(No Model.) 2 Sheets—Sheet 1.

E. ARMSTRONG.

SYSTEM FOR DISTRIBUTING COOLING LIQUIDS FOR REFRIGERATING PURPOSES.

No. 431,502. Patented July 1, 1890.

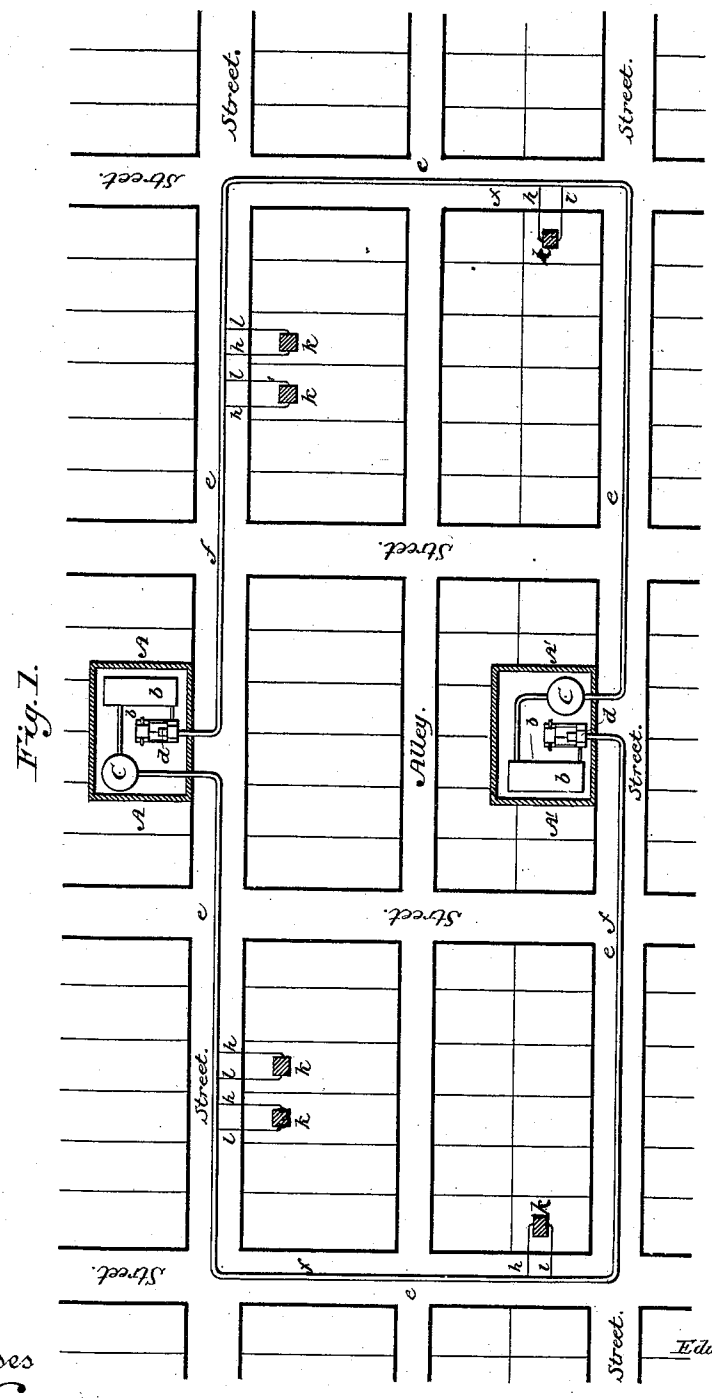


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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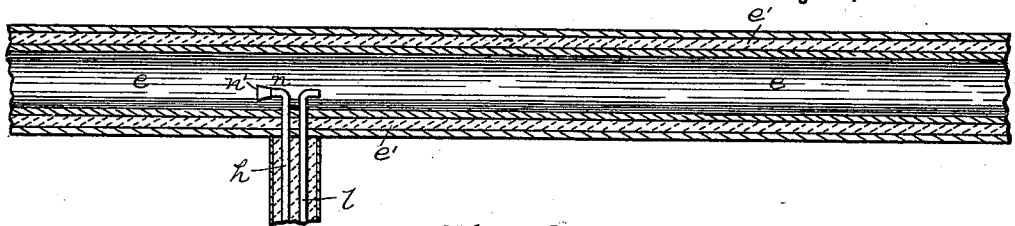
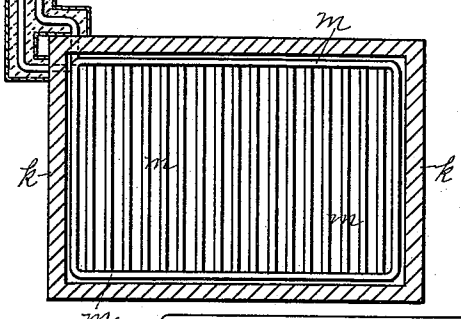


Fig. 2.



