

No. 731,363.

PATENTED JUNE 16, 1903.

T. M. HENDERSON.
AUTOMATIC SELF BALANCING VALVE.

APPLICATION FILED SEPT. 15, 1902.

NO MODEL.

FIG. 1.

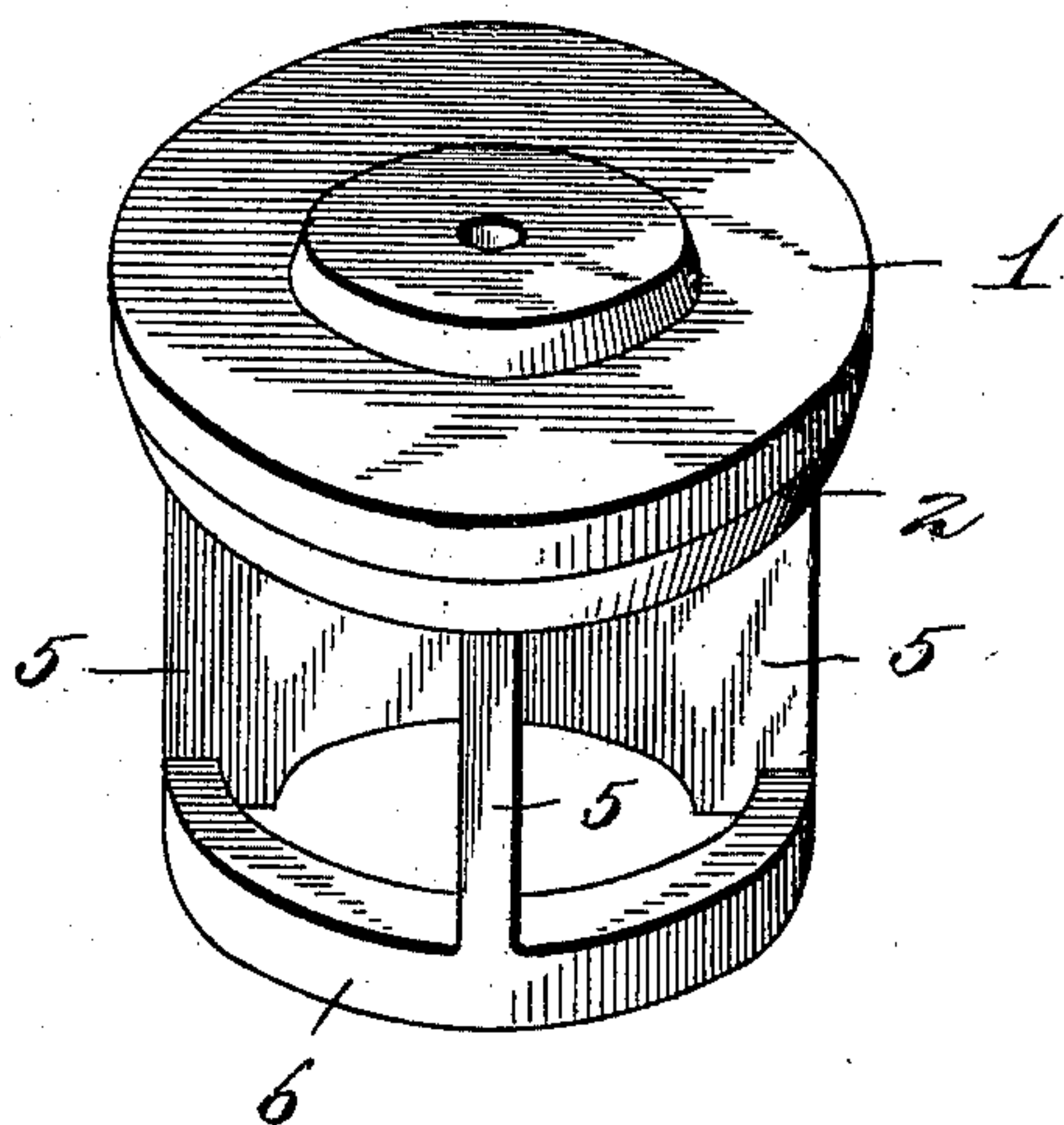
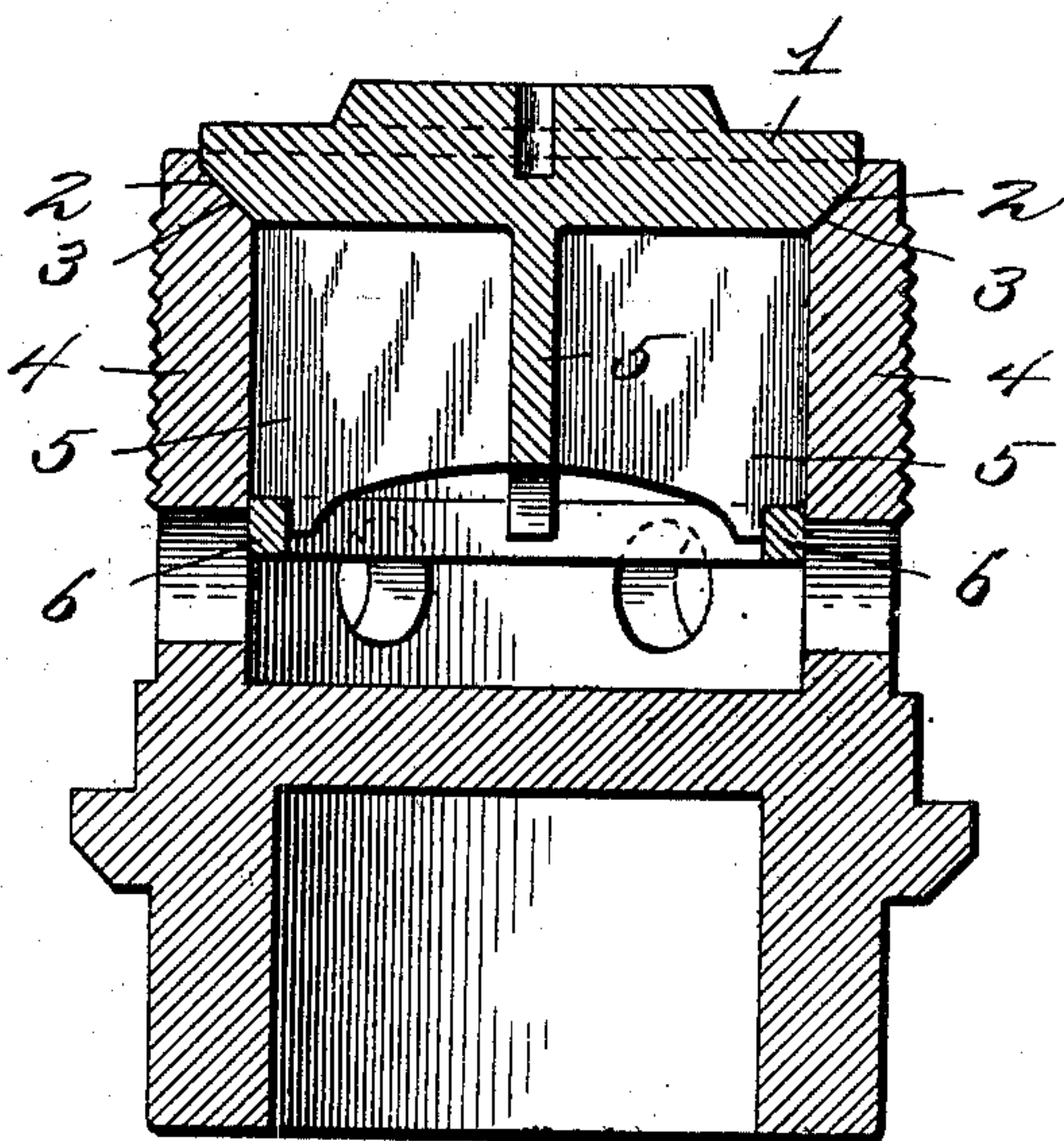


