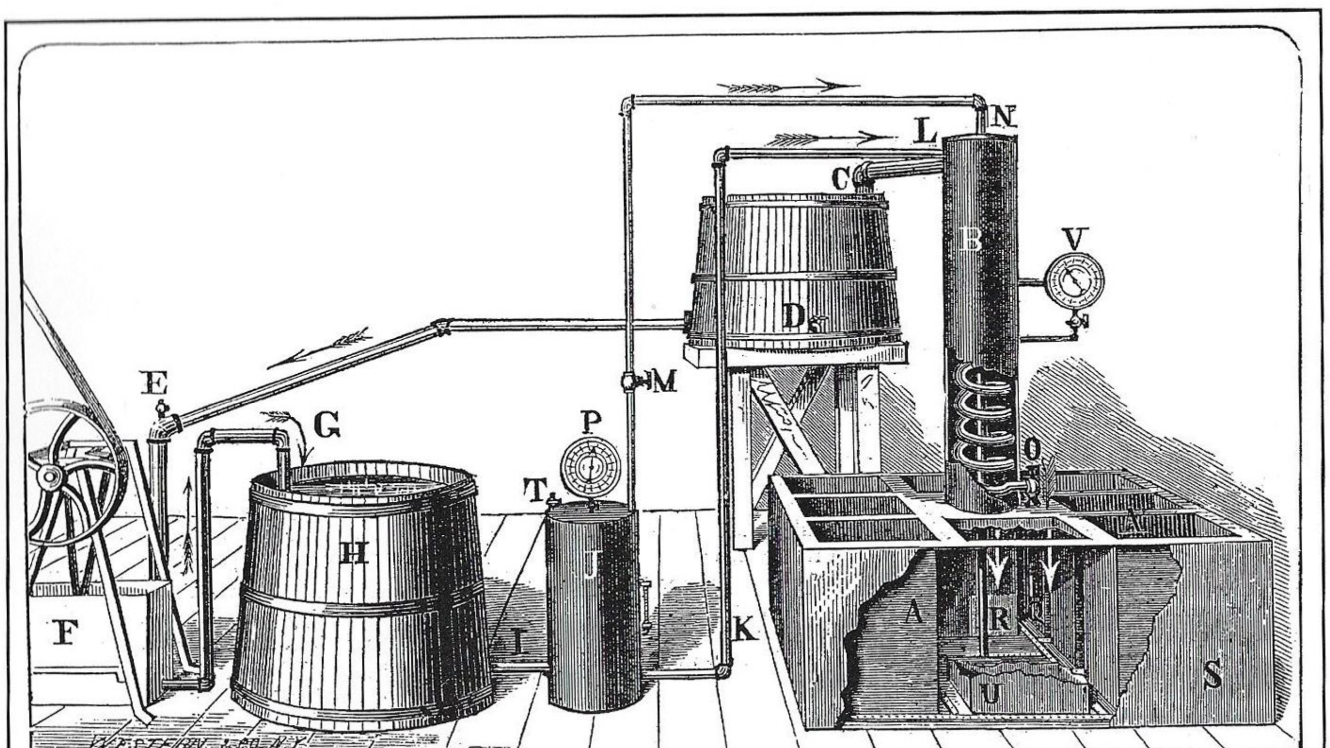
Refrigeration in American Breweries 1860-1920

Holden Refrigeration Machinery



MACHINE FOR MAKING ICE.

D L HOLDEN & BROS

Penn Iron Works, Philadelphia PA, 1878 Catalogue

D. L. HOLDEN & BROS.,

MANUFACTURERS OF

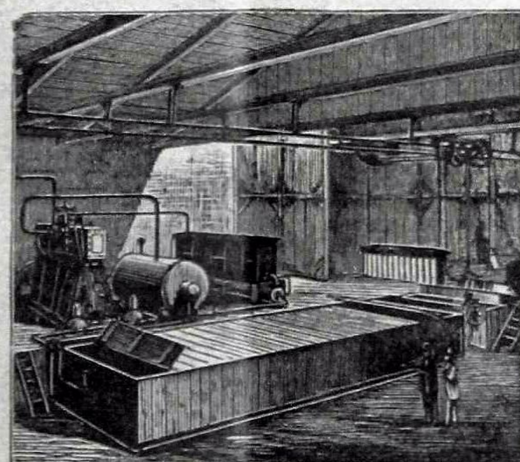
ICE MACHINES,

ALSO

REFRIGERATING MACHINES,

FOR

Breweries, Distilleries, Packeries, Fruit Houses, Steamships, &c.



