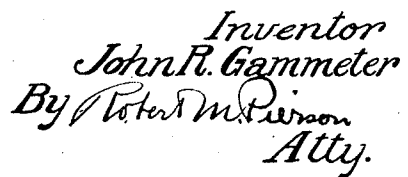


BALLOON VALVE.

Patented Aug. 10, 1920.

1,349,335.



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2 SHEETS—SHEET 2.

1,349,335.

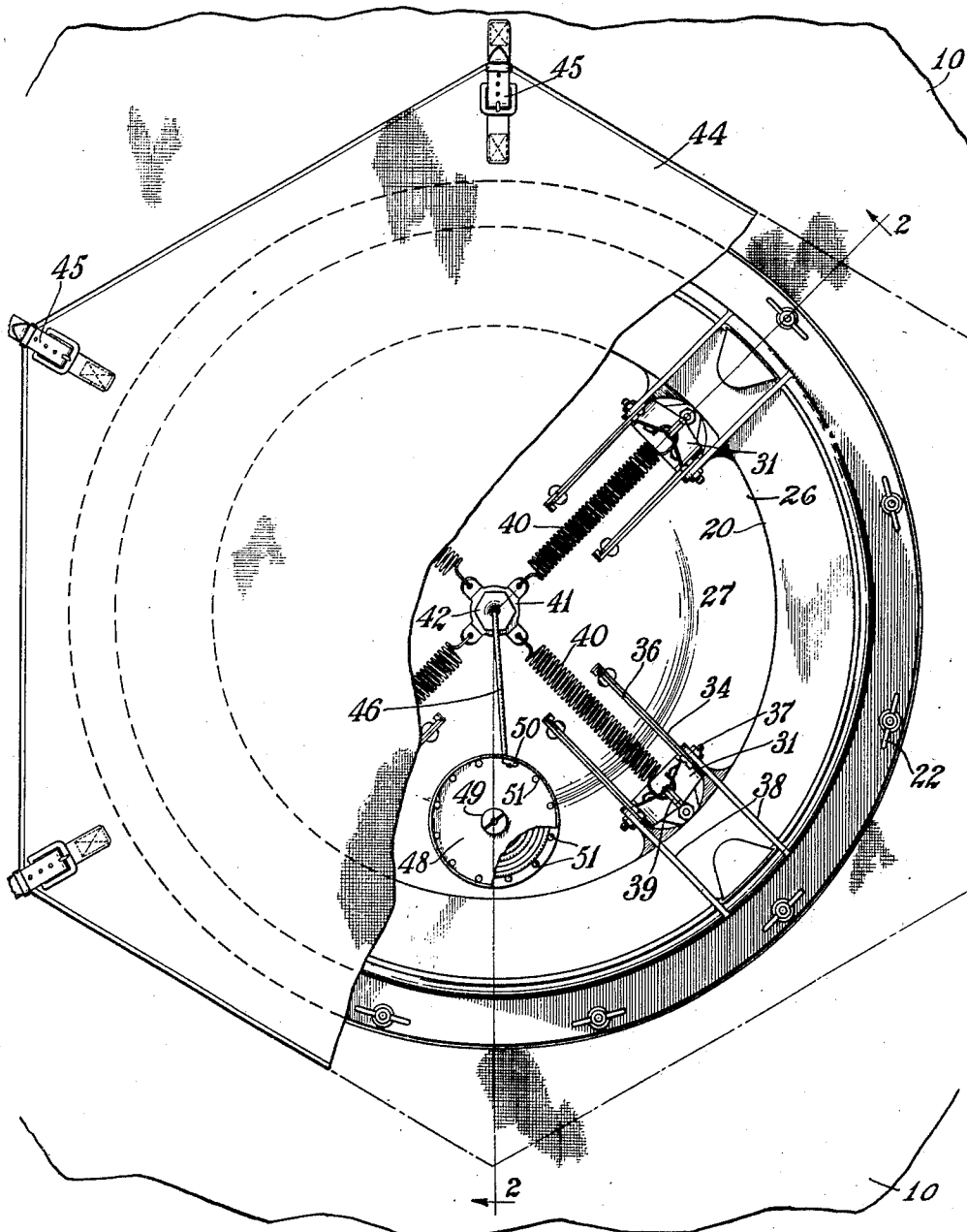


Fig. 4

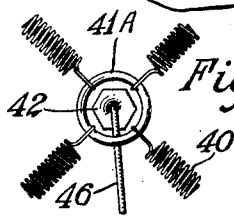


Fig. 5

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BALLOON-VALVE.

