2 Sheets—Sheet 1.

V. P. & J. S. HILL.

Milk-Cooling Apparatus.

No. 206,108. Patented July 16, 1878.

Fig. 1.

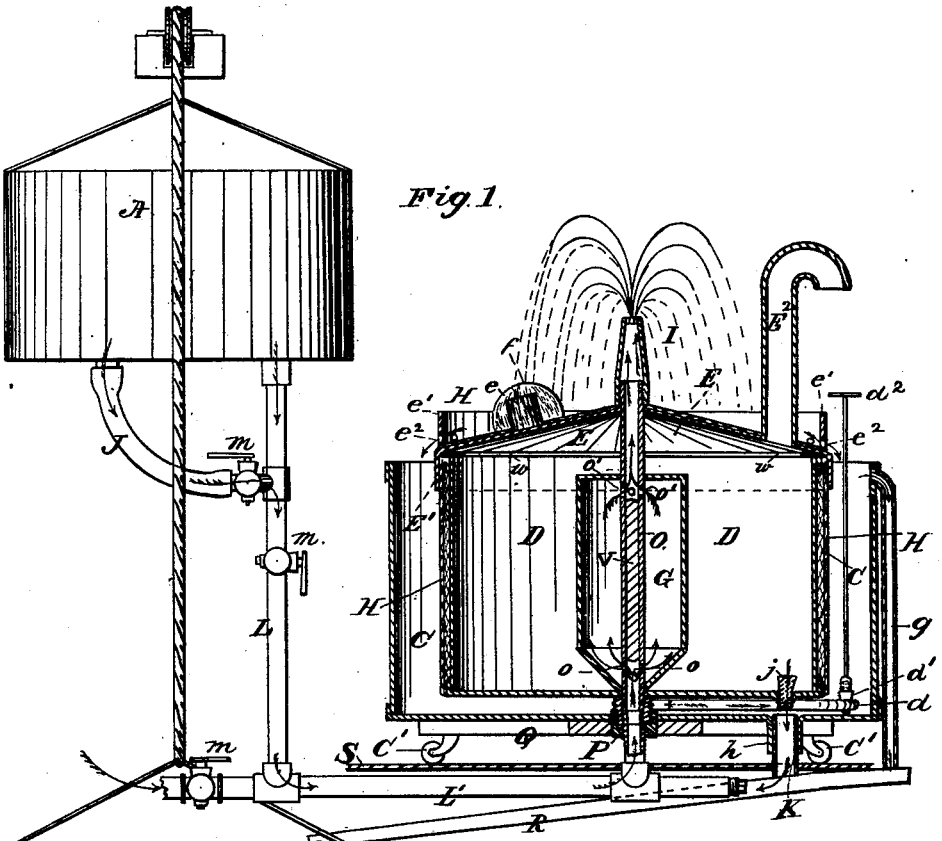

Fig. 2.

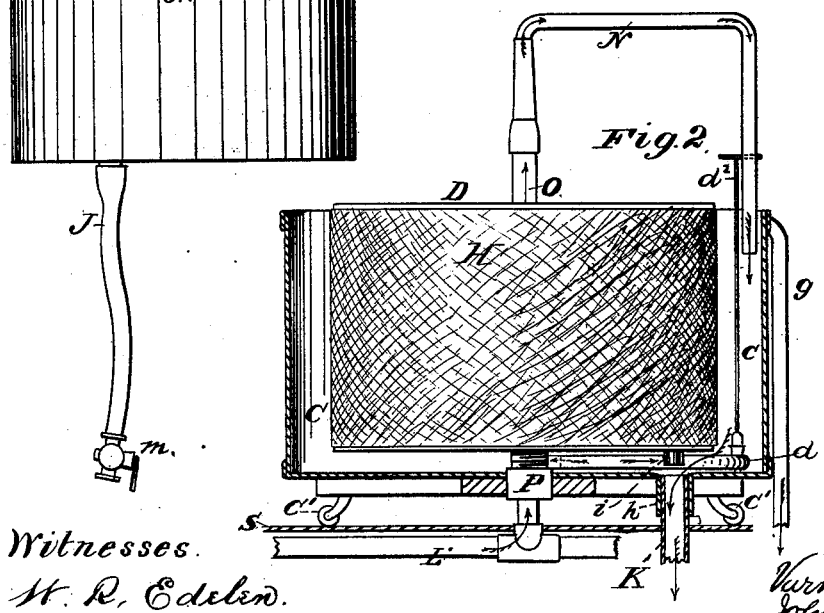

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Fig. 3.