PENN IRON WORKS,

BEACH AND PALMER STREETS,

P. O. Box, 1808,

PHILADELPHIA, PA. U. S. A.

D. L. HOLDEN, E. C. HOLDEN, C. M. HOLDEN.

PHILADELPHIA:
LEHMAN & BOLTON, PRINTERS.
1878.

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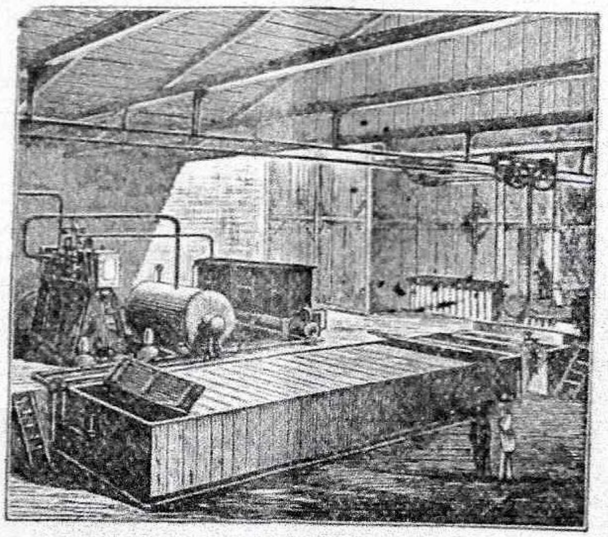

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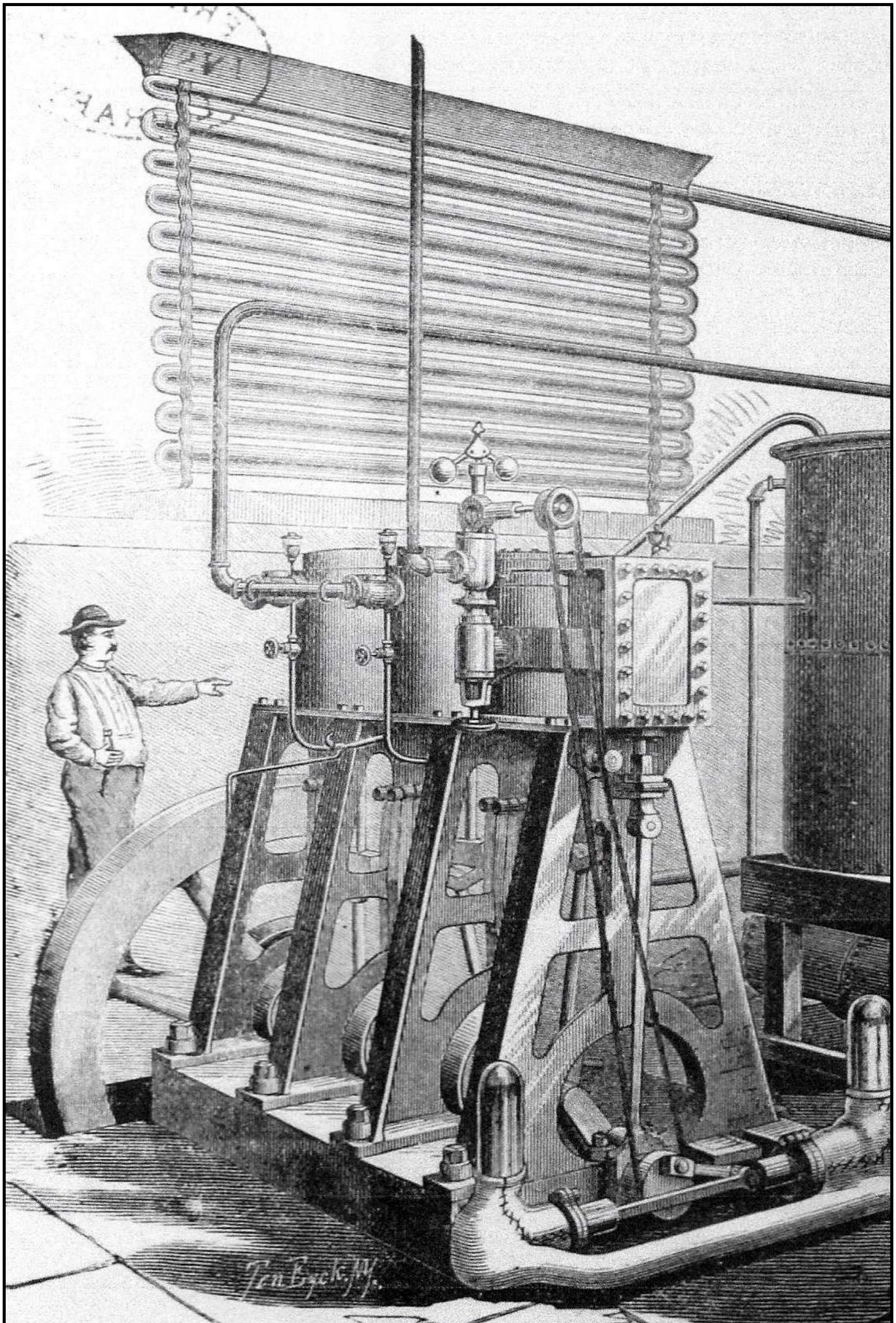

