# A. APRAXINE.
## Aerial Balloon.

**No. 213,603.** **Patented Mar. 25, 1879.**

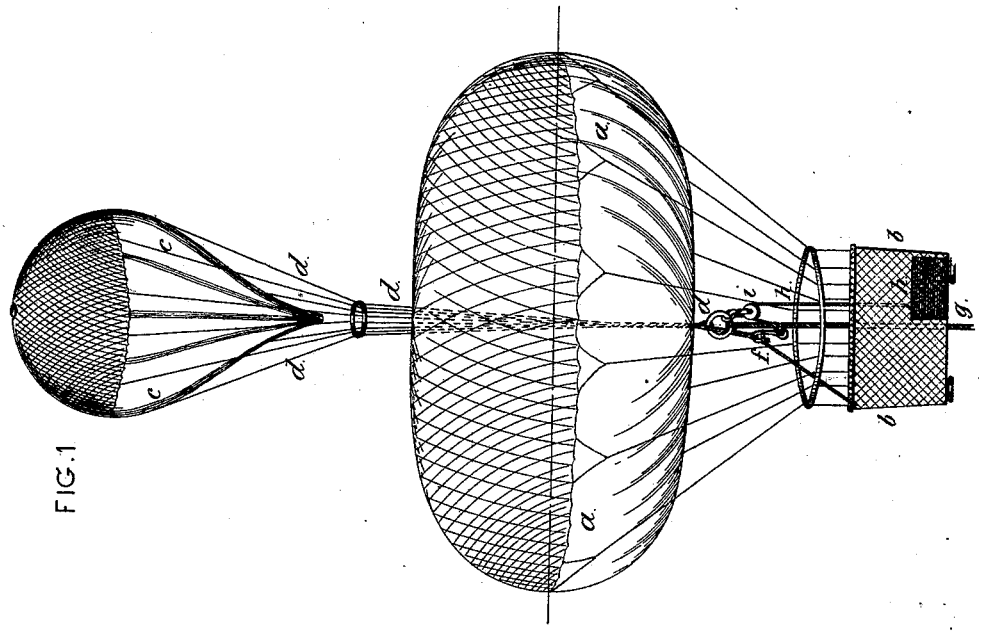


FIG. 1

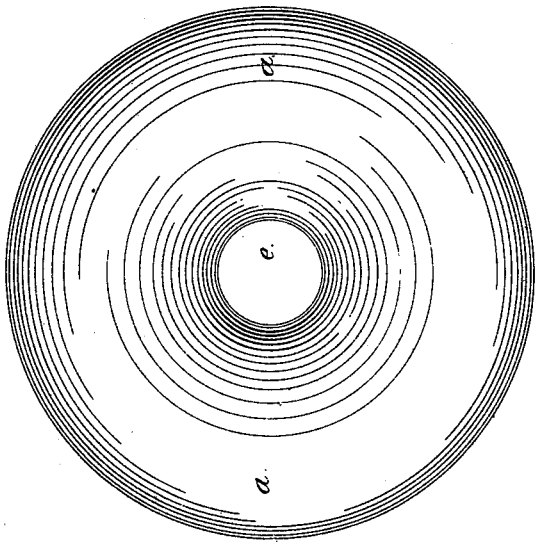


FIG. 2

WITNESSES

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# UNITED STATES PATENT OFFICE.

COUNT ANTOINE APRAXINE, OF ST. PETERSBURG, RUSSIA.

## IMPROVEMENT IN AERIAL BALLOONS.

Specification forming part of Letters Patent No. **213,603**, dated March 25, 1879; application filed June 28, 1878.

*To all whom it may concern:*

Be it known that I, Count ANTOINE APRAXINE, of St. Petersburg, in the Empire of Russia, presently resident at Paris, in France, have invented certain new and useful Improvements in Aerial Balloons, of which the following is a specification:

This invention relates to improvements in the construction or arrangement of aerial balloons, with a view to facilitate the working and control of the same, and to permit of dispensing, either wholly or partially, with the discharge of ballast or gas during the ascensions or descents.

Figures 1, 2 of the accompanying drawings represent, in elevation and plan, one of the forms of the improved aerostat.

In these figures, *a* is an annular balloon, of impervious tissue, to which is suspended the car *b*. *c* is a second balloon, of any convenient form, the attachment-cords *d d* of which, descending through the central space, *e*, of the balloon *a*, are connected with a hook or other suspension mechanism secured to the car, and so arranged as to set these cords free at the will of the aeronaut, thus rendering the balloons independent of each other.

It should here be remarked that although I give preference to the annular form of the lower balloon, *a*, this form may be replaced by any other, provided a central space be reserved for the passage of the attachment-cords or other appliances, and of the cable hereinafter mentioned.

