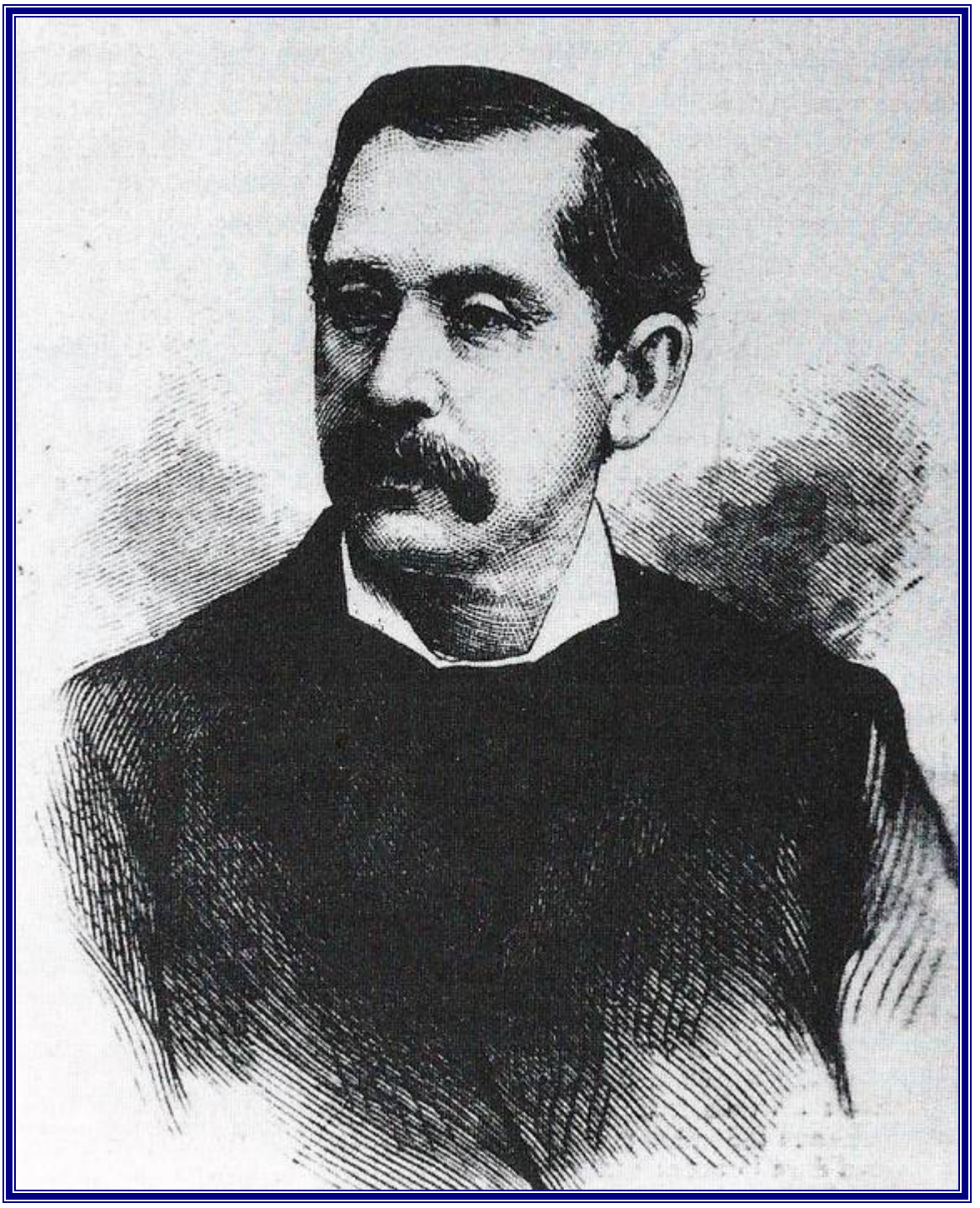
DANIEL L HOLDEN

By EurIng Brian Roberts, CIBSE Heritage Group



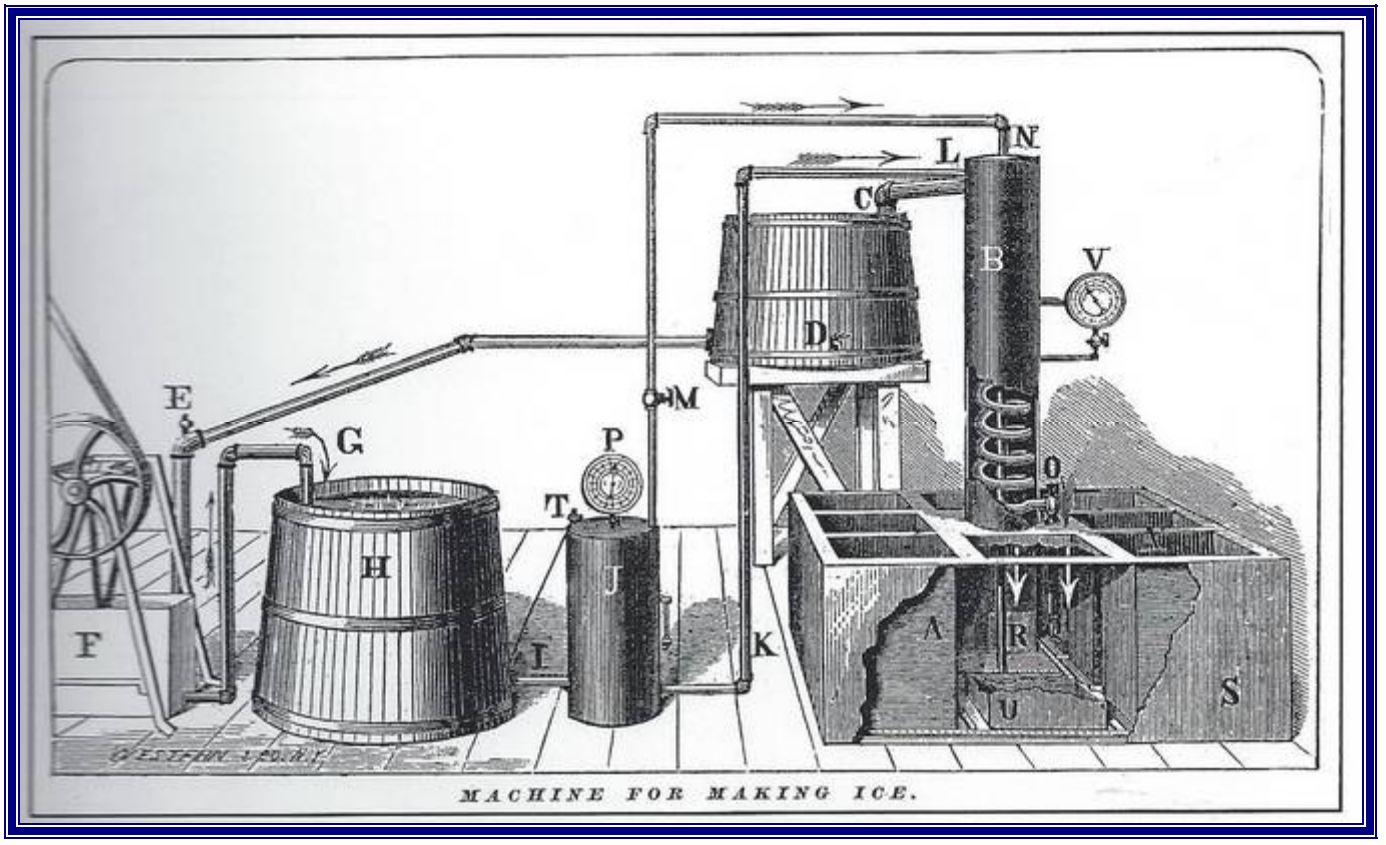
Daniel Livingstone Holden, 1837-1924

The first Carre machine on the American Continent was set up at Matamoros in Mexico, where it operated for a short time before being moved to Texas. In 1863, Bujas and Girardey of New Orleans managed to smuggle another Carre machine through the Union blockade. It was erected and operated in a convalescent hospital in Augusta, Florida, by Girardey, producing artificial ice since the Union had cut off supplies of natural ice from the north. The same year, a further three Carre machines were brought through the blockade. However, the fuel-fired generators caused considerable operating difficulties.

Daniel Holden was born at Higginsport, Kentucky in 1837. During the American Civil War he served as a Major in the Confederacy Army and in 1865 he purchased one of these Carre units and in 1866 put it to work in San Antonio making commercial ice when he and his brother Eldridge set up an ice making plant, producing 1.5 tons of ice per day in San Antonio. They also experienced problems with the fuel-fired generator and found that the San Antonio water produced an off-colour ice. Holden's first modification was to place steam coils in the generator to heat the aqua-ammonia, while his second idea was to produce ice from distilled water. He placed the Carre machines on a sound commercial footing, and so quickly did these changes bring about public acceptance of machine-made ice, that Bujas and Girardey announced that Holden's work was "the development that made possible the introduction of Carre machines as large units."

In 1869, took out his US Patent No. 95347. This used a compressor with chimogene refrigerant and by the end of that year there were five of his compressors in use in the Southern States. From 1871 to 1875, Holden and his brother equipped the large G W Fulton Texas abattoir with a refrigerating system. In 1877, he took out his US Patent No. 190036 on a special freezing machine called the *Regealed Ice Machine*, a combination of the absorption and compression ammonia systems, which produced ice in flakes and afterwards pressed into blocks. This machine was manufactured in Philadelphia for some years.

Daniel Livingstone Holden died in 1924.



Ice-making plant erected by Holden at New Orleans in 1869 using chimogene as the refrigerant

D. L. Holden.

Ice Machine.

No. 95347. Fig. 1 Patented Sept. 28. 1869.