Fig. 1. is a perspective view of the Machine as used in breweries, a de

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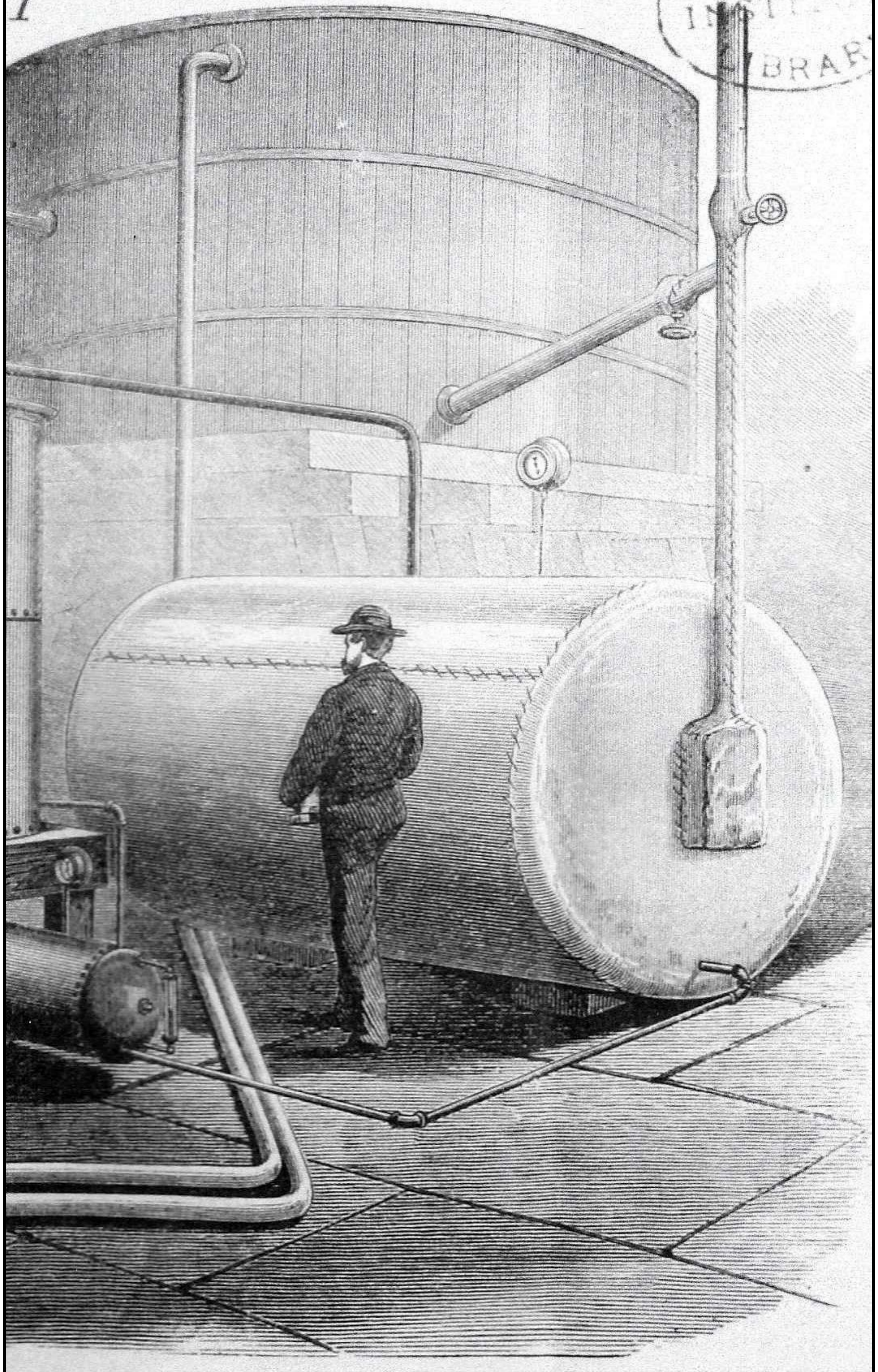
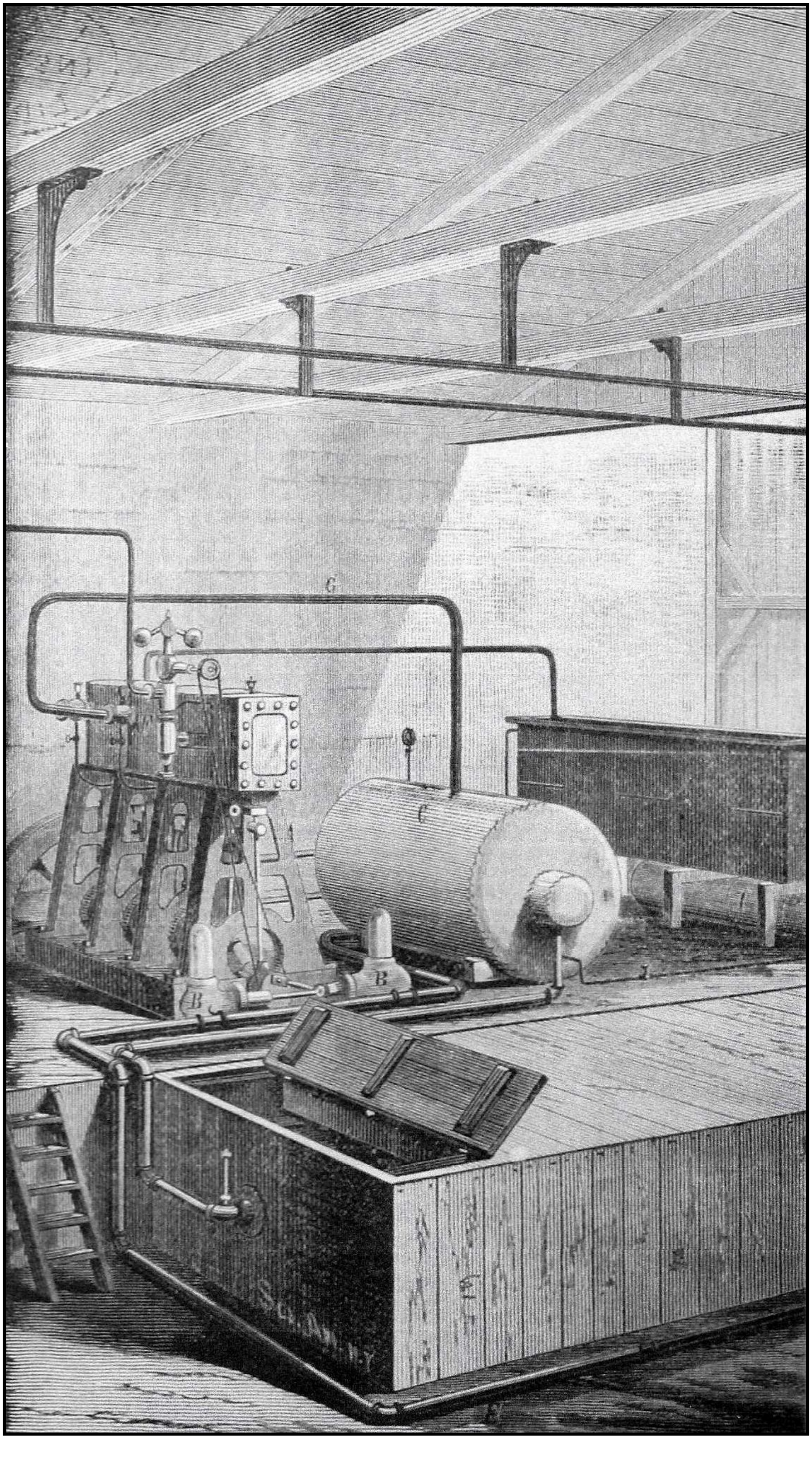


