

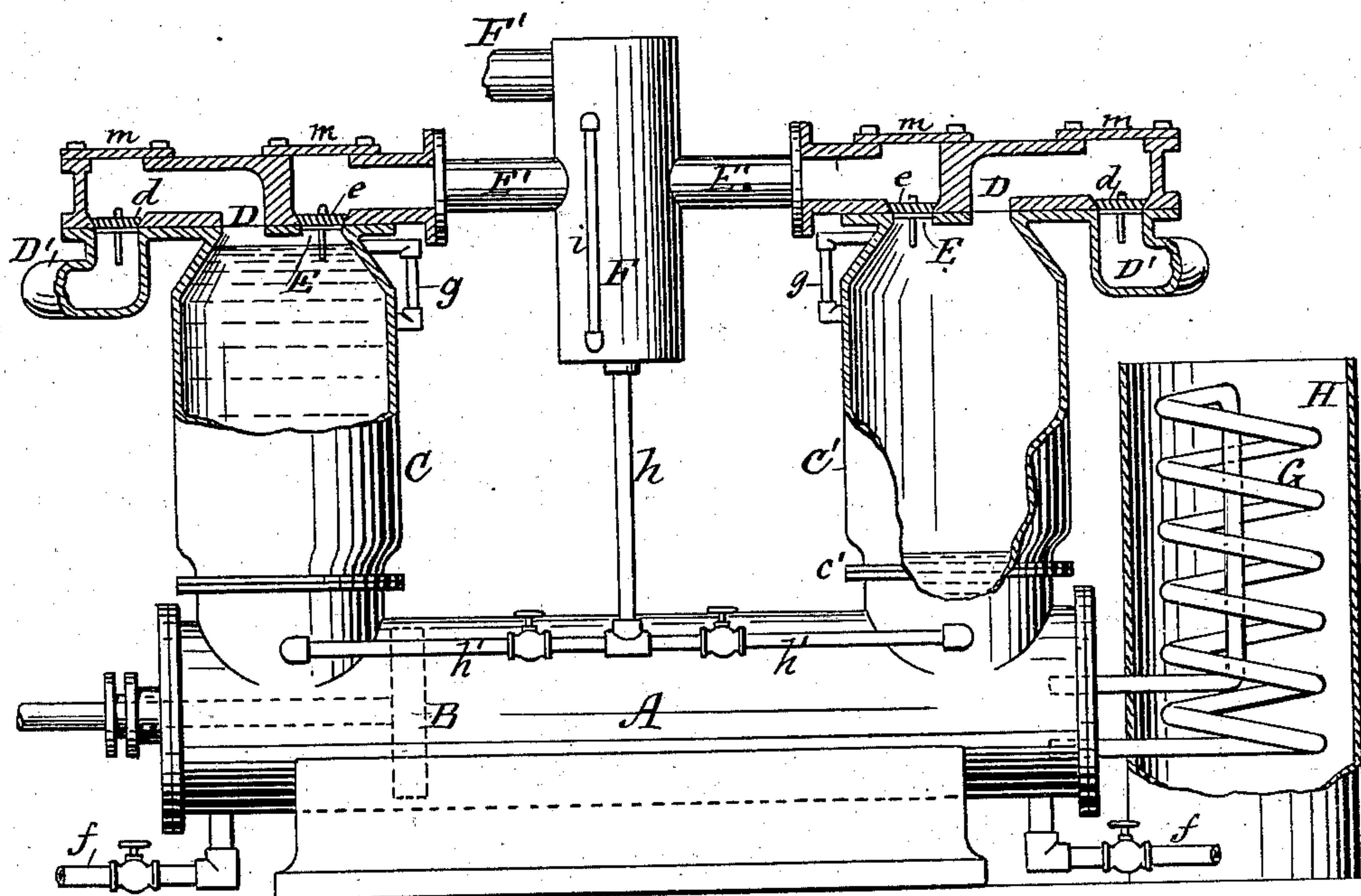
(No Model.)

