(No Model.) 2 Sheets—Sheet 1.

A. H. HAMON.

DIRIGIBLE AEROSTAT.

No. 350,303. Patented Oct. 5, 1886.

FIG. 2.

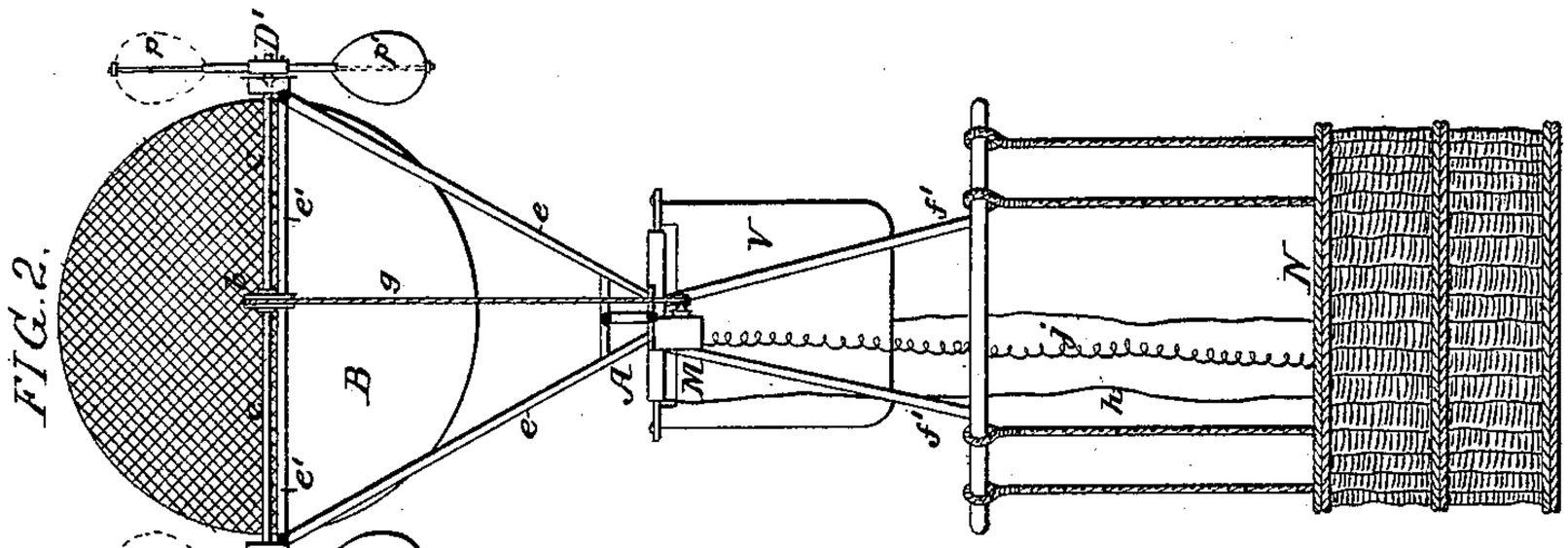
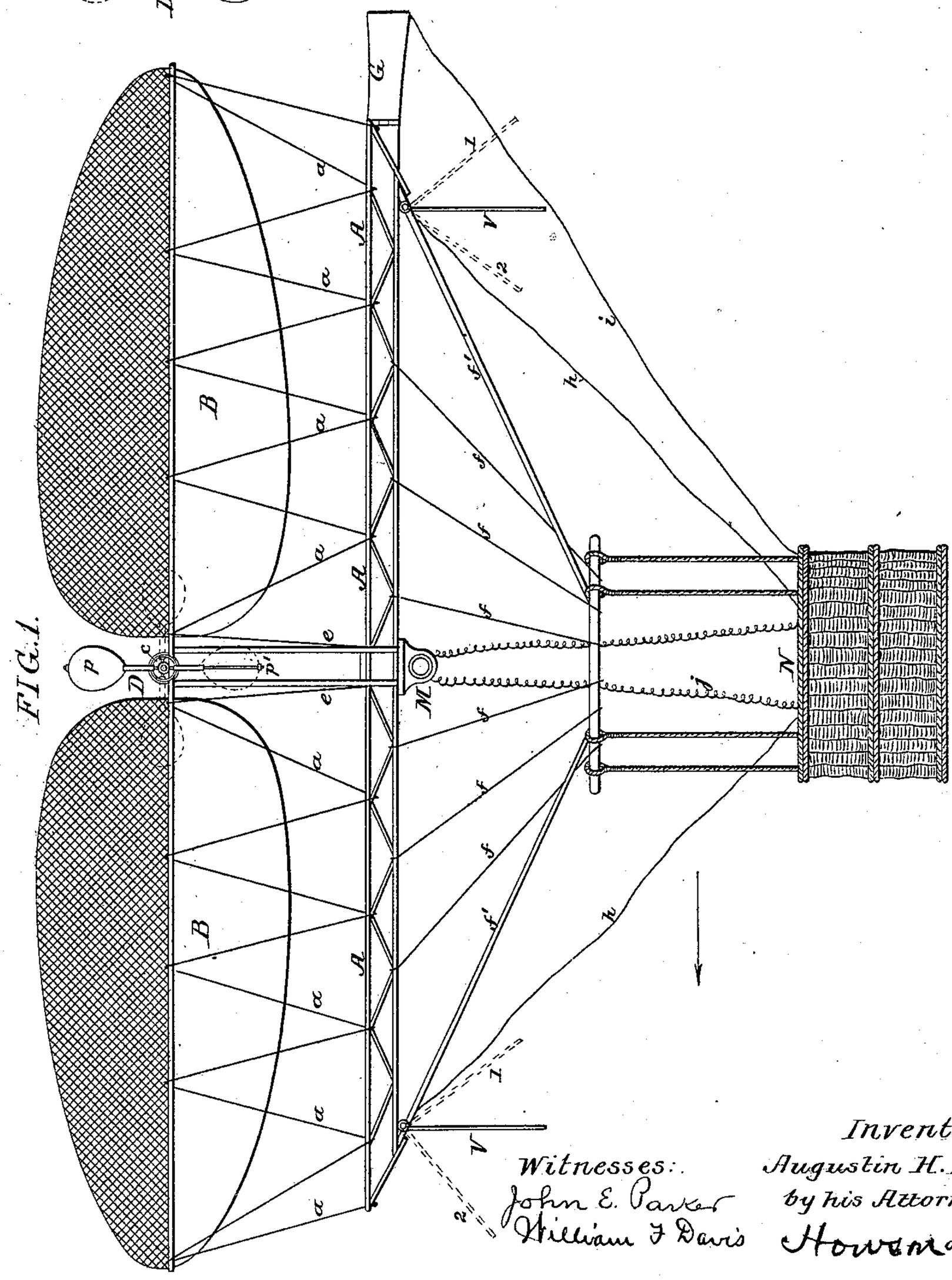


