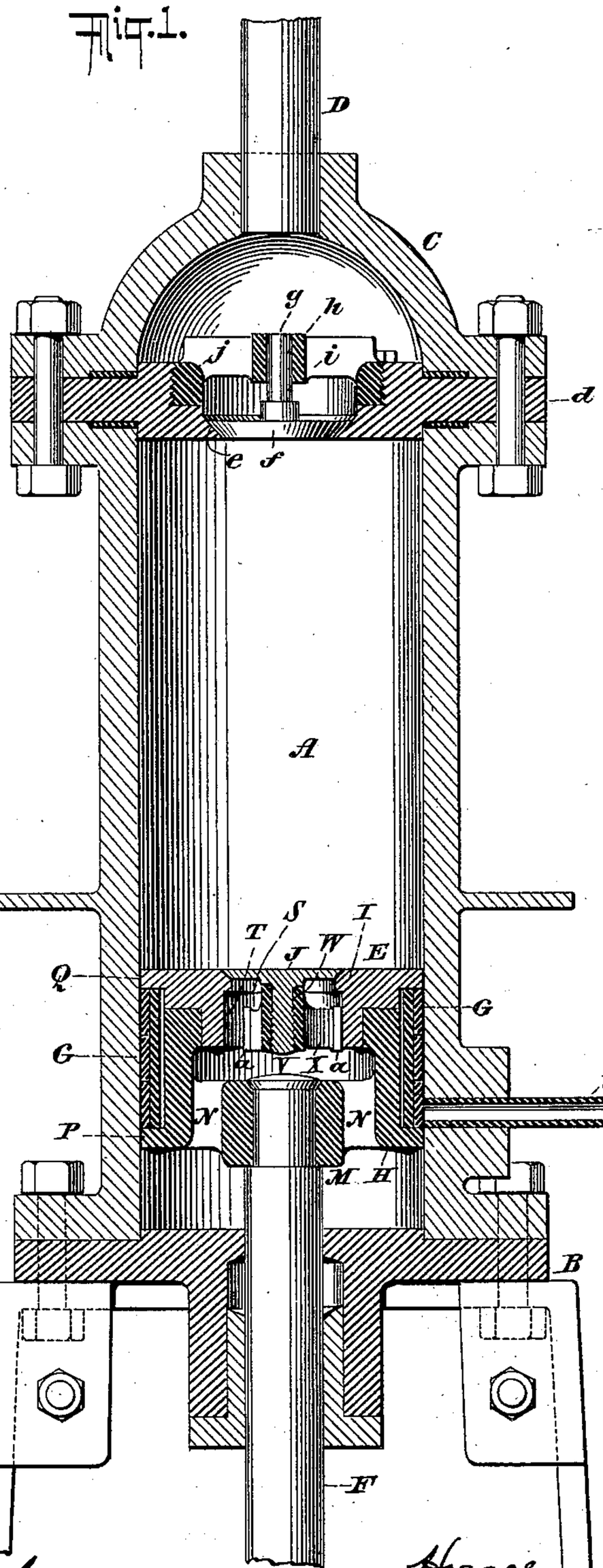
(No Model.) 2 Sheets—Sheet 1.

H. J. CAMPBELL.

COMPRESSION PUMP FOR REFRIGERATING APPARATUS.

No. 592,235. Patented Oct. 26, 1897.