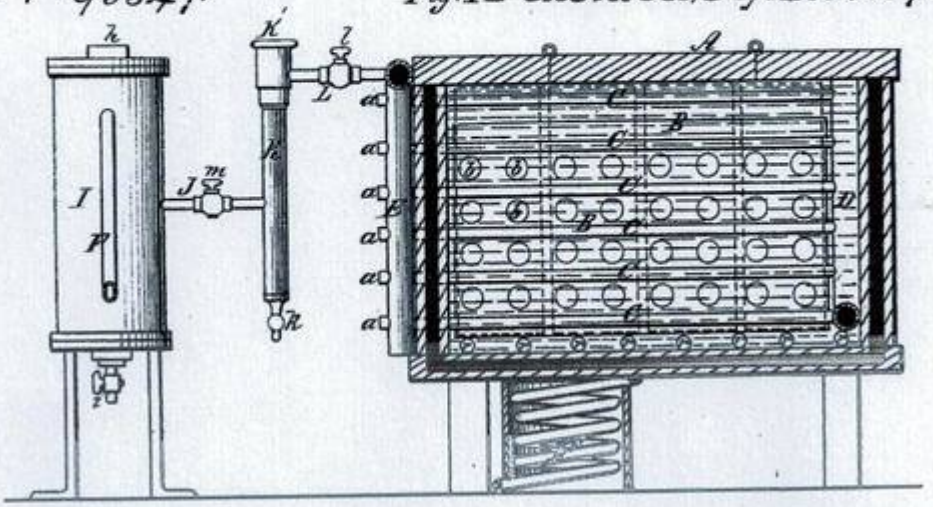


Fig. 2

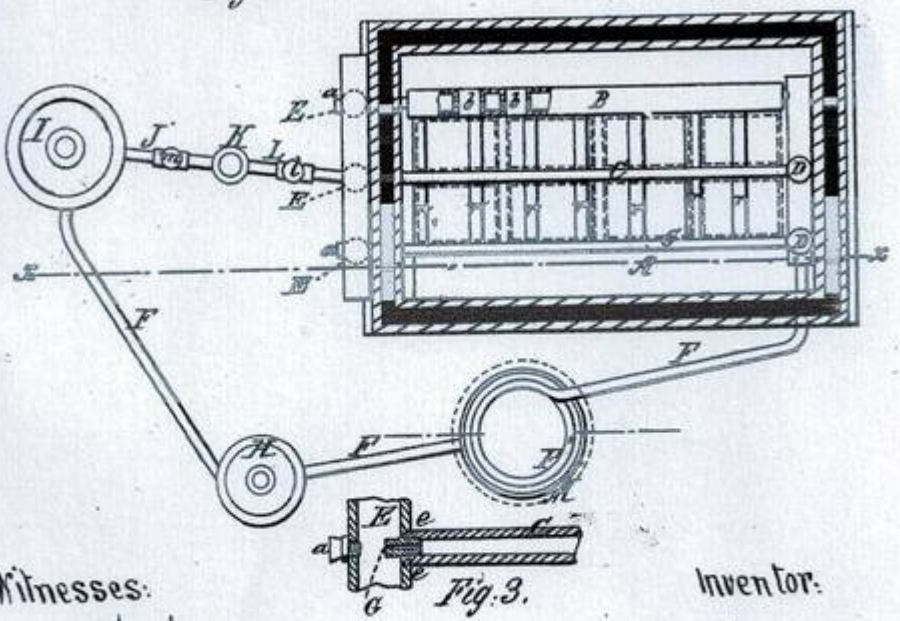


Fig. 3.

Witnesses:

Nathan W. Ellsworth

Chas. A. Pettit

Inventor:

D. L. Holden.

by Munn & Co

Attorneys.

UNITED STATES PATENT OFFICE.

D. L. HOLDEN, OF NEW ORLEANS, LOUISIANA.

IMPROVEMENT IN ICE-MACHINES.

Specification forming part of Letters Patent No. **95,347**, dated September 28, 1869.

To all whom it may concern:

Be it known that I, D. L. HOLDEN, of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Ice-Machine; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal vertical section through line *x x* of Fig. 2. Fig. 2 is a top view. Fig. 3 is a detached sectional view of one of the sprayers.

This invention relates to that class of ice-machines in which chimogene, gasoline, rhigoline, and other kindred substances are sprayed into a freezing-chamber or into freezing-pipes; and consists in a new and improved construction of the spraying apparatus, whereby its cleaning and repairing are greatly facilitated, together with a new apparatus for purifying the gasoline, &c., during the process, and a new and improved arrangement and combination of all the parts, whereby the whole is greatly simplified, and its cost and expense of running reduced, while its effectiveness is increased.

In the drawings, A is the freezing-cistern, in which the pans or vessels of water to be frozen are arranged. In this cistern is a series of hollow boxes or shells, B B, into the interior of which the gasoline, &c., is sprayed, and which conduct the cold thereby produced to the salt water or other incongealable liquid with which the cistern is filled, and, by means of the same, to the water-vessels. The shells may be provided with a great number of short tubes, *b b*, extending laterally through them, for the purpose of exposing as large a surface as possible to the contact of the salt water. Instead of the series of shells, a series of pipes, C C, may be employed, arranged in vertical sections or rows, and all the pipes of each section being connected with a vertical discharge-pipe, D, at one end, and a vertical supply-pipe, E, at the other.

The volatile fluid or vapor is injected into the shell B or tubes C C from the pipe E, through a small "sprayer," G, Fig. 3. It immediately expands in the cavity of the shell or tubes, producing thereby an intense cold. At the opposite end of the shell or tubes, as the case may be, and in the pipe D, the vapor again becomes condensed, and, assuming the liquid form, passes off through the pipe F to the pump H, by which it is forced into the reservoir I. From the reservoir it is conducted by means of a pipe, J, to the well-tube K, and thence, through a pipe, L, to the supply-pipe E, having thus made the circuit of the entire apparatus.

When the condensed gasoline or other substance first escapes from the freezing apparatus it is still intensely cold, and I therefore make use of it at this point, through the instrumentality of a cooling-vessel, M, conducting it through said cooler in a coil, F, to reduce to a very low temperature the water that is to be frozen before it is put into the pans and set into the freezing-cistern.

The function of the pump H is to exhaust the liquor from the freezing apparatus and force it (by atmospheric or other pressure) to the reservoir. The latter is provided with a cock, *i*, at the bottom, through which any water that might be intermingled with the lighter fluid could be drawn off after it had settled to the bottom of the reservoir. The reservoir is also provided with a screw-cap or cover, *h*, suitably packed, through which to introduce the gasoline before starting the apparatus.

The pipe J is provided with a cock, *m*, which is not to be opened till, by the action of the pump, a suitable pressure is exerted upon the liquid in the reservoir to force it with great violence through the sprayers into the freezing chambers or pipes.

