J. MATTINGLY.

AIR VALVE CAGE FOR AIR BRAKE PUMPS.

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912,706. Patented Feb. 16, 1909.

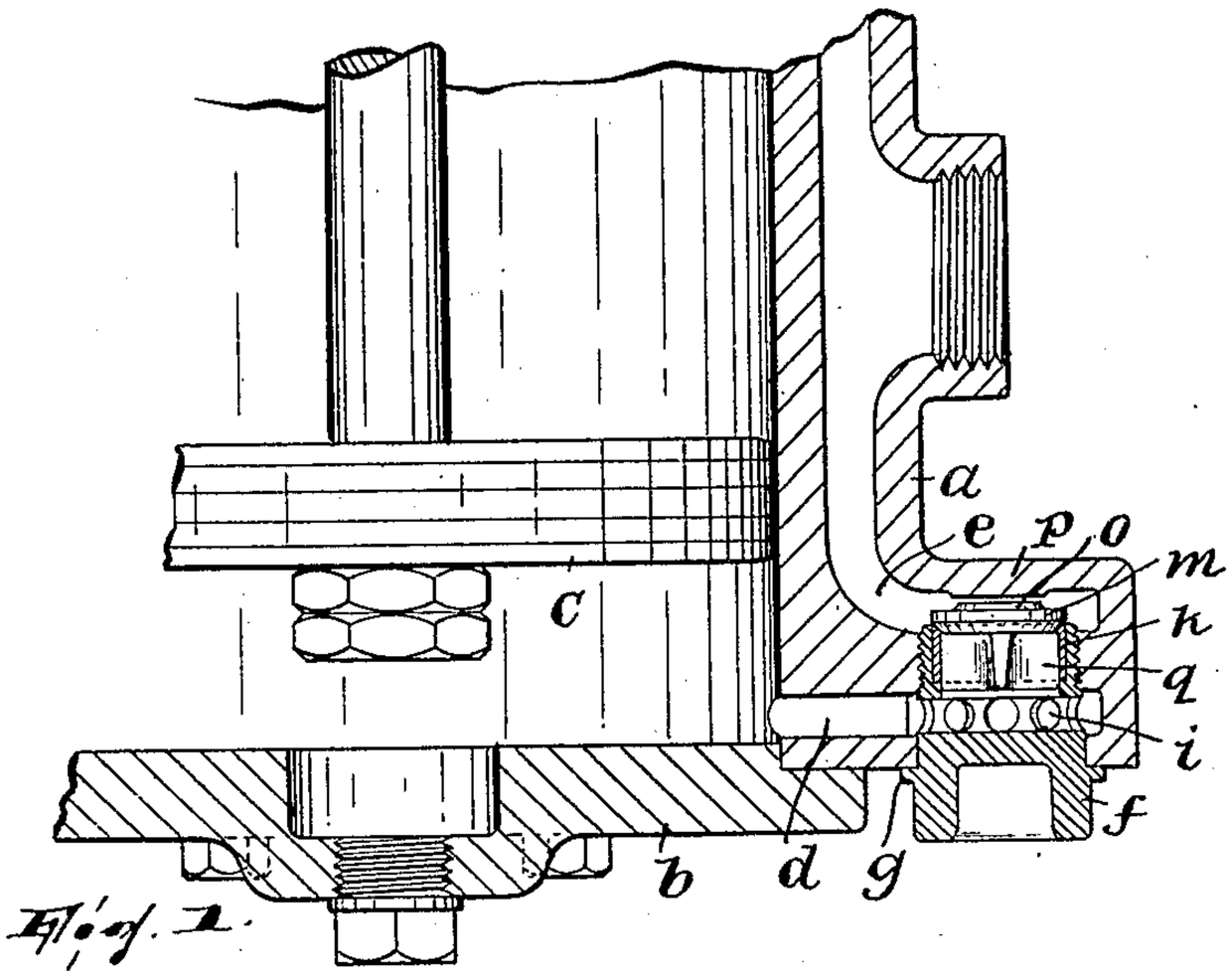

Fig. 1.