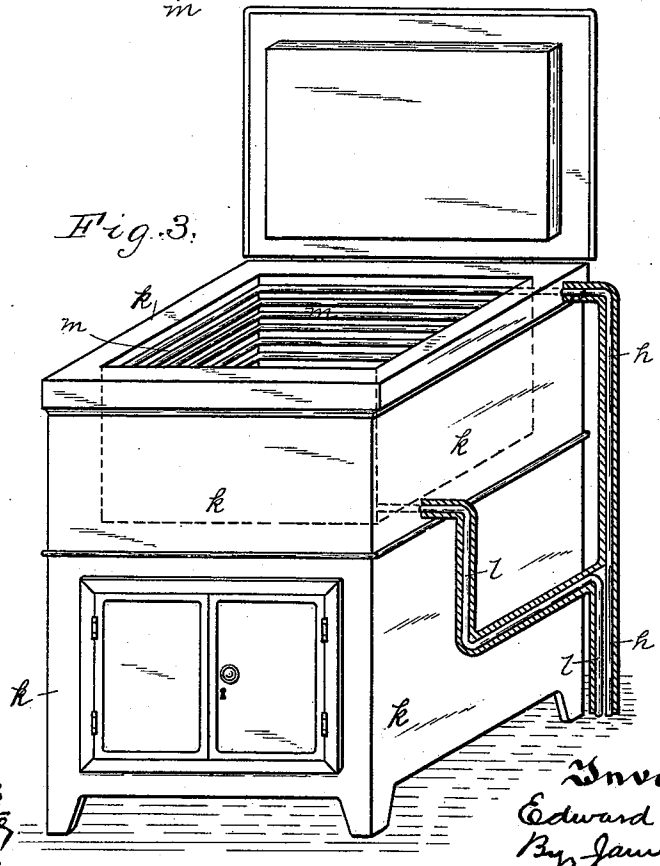


Fig. 3.

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UNITED STATES PATENT OFFICE.

EDWARD ARMSTRONG, OF ALLEGHENY, PENNSYLVANIA.

SYSTEM FOR DISTRIBUTING COOLING-LIQUIDS FOR REFRIGERATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 431,502, dated July 1, 1890.

Application filed February 10, 1890. Serial No. 339,806. (No model.)

To all whom it may concern:

Be it known that I, EDWARD ARMSTRONG, a resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Systems for Distributing Cooling-Liquids for Refrigerating Purposes; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the refrigeration or cooling of refrigerators or chambers within houses for domestic use, its object being to provide a system by which the refrigerating-liquid may be supplied from a central station and distributed through the pipes laid within the streets of cities and towns, and by connections therefrom caused to circulate through the refrigerators or refrigerating-chambers within the dwellings, and so provide cool chambers for the preservation of meats, vegetables, fruits, &c., so doing away with the necessity of the ice-cooled refrigerators in dwellings and insuring the holding of these chambers at the proper low temperature at all times, as is necessary for the preservation of the contents.

To these ends my invention consists in a system for refrigerating within the houses of towns and cities, comprising, generally stated, a refrigerating apparatus, a pump, and a main pipe leading therefrom and extending through the streets of the city and returning to the refrigerating-station and carrying the cooled brine, branch supply-pipes leading from the main supply-pipe to the refrigerators or chambers within the houses, and branch return-pipes leading from the same back to the main supply-pipe, whereby the circulation of the cooling-liquid can be maintained within a single main supply-pipe, and the system of distributing such cooling-liquid and returning it to the refrigerating apparatus is much simplified.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of the central station and system of pipes extending out from and returning thereto and the houses through which the liquid is caused to circulate. Fig. 2 is a detail view illustrating the preferred manner of carrying the branch pipes from the mains laid within the streets to the houses and the refrigerating-chambers therein. Fig. 3 is a view of a refrigerator, such as employed with my invention, and the connections with the branch pipes.

Like letters of reference indicate like parts in each.

In practicing my invention I arrange the pipes so that the single pipe leading from the refrigerating-station extends through one street and in any desired course through other streets, finally returning to the refrigerating-station, and I withdraw the refrigerating-liquid from such main and cause it to circulate within the refrigerators within houses and return it to this main.

The refrigerating-station—such as A—is located at any suitable point or points within a circuit in which the system is employed, this refrigerating-station being provided with a refrigerating apparatus for the cooling of brine or other suitable non-congealing liquid—such as shown at *b*—the surplus brine being held within a suitable tank, as shown at *c*, in the refrigerating-station, and passing therefrom through the refrigerating apparatus, and thence through the force-pump *d* into the supply pipe or main *e*, located within the street.

I prefer to employ brine or water containing in solution a large amount of salt or like saline material, as such brine is cheap in cost and has no dangerous qualities whatever and can be cooled to a suitable temperature, such as about 15° Fahrenheit, this being sufficiently low for all the purposes of the system. Any other suitable liquid may, however, be employed which can be held at a low temperature and will act to cool the refrigerating-chambers within the buildings without requiring too rapid a circulation thereof, and which is of such low specific gravity as to be conducted within mains without liability of great leakage.

