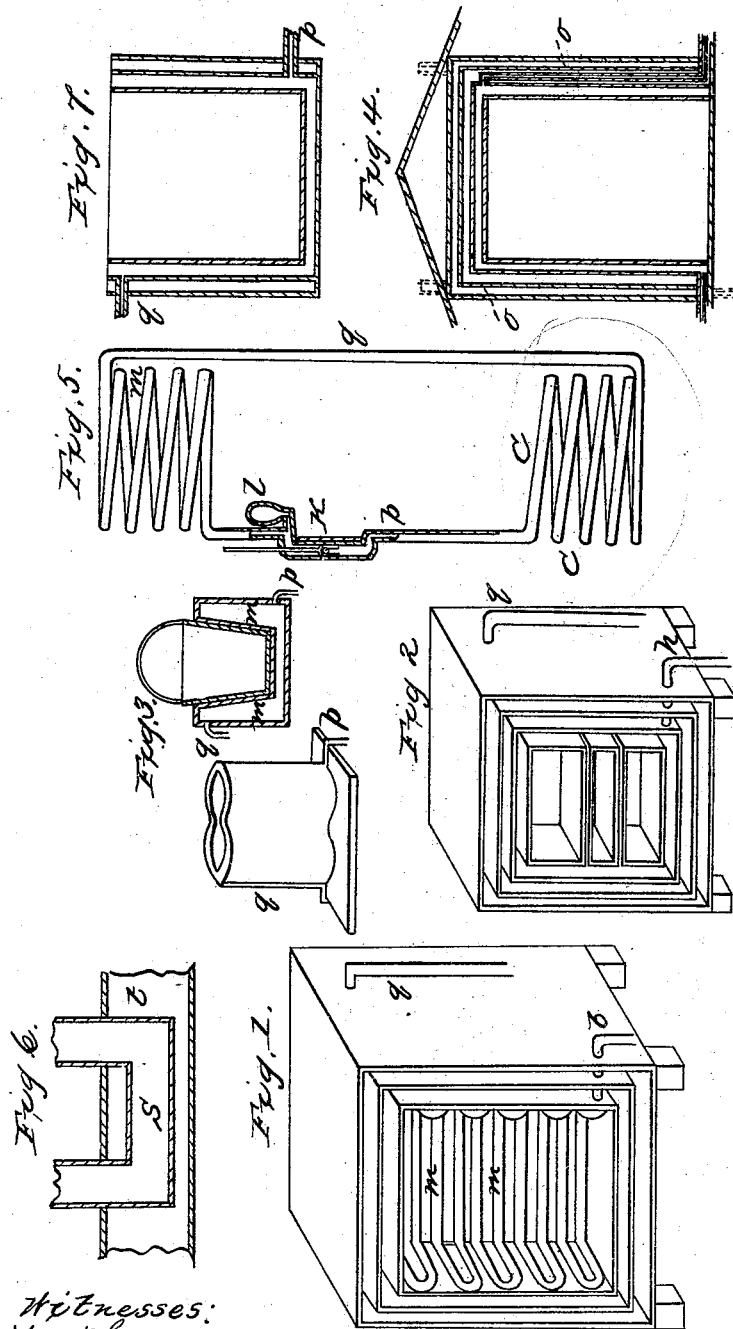


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Cooling Preserving Houses, Packing Houses, &c.

No. 46,595.

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Witnesses:
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN COOLING PRESERVING-HOUSES, PACKING-HOUSES, REFRIGERATORS, AND OTHER SIMILAR STRUCTURES.

Specification forming part of Letters Patent No. **46,595**, dated February 28, 1865.

To all whom it may concern:

Be it known that I, DANIEL E. SOMES, of the city of Washington and District of Columbia, have made certain new and useful Improvements in Cooling Vessels, Boxes, Chambers, Packing-Houses, Preserving-Houses, and like Vessels and Structures, in which articles of food and other substances are to be preserved or stored; and I hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, making part of this specification.

The nature of my invention consists in cooling vessels, boxes, chambers, and other similar structures, in which perishable articles are to be kept, by means of a current of water cooled by being made to descend below the surface of the earth, in the manner herein more fully explained, also by means of air cooled as hereinafter described. The temperature of the earth at a short distance below its surface is nearly constant throughout the year, so that well and spring water is nearly of the same temperature in summer and winter. In those parts of the country in which cool flowing springs are found it is easy to have at all times cool dairies and houses for preserving fresh meats and fruits; but in cities and other places where such springs are not to be found the only good substitute yet found has been those structures and vessels commonly called "refrigerators," in which ice is used as the cooling agent; but ice is generally expensive, and the refrigerators are, therefore, commonly made small and close, so that the ventilation is not such as to keep the article to be preserved in good flavor.

