J. DUTTON.

Ice Machine.

No. 4,697. Patented Aug. 18, 1846.

Fig. 1.

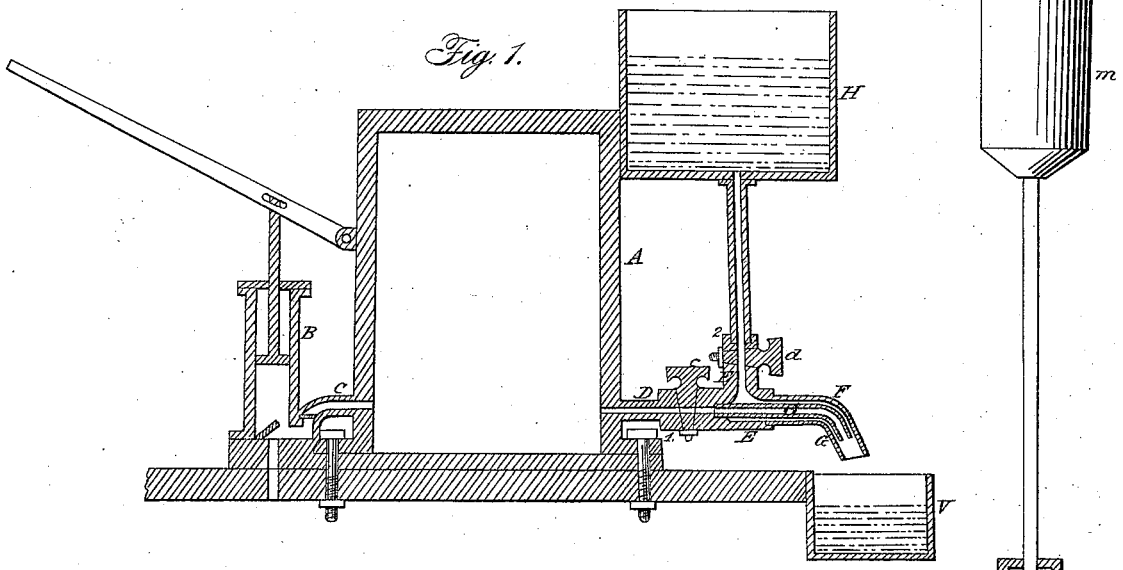


Fig. 2.

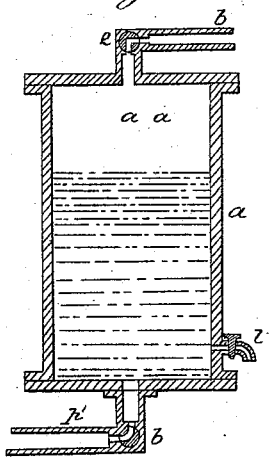
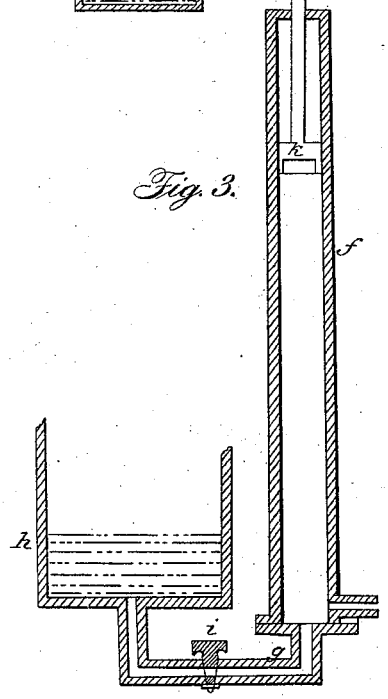


Fig. 3.



UNITED STATES PATENT OFFICE.

JOHN DUTTON, OF ASTON, PENNSYLVANIA.

MANUFACTURE OF ICE.

Specification of Letters Patent No. 4,697, dated August 18, 1846.

To all whom it may concern:

Be it known that I, JOHN DUTTON, of Aston, in the county of Delaware and State of Pennsylvania, have invented a new and useful improvement in the manner of accumulating ice and cooling water and other fluids and substances by means of compressed air and an apparatus to effect the same, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a vertical section through the center of the apparatus. Fig. 2 is a section of a modification of ditto. Fig. 3 is a vertical section of a hollow cylinder and weighted piston for compressing the air.

Similar letters in the several figures refer to corresponding parts.

