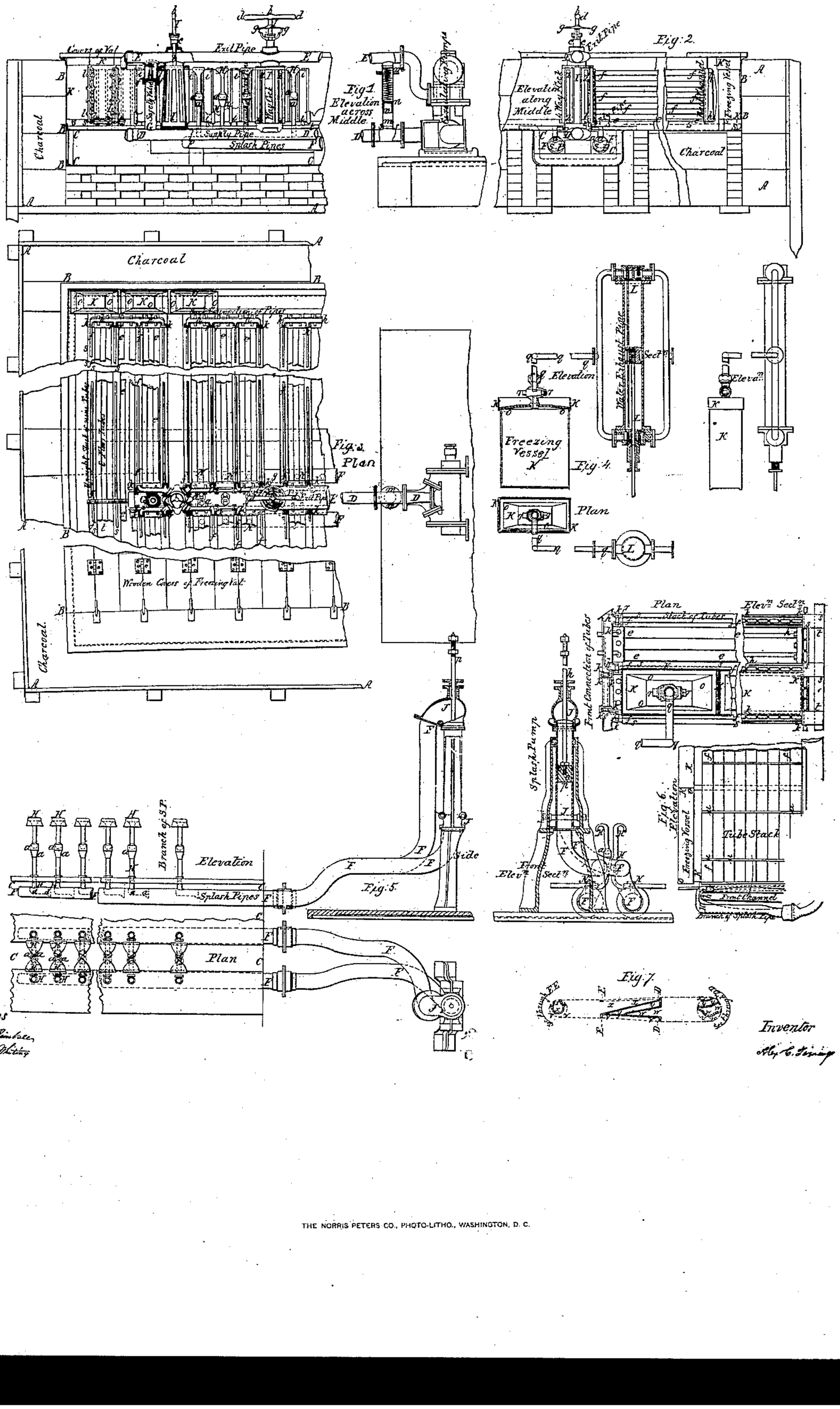
A. C. TWINING.

APPARATUS FOR COOKING AND FREEZING.

No. 34,018. Patented Dec. 24, 1861.



UNITED STATES PATENT OFFICE.

ALEXANDER C. TWINING, OF NEW HAVEN, CONNECTICUT.

IMPROVEMENT IN APPARATUS FOR COOLING AND FREEZING.

Specification forming part of Letters Patent No. **34,018**, dated December 24, 1861.

To all whom it may concern:

Be it known that I, ALEXANDER C. TWINING, of the city of New Haven, county of New Haven, and State of Connecticut, have invented a new and useful Improvement in Freezing and Cooling Apparatus; and I declare that the following is a full and correct description of my said improvement.

