No. 625,292. Patented May 16, 1899.

D. C. DEMAREST.

SUCTION VALVE.

(Application filed Oct. 11, 1898.)

(No Model.)

Fig. 1

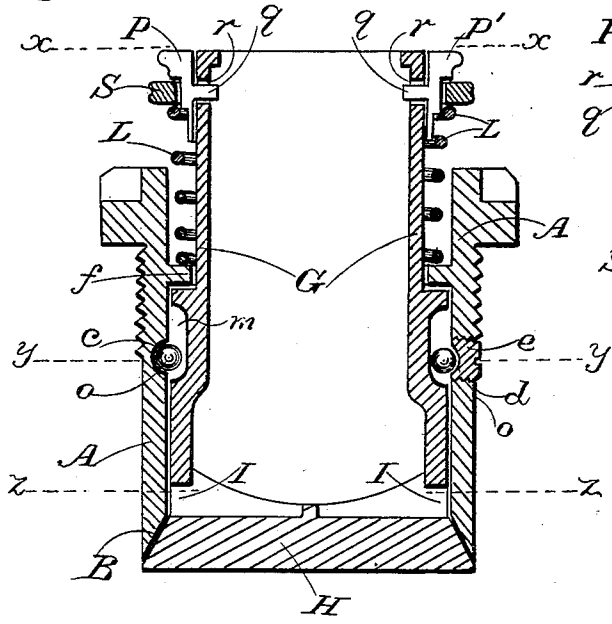


Fig. 2

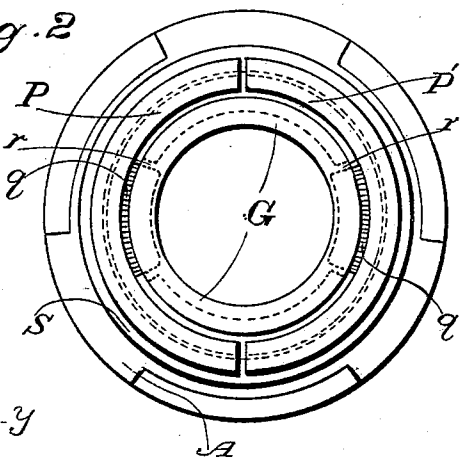


Fig. 3

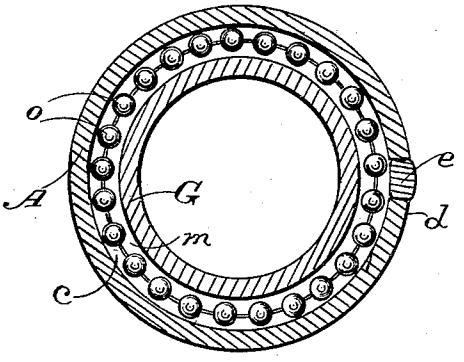
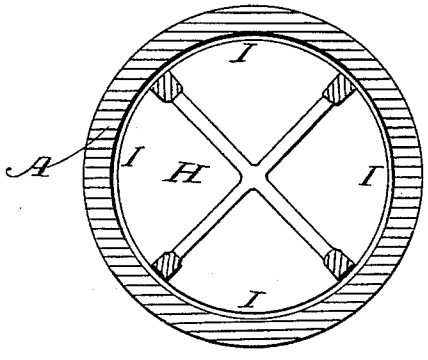


Fig. 4



WITNESSES

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DAVID CLARENCE DEMAREST, OF ANGEL'S CAMP, CALIFORNIA.

SUCTION-VALVE.

SPECIFICATION forming part of Letters Patent No. 625,292, dated May 16, 1899.

Application filed October 11, 1898. Serial No. 693,232. (No model.)

To all whom it may concern:

Be it known that I, DAVID CLARENCE DEMAREST, a citizen of the United States, residing at Angel's Camp, Calaveras county, State of California, have invented certain new and useful Improvements in Suction-Valves; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

My invention relates to that class of suction-valves in which the valve proper is formed on the lower end of a tube which slides in an outer cylinder or casing, while the valve-seat is formed on the lower end of the outer casing. In this class of valves a spring is arranged to close the valve by drawing the inner tube outward, and thus forcing the valve against its seat. A common use of this class of valves is found in air-compressors, where the outer casing is screwed into the compressor-cylinder and the valve is operated alternately by the vacuum in the cylinder and the spring.

The object of my invention is to provide a simple device and arrangement for limiting the movement of the inner tube by means exterior of the tube, thereby leaving the interior of the tube free from obstructions and at the same time increasing the convenience and efficiency of the valve, all as hereinafter more fully described.

Referring to the accompanying drawings, Figure 1 is a longitudinal section of my improved suction-valve. Fig. 2 is an end view on the line $x\,x$ of Fig. 1. Fig. 3 is a cross-section on the line $y\,y$ of Fig. 1, and Fig. 4 is a cross-section on the line $z\,z$ of Fig. 1.

Let A represent the outer cylindrical casing of the valve. It is adapted to be screwed into or otherwise secured in the cylinder or chamber of the air-compressor or other vessel, so that its lower end extends into the chamber or vessel, while its opposite end is outside the chamber or vessel. The lower end of this cylinder or casing is so fashioned as to form a valve-seat B. At a point near the middle of this cylinder I form a semicircular groove or channel *c* entirely around its interior, and at some point in the circuit of this groove I bore a hole *d* through the cylinder, so as to communicate with the groove, and I tap it with screw-threads, so that a screw-threaded plug *e* can be turned in to close it. A short distance above this groove I form an inward-projecting flange *f* on the interior of the casing, which extends entirely around the cylinder.