A. CONACHER.  
Refrigerating Apparatus.

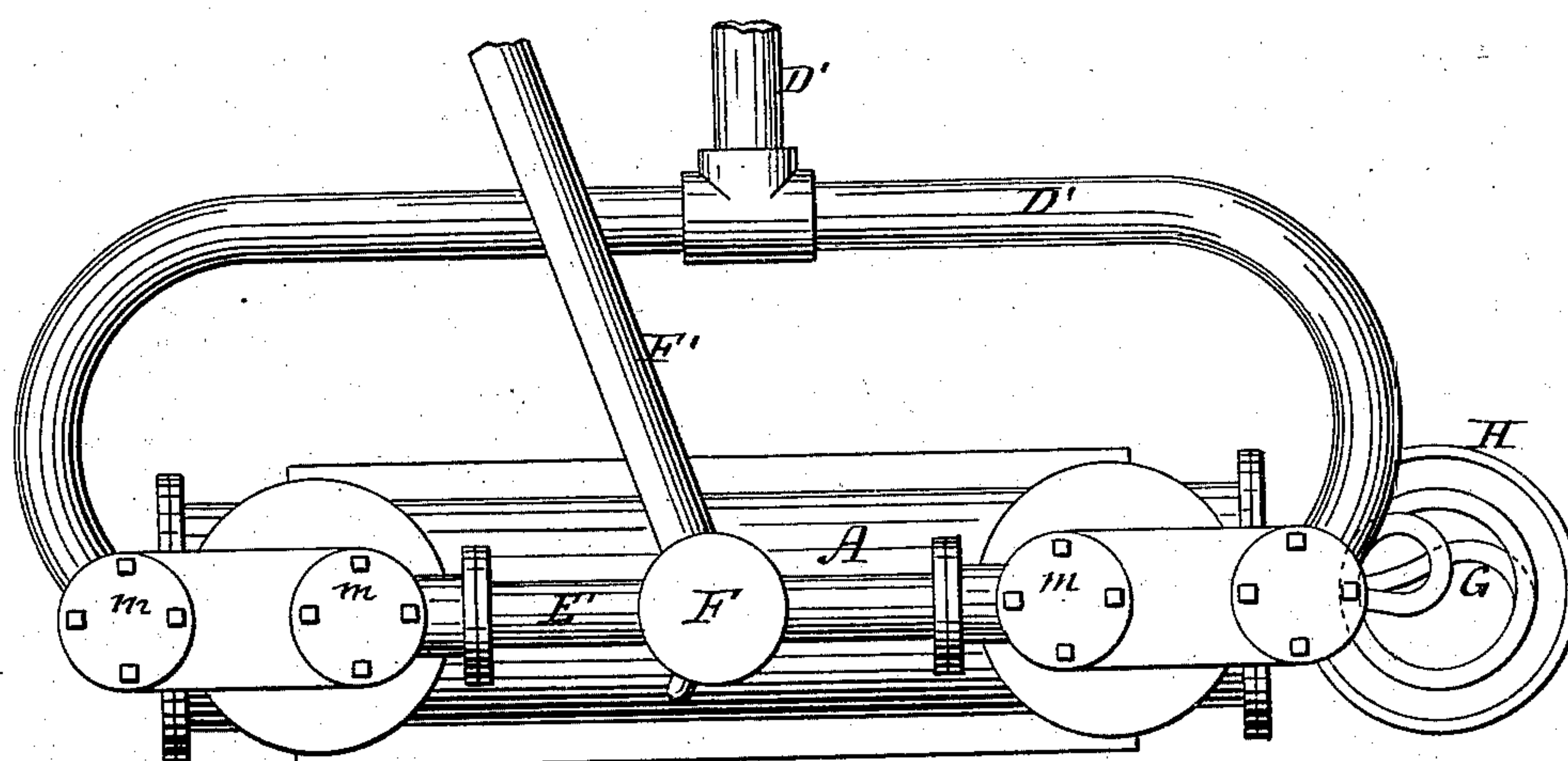
**No. 237,251.**

**Patented Feb. 1, 1881.**

Fig. 1.



*Fig. 2.*



Witnesses:  
W. B. Masson.  
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# UNITED STATES PATENT OFFICE.

ALEXANDER CONACHER, OF AUGUSTA, GEORGIA.

## REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 237,251, dated February 1, 1881.

Application filed January 3, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER CONACHER, of Augusta, in the county of Richmond and State of Georgia, have invented certain new and useful Improvements in Refrigerating Apparatus, of which the following is a specification.

My invention relates to that class of refrigerating apparatus or ice-making machinery in which ammonia-gas, anhydrous sulphurous acid, or other similar gas is the freezing agent, said gas being compressed by means of a pump, cooled, and directed into a refrigerating-vessel, in which it is allowed to expand, and thus absorb the caloric of the contents of said vessel.

My invention is particularly directed to the construction of the double-acting pump and its connections, so as to use a body of liquid in columns on each side of the piston, by which the liquid is moved back and forth, said liquid being preferably glycerine, by which means a close-fitting piston is not required, and the working of the valves is improved, and other defects which have heretofore impeded the successful operation of the machine are removed.

