J. R. GAMMETER.

BALLONNET INFLATER.

APPLICATION FILED FEB. 16, 1918.

1,286,579.

Patented Dec. 3, 1918.

2 SHEETS—SHEET 1.

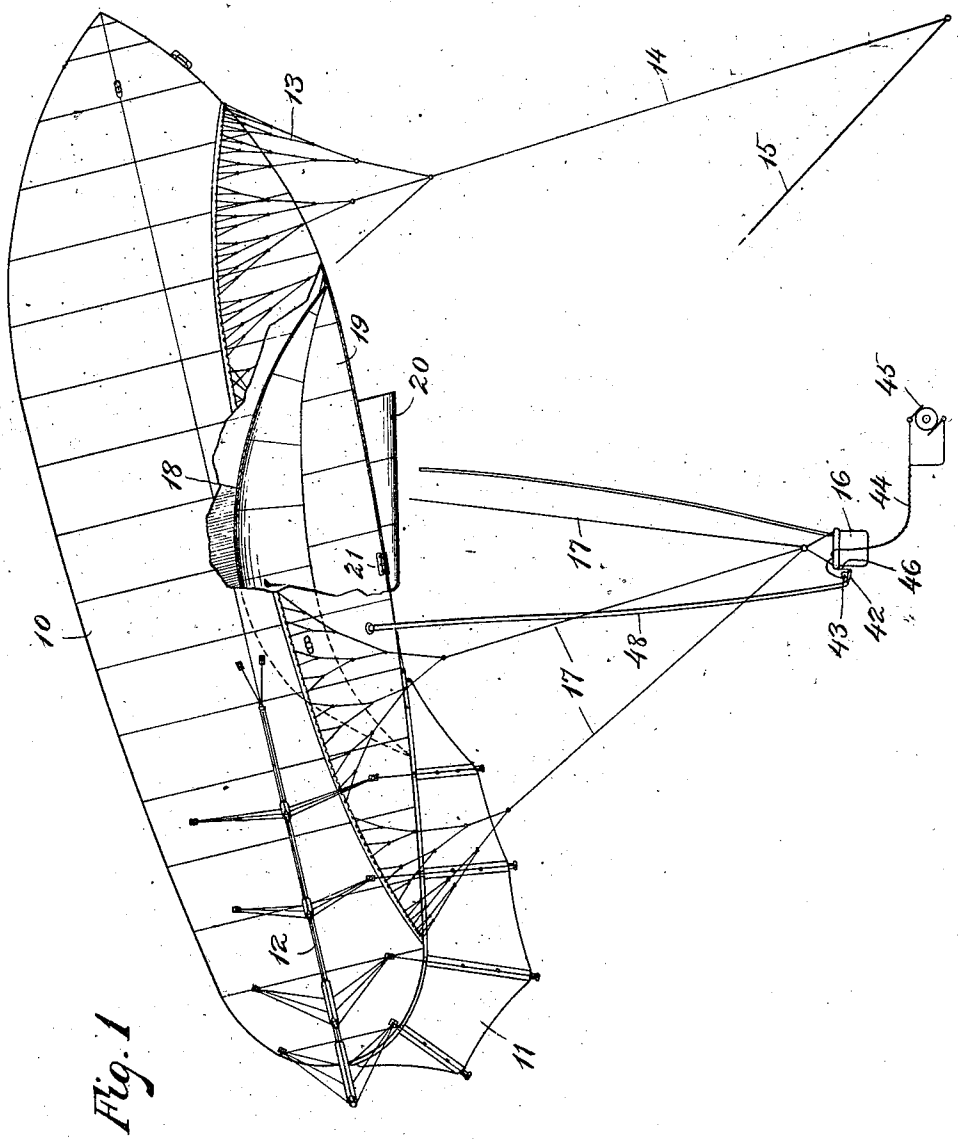


Fig. 1

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2 SHEETS—SHEET 2.