Fig. 1.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

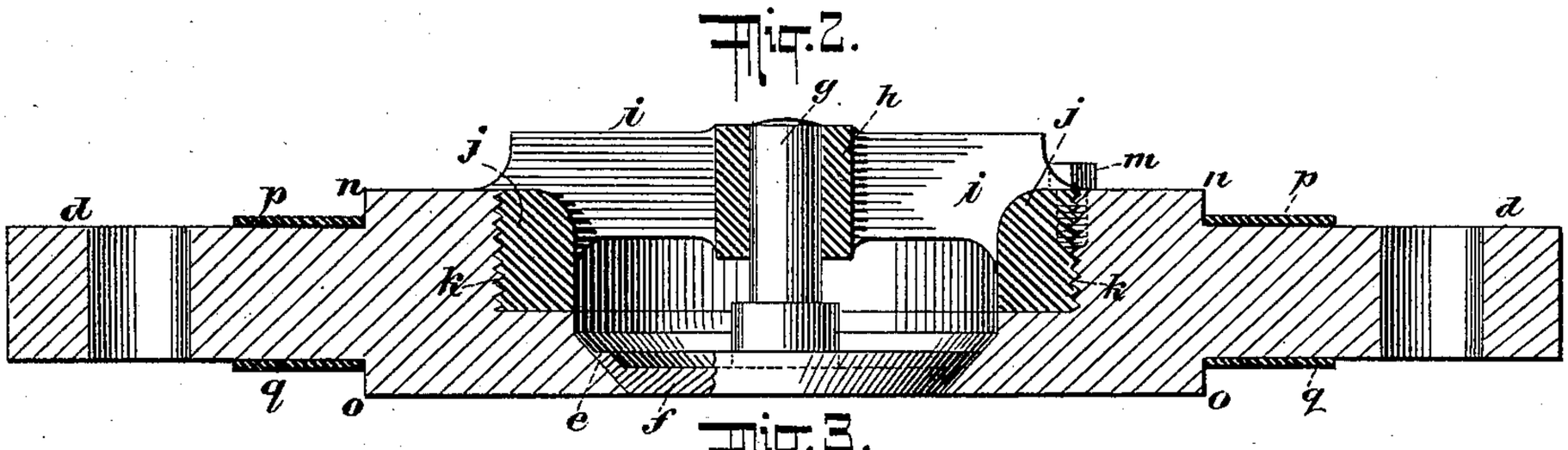


Fig. 3.

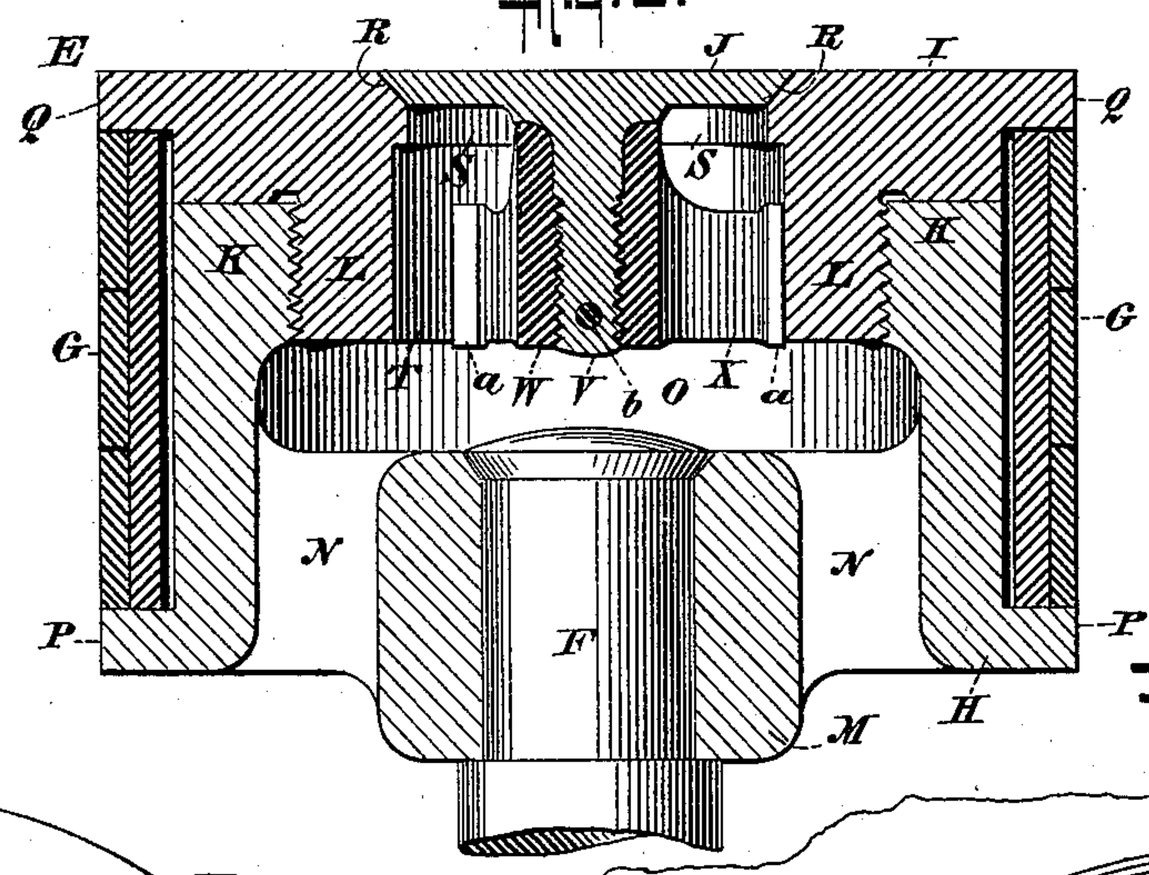


Fig. 5.

