

R. C. TILGHMAN.
BALLOON.

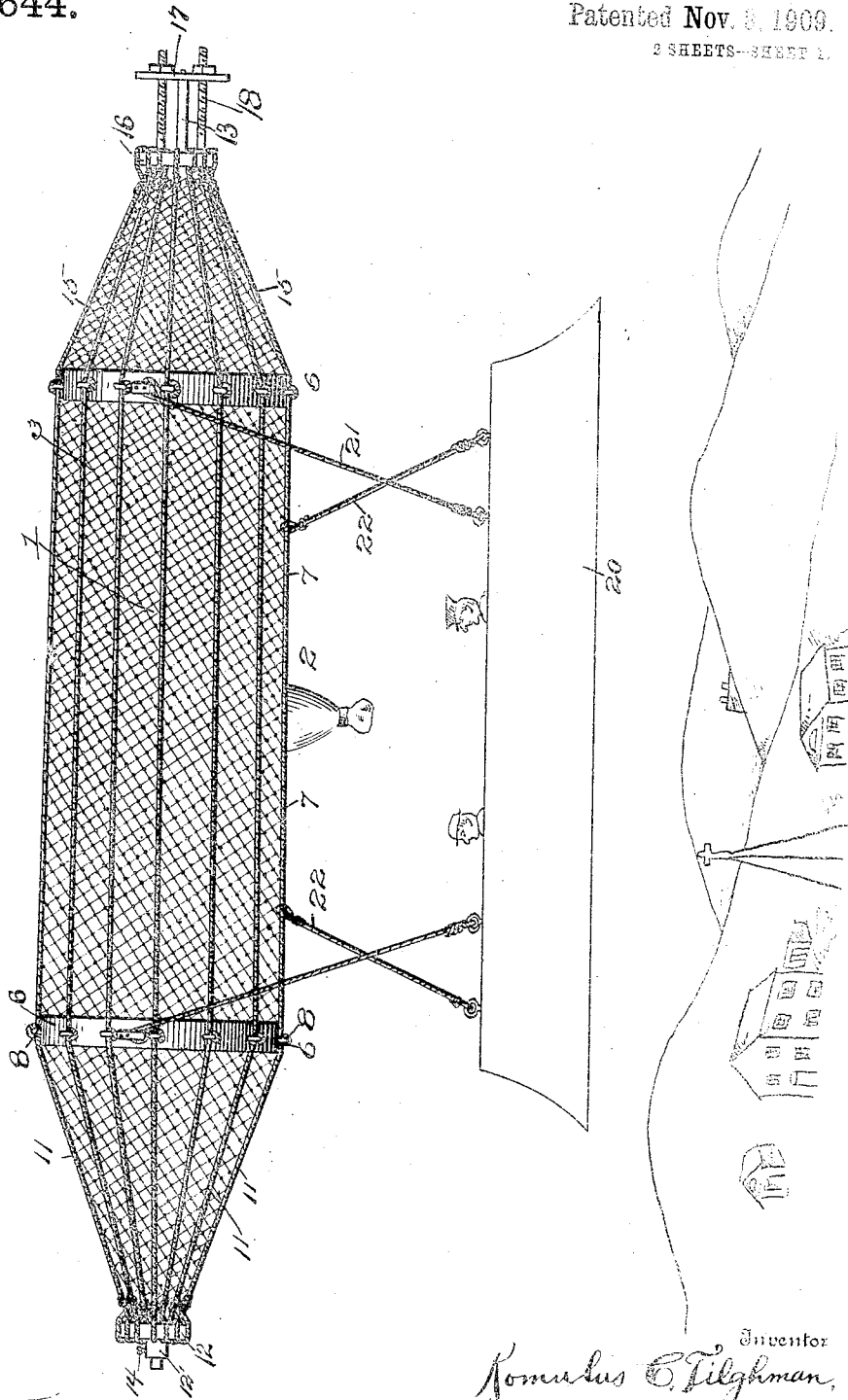
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939,644.

Patented Nov. 9, 1909.

2 SHEETS--SHEET 1.

Fig. 1.



Witnesses

G. F. Tolson
C. H. Fesler

Inventor
Romulus C. Tilghman,

By *Edgar M. Kitchin,*
his Attorney.

