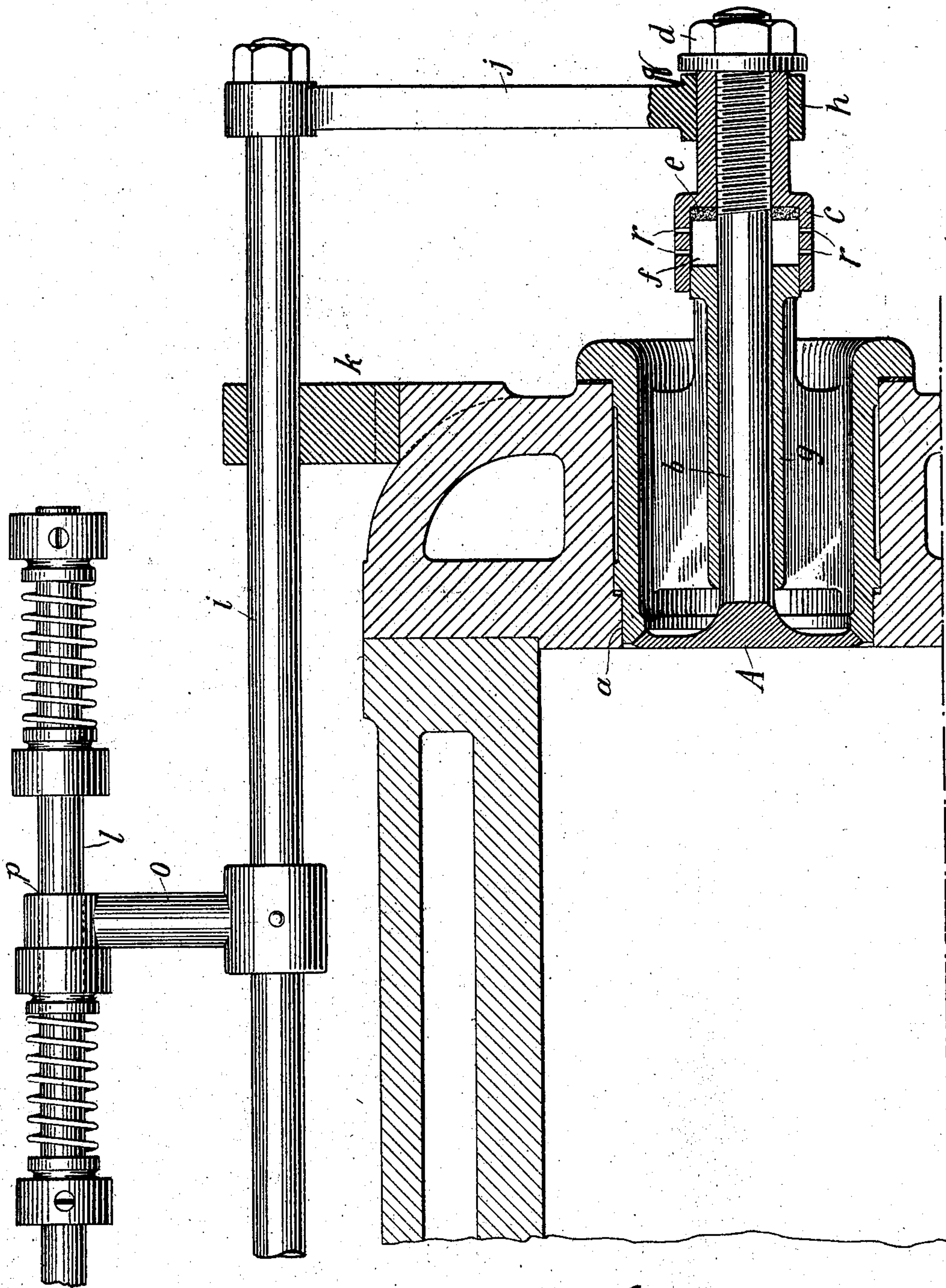


No. 815,488.

PATENTED MAR. 20, 1906.

T. E. STURTEVANT.
VALVE FOR AIR COMPRESSORS.

APPLICATION FILED APR. 9, 1903.



Witnesses:

Raphael Ketter
Leino J. Auger

Thomas E. Sturtevant Inventor
by *Alfred W. Roesch* Att'y

UNITED STATES PATENT OFFICE.

THOMAS E. STURTEVANT, OF DOVER, NEW JERSEY, ASSIGNOR TO
McKIERNAN DRILL COMPANY, OF DOVER, NEW JERSEY.

VALVE FOR AIR-COMPRESSORS.