FIG. 2.



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AUTOMATIC SELF-BALANCING VALVE.

SPECIFICATION forming part of Letters Patent No. 731,363, dated June 16, 1903.

Application filed September 15, 1902. Serial No. 123,460. (No model.)

To all whom it may concern:

Be it known that I, THOMAS MARSH HENDERSON, a citizen of the United States, residing at Portsmouth, in the county of Norfolk and State of Virginia, have invented a certain new and useful Automatic Self-Balancing Valve, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to valves, the object in view being to provide an automatic self-balancing valve especially adapted for use in connection with the pumps of air-brakes such as are at present in use in railway equipments.

15 Valves now in use, and especially those working under high pressure and at a great rapidity, are subject to very trying tests, and especially is this the case with the valves employed in the Westinghouse air-pump now in universal use. These valves are provided with wings which operate in contact with the inner surface of the valve cage or casing, and on account of the great rapidity of movement and constant friction the cage or casing becomes worn and the wings of the valve cut into and form grooves in the wall of the cage. This finally results in the valve becoming stuck or jammed, by reason of the wings catching and binding in the grooves so formed, causing the pump to lose a stroke and allowing the pump-piston to fly back to the end of the cylinder and striking a powerful blow and endangering the life of the pump, there being no air to form a cushion for the pump-piston when thrown back with such force.

