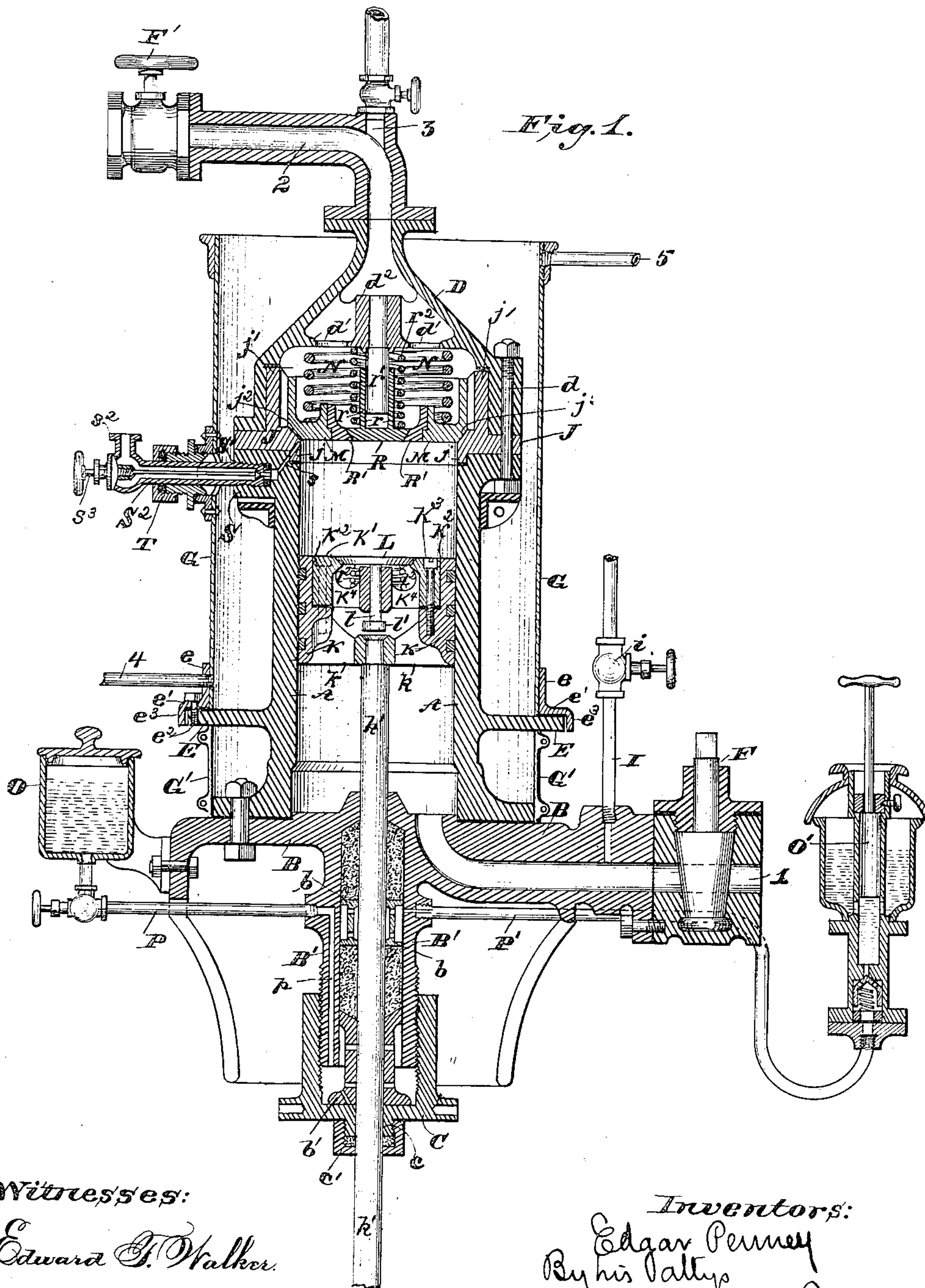


2 Sheets—Sheet 1.

COMPRESSOR PUMP FOR REFRIGERATING MACHINES.