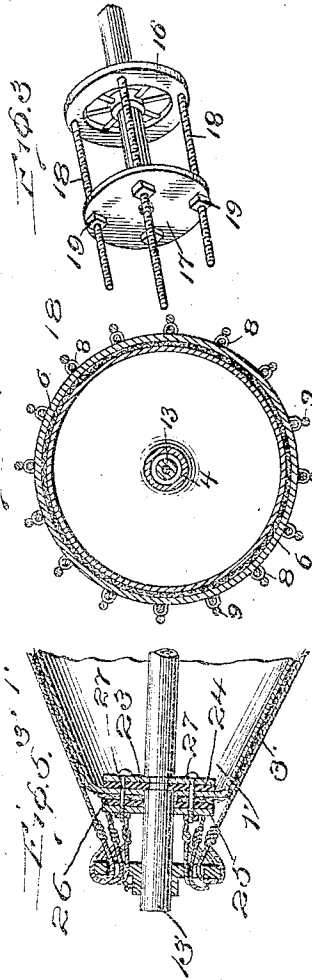
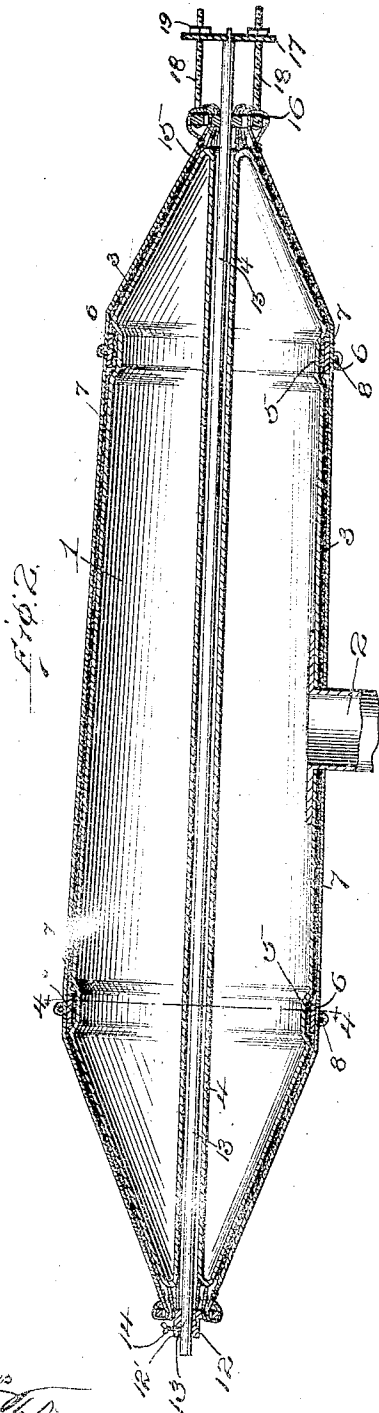
R. C. TILGHMAN.
BALLOON.

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2 SHEETS—SHEET 2.



Witnesses

A. E. Tolson.

C. H. Fisher

Inventor

Romulus C. Tilghman

Edgar M. Kitchen
his Attorney.

UNITED STATES PATENT OFFICE.

ROMULUS C. TILGHMAN, OF ANACOSTIA, DISTRICT OF COLUMBIA.

BALLOON.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ROMULUS C. TILGHMAN, a citizen of the United States, residing at Anacostia, District of Columbia, have invented certain new and useful Improvements in Balloons; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in aerial navigating apparatus, and more particularly to such as are provided with sustaining gas containers.

The object in view is the provision of means for causing the gas bag, when the gas is suddenly or otherwise exhausted, to perform the functions of the sheet of a parachute, and a further resultant object is the provision of means for causing the balloon to transform itself into a parachute immediately upon exhaustion of the sustaining gas.

With these and further objects in view, the invention comprises certain novel constructions, combinations and arrangements of parts as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a view in side elevation of a balloon embodying the features of the present invention. Fig. 2 is a longitudinal, vertical, central section through the gas bag and surrounding parts. Fig. 3 is an enlarged, detail perspective view of the cable tightening device. Fig. 4 is a transverse, vertical section taken on the plane indicated by line 4, 4 of Fig. 2. Fig. 5 is an enlarged, detail vertical section taken longitudinally through a fragment of one end of a modified form of the gas bag and surrounding parts.

It is quite common to utilize a parachute for purposes of descent from a balloon, but when the gas bag suddenly collapses, the operator usually has no opportunity to free his parachute and fatal results follow.

The present invention is designed to obviate such catastrophe, and to this end embodies means for sustaining the bag fabric in an extended condition after the exhaustion of the gas so as to present a sustaining plane during the descent of the balloon.

Referring to the drawings by numerals, 1 indicates a gas bag composed of any suitable flexible fabric provided at one of its lowermost points with a filling tube 2. The bag

1 may be of any desired shape and for the sake of illustration I have shown the same as of cylindrical or slightly longitudinally tapering form and having abruptly tapering terminals. The bag 1 may be incased in the usual net 3. The terminals of the bag are connected by a longitudinal tube 4 extending centrally throughout the length of the bag and formed of the same material as the bag, the tube 4 lying preferably coaxial with the longitudinal axis of the bag, and opening at the ends to the atmosphere, the ends of the tube 4 merging into the ends of the bag 1.