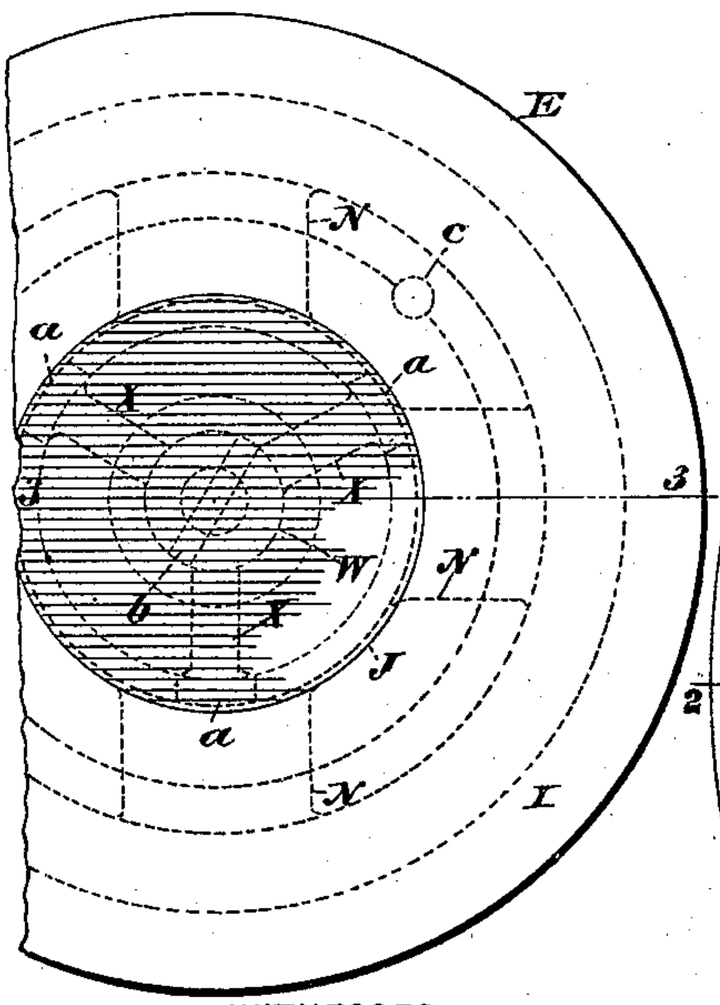
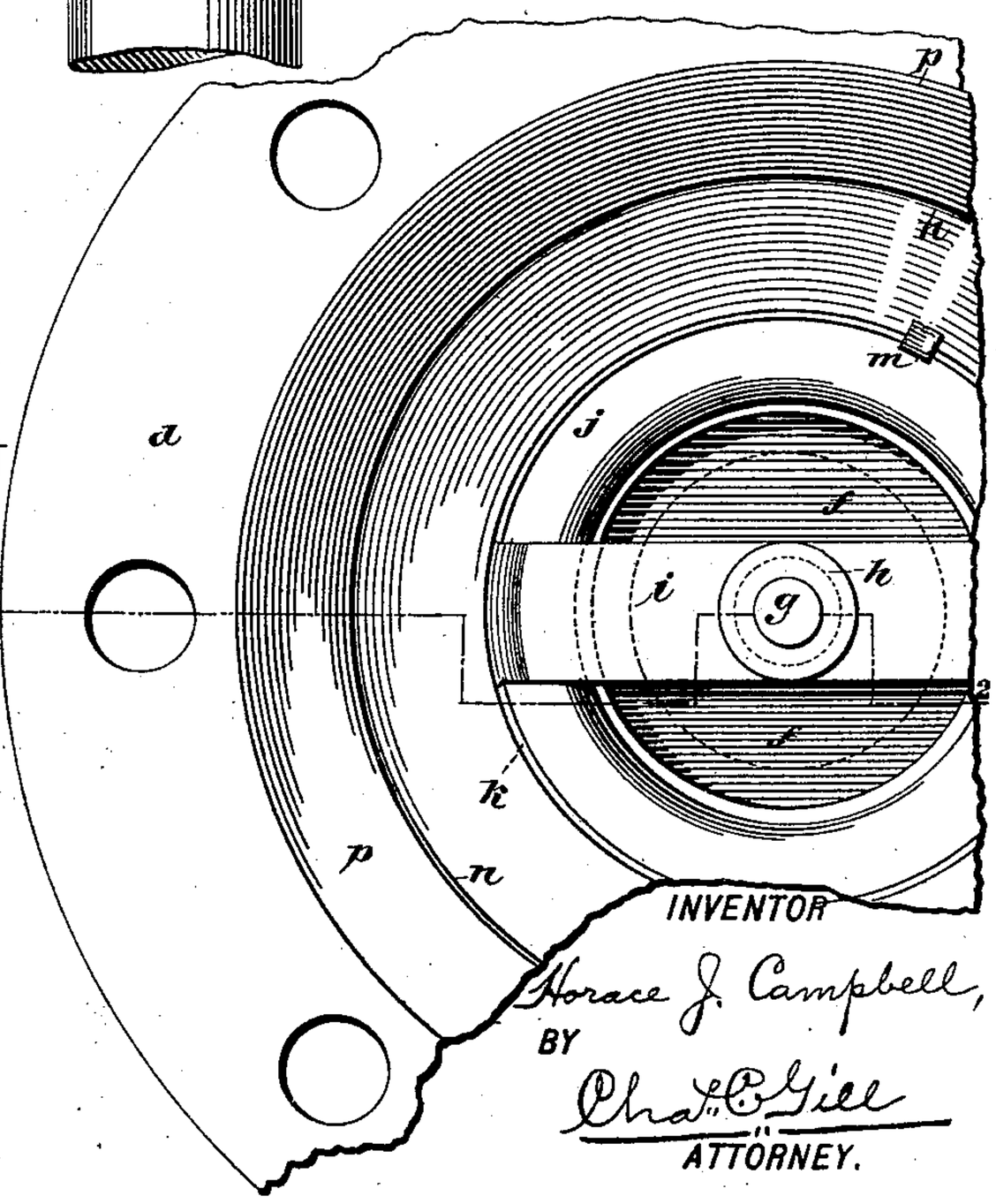


