No. 612,996. Patented Oct. 25, 1898.

R. M. W. H. VON SIEGSFELD.

AIR BALLOON.

(Application filed Aug. 14, 1896.)

(No Model.) 2 Sheets—Sheet 1.

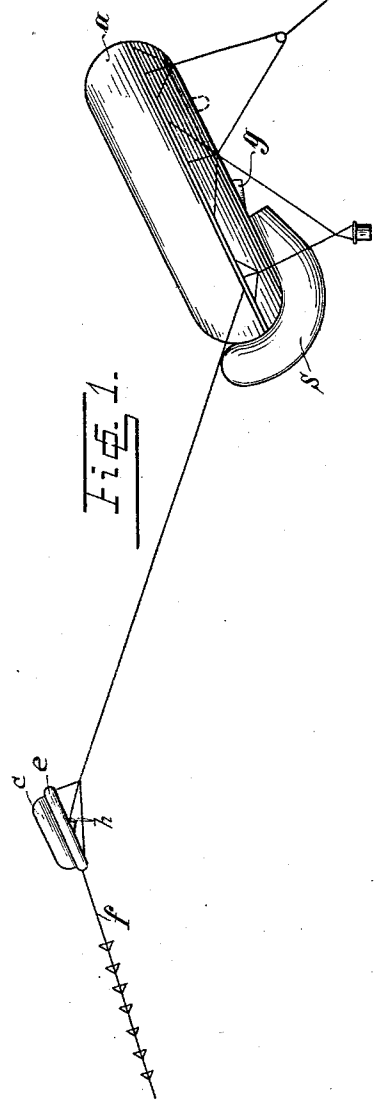


Fig. 1.

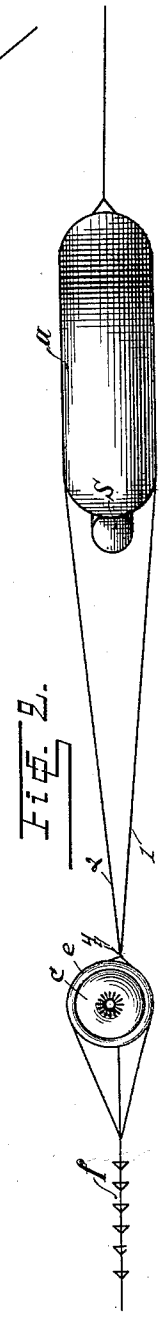


Fig. 2.

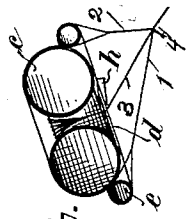


Fig. 3.

Attest
James McHear
C. S. Middleton

Inventor
R. M. W. H. Von Siegsfeld
by Ellis Spear
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