The nature of this invention consists in cooling water and accumulating ice by compressing air to one fifth its bulk, more or less, in any convenient manner and causing it to suddenly expand to its original state and come in contact with a body of water issuing from another vessel, and passing by the air outlet, in such a manner, that the water will be suddenly converted into ice, or a degree near it, on the general principle that air, by suddenly expanding generates cold, its capacity for heat being increased.

The apparatus for producing the effects before stated, consists of a globular or cylindrical vessel A, of cast iron or other material, for containing compressed air, condensed to one-fifth its bulk, or any required bulk, by means of an ordinary air pump B attached conveniently near one side and communicating with the same, by a side pipe C. Another pipe D communicates with the air vessel, at the opposite side, connecting with a cast or other formed elbow E having a cock *c*, for passing on, and arresting the air at proper occasions. This elbow E is shown in section at Fig. 1, and has a pipe F, screwed or otherwise secured, to its angle, which pipe surrounds one of smaller diameter G, passing through the branch 1 of the elbow, and communicating with the pipe D. The outer tube F communicates with the upper branch 2 of the elbow, which is connected with the lower part of a tin vessel H of any convenient size and dimensions, placed and secured a short distance above the air vessel. The branch 2 of the elbow, with which the last mentioned pipe communicates, is also provided with a cock *d* for shutting off and letting on the water through the outer tube from the vessel above.

When the cocks are turned to the positions represented in the drawing, the water passes through the last mentioned tube F, and is met by the air passing (from the air vessel) through the inner tube G, at its termination, when it suddenly expands, while surrounded by the water from the outer tube, and generates cold, and quickly congeals and cools the water, and forces it out in small particles of ice into a vessel *v* placed conveniently to receive it.

After the cocks have been turned the air vessel is replenished with air by the air pump, which, while the apparatus is operating, is constantly worked by the operator.

Another mode of compressing the air without the aid of a force pump, and the power necessary to move it, is by means of columns or heads of water, which, in large cities are supplied through pipes.

When this mode is used the air pipe *p* Fig. 2, extends from the top of the air vessel *a* (corresponding with pipe C, Fig. 1) and the pipe *p'* from the head or column communicates with the lower part of the same (corresponding to pipe D, Fig. 1) being provided with a cock *b* (corresponding with cock *c*, Fig. 1). The air vessel is also provided with a waste cock *l*.

When the lower cock *b* is turned, the water from the head passes into the lower part of the air vessel *a*, and compresses the air therein at *a a*, to a bulk proportionate with the height of said head; and upon the upper cock *c* being opened forces it through the tube *p* connected to a tube corresponding to tube G in Fig. 1 surrounded by an outer tube corresponding to the outer tube F, Fig. 1, communicating with the vessel containing the water to be congealed, which in this case, as before, is placed above.

When the air is pressed out of the vessel *a* the lower cock *b*, is closed, which shuts off the water from the head, and the waste cock *l* is opened, which allows the water to discharge from the vessel. The waste cock is then closed and the lower one *b* is opened and the upper one *e* closed and the operation can thus be repeated until a sufficient quantity of water is cooled and congealed.

Another mode of accomplishing the object proposed and giving a gradual supply

of air is represented in Fig. 3 by means of a descending weighted piston in an upright cylinder.

f is an upright cylinder or pump, having a tube *g* extending to the lower end of a vessel *h*, containing water to congeal or cool, and communicating with the same; which tube in provided with a cock *i* for shutting and opening the communication between the cylinder *f* and vessel *h*. This cylinder contains a piston *k*, secured to a rod passing through an opening in the upper end, on the end of which rod is placed a weight *m* of suitable size and material. This weight is raised by means of a rack and pinion, or any convenient mechanical device, and is of sufficient capacity in relation to the piston to compress the air to the degree required. After the weight has descended and the air has become condensed in the cylinder the cock *i*, is opened and the air rushes through the water in the vessel and cools and congeals the same. The weight gradually descending and keeping the air in the cylinder at the same pressure until all has escaped.

What I claim as my invention, and which I desire to secure by Letters Patent, is—

Cooling and congealing water and other fluids by means of compressed air confined in the vessel A and conveyed through a tube D, provided with a cock *c*, and surrounded by another tube F, also provided with a cock *d*, and communicating with a reservoir of water, and allowing it to suddenly expand while surrounded with the water, in such a manner as to cool or congeal the water, on the principle that air by suddenly expanding absorbs heat, its capacity for heat being increased, as described.

JOHN DUTTON.

Witnesses:
ADAM KINSLER,
JOHN LANE.