Fig. 2

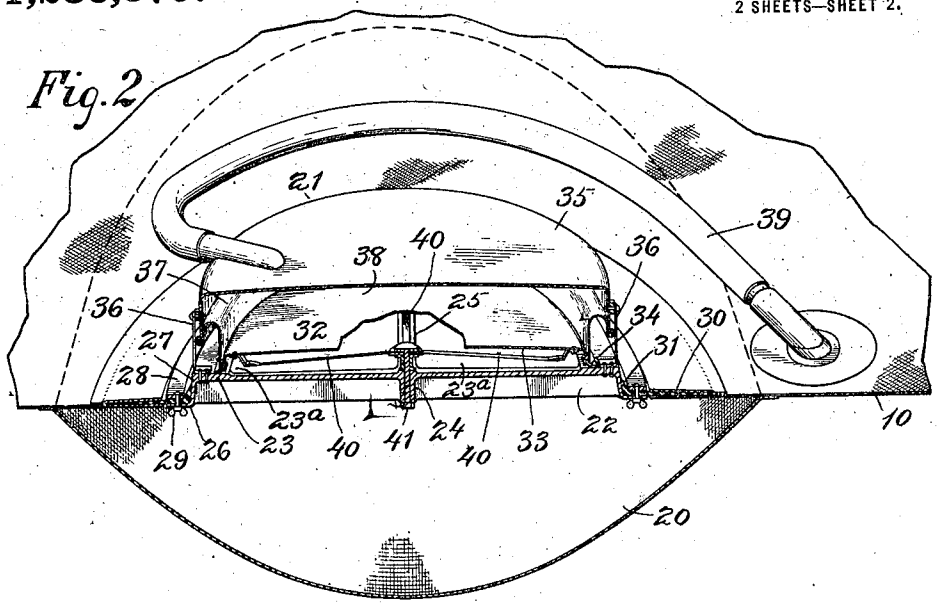


Fig. 3

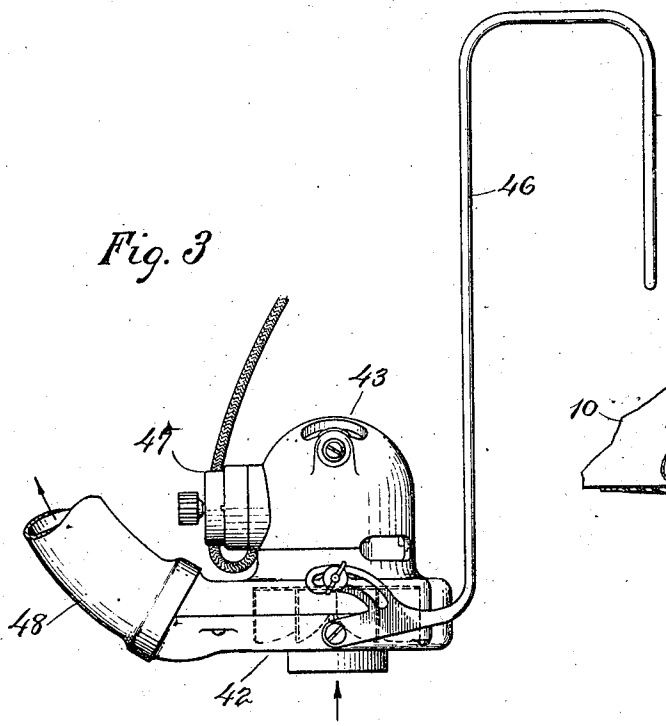
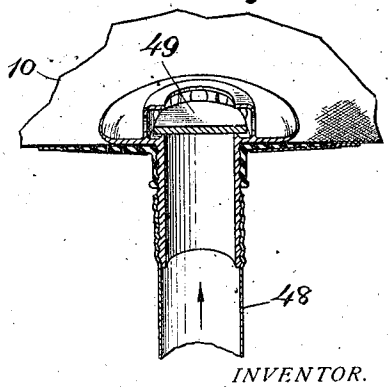


Fig. 4



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UNITED STATES PATENT OFFICE.

JOHN R. GAMMETER, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BALLONNET-INFLATER.

1,286,579. Specification of Letters Patent. Patented Dec. 3, 1918.

Application filed February 16, 1916. Serial No. 217,644.

To all whom it may concern:

Be it known that I, JOHN R. GAMMETER, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Ballonnet-Inflater, of which the following is a specification.