FIG. 1.



Witnesses:
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William F Davis

Inventor
Augustin H. Hamon
by his Attorneys
Howson and Sons.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

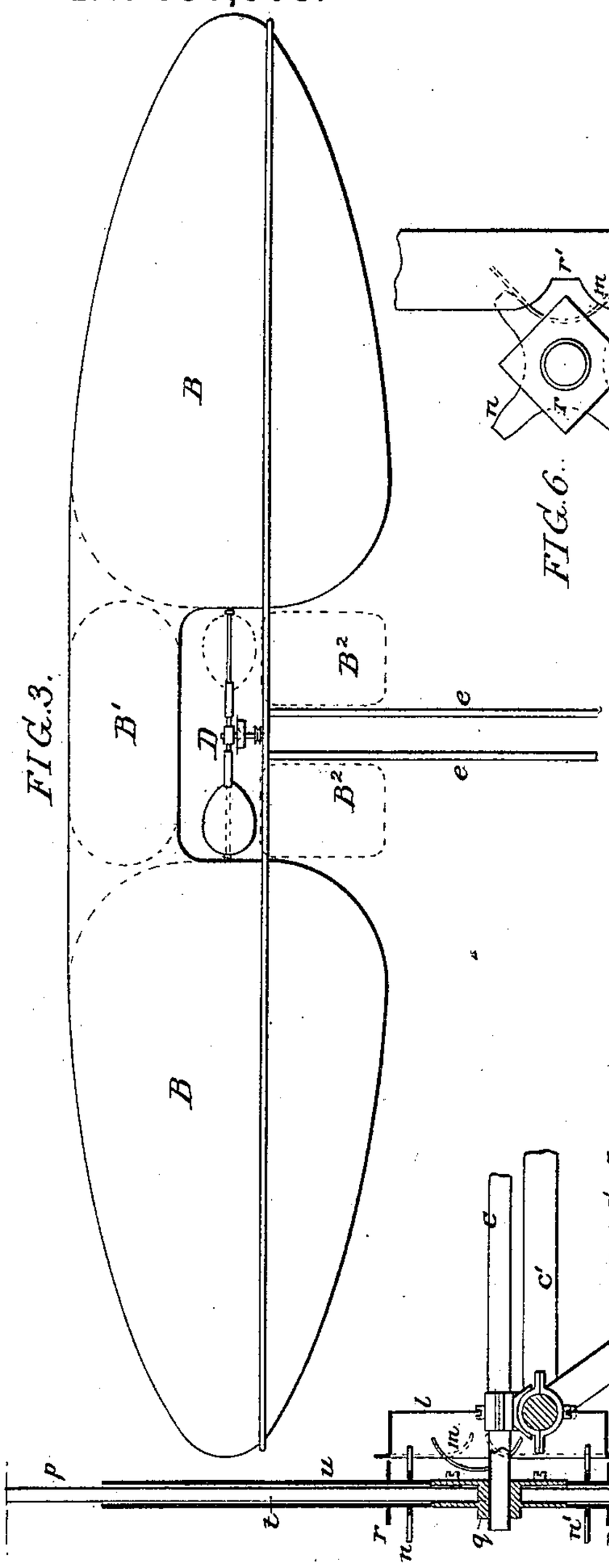


FIG. 6.

FIG. 7.

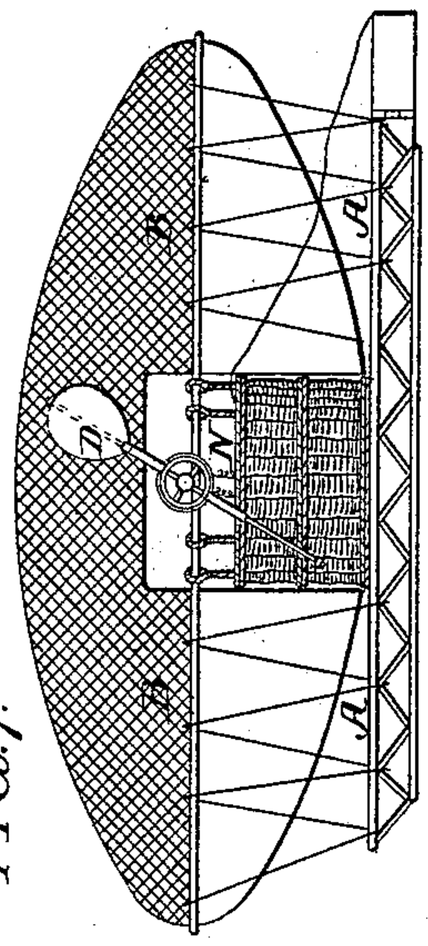


FIG. 8.