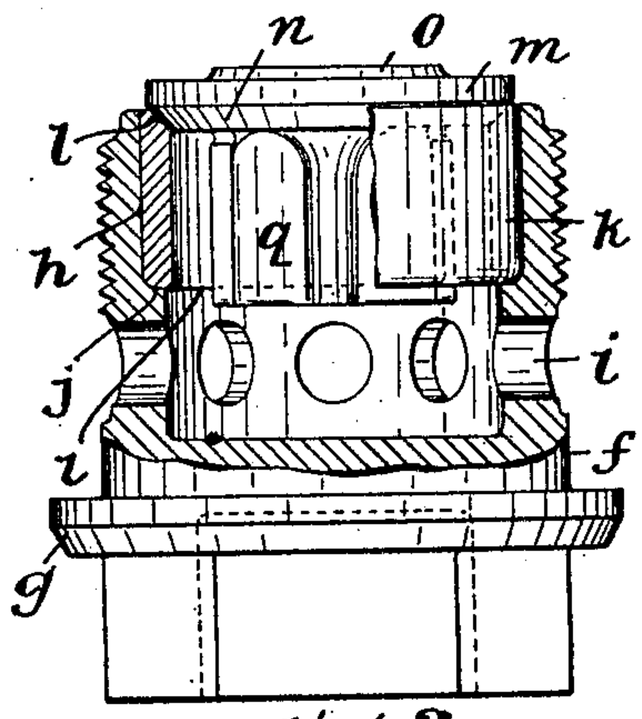

Fig. 2.

WITNESSES

Wm. D. Bell.

Chas. Kaufmann.

INVENTOR,

James Mattingly,

BY

Carters & Stewart,

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES MATTINGLY, OF MARSHALL, TEXAS.

AIR-VALVE CAGE FOR AIR-BRAKE PUMPS.

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To all whom it may concern:

Be it known that I, JAMES MATTINGLY, a citizen of the United States, residing in Marshall, Harrison county, State of Texas, have invented a certain new and useful Improvement in Air-Valve Cages for Air-Brake Pumps; 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My present invention relates to pumps or compressors, and particularly to pumps or compressors employed in connection with air-brake systems.

The objects of my invention may be perhaps best expressed as follows: Much difficulty has been heretofore experienced in reference to the valve structures for such apparatus for the reason that, while some such relatively soft metal as brass is found to be indispensably the metal of which the cage of the structure should be made (in order to secure a valve-cage which may be screwed in and out of the steel or other hard metal wall of the pump without sticking and without damaging the threads of the pump wall and in such manner that the cage will freely respond to the operation of removing it), the seat-portion quickly wears away under the action of the valve proper, with various undesirable results requiring frequent repairs and more or less constant attention to the parts, such as the excessive movement of the valve, involving its pounding and often fracturing, and the undue heating of the wall of the pump and the valve itself, due to the excessive "lift" or vertical movement of the valve under conditions of incessant vibration which the intermittent pressure-action of the pump puts upon it. I have devised a structure which practice has demonstrated avoids the various disadvantages above pointed out, with the result that, while the cage is capable of being removed with perfect freedom from the wall of the pump as frequently as necessary and without damaging the threads, the cage is still much more durable as to the parts thereof which cooperate with the valve than the cages now in use; my improved structure has the further advantage that the part which is subjected to the most wear and tear may be removed readily for the purpose of repairs or for replacing with a new one, thus materially reducing the maintenance cost of the valve-structure, which is now considerable.

My invention will be found fully illustrated in the accompanying drawing, wherein,

Figure 1 is a vertical sectional view of the lower portion of a Westinghouse air-brake pump, the section being taken in the plane of the axis of one of the improved valve-structures, the valve proper of which appears in elevation; and, Fig. 2 is a side view of the improved valve structure, on a larger scale, removed from the pump, the upper portion of said structure appearing partly broken away.

Referring to the drawing, *a* designates the cylindrical wall of the pump cylinder and *b* its head; *c* denotes the piston of the pump and *d* and *e* are respectively the ports leading from the interior of the cylinder to the valve structure and from the valve-structure to the outlet to the main reservoir of the system.

f is the air valve cage, the same being formed of some such relatively soft metal as brass and being of the usual construction, except as hereinafter indicated; its external threads are shown in Fig. 1 as entered into the internal threads of the wall of the pump cylinder, the hermetic nature of the joint produced between the cage and cylinder wall being preserved when the cage is in proper position by the counter binding action of the interlocking threads and the flange *g* of the cage which takes against the outer surface of the cylinder wall. The cage being of a relatively soft metal and the wall of the cylinder of a hard metal, the cage can be screwed in to the extent necessary to secure the proper tight joint without danger of damaging the threads, although circumstances may make it necessary that the cage be removed and re-introduced more or less frequently.