The function of the well-tube K is to cleanse and purify the liquid. To this end it is placed in a vertical position, and the pipe J is introduced into it at a point somewhere near its center, in order that water and other impurities may have a free space below the moving currents into which they may settle and rest undisturbed. At its lower end it is provided with a cock, *k*, by which to draw off such impurities when necessary. It is also provided with a strainer, *n*, across its upper end, just below the entrance to pipe L, to prevent any impurities from entering said pipe. It may also have a screw-cap, K′, which can be removed in order to take out and cleanse

the strainer, &c. The pipe L may have a cock, *l*, between the well-tube and the supply-pipe E.

I construct the "sprayers" in the following manner:

First, the tubes C C, or the short tubular passages into the freezing-chambers B B, are screwed into the wall of pipe E, as shown in Fig. 3, at *e*. The inner wall of said tubes C C, or tubular connections, is cut into a female screw, and the sprayer G—a short tube having a minute passage through it—is screwed into the end of the pipe C, or connecting-pipe, as clearly shown in Fig. 3. Opposite the end of the pipes C C an opening is cut through the wall of pipe E large enough to admit of the introduction of the sprayer through it. This opening, when the machine is in operation, is closed by a screw-plug, *a*. Both the outer end of the screw-plugs and the end of the sprayers that is not in the pipes C C are so formed that by means of a key (resembling a watch-key) they can be inserted and screwed tightly into place, or unscrewed and removed, as occasion may require.

I claim in this part of my invention a particular and important advantage over every apparatus heretofore constructed for a similar purpose, in that, by simply removing the plugs *a a*, or any of them, any one or all of the sprayers G G may be removed and cleaned or repaired without in any manner interfering with or disturbing the other parts of the machine.

Instead of screwing the end of the horizontal pipes into the vertical tube E, the latter may be cast with projecting flanges or short tubular arms upon its side, over or into which the ends of the horizontal pipes can be screwed, bolted, or otherwise firmly secured, the sprayers screwing into the ends of the horizontal pipes, as above described; or, if preferred, screwing through the wall of tube E, so that their inner end shall project into the cavity of pipes C C. Any other suitable connection of these parts may be employed that will admit, on the one hand, of the convenient attachment of the pipes C C, E, and D, and their separation, and, on the other, will admit of introducing and removing the sprayers in the manner above described.

The method of operating this machine is very simple and convenient. The water to be frozen is placed in vessels of suitable shape and material, which are then set into the salt water between the vertical series of chambers B B or horizontal pipes C C. Of course the water-vessels nearest the sprayers are subjected to the greatest degree of cold, and the water in them is frozen before the water in the vessels at the other end of the freezing-cistern. As fast as such vessels thus have their contents congealed they are removed, and the whole series of vessels in that row are pushed along, leaving an empty space next to pipe D, into which a fresh vessel (just filled from cooler M) is set, and this process is continued as long as the machine is in operation. The freezing-cistern may be provided with rollers *r r*, Figs. 1 and 2, to facilitate the moving of the cups or water-vessels into the place of those that have been thus taken out.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The well K, provided with a space below the inlet-pipe J, having a cock, K, through which to draw off the impurities, and also provided with a strainer between the ends of pipes J and L, when arranged in an ice-machine to operate in the manner and for the purpose specified.

2. The arrangement of the sprayers G, in connection with the plugs *a a*, pipe E, and tubes C C, or tubular connections with the chambers B B, substantially as shown and described.

D. L. HOLDEN.

Witnesses:
N. K. ELLSWORTH,
CHAS. A. PETTIT.

2 Sheets—Sheet 2.

D. L. HOLDEN.

APPARATUS FOR MANUFACTURE OF ICE.

No. 101,876. Patented Apr. 12, 1870.

Fig. 3.

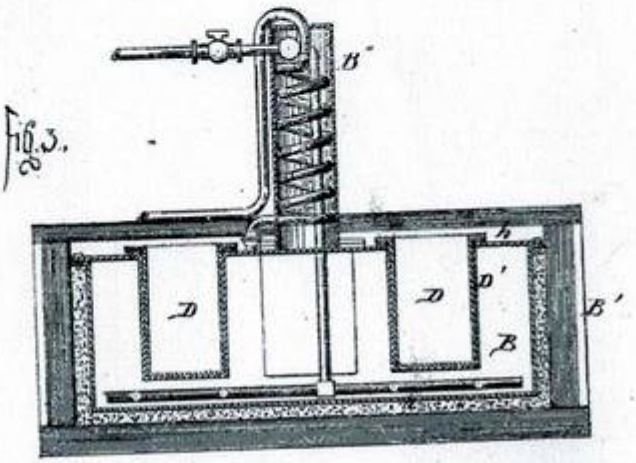
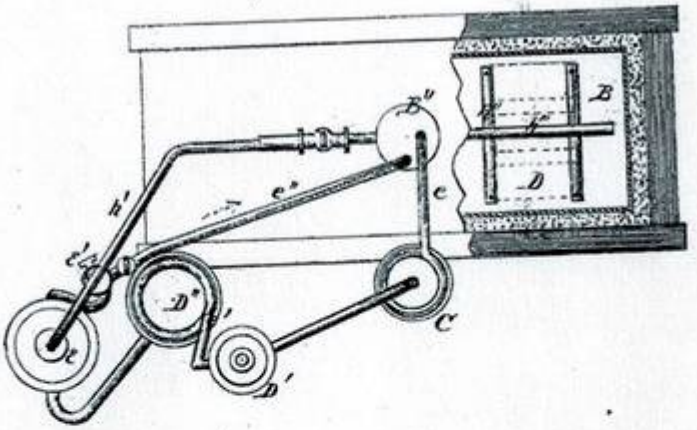


Fig. 4.