The inner tube G carries a valve H at its lower end, the outer edge of which is fashioned to fit the valve-seat B of the casing, and proper spaces I I are left between the lower end of the tube and the valve to permit air to pass freely toward the valve-seat. The exterior diameter of the lower portion of this tube is about the same as the interior diameter of the casing, but the diameter of the upper portion is considerably reduced, so that it will pass the projecting flange *f* when the tube is inserted upward into the casing. This reduced diameter extends down far enough to permit the valve H to fit snugly and closely against the valve-seat B. The shoulder formed by the larger diameter of the lower portion of the tube will then be below the under side of the flange *f*, but it need not abut against it. A spiral spring L passes down over the upper end of the tube into the space between the upper end of the casing and the reduced upper end of the tube, so that the lower end of the spring rests upon the projecting flange *f*, while its upper end passes under and bears against a shoulder, which is described farther on.

Around the exterior of the tube G and opposite the interior semicircular groove *c* of the casing I make a wide groove or channel *m*, which entirely encircles the tube. The bottom of this wide groove or channel registers with the bottom of the semicircular groove when the valve is closed, but it extends upward some distance above the upper edge of the semicircular groove, according to the extent it is desired to permit the valve to open. When thus adjusted, I insert through the hole *d* in the outer cylinder one or more steel balls *o* into the semicircular groove or channel and then close the hole by inserting the screw-plug *e*. These balls will then fit in the semicircular groove and project into the wide channel *m* of the inner tube. This will allow the inner tube to play lengthwise in the casing to the limit of the channel *m*, but will effectually prevent it from being drawn into the cylinder. At the same time the balls per-

mit the inner tube to adjust itself and to be rotated, if necessary.

A ring or collar could be screwed down over the upper end of the inner tube to furnish an abutment and bearing for the upper end of the spiral spring L; but I have devised a more convenient device, which consists of a divided ring or cap formed in two parts P P′, each of which has a lug *q* projecting inwardly from its middle. A slot *r* is made in the upper end of the tube G on each side, into which the lugs *q q* will enter. The two-part ring or cap is made smaller at its lower end, and before it is applied I slip a locking-ring S down over the end of the tube. The two parts of the cap-ring are then fitted against and around the upper end of the tube by inserting the lugs *q q* into the slots *r r*. The locking-ring is then slipped up over the lower end of the ring and holds them in place. By this construction I provide a suction-valve that will operate freely and easily at all times. The interior of the air-inlet tube is entirely free from obstruction and the steel balls will limit the movement of the valve and prevent the possibility of the inner tube, with its valve, being drawn into the cylinder, even when the spring and cap-piece are removed. They also permit a rotation of the valve on its seat, and thereby cause an even wear with minimum leakage.

The external spiral spring, with its retaining split cap and its lock-ring, forms a combination easy of access and perfectly secure from danger of entering the cylinder or causing other accident. The spring can be replaced easily while the compressor is in motion.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A suction-valve comprising an outer cylindrical casing; a valve-seat formed on the lower end of said casing; a circumferential groove formed around the interior of the casing; an inward-projecting flange on the interior of said casing outside the groove; a tube adapted to fit inside the outer casing; a valve formed on the inner end of said tube and adapted to fit the valve-seat of the outer casing; a circumferential groove on the exterior of the inner tube opposite the groove in the outer casing, and wider than the groove in the casing, and one or more steel balls applied in the semicircular groove, substantially as described.

2. In a suction-valve in which air is admitted to the valve-opening through a central tube, which is adapted to slide endwise in an outer tube or casing, a device for limiting the longitudinal movement of the sliding tube, consisting of one or more steel balls contained in a semicircular groove or cavity in the inner wall of the casing and projecting into a corresponding groove or cavity in the exterior wall of the inner tube, one of said grooves or cavities being hemispherical in form and adapted to fit one half the circumference of the ball or balls while the other is elongated equal to the longitudinal movement desired to impart to the inner tube, substantially as described.

3. In a suction-valve wherein the valve-seat is formed on the lower end of a cylindrical valve-casing and the valve is formed on the lower end of an inner sliding tube; means for limiting the movement of the inner sliding tube, consisting of one or more steel balls contained in a semicircular groove formed around the interior circumference of the outer casing and projecting into a circumferential groove of greater width in the exterior wall of the inner tube, substantially as described.

4. In a suction-valve, a cylindrical outer casing; a valve-seat formed on the lower end of the casing; a tube adapted to slide endwise inside said cylindrical casing; a valve carried at the inner end of said tube; one or more steel balls confined in grooves or cavities between the tube and casing; a flange or ledge on the inner wall of said casing above the groove, and a spiral spring adapted to rest upon said ledge outside the inner tube while its upper end bears against a cap or flange at the upper end of the inner tube, substantially as described.

5. In a suction-valve comprising an inner tube adapted to move longitudinally within an outer tube, and means for limiting the movement of the inner tube; a cap-piece composed of two semicircular parts fitted to clasp around the upper end of the inner tube, and provided with lugs, which interlock in slots in the sides of the tube; a ring adapted to slip over and surround the two semicircular parts of the cap-piece; and a spiral spring interposed between the ring; and an inward-projecting flange on the outer tube, substantially as described.

In witness whereof I have hereunto set my hand this 27th day of September, 1898.

DAVID CLARENCE DEMAREST.

Witnesses:

LAWRENCE MONTE VERDA,

VICTOR L. MARCHAL.