This invention relates to means for inflating the air ballonnets of balloons of the captive observation type. Its general object is to provide improved means for retaining substantially the full contour of the main gas bag in the face of shrinkage or diminution of the gas volume from any cause. The main envelop is filled with hydrogen or illuminating gas or with hot air, and the ballonnet is commonly inflated by wind pressure if there is any. Usually there has been an open connection between the wind scoop and the ballonnet, and should there be little or no wind, the ballonnet fails to make up, by its inflation, the loss or shrinkage of buoyant gas, so that the envelop becomes flabby. My invention provides for automatic filling of the air ballonnet and for retention of any air which enters it. The retention may be accomplished by means of a check valve or valves, but in providing an automatic wind-operated valve for that purpose a considerable problem is involved in working it by the small differences of air pressure available. This problem I have solved by a mode of guiding and pressure-balancing the wind-operated valve so that it may afford a large port-opening with a relatively-small movement and will function under slight differences of pressure. In connection with the invention, means may be provided to enable the ballonnet to be charged mechanically when the wind velocity is insufficient.

Of the accompanying drawings,

Figure 1 is a side elevation of a balloon of the observation or captive type, provided with wind valve filling apparatus constructed according to my invention.

Fig. 2 is a sectional perspective view of the automatic wind-valve and associated parts.

Fig. 3 is a side elevation of an electric fan blower which may be used.

Fig. 4 is a sectional perspective view of the fan-pipe check-valve.

In the drawings, 10 is the main envelop or gas-bag of the balloon, having suitable rear vertical and horizontal guide-vanes or fins 11, 12, cord harness 13, mooring or traction cables 14, 15, and observation basket 16 suspended by ropes 17. 18 is a flexible diaphragm which, together with a part of the lower wall of the main envelop, forms an internal ballonnet or compensating chamber 19 into which atmospheric air is forced to make up for the loss or shrinkage of the buoyant gas in the main envelop.

Under the ballonnet 19 there is a wind-scoop or concentrator 20 having its mouth directed forwardly for the purpose of keeping the ballonnet filled by wind pressure when the wind has sufficient velocity. Near the rear end of this scoop there is an opening therefrom into the ballonnet chamber through the wall of the main envelop, and said opening I control by means of the automatic wind-operated check-valve device 21, shown in detail in Fig. 2.

22 is a metallic frame having an annular, horizontal or transverse flat valve-seat 23 on its upper side surrounding the large air-port 23^a, a central hub 24 supported by radial arms 25, a horizontal attaching-flange 26, and an axially-extending slightly-conical portion 27 connecting said flange with the valve seat. The frame 22 is detachably connected with an interior metal ring 28 by means of wing-nut bolts 29 which pass through a fabric and rubber ring 30, the latter being secured to the main envelop 10 and provided with an annular soft-rubber packing lip 31 which telescopes with the frame portion 27 and is held in fluid-tight relation therewith by the internal air-pressure. This valve-frame packing expedient is claimed in an application filed by me February 8, 1918, Serial No. 215,965.

32 is the valve proper, of the floating disk type, comprising a shallow, inverted, flat-bottomed, cup-shaped thin-metal valve body 33, and a soft-rubber, annular seating member or packing 34 having a thin-edged, lateral, flexible lip co-acting with the valve-seat 23. 35 is a flat-bottomed, inverted cup-shaped metal member supported at intervals from the valve frame 22 by means of vertical struts 36, and 37 is a flexible annular web of inverted J-section having its short limb attached to the rim of the member 35 and its long limb attached to the rim of the valve 32, for closing the space between said member and valve. This web is composed

of light cloth which is rendered impervious to air and moisture by suitable treatment. The valve 32, member 35 and web 37 together form a closed chamber 38 for balancing the upper area of the valve, said chamber being connected with the atmosphere at a point external to the scoop 20 by a tube 39 having its outer orifice in a plane parallel to the surface of the envelop 10.

To guide the valve 32 and keep it centralized above its seat I provide a series of radial straps 40 of cloth or other flexible material, connected at their outer ends to the rim of the valve and at their inner ends secured to the central hub 24 by a bolt 41. These straps and the web 37 permit a practically frictionless rising and falling and tipping or floating movement of the valve.

In operation, the valve 32 normally closes by its own weight and is balanced on its upper side by the pressure of the atmosphere admitted to the chamber 38 through tube 39. When the balloon faces a wind of sufficient velocity to create enough pressure in the scoop 20 to overcome the weight of the valve, plus the unconcentrated, and possibly slightly negative atmospheric pressure transmitted to the balancing chamber through the tube 39, the valve 32 is lifted off its seat and air enters and inflates the ballonnet 19 until the internal and external pressures reach a condition of equilibrium, when the valve closes. Owing to the described mode of balancing and guiding the valve, it will move in response to very slight pressure differences, and its relatively large diameter produces an ample area of port opening to pass a substantial volume of air.