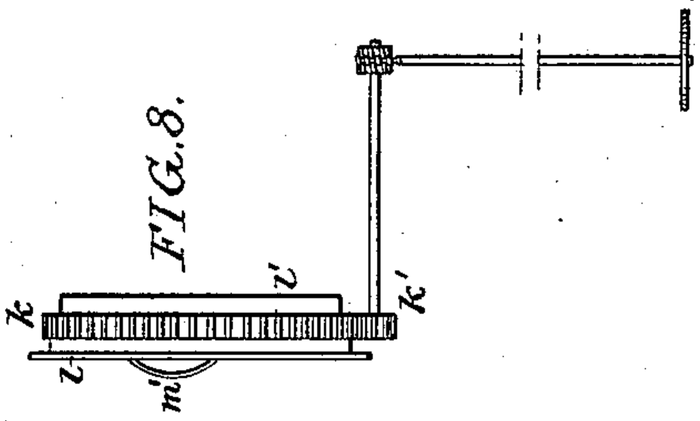
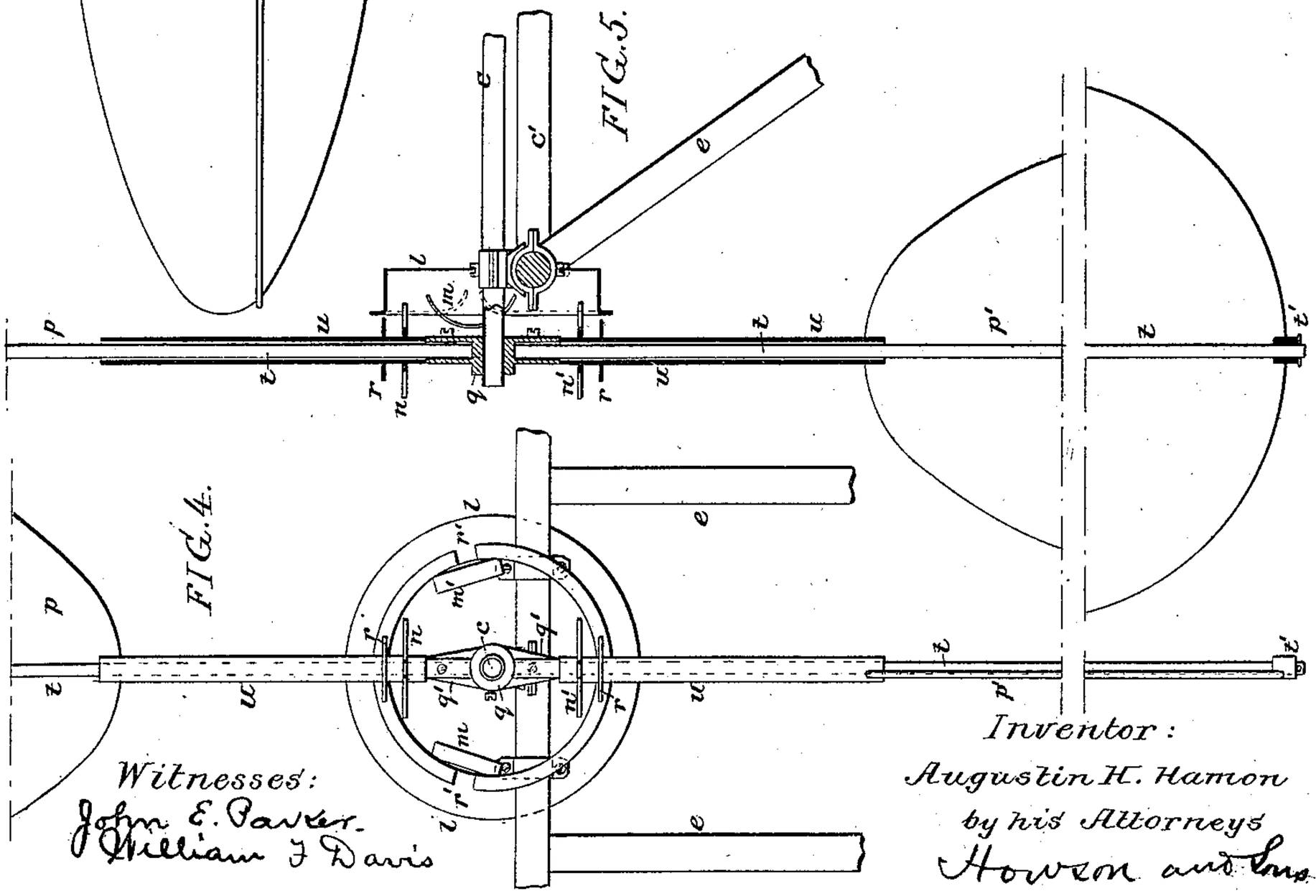


FIG. 5.



Witnesses:
John E. Parker.
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Inventor:
Augustin H. Hamon
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Howson and Sons

UNITED STATES PATENT OFFICE.

AUGUSTIN HENRI HAMON, OF BOULOGNE-SUR-SEINE, FRANCE.

DIRIGIBLE AEROSTAT.

SPECIFICATION forming part of Letters Patent No. 350,303, dated October 5, 1886.

Application filed April 8, 1885. Serial No. 161,757. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN HENRI HAMON, engineer, of Boulogne-Sur-Seine, in the Republic of France, have invented a Dirigible Aerostat, of which the following is a specification.

My invention consists of certain improvements in the construction of dirigible aerostats or balloons, my improvements having more especial reference to the device for operating the propeller-blades.

In the accompanying drawings, Figure 1 is a side view of a balloon embodying my improvements. Fig. 2 is an elevation of the same with the frame in section. Fig. 3 illustrates another form of balloon embodying my improvements. Figs. 4 and 5 show my improved feathering propelling devices in enlarged elevation and section. Fig. 6 is a still further enlarged view of a portion of the same. Fig. 7 is another modified form of balloon to which my improved propellers may be applied, and Fig. 8 is a detached view of one feature of my improvement.

A, Figs. 1 and 2, is the main frame, preferably constructed of bamboo. To this frame are attached the ropes or cords *a*, connecting it to the net of the aerostat B, which in this case is shown as comprising two air-vessels in line with each other. Upon this frame A at the center is fixed a motor, M, of any suitable construction, preferably an electric motor, from which motion is transmitted by means of a chain or band, *g*, Fig. 2, to a pulley, *b*, on a horizontal transverse driving or propeller shaft, *c*. This driving-shaft occupies the space between the front and rear sections of the aerostat, and is mounted in suitable bearings in a frame, *e'*, supported by suitable braces, *e*, on the main frame A. This shaft I prefer to make of a metal tube, and at opposite ends it carries propellers D D', each provided with feathering-blades *p p'*, the motions of which are controlled, as hereinafter described.