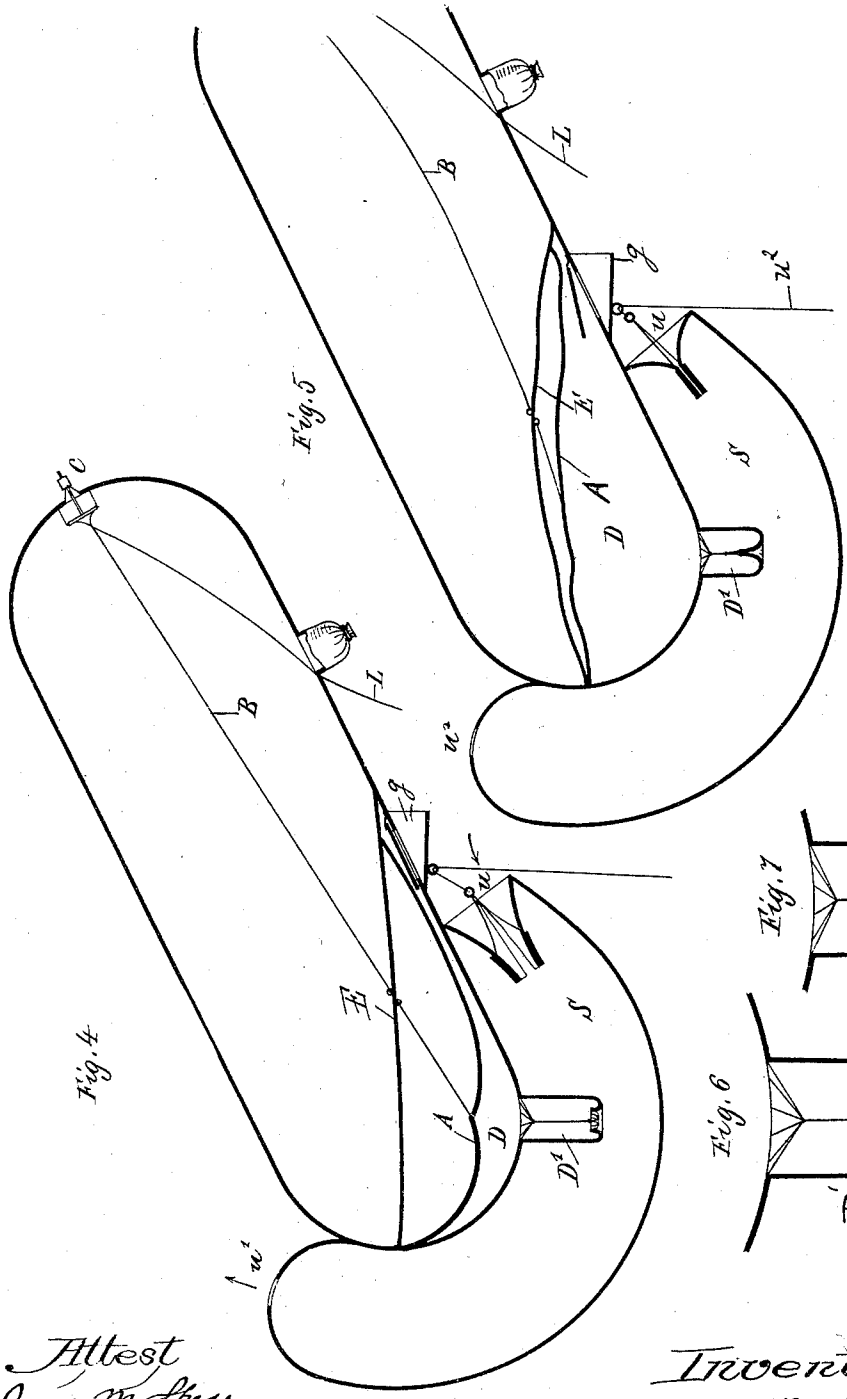
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(Application filed Aug. 14, 1896.)

(No Model.) 2 Sheets—Sheet 2.



Attest
James M Spear
C. S Middleton

Inventor
R. M. W. H. Von Siegsfeld
by Geo. Spear
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

RUDOLPH MAX WILHELM HANS VON SIEGSFELD, OF SCHONEBERG, GERMANY.

AIR-BALLOON.

SPECIFICATION forming part of Letters Patent No. 612,996, dated October 25, 1898.

Application filed August 14, 1896. Serial No. 602,800. (No model.) Patented in Germany October 10, 1893, No. 75,731.

To all whom it may concern:

Be it known that I, RUDOLPH MAX WILHELM HANS VON SIEGSFELD, a subject of the Duke of Anhalt, and a resident of Schoneberg, near Berlin, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Air-Balloons with Openings Opposite to the Air-Current, (patented in Germany October 10, 1893, No. 75,731,) of which the following is a specification.

The object of the present invention is an air-balloon which is united by a system of cords with a second smaller balloon to obviate the disturbing movements and variations of the main balloon which render accuracy difficult in military and metereological observations. Both balloons are provided with certain special improvements in order to prevent deformation or bumping by the action of the wind, the form of the balloon being essential to the velocity, steadiness, and accuracy of its movement.

The invention is explained by reference to the accompanying drawings.

Figure 1 represents a side elevation, and Fig. 2 a plan, of the invention. Fig. 3 is a section of the auxiliary balloon. Figs. 4 and 5 represent in section the arrangement of the rudder-bag at the lower end of the balloon, in Fig. 4 the pocket D being full or blown out, while in Fig. 5 it is shown open. Figs. 6 and 7 are detail views of the valve D′, leading from the pocket D to the rudder-bag S.

The main balloon, the essential parts of which are already known, acts like a kite, and consists chiefly of a long cylinder with hemispherical ends. Although it is provided with a rudder S adapted to the form of the ends of the balloon, it is important to render the instrument independent from all sudden irregular motions occasioned by too great velocities of wind. Such violent sudden motions of the basket or car render continuous observations very difficult. Now it has been shown from a number of experiments that this difficulty can only be avoided by attaching to the balloon another body a certain distance from the main body in such a manner that in proportion as the balloon moves this secondary body will overcome a certain resistance and perform a certain amount of work, and it has been found a series of smaller balloons or kites attached to the main body by cords or similar appliances will be most suitable for the purpose of steadying the main balloon in its motions. It is not advisable to employ any stiff unyielding parts, since balloons being filled in the open air violent motions will be occasioned by a strong current of wind and will detract from the safety of the whole machinery. Now inasmuch as the main object of using these auxiliary balloons or kites is to employ certain bodies which by a rotary motion of the main body will be compelled to perform certain work, it results that the secondary bodies must be given a form which with a small volume will combine great resistance to the pressure of the wind. This is accomplished by giving to the main body of the auxiliary balloon the form of a ring *c*, while its base by certain suitable covering *d* presents a smooth flattened surface which can operate like the surface of a kite. In order to increase the surface, another ring *e* of larger diameter and smaller cross-section is placed around the first, whose base coincides with that of the second.