Patented Aug. 2, 1887.



Witnesses:

Edward J. Walker.

Ana R. Steward

Inventors:

Edgar Penney
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Whitaker & Prouse

(No Model.)

2 Sheets—Sheet 2.

E. PENNEY.

COMPRESSOR PUMP FOR REFRIGERATING MACHINES.

No. 367,726.

Patented Aug. 2, 1887.

Fig. 3.

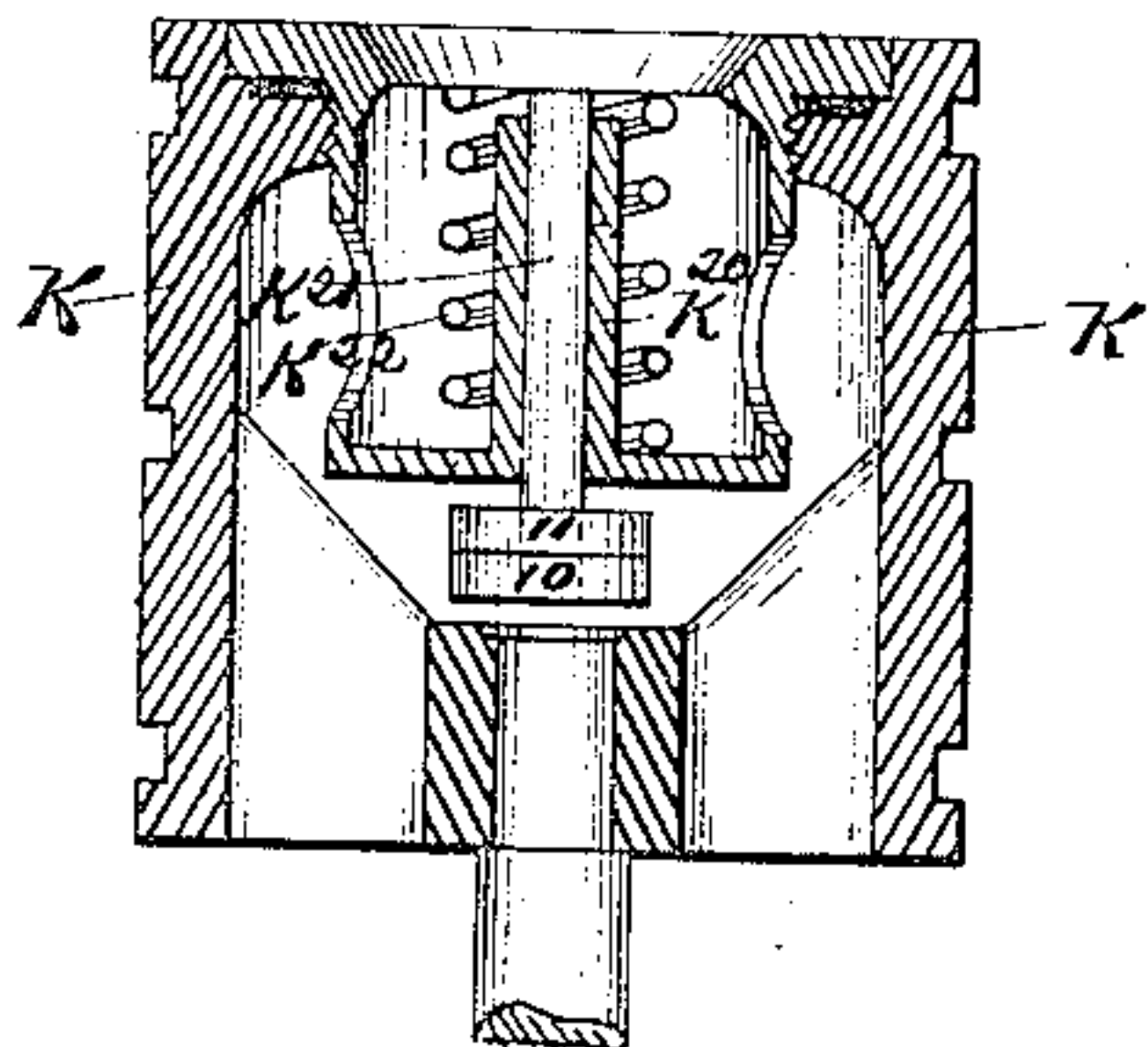
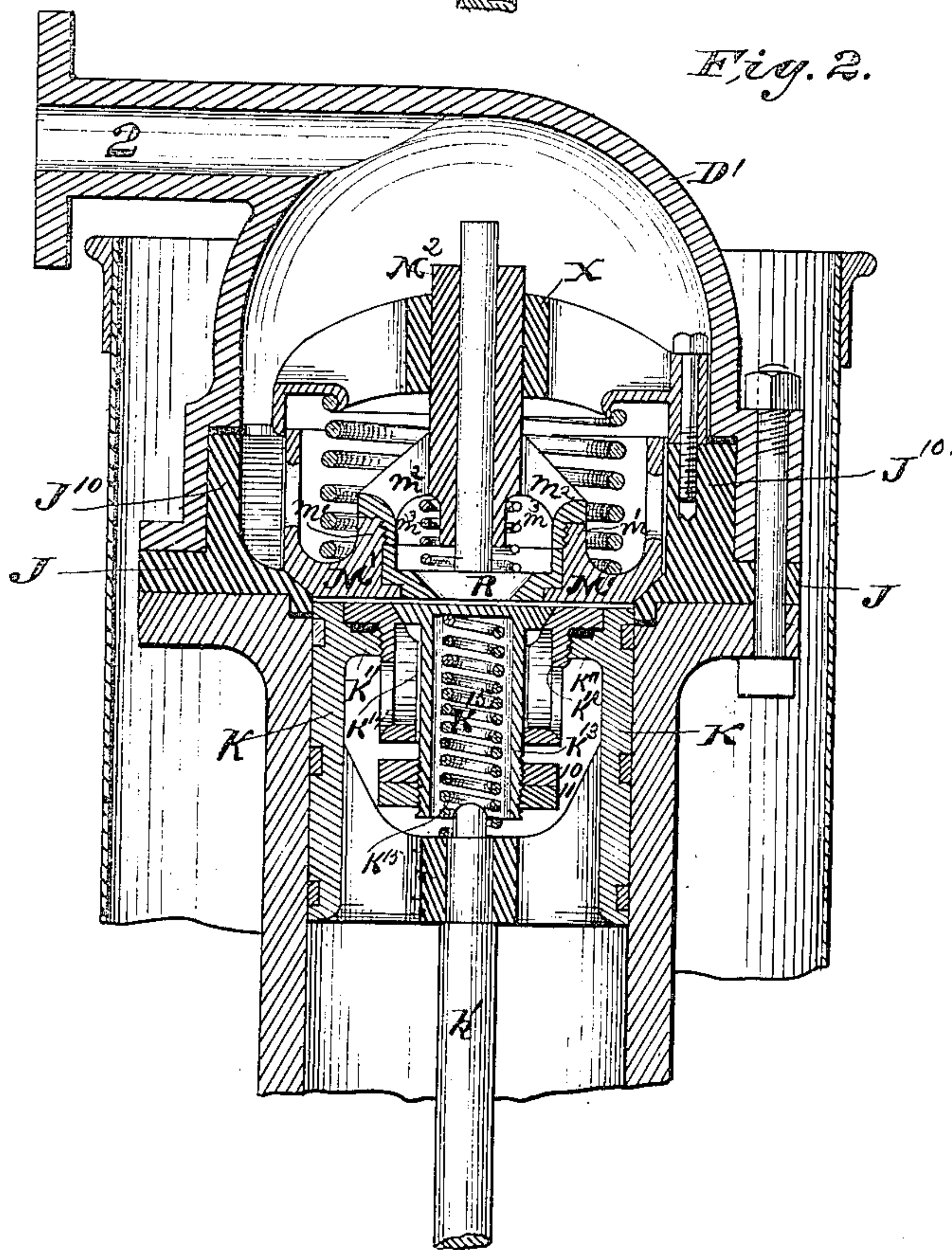


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDGAR PENNEY, OF WAYNESBOROUGH, PENNSYLVANIA.