In the system as illustrated in Fig. 1 the supply pipe or main *e* leads from the refrigerating-station and is buried a suitable depth within the ground and is protected by a covering of any suitable non-conducting material

e', which is held around the pipes in any suitable way, so as to prevent the rapid heating of the pipes and the contents thereof by the surrounding earth, which would raise the temperature of the cooled liquid and reduce its cooling qualities at the point where the same is to be utilized. This pipe e extends through the different streets, as illustrated in Fig. 1, extending in one direction through one street and returning through another, and finally returning to the refrigerating-station A, as at f, and opening into the storage-tank. The return-pipe f may, if desired, lead directly to the refrigerating apparatus; but I prefer to employ the storage-tank, as it provides for a full supply to the refrigerating apparatus and provides a surplus in the event of leakage from the mains. If desired, at suitable points in the circuit of the main e other refrigerating-stations—such as at A'—may be located, the main pipe leading into these refrigerating-stations and the liquid being passed through refrigerating apparatus therein and again cooled and fed to the main, the circuit having in this way two or more refrigerating-stations, and the liquid passing from one refrigerating-station to another. The branch supply-pipe—such as h—leads from the single main or supply pipe employed in each street into the house, and thence into the refrigerator or refrigerating-chamber k therein, and the return-pipe l leads back into the main pipe. Within the refrigerator or refrigerating-chamber k, as shown in Fig. 3, are located coils of pipe, as at m, and the branch supply-pipe h communicates with one end of this coil, while the branch return-pipe l communicates with the other end and extends back to the main pipe. In order to cause a circulation through this branch pipe and through the refrigerator, I provide the supply-pipe with the nozzle n, which extends in a direction opposite to the current of the liquid within the main pipe e, and is preferably provided with an enlarged or bell mouth n', so that the cooled liquid will naturally pass into the same and by the pressure in the main pipe will be forced through the coil of pipes within the refrigerator, returning through the branch pipe l. This pipe l is also provided with a nozzle within the main pipe extending in the direction of the current of the liquid, this nozzle being preferably of the same diameter as the return-pipe, so that the liquid under pressure within the main pipe will act as a siphon to draw the liquid through the return-pipe, the liquid being thus forced into the branch pipe and through the refrigerator, and thence exhausted by siphonic action through the branch return-pipe into the main pipe. By such construction I am enabled to provide all the circulation necessary within the refrigerating-chamber for the cooling of the same, and I do away with the necessity of the employment of a return-pipe within the same street as the main supply-pipe.

In practicing my invention I employ ammonia, bisulphide of carbon, or any other suitable refrigerating agent for cooling the brine or other non-congealing liquid, the same being expanded and condensed in any suitable way for the cooling of the brine. The cooled brine is then forced by the pump through the main supply-pipe laid within the streets and at any point in the system where it is desired to utilize the same. It is carried through the branch supply-pipe through the refrigerator or refrigerating-chamber, as above described, and returned to the main pipe, the current within the main supply-pipe being kept up at any suitable speed, as is found necessary for the purposes of refrigeration, according to the number of houses connected with the main supply-pipe. After the liquid has been carried in this course for a time sufficient to reduce the temperature within the several refrigerators or chambers connected with the system below the freezing-point, or to such degree of cold as is found necessary, it will be found that a comparatively slow current within the main pipe and the refrigerators connected therewith will be sufficient to maintain the refrigerators at the desired temperature, and after the first cooling of the same the liquid will be raised but little in temperature in performing the work required of it, and the system may be maintained at a comparatively small cost, as the refrigerators themselves and all the pipes within the system can be so insulated as to be little affected by the normal temperature of the ground, the atmosphere, or the compartments wherein the refrigerators are located.

The system may of course be employed, if desired, during heated seasons for the cooling of the atmosphere within different apartments of dwellings—such as sick-rooms within houses, where it is often of great importance to reduce the temperature—and this is included within my invention.

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

1. A system for refrigerating within the houses of towns and cities, consisting in a refrigerating-station having refrigerating apparatus, a pump, and a main supply-pipe leading therefrom and extending through the streets of the city and returning to the refrigerating-station and carrying the cooled brine, and branch supply-pipes leading from the main supply-pipe to the refrigerators or chambers within the houses, and branch return-pipes leading from the same back to the main supply-pipe, substantially as and for the purposes set forth.

2. In apparatus for refrigerating within the houses of cities or towns, a main supply-pipe extending through the street, in combination with a branch supply-pipe leading therefrom and provided with a nozzle in the main pipe extending in the opposite direction to the current of the liquid, a refrigera-

tor or refrigerating-chamber having a coil of pipes therein, with which said branch supply-pipe communicates, and a branch return-pipe leading from said refrigerator and communicating with the main pipe and having a nozzle in the main pipe extending in the direction of the current of the liquid, substantially as and for the purposes set forth.

In testimony whereof I, the said EDWARD ARMSTRONG, have hereunto set my hand.

EDWARD ARMSTRONG.

Witnesses:
ROBT. D. TOTTEN,
J. N. COOKE.