Witnesses:

Victor Hagmann

Chas. A. Pellet

Inventor:

D. L. Holden

per Munn & Co

Attorneys.

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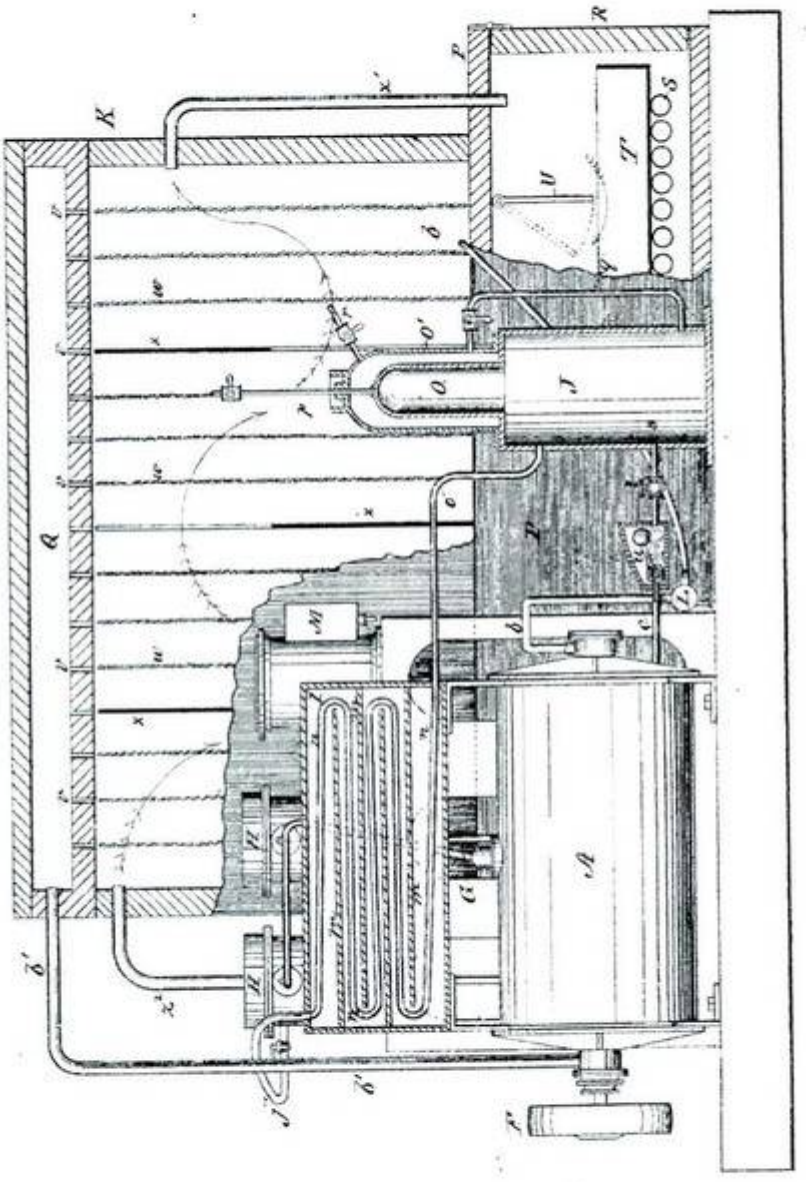
D. L. HOLDEN.

ICE-MACHINE.

No. 190,036. Patented April 24, 1877.

Fig. 1.



WITNESSES:

W. W. Hollingsworth

Edw. W. Byrn

INVENTOR:

D. L. Holden.

BY Munn & Co

ATTORNEYS.

4 Sheets—Sheet 2.

D. L. HOLDEN.

ICE-MACHINE.

No. 190,036. Patented April 24, 1877.