No. 815,488.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed April 9, 1903. Serial No. 151,849.

To all whom it may concern:

Be it known that I, THOMAS E. STURTEVANT, a citizen of the United States, residing in the town of Dover, county of Morris, State of New Jersey, have invented certain new and useful Improvements in Valve Mechanism for Pneumatic Engines or Air-Compressors, of which the following is a full, clear, and exact specification.

My invention relates to certain new and useful improvements in valve mechanism for pneumatic engines or air-compressors; and it consists of the combinations and parts hereinafter more particularly described.

In order to obtain the greatest efficiency in engines of this type, it is necessary that the opening and closing of the inlet-valves be accurately effected both as to time and manner of operation. For this purpose it is desirable that the closing of the valve be positively brought about by having the same mechanically connected with some moving part of the apparatus, and it is also necessary to provide means for the prevention of hammering and consequent breakage liable to occur in the operation of the compressor.

My invention therefore consists in a compressor valve mechanism which is not only positive and efficient in operation, but which is so arranged that all hammering and violent contact of parts is prevented, whereby great efficiency of operation is obtained and breakage reduced to a minimum.

The accompanying drawing, which illustrates one form of my invention, represents a longitudinal sectional view of one end of a compressor-cylinder, showing one of the inlet-valves, it being understood that the other end thereof is a duplicate of that shown, the two valves, however, working reciprocally, one being opened while the other is being closed. A full view of both ends of the cylinder is unnecessary, as the valves and mechanism at each end of the cylinder are identical.

In the drawing, A indicates the inlet-valve; a, the valve-seat; b, the valve-stem, preferably made in one piece; c, the sleeve-nut or cushioning-cylinder; d, the jam or lock nut; e, the fiber packing or washer; f, the cushion-chamber, and g the hub or journal for the valve-stem, which extends down through the valve-seat a and is connected to the valve-seat by webs. The bar j connects the connecting-

rod i to the operating sleeve or cylinder h, said sleeve having a limited sliding movement upon the neck of the sleeve-nut c, as is indicated at q q. The connecting-rod i has a longitudinal movement through the bearing k, secured in any well-known manner to the compressor-cylinder, and for positively operating the said connecting-rod there is a link or bracket o, fixed thereto and which carries a journal or bearing p, having a limited play or sliding movement on a tappet-rod l. This tappet-rod is connected to some moving part of the mechanism of the compressor in such a way as to have a movement that will close the inlet-valve of the opposite end of the cylinder as the piston reaches the end of the stroke. It is also desirable to so connect the tappet-rod that it will have a comparatively short stroke. The inlet-valves, as will be readily seen, are adapted to be opened by atmospheric pressure created as soon as the piston-head begins to travel away from the opening valve.

For the purpose of preventing hammering and violent contact between the parts upon the opening of the valve, as above described, I have provided a cushioning means as follows: The sleeve-nut which is screwed upon the valve-stem b has an enlarged recess or cylinder located at its lower end. This cylinder is so adjusted as to fit snugly over the upper end of the valve-stem journal and forms therewith a cushion-chamber f. The cylinder-walls are so proportioned with respect to the length of stroke of the piston-stem that they always embrace the upper end of the valve-stem, and the cushion-chamber, therefore, merely varies in size according to the position of the valve-stem.

In order to regulate the action of this inlet-valve, I drill through the sleeve-nut c into the cushion-chamber f small holes r r in such number as may be found necessary to permit of the proper escape of the air and the prompt action of the valve, the object being to allow the air to escape from the cushion-chamber with such a degree of rapidity as will not destroy the cushion and at the same time will allow the inlet of air to the compression-chamber, and so not hinder the opening of the valve and stem. By adjusting these holes r r in the proper number and at the proper place or places in the sleeve-nut it will be observed that as the space between the hub or

journal *g* and the upper inner shoulder of the sleeve *c* is reduced by the movement of the valve and stem inward a number of openings *rr* will first be closed by the action of the said sleeve-nut *c* sliding over the hub and finally a closing of the inner openings *rr* is brought about. By adjusting these holes properly the hammering and noise incident to the operation of these valves are practically done away with.

As will be readily understood, the valve is closed by means of the upward movement of the tappet and connecting-rods *o*, *i*, and *j*, the sleeve *h*, connected to the latter rod, bearing against the under side of the washer beneath the lock-nut *d*. Before the time arrives for the valve to open the tappet and connecting-rods and sleeve *h* have made a short downward movement, and upon the formation of a vacuum in the cylinder by the downward stroke of the piston the valve springs open by reason of the atmospheric pressure; but its full opening is retarded and prevented by the air-cushion formed in the chamber *f*.

