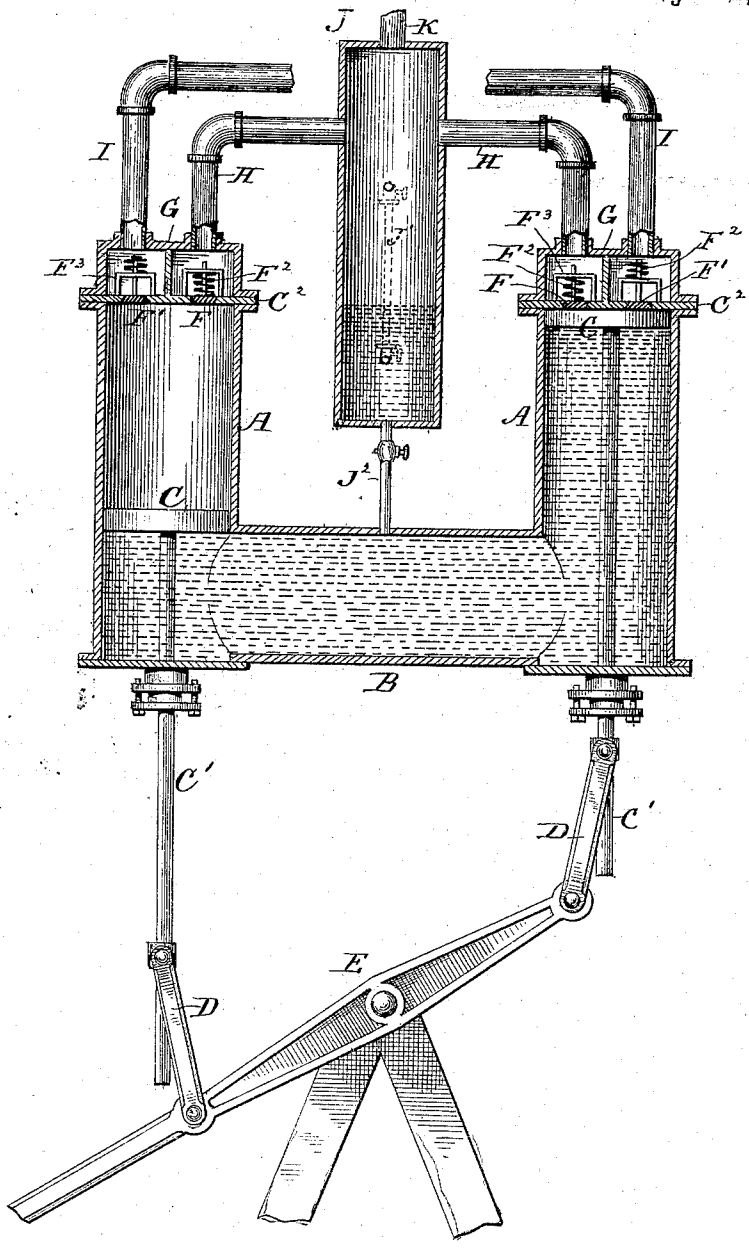
(No Model.)

A. CONACHER.

REFRIGERATING APPARATUS.

No. 317,629. Patented May 12, 1885.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

ALEXANDER CONACHER, OF SAN ANTONIO, TEXAS.

REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 317,629, dated May 12, 1885.

Application filed August 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER CONACHER, a citizen of Great Britain, residing at San Antonio, in the county of Bexar and State of Texas, have invented certain new and useful Improvements in Refrigerating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to refrigerating apparatus or ice-making machinery in which ammonia-gas, anhydrous sulphurous acid, or other similar gas is used, which has the property of liquefying under pressure and of absorbing caloric when relieved from pressure; and the invention has particular reference to improvements on the compressing apparatus for which Letters Patent No. 237,251, dated February 1, 1881, were granted me.

The objects and advantages of the improvements and the construction and operation of the apparatus, will be hereinafter described, and its novel features will be specifically set forth in the claims.

Referring to the drawing, A A represent vertical cylinders directly communicating with each other through a horizontal cylinder, B. A piston, C, is provided for each of the vertical cylinders, and is operated by a piston-rod, C', both of which in this instance are connected by links D and a walking-beam, E, so that, by the operation of said beam by any suitable motor, alternate reciprocations of the piston-rods and pistons are produced in the cylinders A. The cap C^2 of each cylinder is provided with valves F F', the former opening upwardly and held to its seat by a suitable spring, F^2, and the latter opening downwardly and held to its seat by a suitable spring, F^2, a bracket, F^3, being arranged in connection with the stem of each valve, and the springs arranged above and below the brackets to produce the desired action on the valves in each case. A casing, G, is fitted upon the cap C^2, and is divided into two compartments, into one of which the compression-pipe H is fitted, and into the other of which the suction-pipe I is fitted, so that the valve F has communication with the compression-pipe and the valve F' with the suction-pipe. The compression-pipe of each cylinder communicates with a trap-cylinder, J, which is provided with a glass gage, J', and with an outlet-pipe, J^2, having a suitable stop-cock and communicating with the horizontal cylinder B.