The car N is suspended from the frame A by means of suitable ropes, *f*, and is steadied by means of light rods *f'*. To the rear of the frame A is hinged a rudder, G, which the aeronaut can control from the car N by means of a suitable rope or ropes, I. Horizontal rudders V are also hinged to the frame A at its extremities, and cords *h* are provided, whereby the rudders V may be adjusted to different positions. Thus, when it is desired to cause the balloon to rise in its forward motion these fan-shaped propellers V are inclined backward, as shown by the dotted lines 1, Fig. 1, and, on the other hand, when it desired to cause the balloon to descend as it advances, the rudders G are inclined forward, as indicated by the dotted lines 2.

The battery for working the electric motor may be contained in the car, and suitable conductors, J, provided. It is not necessary, however, that the propellers should be mounted on a horizontal axis. For instance, in the modification, Fig. 3, I have illustrated a propeller or propellers mounted on vertical axes and occupying an enlarged space between the separated portions of the aerostat. In such case I prefer to fill up the intermediate spaces with air-vessels $B' B^2$, as found convenient, the whole being enveloped in netting.

Instead of suspending the car N from frame-work, as illustrated in Figs. 1 and 2, I may so construct the air-vessels that sufficient space will be left between them to mount the car on the frame-work, as illustrated in Fig. 7, and in such case the motor, as well as the batteries, may be carried in the car.

I prefer to make the car of an ovoid form, in order to present less resistance to the forward movement of the aerostat.

As I have before said, I make the blades of the propellers to "feather"—that is, each blade of each propeller will strike the air during one-half of the revolution of the shaft with its flat surface, and during the other half present only its edge as a resistance. By this means the resistance during the return-stroke is reduced to a minimum. To obtain this feathering movement of the blades I make use of the devices illustrated more fully in Figs. 4, 5, and 6. On the frame-work *c'* and *e*, around the shaft *c*, is rigidly fixed a hoop or flanged ring, *l*, provided within its periphery with two cams, *m m'*, and in the flanges of the ring are formed, adjacent to the said cams, recesses or notches *r'*, Figs. 4 and 6. At the extremity of the hollow shaft *c* there is secured a hub, *q*, carrying sockets *q'*, for the reception of the ends of the rods *t*, which are secured in the sockets by any

suitable means. Over each of these rods and free to turn thereon is a tube, *u*, to which is rigidly connected at its extremity the blade *p*, the tube and blade being held on the rod by a suitable collar or pin, *t'*. The tube *u*, which, together with its blades, can turn on the rod *t*, carries a star-wheel, *n*, in such a position that the cams *m m'* will be in its path as the shaft *c* carries the blades around. The tube also carries a square, *r*, a flat edge of which is adapted to act against the flanged face of the ring *l*, so that as the shaft *c* rotates, carrying with it the rods *t* and blades, the square *r*, in conjunction with the flanged edge of the ring *l*, will keep the blades in the positions they occupy in relation to the rods *t* T until the star-wheels *n n'* come into contact with the cams *m m'*. Then a quarter-turn will be imparted to each blade by means of the cam, the corners of the square *r* permitting this at the time, since these corners then enter the notches *r'*, as illustrated in Fig. 6. By this movement the requisite feathering will be imparted to the blade. By changing the points at which this feathering takes place it will be understood that the balloon may be caused to rise or descend as the blades are operated. This change of the feathering-point may be effected by mounting the ring *l* to turn on a supporting-ring, *l'*, which is fixed to the frame, as illustrated in Fig. 8, so that the cams *m m'* and notches *r'*, which control the positions of the blades, may have their positions changed. This controlling-ring may be adjusted from the car of the aerostat by providing the ring *l* with a circular rack, *k*, into which gears a pinion, *k'*, controlled by a handle, k^2, and intermediate rods from the car.

I claim as my invention—

1. The combination of the frame of an aerostat carrying a ring, *l*, having cams and notches, with a rotating shaft having swiveled blades *p p'*, provided with star-wheels and squares to engage with the said cams and notches to give two quarter-turns to the blades on each revolution of the shaft, all substantially as set forth.

2. The combination of the frame of an aerostat and propeller-shaft having swiveled blades carrying star-wheels and squares, with an adjustable ring, *l*, mounted on the frame, and having cams and notches to act on the said star-wheels and squares, all substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUSTIN HENRI HAMON.

Witnesses:
LÉON FRANCKEN,
ROBT. M. HOOPER.