COMPRESSOR-PUMP FOR REFRIGERATING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 367,726, dated August 2, 1887.

Application filed October 12, 1886. Serial No. 216,023. (No model.)

To all whom it may concern:

Be it known that I, EDGAR PENNEY, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Compressor-Pumps for Refrigerating-Machines; 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.

This invention relates to compressor-pumps for ice-machines and refrigerating apparatus; and it consists in improvements and details of construction, which will be hereinafter fully described, and the invention particularly pointed out in the claims.

Figure 1 is a vertical section of a compressor-pump for ice-machines with my improvement attached. Fig. 2 is a vertical section of modified piston, delivery-valve, and hood covering the latter. Fig. 3 is another form of piston and valve.

Referring to Fig. 1, A designates the pump barrel or cylinder; B, the base of the same, attached to any suitable supporting-frame, the preferred form of such frame being that shown in my patent, No. 363,672, May 24, 1887.

The base B is provided with a downwardly-extending sleeve, B', surrounding the piston-rod, the same being enlarged interiorly from a point near the cylinder to form a stuffing-box for the piston-rod. Within this sleeve near its center is located the gland b and at the lower end a gland, b'. The stuffing-box is closed at its lower end by the cap-nut C, provided with the screw-extension c, to which is attached a smaller cap-nut, c', the space between the projection c and the nut c' being filled with a suitable packing. The glands b and b' are reduced around their center portion and provided with openings in such reduced portion extending into the piston-rod. The upper gland, b, has an annular recess against the piston-rod, as shown in the drawings. The space in the sleeve B' not occupied by glands b and b' is filled with any preferred form of packing.

The space between the sleeve B' and the cap-nut C is supplied with oil to assist in lubri-

cating the piston-rod and sealing the same to prevent the escape of gas from the cylinder as follows: A passage, p, is drilled in the wall of the sleeve B', and a pipe, P, connects this passage with an oil-reservoir, O, suitably supported above said pipe. The gland b is supplied with oil by a pipe, P', connecting with the annular space around the same. The other end of the said pipe is connected to a pump, O', by means of which oil is supplied to this gland under such pressure as to securely seal the cylinder and prevent the escape of gas therefrom. The base B is provided with the pump-inlet 1, in which is fitted the cock F. Between this cock and the pump barrel or cylinder the pipe I connects with the passage 1. This pipe is provided with a valve, i, and such pipe may communicate with the open air and also with a reservoir containing a liquefied form of the gas used in the compressor-pump and its connected apparatus. The pump barrel or cylinder is surrounded by a jacket, G, and is provided with a hood or bonnet, D, from which lead passages 2 and 3. The pump-barrel is provided at a short distance above its lower end with an annular flange, E. The jacket G is provided at its base with a ring, e, having the annular projection e', and the jacket is secured to the flange by bolts e'', passing through the annular projection of the ring e into the flange E, a suitable packing being interposed between them. This annular flange may be constructed with a downward projection, e'', covering the end of the flange. A supplemental jacket, G', is interposed between the flange and the base B, detachably or removably secured in place. The jacket G is provided with a water-inlet, 4, connected with the same through the ring e, and provided at its top with an outlet, 5. By this construction the jacket G is secured to the cylinder by a tight joint at its base, while means is provided whereby the bolts connecting the base and cylinder can be reached and the cylinder detached when it may become necessary without detaching the jacket G from the cylinder. It will also be seen that if necessary the jacket G can be detached.

The inlets supply water to the jacket for the purpose of keeping the cylinder cool. The outlets, carrying off the water after it has reached

a certain height, enable a constant circulation to be kept up in the jacket.