The upper part of the cage is formed internally with a socket *h* produced by enlarging the internal diameter of the cage from a point slightly above the ports *i* of the cage to the top of the cage and forming the shoulders *j*. Into this socket is snugly fitted a cylindrical part *k* which abuts at its lower end against the shoulder *j* and has its upper end flush with the top of the cage,

said upper end being internally chamfered, as at *l*, to form the valve seat. The part *k* is formed of a hard metal, preferably steel.

m is the valve, the same being of usual construction, that is, a disk having the bevel *n* which is adapted to bear squarely against the chamfer *l*, the table or boss *o* on its top surface, adapted to contact against the opposed portion *p* of the wall of the pump cylinder, and the downwardly projecting spider *q*, which latter rather closely fits within the cylindrical part *k*. The valve *m* is, like the part *k*, formed of a hard metal, preferably steel, with the result that a close fit between the valve and part *k* is produced when the valve is seated and the wear heretofore met with is overcome. Thus, the vertical play of the valve is kept substantially constant and not more than it is calculated it should be, so that heating of the parts through undue vertical movement of the valve and the pounding of the latter is entirely avoided. By arranging the part *k* so that it takes against the shoulder *j*, the latter forms a positive abutment against undue downward movement of part *k* under the action of the valve.

It will be observed that the construction of the part *k* is such that the wear is not only reduced as between the seating faces but as between the spider *q* and the surrounding portion of the structure, so that the production of undue lateral free motion of the valve when unseated is also considerably postponed; this is partly due to the fact that the part *k* is formed of hard metal and so resists wear and partly due also to the fact that the part *k* has approximately the same vertical dimension as the spider *q*, thus limiting the leverage of the valve and its tendency to bind.

The part *k* has such thickness that its sectional dimension is greater than the corresponding dimension of the socket, so that the lower inner edge of part *k* projects inwardly slightly as a shoulder *l* serving to afford a convenient grip for a suitable tool to remove part *k* whenever necessary.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination of the relatively hard-metal wall of an air-pump or the like, the relatively soft-metal air-valve-cage screwed into said wall, the relatively hard-metal valve, and a relatively hard-metal annular part arranged in the valve-cage and forming the seat for the valve, substantially as described.

2. The combination of the relatively hard-metal wall of an air-pump or the like, the relatively soft-metal air-valve-cage screwed into said wall, the relatively hard-metal valve having a spider extending into the valve cage, and a relatively hard-metal cylindrical part arranged in the valve-cage and forming the seat for the valve, said part extending substantially as far into the valve cage as the spider and forming a guide therefor, substantially as described.

3. The combination of the relatively hard-metal wall of an air-pump or the like, the relatively soft-metal air-valve-cage screwed into said wall and having a socket formed in its open end and a shoulder constituting the bottom of said socket, the relatively hard-metal valve, and a relatively hard-metal annular part snugly fitting said socket and bearing against said shoulder and forming the seat for the valve, substantially as described.

4. The combination of the relatively hard-metal wall of an air-pump or the like, the relatively soft-metal air-valve-cage screwed into said wall and having a socket formed in its open end and a shoulder constituting the bottom of said socket, the relatively hard-metal valve having a spider extending into the valve-cage, said socket extending substantially as far into the valve-cage as the spider, and a relatively hard-metal cylindrical part snugly fitting said socket and bearing against said shoulder and forming the seat for the valve and a guide for the spider, substantially as described.

5. The combination of the relatively hard-metal wall of an air-pump or the like, the relatively soft-metal air-valve-cage screwed into said wall and having a socket formed in its open end and a shoulder constituting the bottom of said socket, the relatively hard-metal valve, and a relatively hard-metal annular part snugly fitting said socket and bearing against said shoulder and forming the seat for the valve, said part having its lower inner edge projecting inwardly beyond said shoulder, substantially as described.

In testimony, that I claim the foregoing, I have hereunto set my hand this 15th day of January, 1908.

JAMES MATTINGLY.

Witnesses:
JNO. J. O'CONNELL,
O. B. MATTINGLY.