

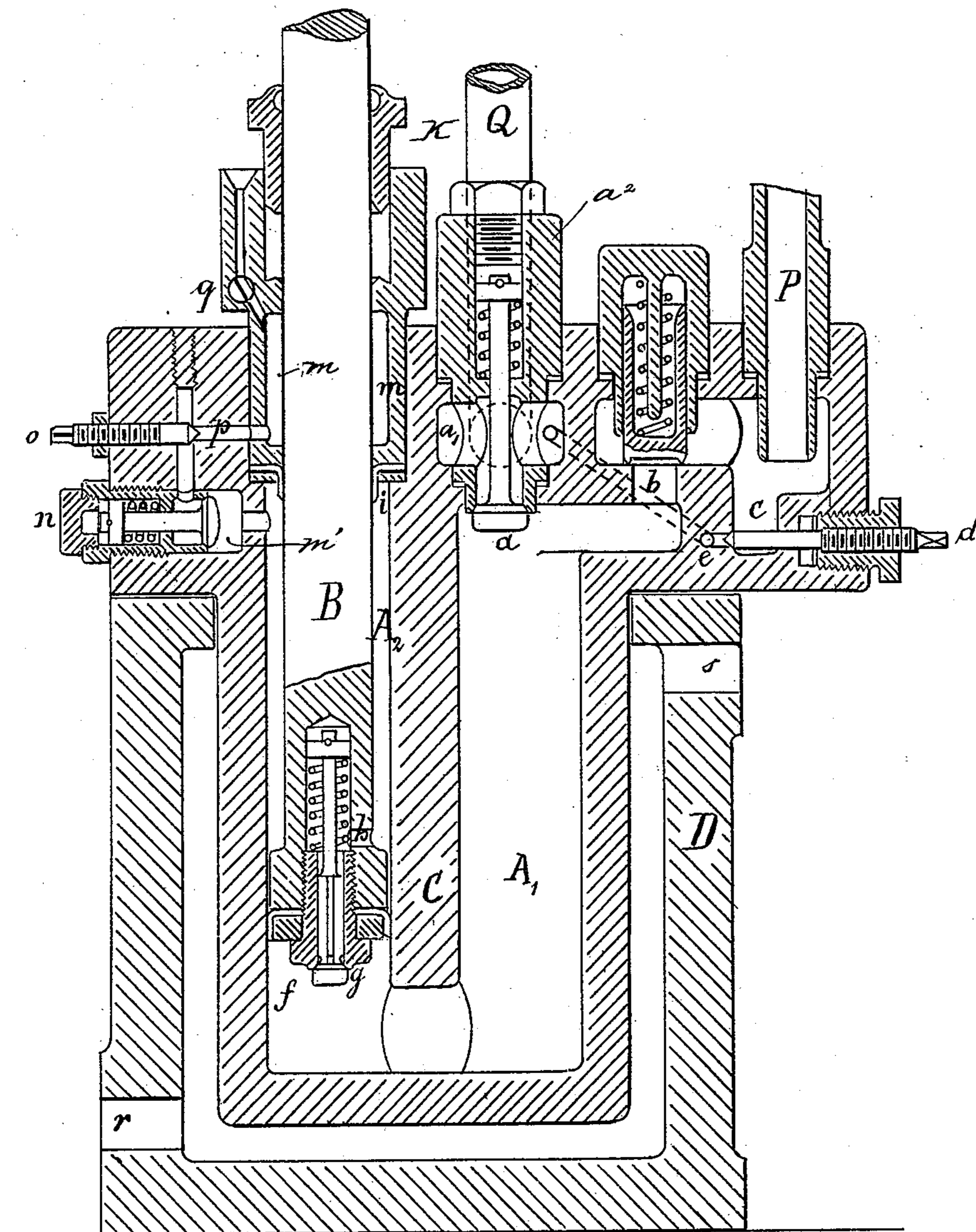
(No Model.)

F. WINDHAUSEN.

APPARATUS FOR COMPRESSING CARBONIC ACID GAS.

No. 405,289.

Patented June 18, 1889.



Witnesses:

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Carl Ziegler

Inventor

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UNITED STATES PATENT OFFICE.

FRANZ WINDHAUSEN, OF BERLIN, GERMANY.

APPARATUS FOR COMPRESSING CARBONIC-ACID GAS.

SPECIFICATION forming part of Letters Patent No. 405,289, dated June 18, 1889.

Application filed November 12, 1886. Serial No. 218,729. (No model.) Patented in Germany August 22, 1885, No. 37,214; in France December 3, 1885, No. 172,692; in Belgium December 15, 1885, No. 71,047, and in Austria-Hungary December 20, 1886, No. 34,528 and No. 63,576.