The main body of the piston K has its periphery fitted to the interior of the cylinder, and provided with packing-rings. This main portion of the piston is in the form of a cylinder, having at its lower end arms k , extending to a hub at the center, to which the piston-rod k' is attached. The upper part of the piston is provided with an annular recess, K^2 , in which is fitted the valve-seat K' , which is attached to the main portion of the piston by the screw-bolts K^3 , with a suitable packing interposed between the valve seat and the shoulder of the recess K^2 . This valve-seat is of cylindrical form, having arms K^4 extending to a central hub, in which is mounted the stem l of the valve L. The limit of the movement of the valve is determined by the nut l' on the end of the valve-stem, and a spring, l^2 , is placed underneath the valve. This spring is of sufficient strength to nearly counterbalance the weight of the valve, so that an accurate and easy movement to the same is secured. This construction of the piston secures a removable seat for the valve, with a packed joint midway of the valve, which prevents all leaking and avoids the employment of small parts, which are more liable to become broken or disengaged and damage to the pump arise therefrom.

Between the cylinder A and the hood D is interposed a ring, J, having the downwardly-projecting annular flange j , fitting within a recess in the upper part of the cylinder, with a packing between the two. It is also provided with the upwardly-extending annular flange j' and a valve-seat, j^2 . The hood or bonnet D is attached to the cylinder by bolts d , extending through projections on said hood, the ring J, and a flange at the upper end of the cylinder. Resting upon the seat j^2 of ring J is a movable cylinder-head or large valve, M, of the same size as the interior of the cylinder. The hood D has arms d' extending interiorly to a central hub, d^2 . Between these arms and the cylinder-head or valve M is interposed a strong spring, N, which serves to keep the part M in place in the ordinary working of the pump, but which will permit the same to yield in case of anything solid becoming interposed between the piston and such valve or cylinder-head, or when for any reason the secondary or working valve shall fail to yield and give passage to the condensed fluid in the pump or cylinder. This secondary valve R rests upon a removable seat, R' , inserted in the valve or cylinder-head M. A sleeve, r , projects upwardly from the same, engaging a guide, r' , depending from the hub d^2 . A spring, r^2 , is interposed between the hub d^2 and the valve-head. The spring r^2 is very much weaker than the spring N, and hence in the ordinary working of the pump the valve R yields and permits the passage of the contents of the pump-cylinder, while the valve or cylinder head M remains stationary.

It will be here noted that the valve-seats are all separable from the other parts of the construction, and are therefore easily removed and replaced when they have become unduly worn without replacing the other portions of the structure.

The gas or fluid to be compressed by the pump is admitted to the pump-cylinder through the inlet 1, and is forced outward by the piston through outlet 2, attached to the upper portion of the hood or bonnet. When it is desired to free the pump from the gas or fluid therein in order to examine or repair the same, the cocks F in the inlet 1 and F' in inlet 2 are closed and the valve i and its air connection and the valve in the outlet 3 opened, by which means the gas or fluid within the pump is speedily replaced by air and the examination or repairs can be proceeded with.

In order to provide a means for the attachment of a pressure-gage, the following construction is employed: The flange upon the outside of the upper end of the cylinder is provided with an enlargement, S, which has a screw-threaded recess, S' , therein. This recess is connected with the extreme upper portion of the pump barrel or cylinder by a duct, s , through the upper part of the cylinder and the plate J. A pipe, S^2 , provided with a valve-seat, is screwed into the recess S' , a suitable packing being interposed between the tube and the bottom of the recess to secure the parts from leakage. This tube passes through a stuffing-box, T, connected to the jacket G, and has an upwardly-extending portion, s^2 , to which the pressure-gage may be attached. A needle-valve, s^3 , passes into the end of this pipe and extends in and seats upon the valve-seat therein, as shown in the drawings.

In the construction shown in Fig. 2 the main portion of the piston is constructed very much the same as that shown in Fig. 1. The recess for the valve-seat is very much shallower and the main part of the valve is provided immediately below this seat with an internal annular projection, k^{11} , which is screw-threaded and receives a screw-thread on the valve-seat k^{12} . A suitable packing is interposed between the valve-seat and the annular projection k^{11} to prevent leakage. The valve in this construction has the tubular stem k^{13} , which is guided by vertical flanges k^{14} on the valve-seat, and a spring, k^{15} , extends within this tubular portion of the valve and encircles a projection of the piston-rod k' . The strength of this spring, as stated in regard to the other construction, is such as to nearly counterbalance the weight of the valve.

