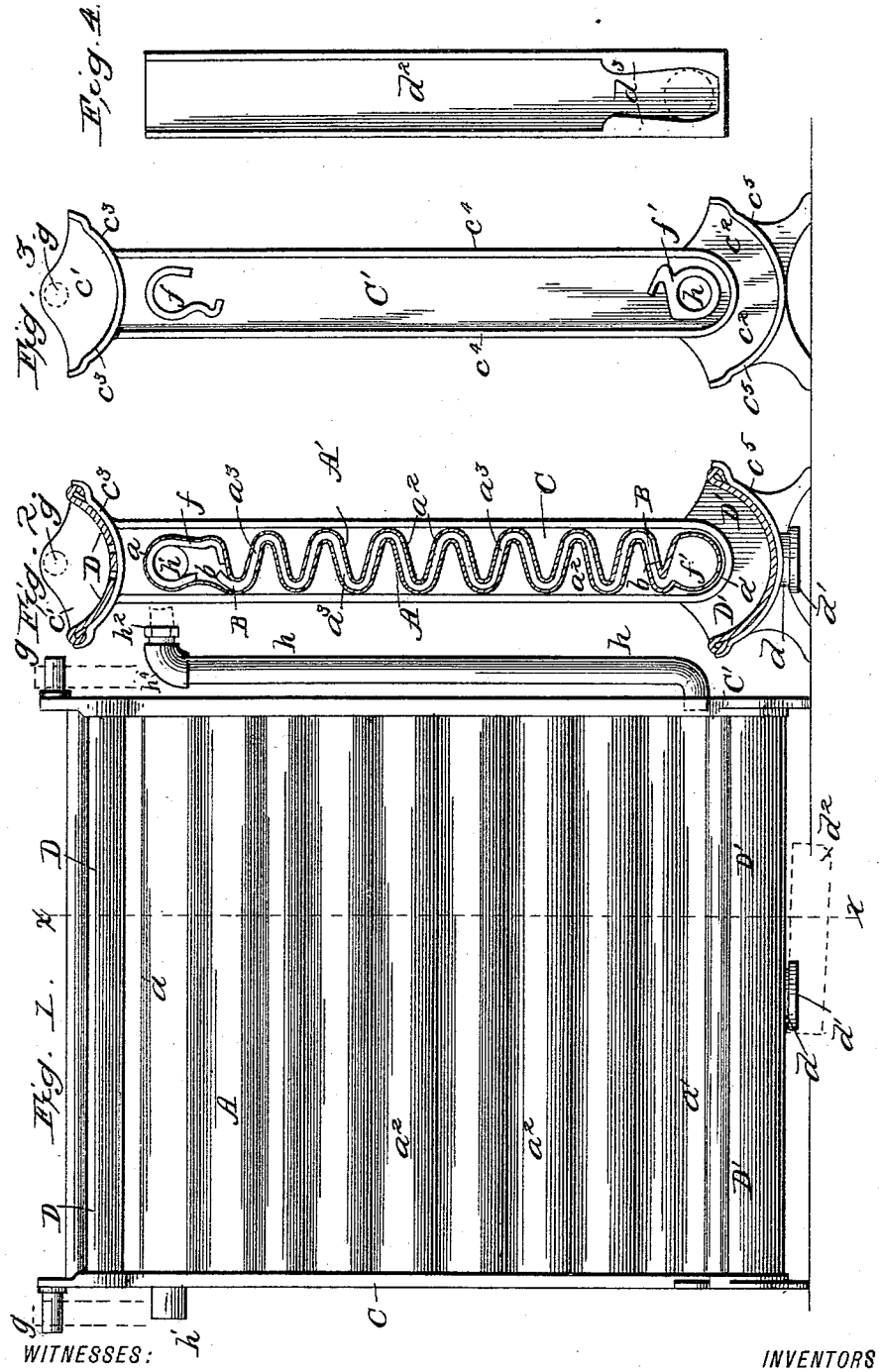
(No Model.)