25 The aim of the present invention is to overcome the difficulties above enumerated, to insure smoothness of operation of the valve by practically converting the valve into a piston, and adding weight to the lower end of the valve, thereby steadying the valve and preventing it from twisting or canting and binding within the cage or casing. Under the construction now in use the valve is top-heavy and not properly counterbalanced, and there is therefore always the liability of the valve canting and binding in the cage, which results in the failure of the valve to properly and uniformly seat itself.

30 With the above and other objects in view the invention consists in an automatic self-

balancing valve embodying certain novel features and details of construction hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a valve constructed in accordance with the present invention. Fig. 2 is a vertical diametrical section through a valve casing or cage, showing the valve therein and also in section.

Like reference-numerals designate corresponding parts in both figures of the drawings.

Referring to the drawings, 1 designates the body of a valve, which may be of the usual form or construction. For the purposes of illustration the valve-body is shown in the form of a disk having a beveled periphery or edge 2, conforming to the valve-seat 3, forming part of the valve cage or casing 4. At one side of the valve-body 1 the latter is provided with a series of wings 5, which extend into the valve-cage and serve to guide the valve in its reciprocatory movements, the outer edges of the wings playing in contact with or in close proximity to the inner surface or wall of the cage 4. The valve thus far described is of the ordinary construction.

To prevent wings 5 from wearing grooves or gutters in the inner surface of the cage, I provide a ring or annulus 6, which is located at the extreme ends of the wings and arranged to project beyond the extreme ends of the wings, so as to avoid all possibility of the extremities of the wings coming in contact with and forming grooves or gutters in the cage. The ring 6 is preferably formed as an integral part of the valve-body or wings, although of course said ring may be formed separately from the rest of the valve and applied or secured in any convenient manner to the wings.

It is also the purpose of this invention to make the ring 6 of considerable thickness, the object being to weight the lower portion of the valve and counterbalance the upper or body portion of the valve. By so weighting and counterbalancing the valve proper the valve as a whole is caused to operate in the nature of a reciprocatory piston, reciprocating in right lines with the least possible friction between the valve and the cage and avoiding the danger of the valve twisting or canting and binding within the cage, and

thereby failing to become properly or uniformly seated.

Valves used in the connection above described are subjected to very rapid reciprocation, often making several hundred strokes to the minute. It is therefore of vital importance to render the operation of such valves reliable and certain and to insure the proper and uniform seating of the valve at each and every stroke required. In addition to the reciprocatory movement of the valve it is also rotated or partially-rotated by reason of the pressure against the wings, and there is therefore a constant tendency for the extremities of the wings to wear or cut into the inner surface of the cage or casing, and this liability is increased by reason of the fact that the wings being lighter than the valve-body fail to properly counterbalance the valve-body. By placing the combined ring and weight at the bottom of the valve and extending the same beyond the extremities of the wings the valve is made self-balancing, and the extremities of the wings are guarded, so that they cannot cut into the valve-cage with the injurious result above stated; also, no additional device or means are necessary to maintain the valve proper in alinement with the cage or casing under the greatest pressure and rapidity of movement.

By reason of the presence of the ring at the bottom of the valve the air rushing through the cage acts in opposite directions on the top and bottom of the ring, and thereby causes the valve to seat and unseat itself easily and without striking sharply against the valve-seat; also, on account of the resistance offered by the air to the movement of the valve friction between the valve and the cage is greatly reduced, which further assists in the easy and rapid movement of the valve.

The ring at the bottom of the valve acts to force the air inward toward the center of the valve-casing, and thereby insures the uniform

distribution of the air to all the wings of the valve, making it a perfect steam-balanced valve and avoiding all tendency of the valve to catch and pound and also decreasing friction and prolonging the life of the valve. Without the ring the air would produce an uneven pressure on the valve-wings, resulting in tilting the valve and causing the valve-wings to cut into the wall of the cage. The pressure on the valve in the return or down stroke produces the same result and in addition by seating itself unevenly eventually destroys the valve-seat. All of these objections are entirely overcome by the rise of the ring, which secures a perfect piston motion.

Without the ring in a new valve the extremities of the wings form close joints in connection with the wall of the cage, which joints are subsequently broken by wear on the extremities of the wings, thus permitting the valve to tilt and the wings to cut into the wall of the cage, all of which is obviated by employing the ring, which gives and maintains a true piston movement and reduces friction to a minimum and renders the wear uniform.

Having thus described the invention, what is claimed as new is—

1. A valve comprising a body portion, wings extending therefrom, and a ring or annulus connecting and covering the extremities of the wings and forming a bearing for the extreme end portion of the valve.

2. A valve comprising a valve-body, wings extending therefrom, and a ring or annulus connecting the extremities of the wings and projecting beyond said extremities and forming a bearing for one end of the valve.

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

THOMAS MARSH HENDERSON.

Witnesses:

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