f which is embodied in the description of Pumps and Refrigerators.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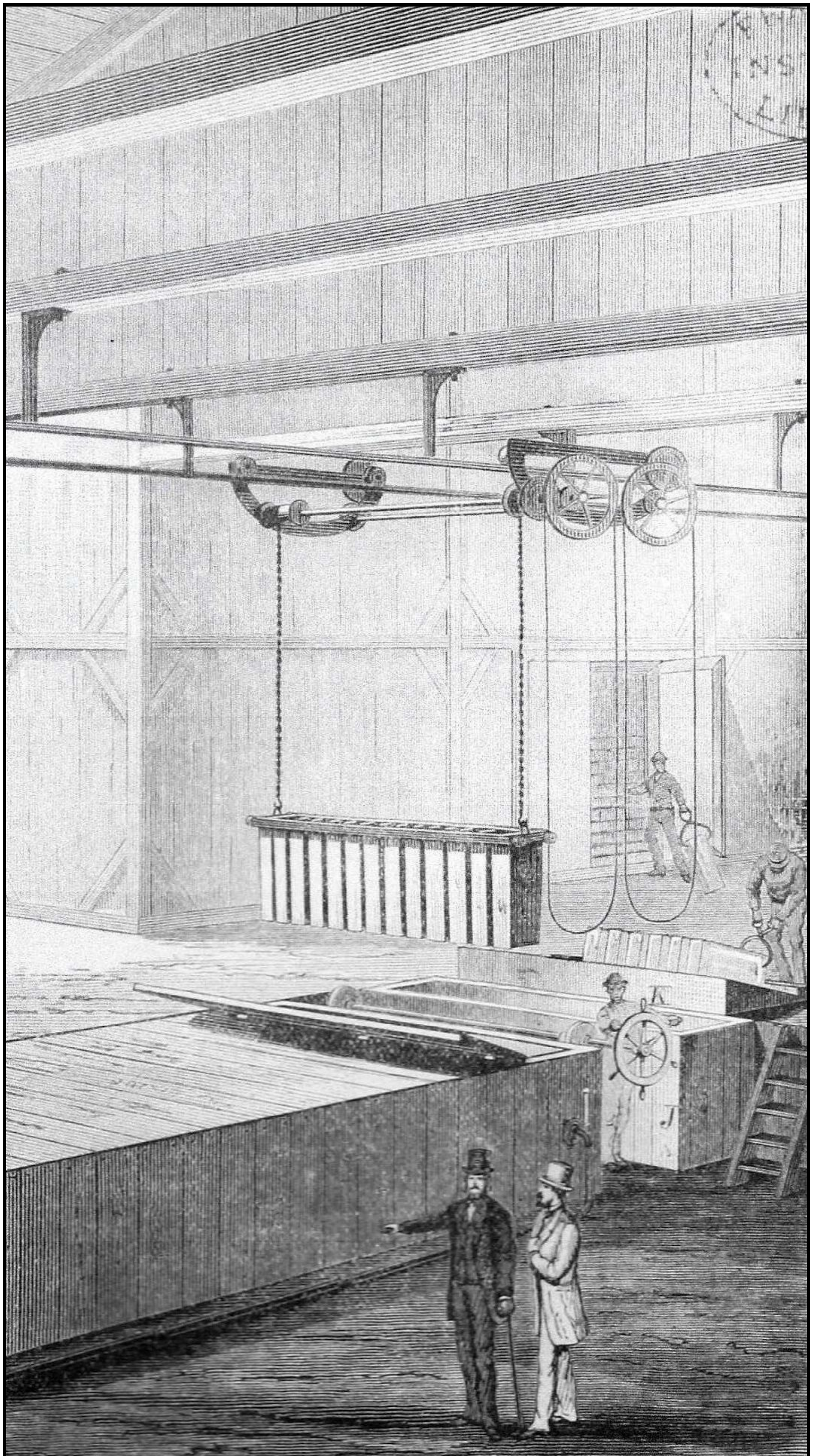