Fig. 4.



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UNITED STATES PATENT OFFICE.

HORACE J. CAMPBELL, OF MEMPHIS, TENNESSEE.

COMPRESSION-PUMP FOR REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 592,235, dated October 26, 1897.

Application filed December 26, 1894. Serial No. 532,935. (No model.)

To all whom it may concern:

Be it known that I, HORACE J. CAMPBELL, a citizen of the United States, and a resident of Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Compression-Pumps for Refrigerating Apparatus, of which the following is a specification.

The invention pertains to the art of refrigerating and ice-making by what is known as the "compression" system; and it consists in the novel pump hereinafter described and claimed, whereby the ammoniacal or other gas may be compressed preparatory to its passage through the condenser to the receiver and thence to the circulating-pipes, in which it expands and which finally direct it back to the pump for recompression.

The present invention relates particularly to the pump-plunger and its valve and will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section through a compression-pump constructed in accordance with and embodying the invention, the piston or plunger being shown in its lower position. Fig. 2 is an enlarged detached vertical section of the valve mechanism at the upper end of the pump-cylinder. Fig. 3 is a like view of the pump piston or plunger. Fig. 4 is a top view, partly broken away, of the upper valve devices and indicating by the dotted line 2 2 the section on which Fig. 2 is taken; and Fig. 5 is a top view of the pump piston or plunger.

In the drawings, A designates the pump-cylinder, suitably mounted upon a support B and having a dome-shaped upper head C, connected with the outlet-pipe D. Within the cylinder A is provided the piston or plunger E, connected with the piston-rod F, which passes downward through a gland in the lower head of the cylinder A.

The piston or plunger E is provided with the usual packing G, and, apart from said packing, consists of the lower portion H, the upper portion I, and the valve J, the portion H being hollow and provided with the internally-threaded annular flange K, adapted to receive the lower externally-threaded flange L, formed on the upper portion I of said piston, as illustrated more clearly in Fig. 3. The lower portion H of the piston contains a central hub M, supported by the radial connections N, (illustrated by dotted lines in Fig. 5,) and receiving the upper end of the piston-rod F in the manner indicated in Fig. 3. Between the upper portion I of the piston and the hub M and connecting-bars N is formed the chamber O, to which the ammonia has access through the space between the bars N. The lower portion H of the piston is also formed with the annular laterally-projecting flange P, the latter corresponding with the annular laterally-projecting flange Q, formed at the edges of the upper portion I of said piston, and with said flange Q forming the space between which are arranged the packing-rings G.

The upper portion I of the piston or plunger is formed with the valve-seat R, the interior annular shoulder S, and below said shoulder with the cylindrical chamber T.

