is twisted with the right hand until a sufficient degree of torsional power has been stored up, when the device may be liberated in vertical position in the air, to take its flight.

In connection with the device as thus described, a ratchet-wheel may be arranged upon the end of the tubular frame adapted to engage with the propeller-shafts, to hold them rigidly when wound up; and, in connection with these ratchets, a spring-catch may be arranged to co-operate, which spring-catch may be touched to release the ratchets and permit the revolution of the propellers, when the device is to be given to its flight.

The device which has thus been described as a toy will be enlarged to carry freight and passengers. When so constructed, a car, S, will be suspended to the tubular frame, at a

central point between the two fans or helices, upon a hinge or other like device, as shown in Figs. 3 and 4, the object of which will be hereafter described. The car will contain a steam-engine or other driving mechanism, and will carry the passengers and freight. The car will be egg-shaped, or something approximating thereto, and suspended so that a line drawn longitudinally through the center of the car will always be parallel with the horizon. This result will be obtained by means of the hinge before mentioned, universal joints at the point of suspension connecting the driving power with the fans, and, by means of a guide or way cut through the egg-shaped car, beginning at the point of suspension A^2, Fig. 3, extending vertically downward to B^2, thence backward and upward to C^2, thence upward and forward to the commencing-point A^2, making a passage or guide through which the tubular frame will swing, when operated by the pilot, for changing the direction of the aerostat from vertical to horizontal flight, or vice versa.

The two fans, before described, one above, one below, the car, when the machine begins flight in a vertical direction, will, when horizontal flight is desired, thus change their position in regard to the car in a maximum of forty-five degrees, the upper fan canting downward and forward, the lower fan canting upward and backward.

To make the machinery in the car adjust itself to the shafting in the tubular frame which connects with the fans, universal joints, flexible shafting-cams, or other devices will be used, or engines will be located upon the tubular frame, and connection will be had with the boiler upon the car through flexible piping.

Having thus described my invention, what I claim as new is—

1. The improved aerostat, consisting of the two propellers B B^1, constructed as described, and arranged upon independent shafts for revolution in different directions, in combination with the interposed tubular frame A, and a suitable driving-power connected with the propeller-shafts through the tubular frame, substantially as and for the purpose described.

2. The combination, with the reversely-arranged propellers B B^1 and the tubular frame A, of the interposed elastic strips contained in said frame and connecting the two propeller-shafts, substantially as and for the purpose described.

WILLIAM S. HULL.

Witnesses:
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