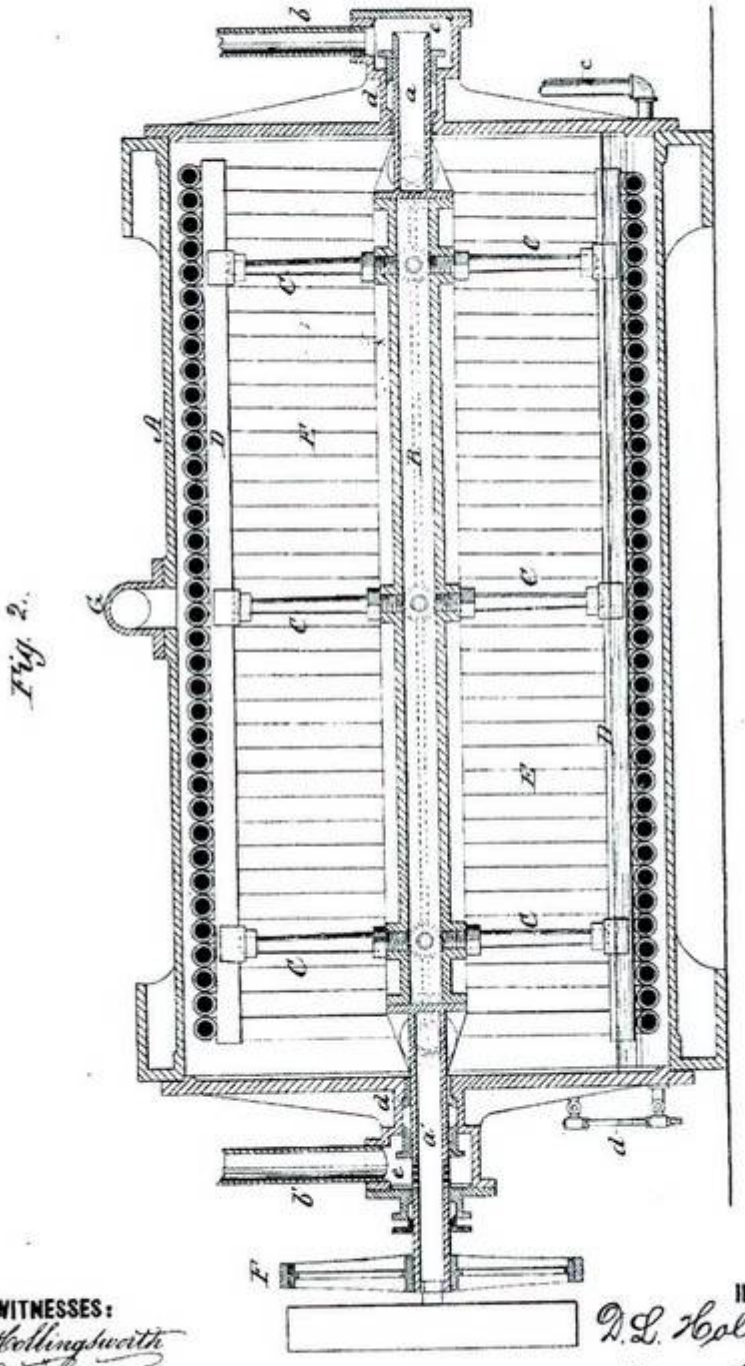


Fig. 2.

WITNESSES:

W. W. Hollingsworth

Edw. W. Byrn

INVENTOR:

D. L. Holden

BY Munn & Co.

ATTORNEYS.

D. L. HOLDEN.

Method and Apparatus for Producing Ice.

No. 205,643. Patented July 2, 1878.

Fig. 1.

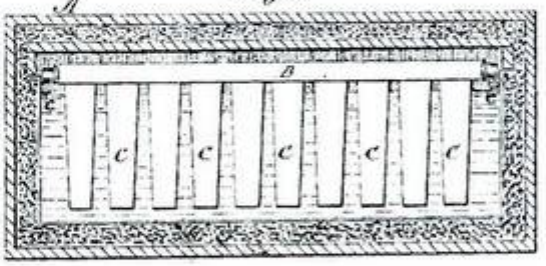
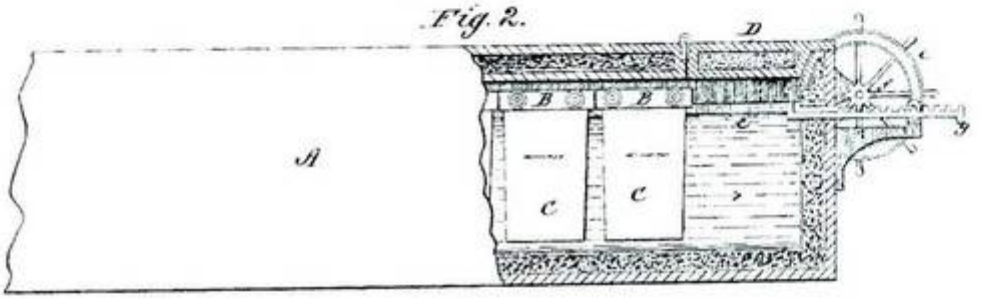


Fig. 2.



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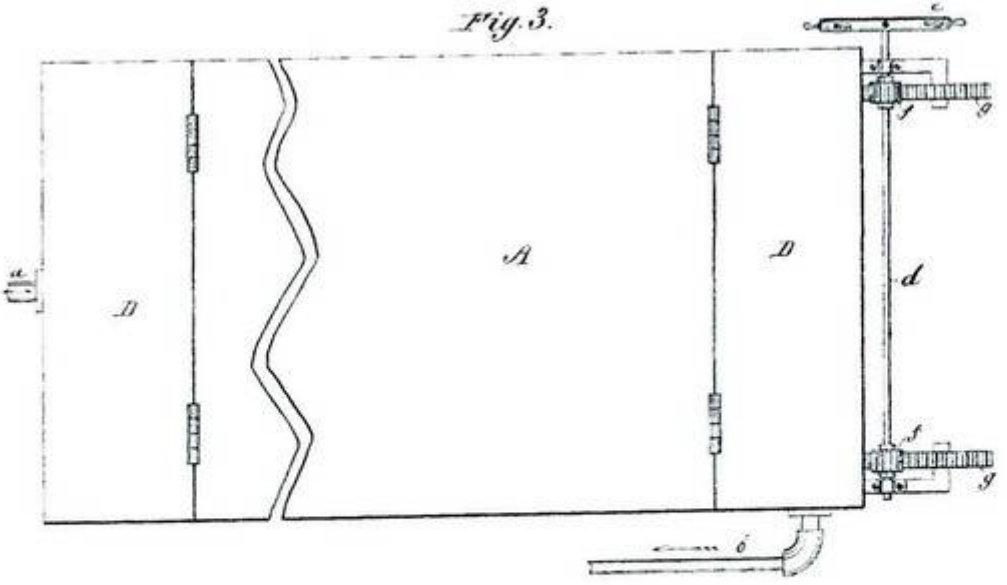


WITNESSES:

W. W. Hollingsworth

Edw. M. Byrn

INVENTOR:

D. L. Holden

BY Munn & Co

ATTORNEYS.

D. L. HOLDEN

Apparatus for Making Ice.