Heretofore the difficulty experienced in compressing various gases with air-pumps has been partly remedied by using single-acting pumps, provided with suitable valves, and having their piston pressing against water or other liquid on a lower level than the gas; but the construction and mechanical means used differ from mine, and also the results obtained.

The invention will first be described in connection with the drawings, and then pointed out in the claims.

In the accompanying drawings, Figure 1 represents, in side elevation and partly in section, the double-acting pump and its accessories used to compress and force the gas into a refrigerating-chamber and withdraw it again by suction. Fig. 2 represents a top view or plan of the same.

In said drawings, A represents the cylinder of the double-acting pump. It is longer than the course intended for the piston B, as its upper side is provided with a large opening near each end, to which are secured hollow upright columns C C', of a capacity about equal

to the cylinder A within the course traversed by the piston. The top of each column is made with two openings or passages, D and E, each provided with a valve. The passage D is what I call the "suction-pipe," as it is through this pipe that the gas is drawn into the pump by the suction of the latter. It is provided with a valve, *d*, that is raised up or opened by the suction of the pump. The passage E, I call the "pressure-pipe," as the gas compressed by the pump is forced through it to the refrigerating-chamber. It is provided with a valve, *e*, opening upward, to permit the gas, when forced by the pump or the liquid therein, to escape therefrom, and prevents its return through the same opening.

As my invention consists, mainly, in having the piston B made to act upon a liquid instead of gas, I introduce into each end of the apparatus, through the pipes *f*, such an amount of liquid that when the piston B has reached one end of its course, as shown in Fig. 1, the liquid will fill the column C up to its valve *e*, and the liquid in the column C' will come about even with its joint or flange *c'*. I have found glycerine to be a very good liquid for the purpose, as it absorbs only a small quantity of the gas and lubricates well the piston and valves. The upper end of the columns C C' is made conical to reduce its area, so that very little gas will remain therein when the glycerine within the pump-columns has reached its highest point. The upper end of each is provided with glass gage *g*, to permit the level of the liquid to be seen from the outside. The action of the piston being intended to carry the liquid back and forth up to the valve *e*, a small quantity of said liquid lubricates the valves and renders them liquid-sealed, and if any portion thereof enters either of the pipes E' it soon falls into a receiver or trap, F, from which it can be introduced, when required, into the pump through the pipes *h* and *h'*. To one side of this trap is placed a glass gage, *i*, and on the other a pipe, F', to lead the gas from either end of the pump to the refrigerating-chamber, and on its way it may be made to pass through a cooling-tank of water. After being diffused in the refrigerating-chamber it is brought back into either end of the pump through the pipe D', and passes in through



the opening closed by the valve *d*, and the operation is repeated.

To prevent the liquid in the pump cylinder and columns becoming heated, I connect with  
5 each end of the cylinder A, as shown at one end, a coiled pipe, G, inclosed in a tank, H, full of water. One end of this coiled pipe enters the cylinder above the other, so as to cause the contents of said cylinder to circulate  
10 through it and remain at a low temperature. The pump-cylinder and its columns may also, in addition, be incased in a water-jacket. Passages are also made directly above the valves *d* and *e* to permit the removal and examination of said valves, these passages being closed  
15 with tight-fitting plates *m* secured with bolts. The various pipes are, as usual, provided with cocks to regulate the flow of the liquid or gas through them.

20 To cool the pipes through which the ammonia is passing, I have them arranged in a box open at one end and at the top, so as to sprinkle them with water from a perforated pipe placed above, at the same time forcing from one end  
25 of said box a current of air upon said pipes with a blast-fan.

Having now fully described my invention, I claim—

30 1. In ice-making machinery provided with a double-acting pump and a vertical column

at each end of the pump-cylinder, the use of a body of glycerine on each side of the pump-piston to be constantly intervening between the said piston and the gas to be compressed, and to render the gas-valves liquid-sealed, substantially as described. 35

2. In a refrigerating apparatus, the combination of the horizontal cylinder of a double-acting pump with hollow vertical columns at each end thereof and two valves at the upper  
40 end of each column, substantially as and for the purpose described.

3. In a refrigerating apparatus, the combination of the horizontal cylinder of a double-acting pump, hollow vertical columns at each  
45 end thereof, and valves *e* with pipes *E'*, liquid-trap F, and pipes *h h'*, substantially as and for the purpose described.

4. In a refrigerating apparatus, the combination of the horizontal cylinder of a double-  
50 acting pump and hollow vertical columns at each end thereof, having two valves at their upper end, with coiled pipe G, having its two extremities secured to the end of the pump-cylinder, substantially as and for the purpose  
55 described.

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Witnesses:

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