At times when there is little or no wind it is desirable to inflate the ballonnet mechanically, and for that purpose I show a rotary fan-blower 42 actuated by an electric motor 43 to which current is supplied through a cable 44 from a generator 45 on the ground, the casing of the fan-blower being conveniently suspended by a hook 46 from the edge of the balloon basket 16. 47 is a controlling switch. The delivery-pipe 48 of the blower leads into the ballonnet chamber 19 past a check or non-return valve 49.

Various modifications may be made without departing from the scope of my invention, and I may employ the hereindescribed valve guiding and balancing expedients in any situation where they may be found useful.

I claim:

1. The combination, with a balloon having a gas receptacle and an air ballonnet, of means for filling said ballonnet by concentrated wind pressure, an automatic wind-operated valve controlling the admission of the air, and a counterbalancing chamber having a movable wall and an inlet for opposing to the concentrated wind pressure, which acts to open the valve, the unconcentrated atmospheric pressure tending to close said valve.

2. The combination, with an air ballonnet, of a wind-scoop for filling the same, a disk-type wind-operated valve controlling communication between the two, a pressure-balancing chamber on the posterior side of said valve, and an air passage connecting said chamber with the atmosphere at a point external to said scoop.

3. The combination, with an air ballonnet, of a wind-scoop for filling the same, a disk-type wind-actuated valve controlling the air admission, a pressure-balancing chamber within the ballonnet comprising a fixed end member, a movable end member formed by a part on the valve, a flexible web connection between said members, and a conduit connecting said chamber with the atmosphere at a point external to the wind scoop.

4. In combination, a fluid port, an automatic valve controlling said port and adapted to be opened by the anterior pressure of the fluid to be admitted therethrough, and a pressure-balancing chamber on the posterior side of the valve, said chamber comprising a fixed end member, a movable end member formed by a part on the valve, and a flexible web closing the space between said fixed and movable members.

5. In combination, a fluid port, an automatic valve controlling said port and adapted to be opened by the anterior pressure of the fluid admitted therethrough, and a pressure-balancing chamber on the posterior side of said valve comprising a movable member formed by a part on the valve, a cup-shaped fixed member, and a flexible annular web of J-section having its longer limb attached to the rim of said valve part and its shorter limb attached to the rim of said fixed member.

6. In combination, a frame provided with an annular valve-seat surrounding a port, a disk-type automatic valve controlling said port, a balancing chamber on the posterior side of said port having a movable end member formed by a part on the valve, a fixed cup-shaped end member supported from said frame and separated therefrom by a space for the passage of the fluid admitted past the valve, and a flexible annular web connecting said fixed and movable end members.

7. The combination, with an air ballonnet, of a wind scoop for filling the same, an automatic wind-operated floating valve controlling the air admission, and flexible means for guiding and centralizing said valve during the movements thereof.

8. In combination, a valve-seat, a disk-type automatic valve co-acting therewith, a balancing chamber on the posterior side of

the valve whose wall includes a flexible chamber-closing web, and valve-guiding and centralizing means adapted to permit a universal tipping movement of the valve.

9. In combination, a valve-seat surrounding a fluid port, an automatic disk-type floating valve coacting with said seat, a central fixed support, and a series of radiating valve-guiding and centralizing members flexibly connecting said support with the valve.

10. In combination, a frame formed with a fluid port, a valve-seat surrounding said port, and a central hub connected with said valve-seat, a disk-type floating valve coacting with said seat, and a series of valve-guiding and centralizing flexible straps radiating from said hub to the valve.

11. In combination, a fluid port, an automatic disk-type floating valve controlling said port and adapted to be opened by the anterior pressure of the fluid admitted therethrough, a pressure-balancing chamber on the posterior side of the valve comprising a fixed part, a movable part on the valve, and a flexible connecting web, and a series of radial guiding and centralizing members flexibly connected with said valve.

In testimony whereof I have hereunto set my hand this 12 day of February, 1918.

JOHN R. GAMMETER.