Referring to the accompanying drawings from Figure I to Fig. VII, and to the elevations, ground plans, and sections shown, respectively, to illustrate the parts shown in those figures, I first describe the arrangements shown by Figs. I and II.

B B B is a vat which holds the freezing-cisterns, and is itself filled with brine or alcoholic water, or other liquid uncongealable at the temperatures employed. It is surrounded by non-conductors beneath and on the sides, and the exterior box, A A A, holds sawdust, dry tow, rags, charcoal, &c., for that purpose.

F F F, &c., show thin stacks of oval copper pipes ranged one above another and running horizontally in the vat, so dividing it up into long and narrow spaces or channels, called "cisterns," that their freezing-vessels K, of iron, copper, or other metal, may be set between and nearly fill the vat. The pipes might be round; but I think an oval or flattened shape preferable. These vessels nearly touch the stacks or partitions of oval pipes, and also their bottom nearly comes down upon the horizontal stacks of oval floor-pipes *e e e*, &c.; but the timber-strips *s s s*, &c., hold the vessels and come close upon both the vertical and horizontal stacks above described. This forms longitudinal chambers *s t s* between the vat-floor, the strips *s s*, and the floor-stacks *e e e*, except that in the latter the pipes are set not quite close to one another, but leaving narrow longitudinal lines open for the cold liquid of the vat to be thrown by the splash-pump, hereinafter to be described. All these oval pipes are to conduct a constant current and circulation of cold ether or other cold liquid, which cools the liquid in the vat, and this last freezes, or, if desired, simply refrigerates, the contents of K K K, &c. This cold liquid comes from the supply-pipe D D, passes up into the first or right-hand four-way cock, I I, (shown with slots *z z* from outside to the interior,) thence through the left front channels, *i i*, thence through the stacks F F F *e e e*, &c., that open from *i i*, thence through the back channels, *h h*, around into the next succeeding stacks F F *e e*, that run back and open into the corresponding right-hand front channel, *i i*, thence into the side slot of the second four-way cock I I, which is shown inwardly with its plug, thence through the plug into the next left-hand channel *i i*, and so on through as many stacks, channels, and cocks as may be desired. The figure shows only two stacks F F, connected with each left-hand channel and each right-hand channel, and four with each back channel; but these may be increased at pleasure. At the last cock on the left in the series the stacks run past and couple by bolts with the opposite stacks of the other half of the vat by the flat brackets *l l l l*. The circulation thus goes on to the back channels of that half, and the cocks and other front channels, till, finally, it comes back to the right-hand front channel of the first cock and goes out at top into the exit-pipe E E, and back to be cooled again at the source of cold. Now, by setting the plugs properly, either cock of the series may be made the first in the system of circulation. This will be understood by carefully considering the construction of the shell, Fig. I, and the plug, Fig. VII. The shell has four up and down slots, *z z z z*, &c., centered one quadrant apart, and which meet openings in the plug. The plug has four compartments or channels—one, *v v*, closed at top and bottom, but open to the outside, except as closed by the shell, and opening to two contiguous slots *z z*, a second, *x x*, opening into the exit E E, above and at one side into a slot of the shell, except when closed by the side of the latter, a third, *w w*, opening below into the supply D D, and outward through the shell or a slot thereof, and the fourth, *y y*, running around between the two last-named compartments from one slot to another slot of the shell one quadrant from it. If *w w* opens from the supply into the left-hand front channel of any cock, *x x* opens into the right-hand corresponding channel, and also into the exit; but *v v* gives a clear way round from one back slot and channel *i i* into the other; but the channel *y y* is closed upon the shell. The other cocks are all to be set with *y y* opening into both front channels and *v v* open both back channels, while both the supply and exit compartments are closed against

the shell. Now, to shift the beginning of the circulation to any other cock, set the supply to open into the left-hand *i i* and have the other cocks closed at both supply and exit, as above. By this means the initial current is thrown successively from cistern to cistern and every freezing-vessel K subjected to the same succession of colder or less cold currents. If by error in manipulating the cocks the supply-pipe or any other part becomes in danger of undue strain, it is relieved by pipe G, with its safety-valve *f f*, which immediately lifts against the tension of a spring and opens the circulation into E directly.