In refrigerators and preserving-houses, packing-houses, and other vessels constructed according to my invention, a low and uniform temperature may be had throughout the year without the necessity of using ice; and when ice is used very much less will be required than in refrigerators of the ordinary construction. When a convenient supply of water can be obtained with sufficient head to rise into the vessels to be cooled, as in cities and other places which have water-works, I effect the cooling of the water in the following manner: The water pipes or mains are connected with a descending pipe, which connects with one or

more subterranean tanks, pipes, or reservoirs lying at sufficient depth below the surface of the earth—say, from thirty to fifty feet more or less. In passing through these reservoirs or tanks the water is cooled to the same temperature as the earth at this point. After the water has passed through the cooling-tanks it can be made to rise nearly to the height of the fountain-head. The water thus cooled is to be passed in tubes, channels, or other conduits through the body of the buildings to be cooled.

In the drawings, Figures 1 and 2 show refrigerators constructed according to my invention. The body A of the refrigerators may be constructed in any convenient manner with single or multiple walls. The inside of the refrigerator is lined with a series of pipes, as shown in Fig. 1 at *m*; or the walls and shelves of the refrigerator may be hollow, as shown in Fig. 2. The pipe is to be connected so as to receive water from the subterranean cooling apparatus already referred to, and the pipe *g* should connect with the water pipe or main, so that there shall be a current of water flowing first from the water pipes or mains into the earth, so as to be cooled, then up through the pipe *p*, through the refrigerator, and out by the pipe *g* into the water main or pipe again. There is, therefore, no consumption of the water in applying it to the purpose of refrigeration, as herein described.

Instead of a refrigerator constructed as shown in Figs. 1 and 2, it will frequently be more convenient to use a closet or small room for a refrigerator. The walls may be covered with pipes; or the cold water may be conveyed through the chamber or closet in any convenient manner. For the purpose of cooling milk, wines, and other liquids, stands such as shown in Fig. 3 may be used. The water is made to circulate through the stand and keep it cooled. Any or all of these shelves, as shown in Fig. 2, may be made in the form of such stands. Bins for the storing of fruits and vegetables may in like manner be placed in any suitable part of a dwelling-house from the cellar to the garret and made as cold at all times as a country dairy or a spring-house. The same principle of cooling and mode of construction is also applicable to packing and preserving houses.

In the drawings, Fig. 4 shows a mode of constructing a packing-house for salting and curing meat. The entire building may be kept cool, and the tanks for salting the meat may have separate coolers attached to them, either by making the walls double, with a current of cool water flowing through the space; or refrigerating coils or pipes may be placed in the tank. In Fig. 4 the walls are shown fourfold. The space between the outer and second wall may be filled with sawdust, air, charcoal, or any good non-conducting material. The second space is filled with air, and the third space with cold water, either in pipes or channels constructed for the purpose.

Fig. 5 shows a tank for salting and curing meat, which may be either round, square, or of any other form. When there is not a convenient head of flowing water to be cooled in the manner already described, I proceed as follows: The subterranean coolers are constructed in the manner already pointed out; also, the vessel or structures to be cooled. The pipes in the ground are connected with the pipes in the refrigerator, as shown in Fig. 5, in which CC are the subterranean coolers, with the pipes *p* and *q*. The coils *m* represent the system of devices for cooling the refrigerator or other vessel. Both systems are filled with water, except air-vessels, as shown at *l*, which are designed to prevent the bursting of the pipes by any expansion of the water or sudden check in its motion. A pump, rotary pump, propeller-screw, or some other device, as shown at D, must be inserted at some convenient point of the circuit. By this device the water in the upper and lower systems of pipes is to be made to circulate so that the cold water in the subterranean tanks or pipes is made to rise into the upper or cooling system, *m*, and the water in *m* is made to descend and be cooled, to be again brought up to cool the pipes or system *m*. Since the descending and ascending columns of water nearly balance each other, but little force is required to cause a circulation of the water. This mode of cooling is applicable to all kinds of refrigerators, packing-houses, preserving-houses, and the like, as already explained in the former part of this specification, with reference to the use of the flowing current of water-works and similar sources of water-supply.

In packing-houses it is sometimes desirable to cool the brine in which meat is to be salted. This may be done by substituting brine for water in the apparatus shown in Fig. 5. The cooled brine may be made to descend and ascend as often as necessary.