The tappet or operating-rod *l* is provided on each side of sliding bearing *p* with encircling cushioning-springs attached at their inner ends to collars loose upon said tappet and at their outer ends to collars secured upon said tappet by set-screws.

It is obvious that many changes and modifications may be made in my invention from the exact form shown and described, and I do not limit myself to this particular construction; but

What I claim, and desire to secure by Letters Patent, is—

1. A valve mechanism for air-compressors comprising a valve, a valve-stem, and a valve-stem journal, said valve provided with air-cushioning means for retarding the opening thereof, comprising a cylindrical sleeve on the valve-stem and a cooperating abutment on the valve-stem journal, a tappet or operating-rod, a connecting-rod having a yielding connection with the operating-rod and an operative connection between said connecting-rod and valve-stem, whereby the connecting-rod has a free movement in one direction without operating the valve.

2. A valve mechanism for air-compressors comprising a valve, a valve-stem, and a valve-stem journal, said valve provided with air-cushioning means for retarding the opening thereof, comprising a cylindrical sleeve on the valve-stem and a cooperating abutment on the valve-stem journal, a tappet or operating-rod, a connecting-rod, a link or arm on said connecting-rod having a sliding connection with said operating-rod, cushioning-springs on said operating-rod upon opposite sides of said link connection, and a second arm rigidly secured to said connecting-rod and having a sliding connection with said

valve-stem whereby the connecting-rod has a free movement in one direction without operating the valve.

3. A valve mechanism for air-compressors comprising a valve-seat, a valve-stem, a valve-stem journal, a sleeve-nut on said stem having an enlarged recessed portion which cooperates with the head of the valve-stem journal to form a cushion-chamber, a reduced portion or neck on said sleeve-nut a lock-nut on the end of said valve-stem, and an operating sleeve or rod sliding on said neck for operating said valve-stem and means for operating said sleeve.

4. A valve mechanism for air-compressors comprising a valve-seat, a valve-stem, a valve-stem journal, a sleeve-nut on said stem having an enlarged recessed portion which cooperates with the head of the valve-stem journal to form a cushion-chamber, a reduced portion or neck on said sleeve-nut, a lock-nut on the end of said valve-stem, an operating sleeve or rod sliding on said neck for operating said valve-stem and means for operating said sleeve, and perforations communicating with said cushion-chamber for the gradual escapement of air confined therein.

5. A valve mechanism for air-compressors comprising a tappet or operating-rod, a connecting-rod having a yielding connection with the operating-rod, an inlet-valve having a valve-seat, a valve-stem, a valve-stem journal, a sleeve-nut on said stem having an enlarged recessed portion which cooperates with the head of the valve-stem journal to form a cushion-chamber, a reduced portion or neck on said sleeve-nut, a lock-nut on the end of said valve-stem, and an operative connection between said connecting-rod and said valve-stem whereby the connecting-rod has a free movement in one direction without operating the valve.

6. A valve mechanism for air-compressors comprising a tappet or operating-rod, a connecting-rod, a link on said connecting-rod and having a sliding connection with said operating-rod, cushioning-springs on said operating-rod upon opposite sides of said link connection, an inlet-valve having a valve-seat, a valve-stem, a valve-stem journal, a sleeve-nut on said stem having a reduced portion or neck and an enlarged recessed portion which cooperates with the head of the valve-stem journal to form a cushion-chamber, a lock-nut on the end of said valve-stem, and a second arm rigidly secured to said connecting-rod and having a sliding connection with said valve-stem whereby the connecting-rod has a free movement in one direction without operating the valve.

7. A valve mechanism for air-compressors comprising a tappet or operating-rod, a connecting-rod, a link on said connecting-rod and having a sliding connection with said operating-rod, cushioning-springs on said oper-

ating-rod upon opposite sides of said link connection, an inlet-valve having a valve-seat, a valve-stem, a valve-stem journal, a sleeve-nut on said stem having a reduced portion or
5 neck, and an enlarged recessed portion which coöperates with the head of the valve-stem journal to form a cushion-chamber, a lock-nut on the end of said valve-stem, a second arm rigidly secured to said connecting-rod
10 and having a sliding connection with said valve-stem whereby the connecting-rod has a

free movement in one direction without operating the valve, and a series of perforations in said cushion-chamber for the partial escapement of air confined therein.

In testimony whereof I have signed my name in the presence of two subscribing witnesses.

THOMAS E. STURTEVANT.

Witnesses:

LEWIS J. ANGEVINE,
GEORGINE J. LOUDON.