SPACE REQUIRED.

The space required to accommodate the ice producing machinery varies with the size of machine, and also with the purpose for which the machinery is intended, whether for ice making or simply refrigeration. Where buildings already exist, in which it is desired to place our machinery, we arrange the apparatus to conform to the requirements of the buildings; but where special buildings are erected for the purpose, it is best to construct them to accommodate the machinery, and when so desired, we will furnish all necessary information in regard to their construction with plans if necessary. The box in which the ice is produced, should be as thoroughly insulated as possible from the influence of the external atmosphere, which of course necessitates the use of the best non-conducting materials in the construction of its walls, for which purpose, as embodying cheapness, may be mentioned framed or hollow walls of wood, the empty space between the clap-boarding being filled with dry saw-dust. Properly used these materials answer a very good purpose. Where the machine produces ice in excess of the daily consumption, and it is desired to store the surplus, an apartment or house is necessary, which should be similar in construction to the above described box.

REFRIGERATING AGENTS.

Nearly every volatile liquid may be used as a refrigerating agent,—the use of any necessitating the construction of special machinery whereby its cooling properties may be fully utilized. The conditions imposed by the use of many volatile liquids exclude them from general use. The number of available substances is therefore limited, in which may be classed as principal, Chymogene, Ammonia, and Anhydrous Sulphurous Oxide.

Chymogene is a light hydro-carbon, a waste product of the distillation of petroleum, the boiling point of which usually ranges from 10° to 40° Fahrenheit, but which may be varied at will, by a slight modification in the mode of preparation. The vapor of Chymogene is extremely heavy, being eight times greater than that of water, and when we consider these facts along with the amount of latent heat its evaporation absorbs, we are forced to the conclusion that Chymogene is the most advantageous substance known, for use, in the production of artificial ice. Considering, that ice machines have only to do with the volume or bulk of the vapor of the refrigerating agent, regardless of its specific gravity, that is, as each stroke of the vapor pump displaces a certain volume of vapor, be it heavy or light, and as the refrigerative effect for equal volumes of different gases or vapors may be measured by the product of the latent heat, multiplied by the specific gravity, it is apparent that the heavier the vapor, the greater will be the amount of matter displaced at each stroke of the pump, and consequently, in the case of chymogene, an amount of latent heat is absorbed by its evaporation far in excess of any other known substance.