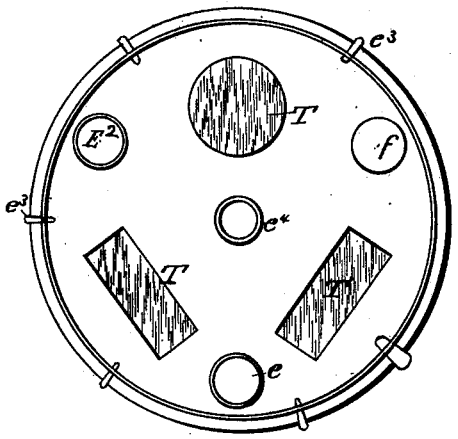


Fig. 4.

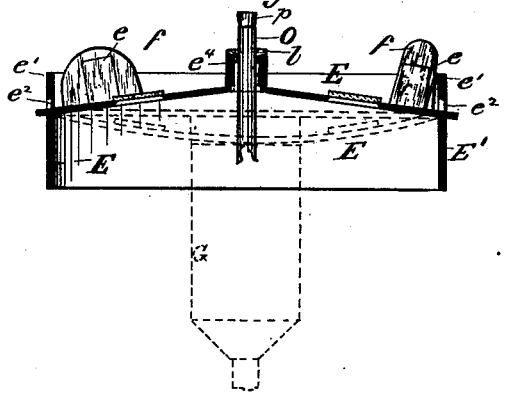
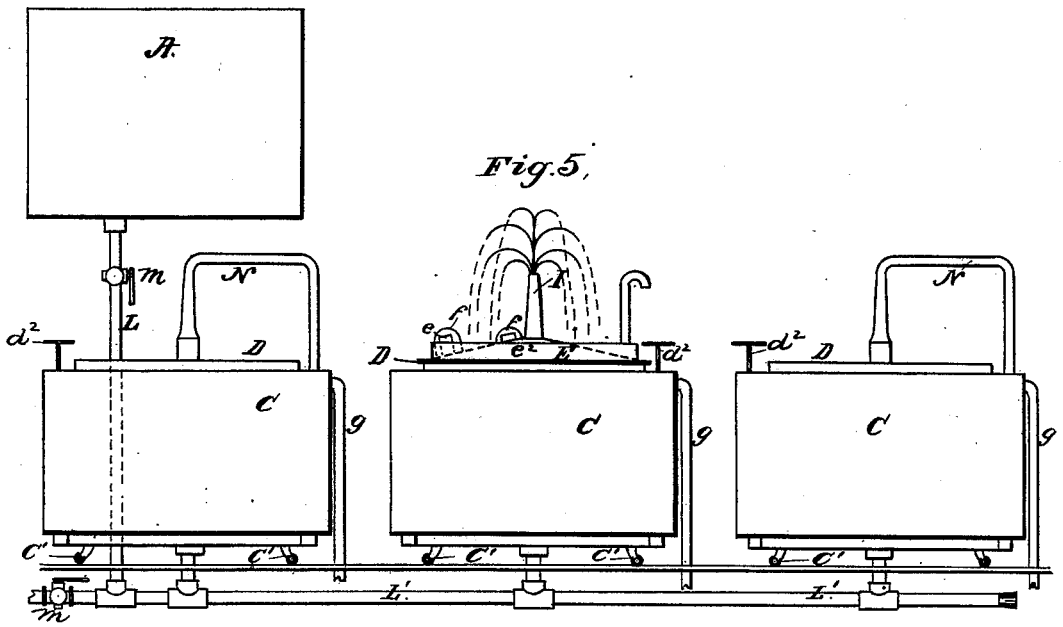


Fig. 5.



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UNITED STATES PATENT OFFICE.

VARNUM P. HILL, OF HANNIBAL, AND JOHN S. HILL, OF MOIRA, NEW YORK.

IMPROVEMENT IN MILK-COOLING APPARATUS.