1,349,335.

Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed October 4, 1918. Serial No. 256,887.

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 Balloon-Valve, of which the following is a specification.

This invention relates to the construction of inwardly-opening disk-type valve devices of large diameter such as are used for controlling the gas outlet of a balloon, and its principal objects are to provide tight closure and easy and full opening with a relatively-light spring pressure, to furnish increased protection from rain and wind, and to enable the adjustment of the valve-operating cord to be more readily and effectively performed than heretofore.

Of the accompanying drawings:

Figure 1 is a sectional elevation of a balloon of the captive observation type having valve-operating devices appropriate for use in connection with my invention.

Fig. 2 is a diametric section of the improved valve device.

Fig. 3 is a sectional perspective view showing a fragment of the lip packing.

Fig. 4 is a front elevation of the valve device, partly broken away.

Fig. 5 is a fragmental front elevation showing a modified form of spring connection.

In the drawings, Fig. 1 shows a known type of observation balloon having a main gas bag or envelop 10 with air-inflated rear stabilizing "fins" 11 for holding the nose of the balloon into the wind, and an internal air ballonet chamber 12 adapted to be inflated by wind pressure received through an air scoop 13, the top wall 14 of said chamber acting as a diaphragm which rises and falls according to the difference in pressure between the gas in the main body of the bag and the air in the ballonet chamber. This movement of the ballonet wall is utilized in a known manner to operate the gas outlet valve 15 in the front end of the envelop 10 through the medium of a longitudinal cord 16 connecting said valve with the tail end of the envelop, and a transverse cord 17 connecting intermediate points of said cord and the ballonet wall 14. By this arrangement, when the gas pressure becomes excessive, the downward pull of the ballonet wall on the cord 16 opens the valve 15 and relieves the pressure until equilibrium is restored.

Provision is also made for manually operating the valve 15 to effect an emergency discharge by means of a cord 18 leading from the aeronaut's car or basket 19 through the wall of the gas bag to a point of connection near the front end of cord 16.

The construction of the valve device 15 is shown in Figs. 2, 3 and 4. 20 is a circular metal frame whose radial marginal flange is detachably secured by a ring 21 and bolts 22 to a flexible supporting member 23 which forms part of the wall of the gas envelop and is provided with a flexible packing lip 24 encircling the frame. 25 is an annular flat seat on the frame surrounding the discharge opening 26. 27 is an inwardly-opening valve of the disk type having the shape of a shallow cup whose seating margin is formed by an annular soft-rubber packing member 28. This member, as shown in detail in Fig. 3, is substantially L-shaped in cross-section, having a ribbed cylindrical flange 29 for securing it on the edge of the metal body of the valve, and an outwardly-extending-substantially-radial, thin-edged tapered lip 30 which is cambered or concaved slightly in the direction of the valve seat 25 when the valve is open, and flattens against said seat when the valve is closed as indicated in Fig. 2. When the valve 27 begins to open, the gas pressure causes the outer edge of this lip to remain in contact with the seat 25 through the first part of the inward movement of the valve body, and when said lip finally leaves the seat a sudden and ample opening is effected without any wire-drawing. When the valve is seated, the flexible lip 30 effects a tight closure.