Chymogene does not, under *any* circumstances, injure the metals, has no affinity for air, water, or oils, and is in itself a lubricant. It is inflammable as are nearly all gases, and when mixed with air in the proper proportions, is explosive; but as this latter will only take place by means of mechanical admixture, as in the case of a laboratory experiment, it is apparent that any skepticism in regard to its use, is only inherent with those who envy its success as a refrigerative agent.

In relation to the explosive nature of chymogene, it is pertinent here to say, that through ignorance or negligence on the part of the person in charge of one of our machines at Hannibal, Mo., a check valve was detached from the machine, while the main valve in the pipe leading from the machine to the condenser had been left open, which pipe was filled with the vapor of chymogene under pressure of 45 lbs. As a consequence the vapor escaped into the building, filling the same, and finally found its way to the boiler room, where coming into contact with the fire, ignited and burned the building down over the machine, the vapor finally burning at the opening of the pipe from which it was discharged, while some *sixty* gallons of chymogene remained in the refrigerator undisturbed, although it was the source of the inflammable vapor. The damage to the machine was very slight, being mainly involved in the disarrangement of pipe fittings.

We submit this as a crucial test of the non-explosive nature of chymogene, and a positive refutation of the malicious libels that have found circulation at the hands of envious but feeble competitors in our line of business, whose pseudo-success is in the main founded upon misrepresentation.

In order to meet the dishonest criticisms of interested parties with reference to some of the properties of chymogene, we submit the following letter of Prof. Lyman of New York:—

New York, Feb. 19th, 1878.

D. L. Holden & Bros.,

Dear Sirs:

Yours of yesterday recd. The first time I ever saw, or heard, or thought of the idea that "Chymogene acts on greases and oils in a similar way to ether," &c, as quoted by you, was, when a few days ago, I read it in the new pamphlet of the Pictet Ice Co. of 1878, to which you refer.

It then surprised me very much, and now I am still more surprised on being informed that I am quoted as authority for that statement. I shall certainly want other authority before I believe it.

It is true that at the request of friends in Boston and this city, who, I was told were talking of buying a Pictet Ice Machine to take the place of one in Fulton that had given out, I called to see it and reported on it, advising them not to purchase it. I never knew what the trouble was with the one in Fulton, but supposed it was becaues they had no mechanic employed who properly understood it, to keep it in order; and the fact that they then had no machinery for repairing short of Galveston or N. Orleans.

Hastily, Yours Truly,

A. S. Lyman, 212 2nd Ave.

The machine above referred to has been in successful operation for over five years, during which time has only once been subject to repairs, which were of a very trivial nature.

Ammonia. For purposes of refrigeration, Ammonia may be used in any one of three states: in the form of Aqua Ammonia, as anhydrous gas, or as highly concentrated solution.

The use of Aqua Ammonia involves the command of a large and constant supply of cold water, not only for condensing the ammoniacal gas, but also to reduce the temperature of the "poor liquor" from which the gas was obtained, to such a degree, that it will reabsorb the gas preparatory to being again introduced into the retort for the purpose of revolitilization. But as ice machines are not required in climates where the temperature of the water is very low, this objection aside from the question of economy, would exclude their use in countries of torrid or even mild temperatures.

The results obtained from the use of either highly concentrated Ammoniacal liquor, or of the Anhydrous gas, have been very satisfactory in the production of artificial cold.

The mechanical means necessary to manipulate this gas, must be the most perfect, as the attendent high pressure and the penetrating nature of the gas, forbid the use of abortive apparatus. The materials used in the construction of the machine are limited to cast iron, wrought iron, and steel, all of which must be of very superior quality. Copper and brass are not available, as the great affinity of the gas for them rapidly disintegrates them. The facilities at our command render it possible to furnish the best of materials along with the best of workmanship, which, together with the superior features of the machinery, remove all obstacles in the way of fully utilizing the refrigerative properties of either the concentrated solution of ammonia, or the anhydrous gas.