The equalizer, Fig. I, performs the office of an air-vessel for equalizing pressure. It is simply a pipe, *m m*, with smooth bore, having a plunger, *n n*, at bottom, checked at *s s* and pressed down by a spring having a proper tension and a considerable range of elasticity. If the supply-pump is at its points of more than average throw, the plunger *n n* will rise against the spring, receiving into the pipe beneath the excess of supply and giving out above the same quantity to supply the stroke of the upper circulation or exit pump. When, again, the supply-pump is throwing less than its average, (and, of course, the circulation-pump drawing just after the same regimen,) the liquid of circulation goes into *m m* above and flows from it beneath. The stacks are formed and united to the channels, as seen in different figures, but especially in Fig. VI. The oval pipes are brazed or soldered into brackets *k k k k*, &c., formed with surrounding jaws, as in the figure. This is received against a thin flange that is formed upon the sides of a projecting hollow ridge or wrist of the channel up and down, and wedges of wood or metal (see the spaces next *r r*) press it home against the flat surface of the bracket. These surfaces have a slight pitch, allowing the stacks to wedge about three-sixteenths of an inch as they go in, and thus allows thin india-rubber or other substance to be interposed to make a tight fit. The channels are attached to the cocks by a similar plan; also certain other parts to the channels. By this arrangement each stack F F can be unfastened by drawing its wedges without disturbing the others. The narrow strips *u u* are soldered on to prevent bruising or abrading the stacks by the vessels K.

The freezing-vessels, being in place, as K in Fig. VI, will have the cold liquid acting in a current upon them by the following arrangement:

Fig. V shows a front elevation, a side elevation, and plan of the splash-pump J J, the splash-pipes F F F F issuing from it and located in the recess C C, Figs. I and II, &c., of the vat. The plunger *o o* is worked by the rod *p p* up and down, which draws and throws the cold liquid of the vat forward and back through F F F F. This liquid is drawn from the surface in the vat through the channels H H H H, &c., which come from funnels *a a a a*, &c., in the splash-pipes that open toward the pump and rise behind and turn over the front channels and down with a flat funnel into the cistern. At *a a a a*, &c., there is a cork ball-valve, which prevents regurgitation, and N N, &c., are valves opening up into the chambers *s t s*, above described, below the floor-stacks. It will be seen how the splash-pump draws liquid from the surface and throws the same back beneath the floor-pipes of that cistern, and how it is forced up through the interstices between the floor-pipes *e e e e* against the bottom and up the sides of *k*. Thus a circulation is kept up between the bottom of each cistern and the top, for the funnels *a a* are sufficient in the aggregate to hold all the throw of a single stroke of the splash-pump. Therefore the identical liquid that comes from the surface through *a a* is thrown into *s t s* through N.

It is a defect in artificial ice that air liberated from the water is incorporated in bubbles within the mass, making it porous and opaque. This I have remedied measurably by using water previously exhausted of air in a vacuum. For this I attached to my earlier engine an air-pump, L L, which drew air out of a water-exhaust, being an air-tight vessel exhausted by L L, and water admitted or sprinkled in through a cock. With this water K K, &c., were filled for freezing, and the water protected from reabsorption of air by a diaphragm or a film of oil floating on top. A still better way is shown in Figs. IV and VI. Here a pipe, *q q q*, with a cock, *r r*, enters the cover *o o*, which, by the intervention of india-rubber, makes the cavity of K air-tight. When L L is at work and *r r* is open, a vacuum is formed in K, and the water in K is exhausted of air. This might break the vessel if allowed before a crust of ice is formed within and on the bottom and around the sides. I do not therefore open the cock till a crust of ice is formed of sufficient thickness. Inasmuch as the first ice is clear and sound, this will not be a considerable objection. Instead, however, of fitting each cover *o o* with a cock, I simply extend *q q q* to lie along and on top of the stacks F F F, with branches coupled on to each cover, and by this means a single cock controls the vacuum in all the freezing-vessels of a cistern. By regulating my cisterns in groups with a cock to each I control the whole, opening one group to the vacuum when sufficiently incrusted, then another, and so on, for it will be observed that my system of four-way cocks enables me to freeze up the cisterns successively and alike in a perpetual round of equable operation.

What I claim, and desire to secure by Letters Patent, is the following:

1. The construction of freezing-cisterns by pipes ranged in stacks, in combination with a supply or an exit pipe, and connecting-channels conducting the circulation from one stack or cistern to another, all substantially as above and whether with or without the cocks.

2. The four-way cocks in their construction, and the combination of those cocks, or their equivalent, with the channels and the stacks, or with the stacks directly.

3. The equalizer.

4. The combination of the splash-pump with the cisterns by pipes and valves, substantially as above.

5. The combination of an air-pump with a tightly-covered vessel or vessels to draw air from the vessels and contents during freezing by intervening pipes or connections.

6. The peculiar mode of connecting the stacks with the channels and channels with the cocks or other pieces, as shown and described.

New Haven, Connecticut, October 4, 1861.

ALEXR. C. TWINING.

Witnesses:
HELEN T. MAGILL,
MARY A. TWINING.