S. M. HEULINGS, Jr. & E. EVANS.

MILK COOLER.

No. 457,533. Patented Aug. 11, 1891.



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MILK-COOLER.

SPECIFICATION forming part of Letters Patent No. 457,533, dated August 11, 1891.

Application filed September 11, 1890. Serial No. 364,699. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL M. HEULINGS, Jr., and ELLWOOD EVANS, citizens of the United States, residing at Haddonfield, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Milk-Coolers, of which the following is a specification.

Our invention relates to that class of milk-coolers having corrugated metal cooling-plates, the corrugations being arranged horizontally and those of one plate entering those of the other plate and forming between them a serpentine passage for the circulation or flow of a cooling or refrigerating fluid, while the milk or other liquid to be cooled flows on the outside of the cooled corrugated plates. The cooler as a whole is preferably pivotally suspended at its top so that it will assume a perpendicular position, and thus secure a more even distribution of the liquid to be cooled over the entire surface of the corrugated cooling-plates.

Our invention has for its object to so construct and connect the parts of the cooler together that it can be more economically and expeditiously made, to provide for the water-pipe or cooling-liquid pipe connection with the cooler in such manner that it will not interfere with the cooler assuming its normal perpendicular position, and to provide the outlet-trough of the cooler with a swinging or rotatable spout to admit of changing the direction of flow of the cooled milk from one point or direction to another to better adapt the cooler for farmers' use in cooling milk preparatory to shipment.

In milk-coolers of the class above mentioned there is liability of the corrugated plates becoming bent or indented, so as to produce unevenness of surface, thereby interfering with the uniform distribution of the liquid to be cooled, and when two plates are adjacently arranged with relation to each other, such bending or indenting produces strictures or reductions in the cross-section area of the serpentine passage between the plates, thereby obstructing the flow of the refrigerant therethrough and resulting in an uneven refrigerating or cooling effect and otherwise interfering with the proper working of the apparatus.

It is the object of our invention to overcome these difficulties and maintain a uniformly-open serpentine passage for the flow of the refrigerating-fluid, and also to hold the various bends or projections of the corrugated plates firmly in proper position and relation to each other.

The matter constituting our invention will be defined in the claims.

Reference is had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a milk-cooler embodying our improvements. Fig. 2 represents a vertical cross-section of the same on line x x. Fig. 3 represents an inner side elevation of one of the end plates or standards. Fig. 4 represents a plan view of the rotatable discharge-trough.

A A′ represent the corrugated plates, which are formed of sheet-copper or other metal, suitably secured together to form upper and lower rounded ends a and a', respectively, with intermediate corrugations a^2, the corrugations of one plate entering those of the other to form a serpentine passage a^3 between them. These plates, when duly formed and connected together, are provided at their sides with division wires or strips B, soldered or otherwise secured between the plates and following the serpentine passage a^3 to maintain the width of the latter from side to side between the plates. These wires B do not continue beyond the corrugations of or the serpentine passage between the plates A A′, but terminate, as shown at b, in advance of the passage between the plates bounded by the rounded ends a and a', for a purpose to be hereinafter described.

C C′ represent the metal side plates or supporting-standards for the cooling-plates A A′. These plates or standards C C′ consist, preferably, of castings having widened upper and lower ends c' c^2, with edge beads or projections c^3 c^4 c^5 on their inner surfaces at top, middle, and bottom parts, respectively. The beads or projections c^3 and c^5 are of a curved or semicircular form to support the inlet and outlet troughs D and D′ of the cooler. Below

the inlet-trough D and above the outlet-trough D′ on the inner sides of the plates or standards C C′ are projecting ribs, lugs, or flanges *f* and *f*′, respectively, each corresponding in outline to the outline of the ends *a a*′ of the plates A A′, so that said projections *f f*′ enter the respective sides of the ends *a a*′ to maintain the shape of the same and also to serve for locating the plates A A′ in position on their side standards C C′ preparatory to soldering the same together.