The jam-nuts 10 and 11 on the tubular stem of the valve serve to limit the movement of the valve, which can be adjusted thereby.

In Fig. 3 I have shown the valve attached to the piston in the same manner as that just described. The valve-seat in this case, however, is provided with a tubular guide, k^{20} , projecting from the bottom of the same, the valve in this case being provided with a stem, k^{21} , and

counterbalanced by a spring, k^{22} , surrounding the tubular guide. Jam-nuts 10 and 11 are employed in this case to adjust the movement of the valve.

5 The delivery-valve in the construction shown in Fig. 2 differs somewhat from that of Fig. 1. An annular ring, J, similar in construction to that heretofore described, is employed in this arrangement. The ring J in
10 this instance is provided with two or more bosses, J^{10} , to which is secured by screw-bolts a guide-frame, X. A similar movable cylinder-head or valve, M' , is employed. This valve is seated upon the ring J in the same manner as the valve M. The seat R' for the smaller valve
15 is inserted in the cylinder-head in the same manner. It is held in position, however, by a tubular stem, M^2 , passing through an opening in the guide-frame and at its lower end screwed
20 into an annular projection, m' , of the cylinder-head M' . The lower annular portion of this stem, which connects with the movable cylinder-head M' , is connected with the tubular stem M^2 by arms m^2 . Inside this tubular stem is
25 the stem of the smaller valve, R, and a spring, m^3 , is interposed between the stem m^2 and the valve R. Both the stems m^2 and the stem of the smaller valve extend above the guiding-frame X, so that when the dome or hood D' is
30 removed these stems can be clamped by the workmen and revolved in their seats whenever it is desired to do so, as is sometimes the case in refitting and repairing these parts. The hood D' employed in this case has no connection with the valve mechanism, and is secured to the cylinder-top in a manner similar to that shown in Fig. 1. In case of repairs it can be removed without removing any part of the valve construction, which is one of the advantages of this arrangement.

It will be seen in this construction that the movable cylinder-head or valve is guided in its movements by the stem M^2 . In order to further guide this portion of the valve construction at its lower end the ring J is provided with guiding-flanges J^{10} .

The operation of this modified form of my delivery-valve construction is similar to that shown in Fig. 1, and hereinbefore described.
50 The smaller valve, R, is designed to do the work and receive the wear and tear. The large valve or cylinder-head M' is made yielding more for the purpose of preventing damage to the structure in case anything solid should be interposed between the piston and the cylinder or in the case of accidental disarrangement of the valve R. In order that the small valve of the piston and the small delivery-valves may be as durable as possible, such valves and
60 their seats are made of steel.

Both the piston and the cylinder, instead of being provided with one valve, may be provided with any desired number of valves by a suitable modification of the construction. It
65 will be noticed that the construction of the piston in each instance furnishes the same with

an even upper surface, and that the arrangement of the delivery valve or valves gives the cylinder-head a like construction. Consequently the piston can be given such a movement that its upward stroke will terminate when the surface of the cylinder is but a slight distance from the cylinder-head, whereby the expulsion of the entire contents of the cylinder is secured.

The constructions of piston shown herein are not claimed, as they are included in an application filed by me on the 9th day of July, 1887.

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

1. In a compressor-pump for ice-machines, a horizontal base, in combination with a cylinder having solid walls mounted on and attached to the base, substantially as described, and provided with an exterior flange a short distance above the base, and a water-jacket surrounding the cylinder above said flange and attached thereto, substantially as described.

2. In a compressor-pump for ice-machines, a horizontal base, in combination with a cylinder having solid walls mounted on and attached to the base, substantially as described, and provided with an exterior flange a short distance above the base, a water-jacket surrounding said cylinder above said flange and connected thereto, and a detachable jacket between the flange and the base, substantially as described.