In cases where very intense cold is wanted, the system of cooling may be aided by the use of ice or other cooling material. Buildings for preserving and also packing houses should be well ventilated, and for this purpose cold air is preferable. Air for this purpose may be cooled by passing through or being compressed in pipes immersed in a cold well or in cold earth. Fig. 6 of the drawings shows

an air-pipe, S, passing through a water-pipe, *t*. If the air is compressed into the pipe S it will soon acquire the temperature of the pipe. If then permitted to expand it will be found to be much lowered in temperature. By rarefying it the temperature will be still further reduced. Instead of compressing the air in subterranean pipes, as explained above, it may be compressed in reservoirs surrounded by cold earth, or in reservoirs or tanks surrounded by cold water in the earth, or cooled by means of the devices for cooling herein described; or the air may be compressed in tanks or pipes cooled by ice, or by ice or salt, or any other cooling material. By this mode of compressing and expanding air it is both cooled and dried, and is therefore of great service in preserving organic matters, curing and cooling meat and other like uses requiring the air to be both cool and dry. Other modes of drying air, such as passing it through water-absorbent materials, may also be used in combination with the above-described modes of cooling.

The principle of cooling air by compression and expansion has long been known, and has been used for the manufacture of ice, and for cooling liquids; therefore I do not claim it except when used in connection with apparatus and devices for cooling and ventilating preserving-houses, packing-houses, refrigerators, and other like structures, as herein explained.

To assist in cooling the walls and the air in packing-houses the principle of cooling by evaporation may be conveniently applied. Thus the walls and the air-space in the walls may be kept cool by moistening the inside by means a jet of water, and keeping a current of air flowing through. In Fig. 4 the space may be kept moist and the air carried off by pipes.

Tanks for the purpose of cooling off meat, and for giving it salt may be constructed in packing-houses, the construction being similar to the construction of the walls of the building, as shown in Fig. 5, or simply double walls, as shown in Fig. 7.

By the application of my invention refrigerators and pantries in dwellings may be kept at a uniform temperature throughout the year with only a small cost for the cooling means. In cities where there are water pipes or mains near the houses, the only cost is that for the fixtures, for the current of water is taken from the street-mains, caused to descend into the earth to be cooled, then carried in pipes or channels through the refrigerators or other structures, and then passes off into the main water-pipes, without loss, and is ready to go the next house and perform the same work of cooling. When there is not a water-supply, the only expense, in addition to the cost of the necessary fixtures, is the expenditure for the small force required to operate the devices, such as shown at *l*, Fig. 5, or other equivalent means for causing a circulation of water from

the coils or tanks in the earth to the air-cooling apparatus.

In constructing packing-houses the mode of forming the walls, floors, and roof, explained in my patent of September 13, 1864, may be used with advantage, so as to prevent, as far as possible the entrance of heat from the outside.

It is obvious that in very cold weather, as in winter, my system of cooling will become a mode of warming, so that freezing can be prevented in the class of structures which are the subjects of this improvement, for the temperature of the earth at the depth of the subterranean coolers is nearly constant throughout the year, and is therefore in winter warmer than the temperature of the air at the earth's surface, and water from the earth's surface flowing through the subterranean reservoirs, tanks, or pipes will have its temperature increased. By adding any convenient heating apparatus—as a steam-boiler or a furnace—the water may be still further warmed, so that in the coldest weather the buildings may be kept at the exact temperature required, and the temperature thus equalized throughout the year. This is very important in packing-houses, preserving-houses, and the like, where a uniform cool temperature is what is desired, avoiding on the one hand such warmth as would produce fermentation or decay, and on the other the destructive effects of freezing.

Besides such substances as meats, fruits, and other articles of food, which are injured by heat and by freezing there are still others, to the storing of which my invention is especially applicable. Volatile liquids—such as petroleum, benzine, and the like—should be stored in cool buildings, so as to prevent the generation of combustible and explosive gases.

Having thus described my invention, and the several modes of applying it for the purpose of cooling and ventilating the several kinds of structures herein particularly specified, I do not wish to limit myself to the mechanical details of the several devices shown in the drawings, since it is evident that these may be greatly varied without departing from the nature of my invention. I do not claim as new these devices except as arranged and combined so as to effect the cooling and ventilating, either one or both, of the class of structures herein especially referred to.

What I claim, and desire to secure by Letters Patent, is—

1. The process herein described for the purpose of cooling preserving-houses, packing-houses, refrigerators, store-rooms, and similar structures, said process consisting in using the low temperature of the earth at certain depths below its surface for the purpose of cooling either water or air, or both, by means of a combination of devices and apparatus, substantially such as herein described, or their equivalents.

2. The process herein described, or any equivalent means for cooling water, in combination with the process for cooling air by first compressing it in contact with a cold surface, and then permitting it to expand when used for the purpose of cooling and preserving, as herein set forth, as described.

3. Cooling refrigerators and salting-tanks and packing-houses and other similar structures by means of a current of cold water or cold brine, as set forth and described.

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Witnesses:

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