At the upper end of the trap-cylinder J is an outlet compression-pipe, K, which communicates with any ordinary condenser or receiver in which the compressed gas is allowed to diffuse and take up the caloric of liquid or liquids therein or in contact therewith, as is is usual in ice-making apparatuses.

Within the cylinders A B is placed a suitable amount of any liquid which has a low capacity for absorbing the gases used in the apparatus—such as glycerine, crude or refined petroleum or oil; but common petroleum lubricating-oil is preferred when ammonia-gas is employed, on account of its cheapness and efficiency for the purpose herein described, and on account of its capability of lubricating the moving parts of the apparatus with which it comes in contact.

The quantity of liquid placed in the cylinders is such that one or the other of the vertical cylinders shall be full below its piston, and the other empty above its piston at the end of the strokes of said pistons. By this construction and use of the liquids within the cylinders accurately-fitted pistons are not required, as any of the liquid which may be carried above the piston-heads acts to "liquid seal" the valves.

The operation of the apparatus is substantially as follows: At the downward stroke of the piston in one of the vertical cylinders the suction-valve is opened and the gas is drawn through the pipe I into the cylinder, while in the opposite cylinder the suction-valve is firmly closed and the compression-valve is opened, and the gas previously drawn within said cylinder is forced through the compression-pipe H of that cylinder into the trap-cylinder J, and in case any of the liquid or oil is carried therein it is added to a quantity intentionally retained therein to fill the same to a point about equal in height to the cylinder-caps C^2. The cock in the pipe J^2 being opened a pressure is exerted on the liquid or oil from the gas forced into the trap J equal to the pressure upon the gas above the piston at the time of its stroke; hence, the areas in the cylinders A being equal, there is no pressure to be overcome on account of the liquids in

the cylinders. The compressed gas is conducted from the trap-cylinder through the pipe K to the condenser, as hereinbefore described. Upon the next stroke or the return-stroke of the piston the suction-valve is operated and a quantity of gas is drawn into the cylinder to be again compressed, and the operation is repeated.

In this apparatus the cylinders are straight instead of contracted at their upper ends, as in my previous invention, and the pressure and suction valves are both arranged directly at the cylinder-head, whereby the compressed gas is forced directly into the trap-cylinder, and there is not, as in my previous invention, a space between the liquid (or its equivalent, the piston) and the suction-valve, which is filled with compressed gas, that actually is not used for any practicable purpose.

It is apparent that the pistons and valves are arranged in such close proximity to each other that no vacant or idle space exists in the means employed for compressing the gases, and hence all the gas that is compressed serves the desired purpose.

I do not limit my invention in this particular instance to the employment of a walking-beam to operate the piston-rods, but I may substitute therefor a rotating shaft with oppositely-arranged cranks, or I may use any well-known motor mechanism.

The cylinders and adjacent parts are jacketed to keep the contents cool, as is customary in this class of apparatus.

Having described my invention and its operation, what I claim is—

1. In a refrigerating apparatus, a horizontal cylinder and two vertical cylinders directly communicating therewith and provided with pistons and with suction and compression valves arranged within the area of the cylinders, in combination with the compression and suction pipes, substantially as specified.

2. In a refrigerating apparatus, the combination of a trap-cylinder communicating with a horizontal cylinder which unites two vertical piston-cylinders, said piston-cylinders having suction and compression valves arranged at their upper ends in a cap having separate communications with suction-pipes with compression-pipes communicating with said trap-cylinder, substantially as specified.

3. The combination of the vertical cylinders A, the horizontal cylinder B, the pistons C, the caps C^2, provided with the valves F F', and the separate compression and suction pipes H I, substantially as shown and described.

4. The combination of the cylinder A, the cap C^2, the valves F F', the casing G, having a separate compartment for each of said valves, and the pipes H I, substantially as shown and described.

5. The combination of the walking-beam E, links D, piston-rods C', cylinders A, A, B, and J, the valves F F', and the pipes H, I, J^2, and K, substantially as shown and described.

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

ALEXANDER CONACHER.

Witnesses:
ERASTUS REED,
BENJAMIN ANDREWS.