No. 207,278. Patented Aug. 20, 1878.

Fig. 1.

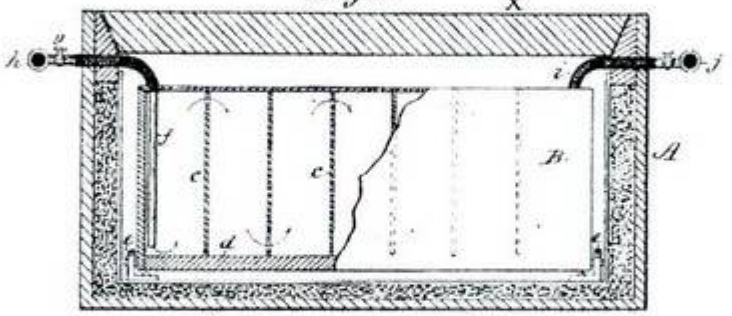
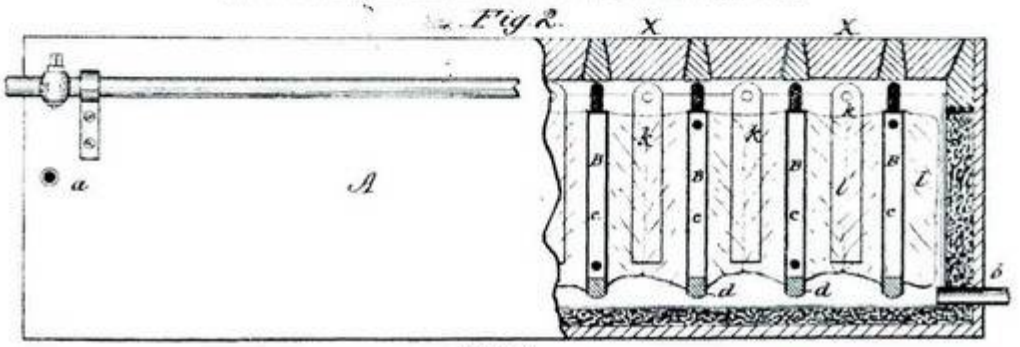


Fig 2.



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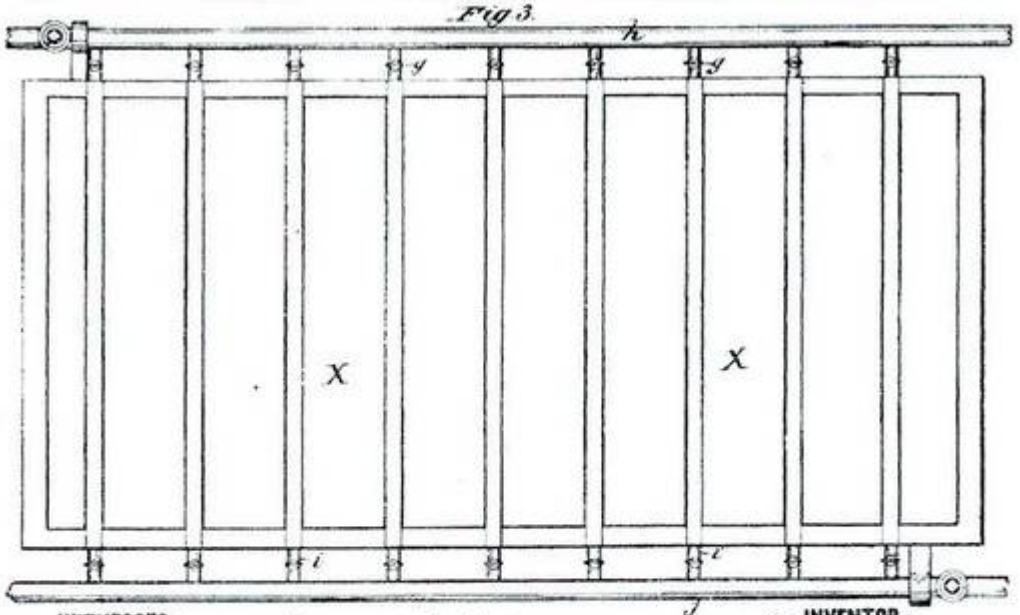


WITNESSES:

W. H. Hollingsworth

Edw. W. Byrn

Fig. 4.

INVENTOR:

D. L. Holden

BY

Munn & Co

ATTORNEYS.

THE REGEALED ICE MACHINE,

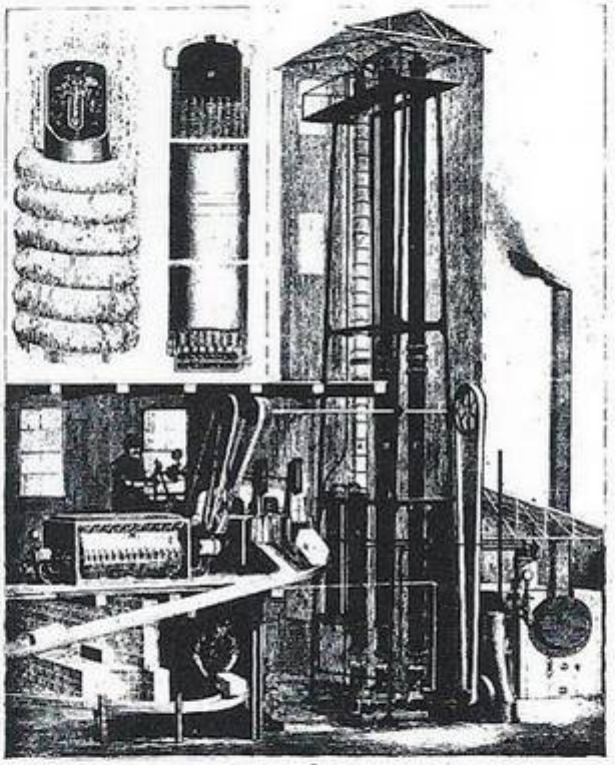
MANUFACTURED SOLELY BY

D. L. HOLDEN,

1336 Beach St., PHILADELPHIA, PA.

Makes Ice at 50 Cents a Ton.