3. A compressor-pump for ice-machines, having a stuffing-box for the piston-rod of the same, said stuffing-box being provided with a central gland and a gland at the lower end of the same, an oil-reservoir connected with the lower gland, and means for supplying oil under pressure to the central gland, substantially as described.

4. A compressor-pump for an ice-machine, having an inlet-passage and an outlet-passage and stop-cocks controlling the same, provided with a pipe communicating with the open air, connected with the inlet-passage between the stop-cock and the cylinder of the pump, and a pipe connecting with the outlet-passage between the cylinder and stop-cock, the said pipes having cocks controlling the same, substantially as described.

5. The combination, with a cylinder of a compressor-pump for ice-machines and a water-jacket surrounding the same, of a stuffing-box attached to said jacket, and a tube passing through said stuffing-box and connecting with the interior of the cylinder, the said tube having a valve-seat and valve at its inner end in close proximity to the cylinder, substantially as described.

6. The combination, with the cylinder of a compressor-pump for ice-machines, of the delivery valve or valves extending beyond the end of said cylinder, the hood or dome removably connected to the said cylinder and inclosing said valve or valves, but disengaged from

every part of the same, whereby the said hood or dome may be removed and the valve or valves be left in operative position and relation, substantially as described.

5 7. The combination, with the cylinder of a compressor-pump for ice-machines, of the guiding-frame connected therewith, the delivery valve or valves having a stem or stems projecting beyond the guiding-frame, the whole
10 of said frame and valves extending beyond the end of the cylinder, and the hood or dome removably connected to the cylinder and inclosing the valve or valves and the guiding-frame, but disengaged therefrom, whereby the dome
15 or hood may be removed and the valve or valves left in operative position and relation, and the operator be given access to the stem or stems of the valve or valves, substantially as described.

20 8. The combination, with the cylinder of a compressor-pump for ice-machines, of the cylinder-closing devices consisting of the annular ring J, the guiding-frame attached thereto, the movable cylinder-head or large valve having a stem passing through said guiding-frame and the working valve or valves located
25 in said cylinder-head or large valve, said ring, frame, and valves being located beyond the end of the cylinder, and the dome or hood resting upon said ring without engaging any of
30 the other devices, substantially as described.

9. The combination, with the cylinder for compressor-pumps for ice-machines, of enclosing devices consisting of the ring J, the
35 guiding-frame X, the movable cylinder-head or large valve M', provided with a tubular stem extending through said guiding-frame, the small working-valve mounted in said movable head or large valve, provided with a
40 stem extending through the tubular stem of the cylinder-head, springs pressing the cylinder-head and valve upon their respective seats,

and the removable dome or hood inclosing the same, substantially as described. 45

10. In a compressor-pump for ice-machines, the combination, with a stuffing-box for the piston-rod, of a perforated gland internally and exteriorly recessed, located centrally in said box, a gland at the outer end of the box exteriorly recessed and perforated, and an oil-supply of a constant pressure connected with the outer gland, and an oil-supply under a variable pressure connected with the central gland, substantially as described. 50 55

11. The combination, with a cylinder of a compressor-pump for ice-machines, a removable cylinder-head, a detachable seat for the same, and a water-jacket surrounding said cylinder, of a tube passing through the water-jacket and connecting with the upper part of the interior of the cylinder by a passage passing through the said detachable seat, said tube being provided with a valve-seat in close proximity to the cylinder, and a valve in said tube, substantially as described. 60 65

12. The combination, with the cylinder of a compressor-pump for ice-machines, of the cylinder-closing devices consisting of the ring J, having the internal guiding-flanges, J¹⁰, and guiding-frame X, of the movable cylinder-head having a stem engaging the guiding-frame, the working-valve mounted in said movable head, the springs pressing the cylinder-head and valve upon their respective seats, and the removable dome or hood inclosing the same and disconnected therefrom, substantially as described. 70 75

In testimony whereof I affix my signature in presence of two witnesses. 80

EDGAR PENNEY.

Witnesses:

D. M. GOOD, Jr.,
D. C. UNGER.