For guiding and centralizing the valve 27, I prefer to make use of the known system of bell-crank levers 31, four in number, fulcrumed at 32 upon bearing ears 33 attached to the outer face of the valve disk, together with links 34 connecting movable pivot points 35 at the inner ends of the inwardly-extending long arms 36 of said levers with fixed pivot points 37 located upon ears 38 forming a part of the frame 20. The short axially-extending arms 39 of the levers 31 are hooked at their forward ends and connected with the outer ends of a series of four valve-seating springs 40. The inner ends of said springs are not connected, as in former constructions, with the fixed frame, but they have a floating an-

chorage which moves axially in and out with the valve disk 27. In the preferred construction shown in Figs. 2 and 4, this anchorage takes the form of a central plate 41 attached to a stuffing-box 42 on the center of the valve disk. The springs are thus independent of each other, and if one should break, the operation of the others and the balance of the valve would not be greatly affected. The spring anchorage may, however, be in the form of a free ring 41^a as shown in the modification, Fig. 5, supported by the inner ends of the springs and therefore moving in and out with the valve disk without being directly attached thereto. In either case the amount of extension of the springs in proportion to the movement of the valve during the opening of the latter is much less than where the springs have a fixed anchorage, and the extreme resistance of said springs is very nearly the same as their initial resistance. On account of the fluid-pressure-sealed lip packing, the amount of spring pressure necessary to maintain a tight closure of the valve is much less than with other forms of valve seating. The power required to open the valve is correspondingly less, and, because of the floating spring anchorage, the resistance does not appreciably increase from initial to full opening.

On the outer side of the frame 20 is formed an annular groove or gutter 43 for the purpose of collecting any rain water which flows down over the nose of the balloon and diverting it around and away from the operating parts of the valve. I also provide a loose-edged shield or cover 44 over the front of the entire valve device to prevent the direct impact of wind pressure against the valve disk, this shield being of water-proof material, hexagonal in form and detachably secured at the corners to the envelop by means of straps 45.

The forward end of the longitudinal cord 16 is formed by a cord section 46 which may also be regarded as an extension of the manual-operating cord 18, and is connected to the two by a loop 47. This cord section passes through the stuffing-box 42 in the center of the valve disk and is secured to and wound up on a flat spool or pulley 48 mounted to turn freely on a stud 49 on the front of said valve disk, the pulley rotating in a plane parallel to that of the valve. A pin 50, which determines the point where the cord section leaves the spool, is positioned in any one of a circumferential series of transverse holes 51 formed in the edge of said spool. The cord section 46 tends to unwind the spool in a counterclockwise direction as viewed in Fig. 4, but is prevented from doing so by the pin 50, whose position on the edge of the spool determines the length of the unwound portion of said cord

section. This device forms an easily operated adjustment for determining the point of opening of the valve disk under the automatic action of the ballonet wall 14.

Various modifications of and omissions from the foregoing described features embodying my invention may be made without departing from the scope of the claims.

I claim:

1. The combination, with a fluid-pressure receptacle, of an inwardly-opening disk-type valve controlling an outlet from said receptacle, an annular seat for said valve, a flexible-lipped, circumferential edge member on the valve, extending substantially radially outward therefrom, for sealing the valve edge against said seat and adapted to remain in sealed engagement with the seat during a substantial part of the movement of the valve body inwardly away from said seat, a spring, a lever connection between said spring and valve for permitting a large movement of the valve for a small variation of spring tension, and mechanical means for forcing said valve open against the spring and the fluid pressure.

2. The combination, with the gas bag of a balloon, of an inwardly-opening disk-type valve controlling a discharge opening in the nose of said bag, and a loose-edged shield detachably secured to said bag in front of the valve for protecting the latter from the direct impact of the wind.

3. The combination with the gas bag of a balloon, of a disk valve controlling an outlet therefrom, controlling mechanism on the outside of the valve, and a detachable shield covering the face of the valve and extending beyond the periphery thereof for protecting said valve against direct, inward wind impact but permitting a fluid flow laterally from under said shield to the atmosphere.

4. The combination, with the gas bag of a balloon, of a disk valve controlling an outlet therefrom, a detachable shield covering the face of the valve and extending beyond the periphery thereof, and a rain gutter surrounding the valve under said shield, on the outside of the gas bag.

5. The combination, with a gas bag of a balloon having an outlet, of an inwardly-opening disk-type valve controlling said outlet, a spool mounted to rotate on the outer face of said valve in a plane substantially parallel to the plane of the valve, at one side of its center, a cord wound on said spool and passing through said valve into the gas bag, and means to prevent the unwinding of the cord from the spool.

In testimony whereof I have hereunto set my hand this second day of October, 1918.

JOHN R. GAMMETER.