To the interior of the auxiliary balloon or kite a system of cords is attached in such a manner as in the main balloon. An additional cord 3 is carried from the combining-point 4 of the two cords 1 and 2 to the inner part of the ring, where it is branched out and neutralizes the pressure of the wind upon the central parts of the balloon. In order to prevent unnecessary violence of movement a tail *f*, formed like the tail of a kite, is fastened by two ropes attached to the auxiliary balloon and almost diametrically opposite each other. The two cords 1 and 2 extend from the point of attachment of the auxiliary balloon or kite and are attached to two points on the main balloon, near the rear end thereof.

Those manageable or captive balloons constructed hitherto cause by the action of the air-currents about them in case a balloon should not be completely filled with gas bumps or deformations in its surface, thus causing irregularity in its motions. All means calculated to prevent this inconvenience require continuous refilling of the balloon or

inflation with air, which results in a considerable waste of time and are, furthermore, dangerous on account of the possibility of overtaxing the capacity of the balloon. In order to obviate this, an orifice or opening *g* is made on the lower side of the balloon provided with a funnel-shaped mouth into which the wind will blow, whereby the air will inflate the balloon by passing into a small balloonette or compartment formed by the deepest portion of the balloon and an inner covering A. This so-called "balloonette" constitutes a pocket in the interior of the balloon, which, being filled by a funnel-shaped opening placed opposite to the direction of the wind, has for its principal function to prevent indentations and deformations of the balloon which might ensue from the pressure of the wind or from loosening the cover of the balloon by escaping gas. The seam of the balloon corresponds with a cut through the middle of the lower edge of the cylindrical part and the middle of the rear hemisphere. A further wind-catcher *h* is arranged at the lower part of the auxiliary balloon, which opening between the covering *d* and the balloon itself acts like a balloonette and keeps the balloon in position.

Fig. 4 shows a horizontal wall A of the pocket inflated downward on account of the expansion of the gas while the balloon is rising. This inflation by acting upon the cord B, connected with the valve of the balloon, causes the same to open. When the balloon descends, the wind entering the small balloonette inflates the principal part of the wall of the balloonette. The wind may still enter the balloonette D, the volume of which may increase or diminish, or it may enter the rudder S through the inlet-valve *u*, which is a flap or non-return valve adapted to permit the entrance of air but not its return and which may be maintained closed, when desired, by cord u^2. This rudder, the vertical section of which presents a curve, is hemispherically-shaped in its upper part and is provided with an opening u' smaller than the entrance for the escape of the wind. Thus a lower tension is maintained in the rudder S than in the balloonette D, which causes the safety-valve D′ of the balloonette to open as soon as the pressure in the balloonette becomes too high.

In Fig. 5, E illustrates the upper wall of the balloonette D; S, the rudder; D′, the safety-valve, and B the rope acting upon the escape-valve C.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a main balloon *s*, an auxiliary balloon or kite above and somewhat to the side of the main balloon and connected therewith by properly-arranged ropes for the purpose of decreasing and obviating the oscillation of the basket or car and keeping the same in position, substantially as described.

2. The combination with a main balloon of an auxiliary balloon or kite above and somewhat to the side of the main balloon and connected therewith by properly-arranged ropes for the purpose of decreasing and obviating the oscillation of the basket or car and keeping the same in position, the main balloon being provided with an apparatus to keep the same smooth and comprising an inner covering or diaphragm and an air-funnel opening toward the direction of the wind-current and arranged to conduct air into the balloonette formed by said covering or diaphragm, substantially as described.

3. The combination, with a main balloon *a*, of an auxiliary balloon or kite above and somewhat to the side of the main balloon and connected therewith by properly-arranged ropes for the purpose of decreasing and obviating the oscillation of the basket or car and keeping the same in position, and consisting of several ring-shaped balloons connected so that their common base acts like a kite in order to obtain with as small a volume as possible an enlarged wind-pressure surface.

In witness whereof I have hereunto set my hand in presence of two witnesses.

RUDOLPH MAX WILHELM HANS VON SIEGSFELD.

Witnesses:

PEREQUINE VARNALS,

MAVRIC SCHMALL.