Near each end of the bag 1 the same is formed with an annular contracted portion 5, and within each contracted portion 5 is arranged an annular band 6, preferably of comparatively rigid material. The bands 6 are connected together by longitudinal cables 7, 7 in any suitable number, each cable 7 being fixed at each end to the respective band 6 by being looped through eye 8 fixed to the respective band 6, and extending therefrom, as at 11, all of the cable ends 11 converging toward and being fixed to a retaining disk 12 in any preferred manner. A shaft 13 extends longitudinally throughout the tube 4, and has its ends projecting beyond the ends of the tube. The disk 12 is provided with a hub 12', and a set screw 14 is passed therethrough into engagement with the shaft 13, the hub and disk being mounted on the shaft and adjustably fixed against longitudinal movement independently thereof by the set screw 14. The opposite ends of the cables 7 extend outwardly from the respective band 6, as at 15, 15, and converge toward and are fixed to a disk 16, which is slidingly mounted on the shaft 13 near the opposite end thereof from that engaged by disk 12. Spaced outwardly from the disk 16 is a disk 17 which is fixed to the shaft 13, and bolts 18, 18 are fixed to the disk 16 and passed slidingly through disk 17 and have their outer ends engaged by nuts 19, so that said nuts may be threaded along the bolts 18 for shifting the disk 16 longitudinally with respect to the shaft 13. Any suitable number of bolts 18 may be employed, and it is obvious that by drawing the disk 16 outwardly the cables 7 and connections may be drawn taut.

Any suitable car 20 may be suspended from the bag 1 in any preferred manner as for instance by suitable guys 21, 21, at each

side of the bag 1 and suitably fixed to the bands 6. Suitable stays 22, 22, may be extended from the lowermost cable 7 to the respective ends of the car 20.

5 It is to be observed that by thus constructing the balloon, absolute collapse of the bag is impossible, and the natural result of the sudden exhausting of gas from the bag will be the practical collapse of the lower half
10 of the bag which, owing to the pressure of air during the descent, would naturally be flattened against the tube 4 and rod 13, while the upper half of the bag 1 will naturally maintain its normal contour, and thus a very
15 considerable surface is presented to the air for acting after the manner of the sheet of a parachute.

In Fig. 5 I have illustrated a slight modification which provides for the use of the
20 central supporting shaft without the employment of the tube 4. In said figure 13' indicates said shaft which is provided with in the end of the bag 1' with a washer 23 disposed preferably within an annular
25 groove in the shaft 13'. The washer 23 is preferably of stiff material and a packing washer 24 is arranged just outside the washer 23, and in contact with the inner face of the end of the bag 1', which end is turned
30 abruptly inwardly in position for being engaged by the packing and washer. Just outside the end of the bag 1' is the usual net 3' against which rests a packing washer 25 and a stiffening washer 26, all of said washers being firmly clamped together by through
35 bolts 27, 27, the end of the bag 1' thus being clamped in position, and leakage at this point being obviated by the packing. It will be obvious, of course, that various other
40 methods may be employed for arranging the shaft centrally of and extending across the body of the bag with or without a surrounding tube without in the least departing from the spirit and scope of the present invention.
45 It is to be noted that by the employment of the system of cables and tightening mechanism disclosed, rigidity of the parts is secured which facilitates rapid flight and adds materially to the safety and firmness of the
50 parts.

The net work of cables with the bands 6 may be retained taut entirely independently of the condition of the inclosed bag 1, so that said bag when deflated may be collapsed
55 against the shaft 13, and then readily pumped up without the necessity for pro-

viding for the escape of contained air, as is true of the metallic and other permanently expanded bags.

What I claim is:—

1. In a balloon, the combination with a bag, of bands encircling the same, longitudinally extending cables connecting said bands, a shaft extending throughout the bag and cable tightening means carried by the
60 shaft and connected with the bands.

2. In a balloon, the combination with a substantially cylindrical bag, of a shaft extending throughout the length thereof, cables extending outside the bag and connected at their opposite ends with the opposite
70 ends of the shaft, and spreading bands surrounding the bag between the bag and cables.

3. In a balloon, the combination with a gas bag, of a shaft extending therethrough, cables lying outside of and engaging said
75 bag, means connected with the shaft for varying the tension of the cables, and car sustaining means connected with the cables.

4. In a balloon, the combination with a gas bag, of a shaft extending longitudinally
80 therethrough, sustaining bands surrounding said bag, a disk longitudinally shiftable mounted on said shaft contiguous to one end thereof, means for adjusting said disk along
85 the shaft, cables connecting said disk to one of said bands, cables connecting the bands, and cables connecting the second band to the opposite end of the shaft from that sustaining the sliding disk.
90

5. In a balloon, the combination with a substantially cylindrical bag, or a shaft extending throughout the length thereof, cables extending outside the bag and connected at their opposite ends to the shaft, spreading
95 bands surrounding the bag between the bag and cables, and means connected with the shaft for tightening the cables.

6. In a balloon, the combination with a bag, a shaft extending therethrough, cables
100 arranged outside of and extending longitudinally of the bag and connected to the ends of the shaft, means connected to the shaft for tightening the cables, cable engaging bands surrounding the bag, and a car sustained from said bands.
105

In testimony whereof I affix my signature in presence of two witnesses.

ROMULUS C. TILGHMAN.

Witnesses:

G. F. TOLSON,
GEO. B. PITTS.