The valve J has a downwardly and inwardly inclined periphery corresponding with and adapted to securely bear upon the valve-seat R, formed in the upper part of the piston, and said valve J is also provided with the central downwardly-extending externally-threaded stem V, which engages the internally-threaded hub W, located within the chamber T and having the radial arms X, whose outer ends are extended laterally to form the guiding-flanges *a*, as indicated more clearly by dotted lines in Fig. 5. The valve-stem V and hub W will preferably be locked together by a pin *b*. When the valve J is upon its seat R, the lower end of the valve-stem V and hub W will, as indicated in Fig. 3, be about on a level with the lower edges of the annular flange L, constituting a part of the section I of the piston, and when the valve J is in its extreme upper position the upper edges of the flanges *a* will reach the lower edges of the annular shoulder S, the latter preventing the valve J from making any undue upward movement and the flanges successfully guiding said valve during its upward and downward movements from and toward the valve-seat R.

The upper end of the piston-rod T is headed in the hub M of the piston, as illustrated in Fig. 3, and preferably a small locking-screw

c (shown by dotted lines in Fig. 5) will be applied from below to the joint between the flanges K and L of the piston in order to prevent under any circumstances the unscrewing of the upper section I from the lower section H of said piston.

Between the dome-shaped head C and the main body of the cylinder A is securely bolted the interposed plate *d*, having a central opening, whose lower downwardly and inwardly inclined walls constitute the annular valve-seat *e* for the vertically-acting valve *f*, the latter being provided with the upwardly-extending valve-stem *g*, which freely passes upward through a vertical aperture in the guiding-hub *h*, the latter also serving to prevent the valve *f* from having an undue upward movement. The hub *h* is formed at the center of the transverse bar or bars *i*, whose outer ends are integral with the externally-threaded ring *j*, which is screwed into the annular recess *k*, formed in the plate *d*, and engages the internally-threaded walls thereof, as illustrated more clearly in Fig. 2. In order to prevent the ring *j* under any circumstances from working loose, I preferably provide a small locking-screw *m* at the joint between the said ring and the surrounding portion of the plate *d*, as illustrated in Fig. 2, and which screw corresponds substantially in form and function with the screw *c*, provided for the purpose of locking the upper and lower portions of the piston together. The valve *f* being upon its seat *e* the hub *h* may be passed upon the stem *g* of said valve while the ring *j* is being screwed into its receiving-recess *k*, thereby conveniently securing the valve *f* and insuring its due vertical movement upward from and downward to its seat *e*. At a suitable distance beyond the center of the plate *a* the latter is provided with the upper and lower annular shoulders *n o* and packing *p q*, in order to render efficient the joint between the dome-shaped head C and the main body of the cylinder A, as illustrated in Figs. 1 and 2.

At the lower or suction end of the cylinder A is provided the inlet-pipe *t*, which will lead from the pipes used in the refrigerating apparatus and through which the gas will be admitted to the lower end of the cylinder A, below the piston or plunger thereof. The outlet-pipe D from the upper end of the cylinder A will pass to the receiver (not shown) or other convenient part of the apparatus in connection with which the pump may be employed.

In the operation of the pump hereinbefore described the upward movement of the plunger E will draw into the lower end of the cylinder A the gas from the pipe *t*, and upon the downward movement of said piston or plunger E the gas within the lower end of the cylinder A will lift the valve J, and through the opening thus formed a portion of the gas from the lower side of the piston E will escape to the upper side of said piston, and the pressure at the lower side of the piston having been thereby relieved, the valve J will reseat itself and thereby prevent any return of the gas from the upper to the lower side of the piston. The gas having been thus directed to the upper side of the piston E, the latter upon its ascent will compress the gas and drive it upward against the valve *f*, elevating the latter and permitting the escape of the gas to the upper side of said valve, thereby relieving the pressure from the lower side of said valve *f* and permitting the latter to lower to its seat and confine the gas above the plate *d*, which space is in direct communication with the pipe D. The reciprocation of the piston E may be effected by any suitable means, and with each upward movement of the said piston the gas from the pipe *t* is drawn into the lower end of the cylinder A, and the gas above said piston is compressed and driven upward through the valve in the plate *d*, as above described, and with each downward movement of the piston E the valve *f* maintains its seat and the valve J elevates to relieve the pressure at the lower side of the piston E and secure the admission of the gas to the upper side of said piston.

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

In a compression-pump for refrigerating apparatus, the cylinder having the valve at its upper end, and the reciprocating piston or plunger within said cylinder and having the packing, said piston or plunger comprising the lower section having the central hub and radial arms, and the upper section secured to said lower section and having the valve-seat and internal annular shoulder, combined with the valve for said seat and having a downwardly-extending stem, the winged hub movable within the said piston below said annular shoulder and guided thereby, and means securing the said valve-stem within said hub; substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 22d day of December, A. D. 1894.

HORACE J. CAMPBELL.

Witnesses:
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EDWARD D. MILLER.