*g* is a cable, of any required strength, secured to the cords *d d* of the upper balloon, *c*, and descending from thence to the ground through the car *b*. *h* is a halyard, having twice the length of the cable *g*. This halyard is coiled in the car *b*, and its free extremity, after passing through the pulley *i*, secured, like the cable *g*, to the cordage of the balloon *c*, is connected with the car by a ring or hook fixed near the suspension-piece *f*.

The lower balloon, *a*, should, with the exception hereinafter stated, be heavier than air—that is to say, that its ascensional force should be more than counterbalanced by the weight of its load, after deduction of half the weight of, say, half the length of the halyard *h*.

The upper balloon, *c*, should have sufficient ascensional power to support the weight of the cable *g* and other adjuncts, plus the power required to determine the ascension and maintainment in the air of the lower balloon, *a*, when loaded to the desired extent.

The arrangement above described can be employed either as stationary balloon or as a free balloon with limited vertical range.

When employed as a stationary or captive balloon, it may be worked in several different ways, as, for instance—

First, the two balloons *a c*, being coupled at the suspension-piece *f*, are allowed to ascend together to the height corresponding with the length or weight of the cable *g*, the free end of which remains on the ground. When about to descend, the aeronaut disengages from the hook *f* the attachments of the upper balloon, *c*, and the lower balloon, *a*, being thus freed from the ascensional power of the latter, returns to the ground along the cable *g*, its descending movement being regulated, slowed, or checked at will by direct action of the hand on the cable *g*, or by tractions on the halyard *h*.

Secondly, the coupled balloons, on attaining the desired elevation, may be brought back together by hauling in from the ground the cable *g*, and thus neutralizing the ascensional force of the upper balloon, *c*, so as to allow the lower balloon, *a*, to descend by its own weight.

Thirdly, the upper balloon, *c*, may be allowed to rise alone to the end of its cable *g*, and the ascent of the lower balloon, *a*, be effected by the aeronaut hauling on this cable or on the halyard *h*.

For free ascensions to a limited height, the coupled balloons may be allowed to rise to the elevation corresponding with the weight of the cable *g*, which point being attained, the free length of the latter is hauled into the car. The aerostat will then remain more or less in equilibrium at that point, and its descent may be effected when required by liberating the upper balloon, *c*, and paying out through the car the cable *g*.

The following modifications may, if so desired, be introduced into the arrangement of the balloons:

First, the cable *g* and the halyard *h* may be replaced by a single line coiled in the car, and

passing by its free end through a pulley fixed at the bottom of the latter, and from thence prolonged and secured to the attachment-cords of the upper balloon. In this case the upper balloon, *c*, is allowed to rise alone to the desired height, and the lower balloon, *a*, being loaded as nearly as possible to the point of equilibrium, its ascent is effected by the aeronaut hauling in the line, which may be recoiled in the car, or allowed to pass freely through the bottom of the latter.

Secondly, for captive or stationary ascensions, the balloon *a*, instead of being loaded beyond its power of ascent, may be underloaded, so as to allow of its rising along the cable *g* without the aid of the upper balloon, *c*, which remains stationary in the air. In that case its descent is effected by hauling from the ground on a separate line, with which it is supplied.

Although the above description is confined to an elementary type of aerostat comprising two balloons only, it will be understood that the system may be modified or extended according to circumstances. Thus, for instance, the number of balloons *a c* may be increased, and their form, dimensions, and general details may be varied. The cable *g* may be made tubular to permit of replacing escapes of gas from the upper balloon without necessitating its return to the ground, and the central open space, *e*, of the lower balloon, *a*, may be arranged as a chamber for the reception of such general apparatus and appliances as it may be desired to carry.

It will further be understood that in such aerostats ballast will, as a rule, only require to be used as a means of adjusting the load in the car, and that the necessity of discharging gas during the ascensions will only occur in exceptional cases.

What I claim, and desire to protect by Letters Patent, is—

1. An aerostat composed of at least two balloons, as in *a c*, separable at will, the one, *a*, being heavier than air, and the other, *c*, having power sufficient to determine the ascension of the latter, and to support the weight of a cable, as in *g*, the whole arranged and operated substantially as and for the purposes above set forth, and shown in the drawings.

2. A captive or stationary aerostat composed of the same elements, but in which the lower balloon, *a*, is rendered lighter than air, so as to ascend along the cable *g* without the aid of the upper balloon, *c*, substantially as and for the purpose herein set forth.

In witness that I claim the foregoing I have hereunto set my hand and seal this 22d day of May, 1878.

COUNT A. APRAXINE. [L. S.]

Witnesses:

J. MENNONS, Jr.,

J. FONTENELLE,

*Clerks to Messrs. Mennons & Co., Patent Solicitors, Paris.*