THE FRUIT OF THIRTY-FIVE YEARS OF EXPERIENCE.



THE HOLDEN SYSTEM OF ICE MANUFACTURE.

AN ABSOLUTELY NEW WAY OF MANUFACTURING ICE.

A COMBINATION OF THE COMPRESSION and ABSORPTION AMMONIA SYSTEMS.

Description of Machine as Shown in Cut.—A, the Still; B, Absorber; C, Condenser; D, Section of Still, showing Steam Pipes; E, 1-inch Steam Pipe; H, Interchanger; K, Cooler; W, Wire Coil; e, Internal ¼-inch Pipe; a, b, c, Receivers; F, Freezing Cylinder; T, Compression Pump; M, Screw Conveyor; Hydraulic Presses to the right.

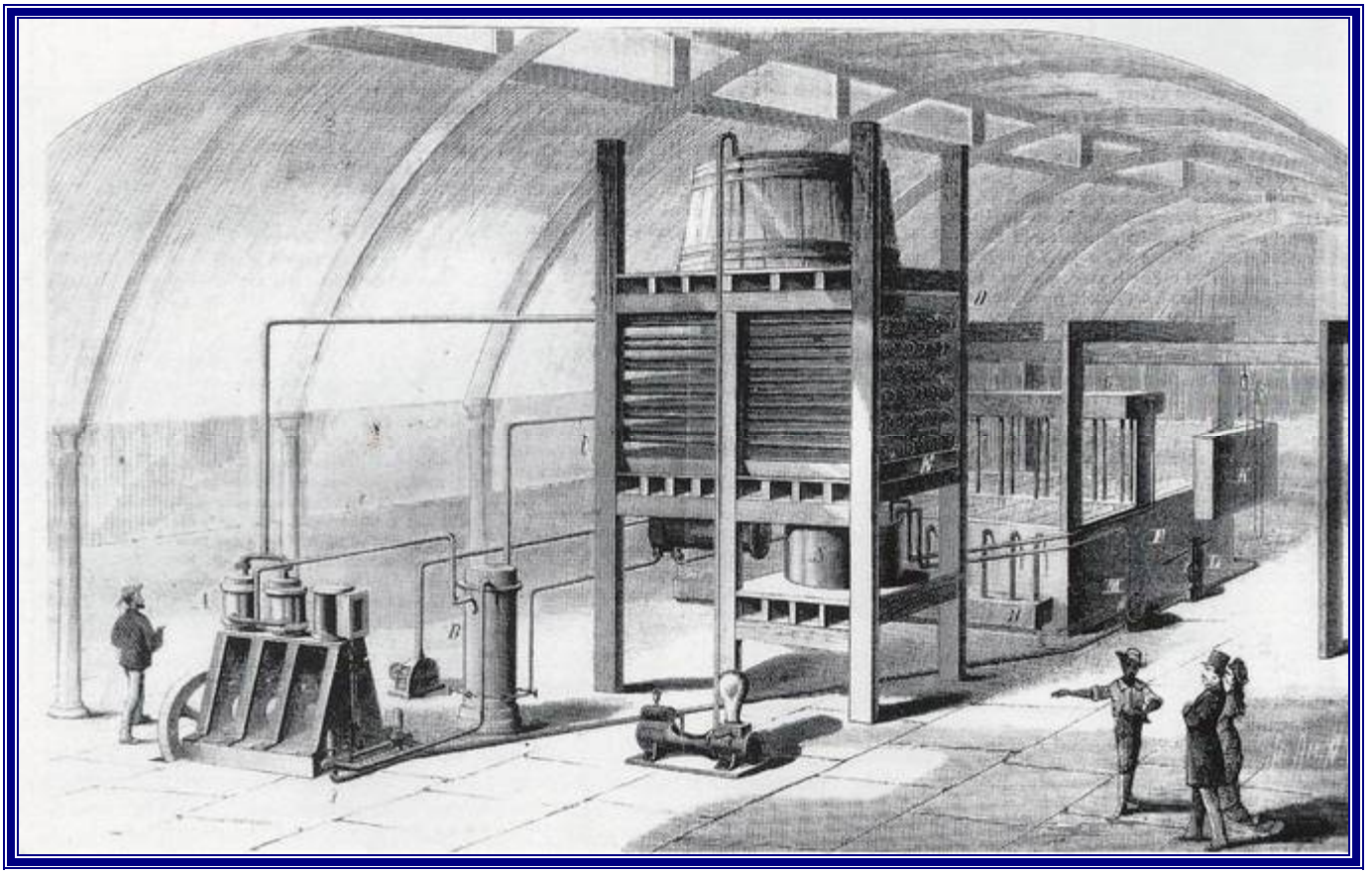
D. L. HOLDEN, 1336 Beach St., Philadelphia, Pa.,

SOLE MANUFACTURER OF THE

REGEALED ICE MACHINE.

NEW YORK OFFICE: 123 Liberty Street.

Holden's combination compression and absorption ammonia system, 1900.



Holden's improved ice plant of 1880, his machines being built at the Penn Iron Works in Philadelphia.

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