Specification forming part of Letters Patent No. **206,108**, dated July 16, 1878; application filed November 22, 1877.

To all whom it may concern:

Be it known that we, VARNUM PARSONS HILL, of Hannibal, Oswego county, and JOHN SIAS HILL, of Moira, Franklin county, both in the State of New York, have invented certain new and useful Improvements in Apparatus for Cooling Milk, of which the following is a specification:

Our invention relates to an improved method of cooling milk by circulating a continuous current of water around, through, and over a systematic arrangement of milk-pans by the employment of suitable tanks, tubes, and connections. It also relates to the employment of a jet or spray tube extending through the center of an internal milk-box and discharging on top, said spray-tube being in communication with an obstructed tube located within the central cooling-chamber, for supplying water to said tube. It also relates to the constructing of the cover of the milk-pan with an upwardly-extending rim, perforated at bottom to permit the water to run off, and having short tubes covered by glass caps for excluding air and condensing the vapor arising from the milk. It also relates to the manner of accommodating the pans for skimming convenient to the operator, through the medium of casters or rollers and other devices, to be more fully described in the following specification.

In the accompanying drawings, Figure 1 is a vertical section of my improved cooling device with the tanks in elevation represented as stationary and suspended. Fig. 2 is a section of the cooler, exhibiting the milk-pan with a textile fabric wound or bound around the same, and the cover and jet-tube removed, having a bent tube for filling the cooler substituted thereon. Fig. 3 is a top view of a cover exhibiting the glass openings and short tubes for admitting light; also, an opening for the escape of animal heat, and also the perforations around the rim closed with plugs. Fig. 4 is a cross-section of a cover, showing the caps for excluding the air and condensing the vapors arising from the milk. It also represents, in dotted lines, a flat and concave crown supported by the central cooling-chamber. Fig. 5 represents our improved cooling device with several coolers operated by one stationary tank.

A may indicate elevated or stationary tanks, having flexible or non-flexible tubing J and L communicating, through the tube L′, with the coolers G and C, by means of obstructed cooling supply-pipes O, located in central cooling-chamber G, water from said pipe passing through perforations *o*, coming in contact with the sides of the cooler, thus producing an instantaneous decrease of temperature, and finding an exit, through perforations *o′*, into the jet-tube I, from whence the water disseminates over the top of the covers E, filling said covers, and also partially submerging the caps *f*, said caps being provided with gum gaskets *f′*, for excluding air, and finally runs over the rim e^1, down the sides of the cooler D, over the textile jacket or covering H, into the external cooler C, whence the water rises to the top and finds an outlet in the overflow or waste pipe *g*. This manner of using the flow of water is adapted to a single or stationary tank, hill-side spring, or reservoir or hydrant.

In using the elevated tanks the water from the jet falls on a textile cover, H′, similar to that used on the sides of the pan, flowing off said cover through perforations e^2, (said perforations being closed with rubber or wooden plugs when it is desired to have the lid overflow,) down the sides of the milk-pan into the external cooler, thence through a waste-pipe, *h*, or a coupling discharge-pipe, K, into the trough R, and finally flowing into the lower tank. The coupling-pipe K is a separate pipe passing through the waste-pipe *h*, and extending up and around the discharge-tube *i*, which is provided with a plug, *j*, in the bottom of the milk-pan D, said plug being removed when it is necessary to draw off the milk. The cover E is also provided with a neck, e^4, having securely fastened to its top a gum packing to prevent the water from the fountain running into the milk. There is also a large gum gasket or packing, *w*, which rests on the top of the pan, being held there by the weight of water contained on the top of the cover. When

the water overflowing the cover is allowed to escape over the pan and through the bottom of the cooler C, the weight of water on the cover presses the gasket *e* firmly on the rim of the pan, thus making an air-tight pan or chamber.

Sometimes it becomes necessary to fill the external cooler more rapidly than can be accomplished by the jet-tube alone, for which purpose we employ a U-shaped tube, *d*, having a faucet, d^1, and handle d^2, to regulate or stop the flow of water.

The milk-pan covers are constructed with deep rims E^1 for the purpose of overlapping the pans a sufficient depth, so as to enter the water and make the pans air-tight. It also prevents the dripping water flowing over the same from entering the pan and mixing with the milk.