Sulphurous Oxide. In the dry, anhydrous state, Sulphurous Oxide may be utilized by proper apparatus for the production of artificial cold. It has a decided tendency to take up or absorb moisture and form sulphurous acid, and in that state, has strong acid properties and readily attacks the metals with which it comes into contact. Sulphurous acid, in the presence of more moisture, shows a marked tendency to pass into the state of Sulphuric acid, the most powerful of the sulphur acids. This affinity of the sulphurous anhydride for water or moisture necessitates the use of apparatus which will exclude all contact between the oxide and the external air. With our machine we are fully prepared to meet the conditions imposed by its use. We may here state that Mr. D. L. HOLDEN has himself experimented with the oxide, some eight years ago, with reference to its use for the manufacture of ice, and is thoroughly familiar with all its properties, and is confident of furnishing apparatus which will more effectually utilize those properties than any other means in existence.

As certain interested parties claim the exclusive right to the use of Anhydrous Sulphurous oxide for the manufacture of ice, it is proper here to say that the use of the oxide for refrigerative purposes has long been known, and has been embodied in all text books on Chemistry from early times. As there is no valid patent in this country covering the exclusive right to its use, we will meet all the requirements of purchasers who desire to use the oxide, and will fully protect them in that use.

We will furnish the oxide at the rate of 40 cts. per lb.

In this machine any volatile liquid can be used as before mentioned, and the operator has the choice to take that which suits him best under the circumstances. In order to give an idea of the field open in this direction, we insert a table of substances which may be used for refrigeration, and which was compiled from the most reliable authorities, and some new data determined by P. H. Vander Weyde, M. D., of New York, who has also largely experimented in this field, and for many years, has been as well on theoretical as on experimental grounds, convinced of the final success of refrigeration by artificial means.

Name of Substance.	Boiling Point at Atmospheric Pressure in deg. Fah't.	Pressure of Vapor, in pounds per square Inch, at 68 deg. Fah't.	Spec. Gravity of Liquid at 40 deg. Water=1.	Spec. Gravity of Vapor at 40 deg. Air=1.	Latent Heat of Vapor by equal weight.	Relative Latent Heat by equal bulk of vapor.	Names of Inventors who used some of these substances.
1—Turpentine .	311	0.9	0.86	4.6	133	611	
2—Water	212	0.3 lbs.	1	0.45	990	447	Leslie, England.
3—Comm. Alcohol . . .	173	0.8	0.80	1.26	385	485	
4—Chloroform .	140	4.0	1.48	4.1			
5—Methyl Alcohol. . . .	118	0.6	0.814	1.1	390	430	
6—Bisulp. Carbon	112	2.5	1.27	2.6	210	550	Paersh, New Orleans
7—Comm. Ether	90	8.0	0.736	2.28	162	369	Siebe, England.
8—Chymogene	30 to 50	12 to 17	0.6	3.9	170	663	*Vander Weyde, N. Y.*
9—Sulpurous Oxide . . .	14	60	1.49	2.25	170		Tait, N. Y.
10—Cyanogen . .	— 4	80	0.86	1.8			
11—Mythilic Ether . . .	— 6	90		1.617	240	384	Tellier, France.
12—Ammonia . .	—30	120	0.76	0.59	900	511	Carré, France.
13—Chlorin . .	—35	150	1.3	2.47			
14—Sulph. Hydrogen . . .	—80	250	1.33	1.19			
15—Hydr. Chl. Acid. . . .	—100	450		1.26			
16—Carbon. Acid.	—112	600	0.80	1.53	300	495	Lowe, N. Y.
17—Nitrous Oxid.	—130	700		1.52	342	520	Vander Weyde, N. Y.*
18—Air	15,000 lbs. pressure per square inch does not liquify it.						Kirk, England.

* Applied for Patent, 1864, but withdrawn and abandoned.

It is seen from this table that the liquids No. 1–6 have rather high boiling points, involving little cooling effect, while 15–17 have very low boiling points, involving strong cooling, but on the other side requiring immense pressure to condense them, hence all attempts to