To all whom it may concern:

Be it known that I, FRANZ WINDHAUSEN, of Berlin, in the Kingdom of Prussia and German Empire, have invented a new and useful Apparatus for Compressing Carbonic Acid, (no patents being obtained by me anywhere for this invention, save in Austria-Hungary, Nos. 34,528 and 63,576, dated December 20, 1886; Germany, No. 37,214, August 22, 1885; France, No. 172,692, December 3, 1885, and Belgium No. 71,047, December 15, 1885,) of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to an improvement in air-pumps for compressing air and gases of anykind in refrigerating-machines, and is especially adapted for forcing carbonic acid to be used as a cold-producing medium; and it consists in the peculiar construction and combination of devices hereinafter described and claimed.

The accompanying drawing is a vertical sectional view of a pump embodying my improvements.

The body of the pump, which is made of steel or iron, has a pair of cylindrical cavities $A' A^2$, arranged side by side and communicating at their lower ends.

A piston-rod B is in the cavity A^2 , and has a piston at its lower end provided with suitable packing fitting in said cavity or cylinder. A cylindrical recess is formed in the lower end of the piston and communicates with the annular space between the cylinder A^2 and the piston-rod by a channel h . A spring-pressed upwardly-closing valve g is seated in the said recess of the piston, as shown. The upper end of the cylinder A^2 is enlarged in diameter, and in the same is fitted a gland K , through which the piston-rod passes. A stuffing-box is in the upper end of the gland, and on the lower portion of the latter is formed an annular chamber m , which surrounds the piston-rod. An air-channel q communicates with the said chamber, and in said channel is a stop-cock. The lower end of the gland has a packing i to effect as tight a joint as possible with the piston-rod. A

channel p communicates with the chamber m and with a recess m' , which in turn communicates with the cylinder A^2 , and in the said channel p is located a pointed screw valve or cock o . A spring-pressed valve n , which is normally closed and opens inwardly, is seated in a gland screwed into the recess m' . An inlet-pipe Q communicates with a chamber a' at the upper end of cylinder A' , and an outlet-pipe P communicates with a channel c , that is in communication with said cylinder.

a represents a downwardly-opening valve seated in a gland a^2 , that extends through and communicates with the chamber a' , and also communicates with the cylinder A' . A spring presses upward on a head or nut on the stem of the valve a , as shown, and keeps the valve normally closed.

b represents a spring-pressed valve that serves to normally close the channel c and is seated in a gland, as shown. A channel e extends from the chamber a' to the channel c , and is normally closed by a screw-plug d .

The operation of my invention is as follows: A quantity of suitable fluid is introduced to the cylinder $A' A^2$, and over which the air, gases, or carbonic acid to be compressed are sucked through the pipe Q by the valve a when the piston ascends, and when the piston descends said air, gas, or carbonic acid is compressed by the rising column of fluid in the cylinder A' and driven past the valve b into the channel c , and from thence through the pipe P into the receiver of the refrigerating-machine. The fluid is supplied in such quantities that when the piston is at the lower limit of its stroke the cylinder A' will be entirely filled and cause the air, gas, or carbonic acid to be entirely expelled from said cylinder. Any fluid which may be driven into the channel c will be caused to flow by the recurring strokes of the piston through the channel e into the chamber a' , and from thence will be sucked with the air, gas, or acid through the valve a back into the cylinder A' .

On the column of fluid below the piston in the cylinder A^2 is a lubricating-fluid of suitable kind. Any of said lubricant which may

- be forced into the part of cylinder A^2 above the piston will, on the ascent of the latter, be forced downward through the channel h and valve g into the lower part of the cylinder.
- 5 Any lubricating-fluid which may be forced into the chamber m at the upstroke of the piston will be sucked downward therefrom through the channel p and valve n back into the cylinder on the ensuing downstroke of the piston. The height of the cylinder A^2 and its capacity are such that the pressure of air which may be sucked therein through the valve n will be less than the pressure under the piston.
- 15 From the foregoing description it will be understood that the piston and piston-rod are at all times lubricated, and therefore no special oiling of the apparatus is required. It will be further understood that none of the compressing-fluid can escape, and that the air, gas, or carbonic acid, being prevented from coming in contact with the piston by the compressing-fluid, will remain entirely pure and will not be vitiated by the pump.
- 20 In order to maintain the pump at any desirable temperature, the same is provided with a surrounding case D , between which and the pump is formed a chamber, in which water may be caused to circulate.

A pump thus constructed is exceedingly compact, is very strong and durable, and may be operated at comparatively small expense.

Having thus described my invention, I claim—

1. The combination of the pump-body having the piston-cylinder, the channel p , communicating therewith, the valve n , the gland K , having the channel m , communicating with the channel p and having the outlet-channel q , the piston-rod in the piston-chamber and extending through the gland, and the packing i in the lower end of the gland, substantially as described.

2. In an air-pump, the combination of the body having the cylinder, the chamber a' , communicating therewith, the escape-channel c , and the channel e between the same and chamber a' , with the inlet-pipe communicating with said chamber, the inlet-valve a , the outlet-valve b in channel c , and the compressing-piston, substantially as described.

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Witnesses:

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