T represents glass, of any desired form or shape, for admitting light, and being secured either inside, outside, or centrally in the cover.

E^2 represents tubes for the escape of animal heat; but said tubes may be removed, and the openings closed by caps of glass or any other suitable material, with suitable packing for making them air-tight.

e indicates short tubes, having transparent caps *f* for admitting light and excluding air.

P represents an internally-tapped square nut, which is attached to arms Q at the bottom of the pan, and allows of the pan being revolved, when necessary, without disconnecting or disturbing the tubes.

Q represents arms provided with casters or rollers, C′, resting on a floor or table, S, said arms being secured to the cooler by means of a square-headed nut attached to the same.

Operation: In the first process of cooling fresh-drawn milk, it requires a larger opening for the escape of animal heat than can be afforded by the small tubes attached to the cover. The cover and jet-tubes are therefore removed. The bent tube N, being attached to the supply-tube O, conducts the water over the exposed milk into the cooler, and fills it almost to the top, from whence it flows off through the pipe *g* into a tank or elsewhere.

After all the milk-pans are filled, the bent tubes N are removed, the cover and jet-tube substituted, and the cooling process is continued by the jet-tube I and the U-shaped tube *d*. By this additional supply of water enveloping the pans, they become air-tight, the remaining animal heat and vapor escaping through the pipe E^2 and the short tubes *e*, the vapor condensing on the under side of the semi-spherical caps or covers *f*, and dripping on the textile fabric or cover H′, and flowing off over the sides of the pan.

When the water enters the pipe O it flows against the obstruction V in said pipe, and jets out of the perforation *e* with considerable force against the sides of the cooler G, instantly cooling the sides of the same, and then escaping through the perforations *o*′, through a jet or spray tube over the cover E and over the rim e^1 or through the perforations e^2, down the jacket wound around the milk-pan D, and either flowing off through the waste-pipe *h* or through the trough R into the lower tank. When said tank is filled it is hoisted into the same position as the upper tank occupies by any ordinary devices, not necessary to be shown or described.

On first starting the flow of water, when it is desirable to cool the milk-pan D much faster than can be accomplished by the jet-tube I, we employ the U-shaped tube *d*, regulating the water by the faucet d^1, operated by handle d^2, so that an equal amount of water may flow through said pipe and jet-tube at the same time, thus reducing the temperature much more rapidly than when only one tube is used. When it is necessary to remove the jet-tube or cover, we insert a plug in tube O, thus stopping the flow of water in this direction, and also preventing the water from running into the milk-pan. The supply of water flowing from the tanks or from springs, reservoirs, or hydrants is regulated by the faucets *m*. When it is necessary to skim the milk or wash the pans, the operator grasps the edge of the milk-pan and revolves it slowly in any direction, the cooler C being held firmly by means of the square nut P, attached to the arm Q, having casters C′, supported on a table, platform, or floor.

In the winter season, when it is not necessary to employ water to cool the milk, we dispense with the central cooling-chamber G by unscrewing the same and inserting a plug in the bottom of the milk-pan, thus giving more room in said pan for the milk.

Having thus described our invention, the following is what we claim as new and desire to secure by Letters Patent:

1. The combination of the central tube I with the pipes L L′, leading from the water-reservoir A and communicating with the central cooler G through the bottom of the milk-pan.

2. In a milk-pan, the combination of an internal milk-box with an external cooling-pan extending up level with the cover, and a jet or spray tube extending through the center and discharging on top of the box, substantially as shown and described.

3. The combination, with the cooling-pan C, of the cover E, having the upwardly-extending rim e^1, perforated at e^2, as and for the purpose set forth.

4. The milk-pan cover E, having short tubes *e*, covered by the glass caps *f*, for excluding the air and condensing the vapor arising from the milk, said vapor, when condensed, run-

ning down the sides of the caps onto the cover E, as explained.

5. In a milk-cooler, the central cooling-chamber G, provided with an obstructed tube, O, and with water-inlets *o* and outlets *o'*, substantially as shown and described.

6. The internally-tapped nut P, arms Q, and casters C', in combination with a milk-pan, as shown and described.

7. A central supply-tube, O, having at its lower end a U-shaped tube, *d*, provided with a faucet, d^1, and handle d^2, substantially as shown and described.

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JOHN SIAS HILL.

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