The inlet-trough D has one or more slits or lines of perforations, as desired, for distributing milk to the rounded end or top *a* of the plates A A′ and to direct the flow to the outside of the corrugated plates A A′.

The plates or standards C C′ have at their upper ends outside lugs *g*, by means of which the cooler may be pivotally suspended from any suitable support—such as brackets—so as to assume a perpendicular position and thus admit of the more even distribution and flow of milk on the outside of the corrugations of the plates A A′.

At one side of the lower end *a*′ and passing through one side of the standards C C′ is the inlet-pipe *h* for the water or other cooling-liquid for circulation through the serpentine passage a^3 between the plates A A′, and oppositely located in the other standard at the top end *a* is the outlet-pipe *h*′ for such circulation. To pipe *h* is secured the flexible or other pipe h^2, leading to a tank or other supply, as usual or as desired, said supply or tank not being shown in the drawings. To bring the coupling connection between the pipes *h* and h^2 near to the pivoted supports *g* or points of suspension of the cooler, so as to prevent the weight of the pipe h^2 from swinging the cooler out of its perpendicular line, the end h^4 of the pipe *h* is continued upwardly to near the top of the cooler, as shown in Fig. 1.

The bottom trough D′ is provided at any suitable point along its length with a nozzle *d*, having an outside flange *d*′ at the lower end for the support of a rotatable spout d^2, which at its upper edges has inwardly-projecting flanges d^3 for engagement with the nozzle-flange *d*′. The inner edges of the flanges d^3 are set at such a distance from each other as to pass on either side of the nozzle *d* and rest upon the annular flange *d*′. The throat or passage between the flanges may be slightly contracted or of a width slightly less than the diameter of the nozzle *d*, so that slight force may be required to apply the rotatable spout of said nozzle.

In order to apply the spout, it is placed directly under the nozzle *d*, with the latter in advance of the throat—that is, between the throat and the delivery end of the spout—and the spout is then drawn forward, so as to cause the edges of the flanges d^3 to embrace the nozzle above its annular flange. The spout can now be turned in any desired direction so as to deliver the cooled liquid into any desired receptacle, thereby making the cooler more valuable for farmers' use in cooling milk directly from the cow for shipment.

In the use of an apparatus of this kind it is well known that the milk or liquid to be cooled is introduced into the trough D and is delivered therefrom upon the curved upper end of the cooling-plates, from whence it flows down said plates and into the trough D′ and from thence to a desired receptacle. In the meantime a refrigerant—such as water—is introduced by the pipe *h* and flows up the serpentine passage and is discharged at the pipe *h*′, the supply being maintained by any suitable means.

The spacing wires or strips B, arranged between the corrugated plates A A′, serve to strengthen and support the corrugations of said plates.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a milk-cooler, the standards having on their inner surfaces curved ribs for supporting and determining the contour of the rounded ends of the cooling surfaces or plates, in combination with the corrugated plates A A′, having rounded ends, substantially as described.

2. In a milk-cooler, the standards having on their inner surfaces curved ribs terminating in a bend for supporting and determining the form of the end corrugations of the cooling-plates, in combination with the corrugated plates A A′, fitted to said ribs, substantially as described.

3. In a milk-cooler having side standards, the corrugated cooling-plates arranged thereon, a bent metallic spacer arranged between the inner surfaces of the opposite standards and between said corrugated plates and supporting the corrugations of said plates, all combined substantially as described.

4. The combination, in a milk-cooler, of means for pivotally suspending it, with a supply-pipe connecting with the lower end of the cooler and extending upward to or nearly to its point of support, substantially as described.

5. In a milk-cooler, the combination, with a discharge-nozzle having an annular flange, of a rotatable and removable spout having inwardly-projecting flanges d^3, extending along its upper edges to embrace said nozzle, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

SAMUEL M. HEULINGS, JR.
ELLWOOD EVANS.

Witnesses:
S. J. VAN STAVOREN,
CHAS. F. VAN HORN.