(No Model.)

C. A. CLARK.

MILK COOLER.

No. 495,877. Patented Apr. 18, 1893.

Fig. 1.

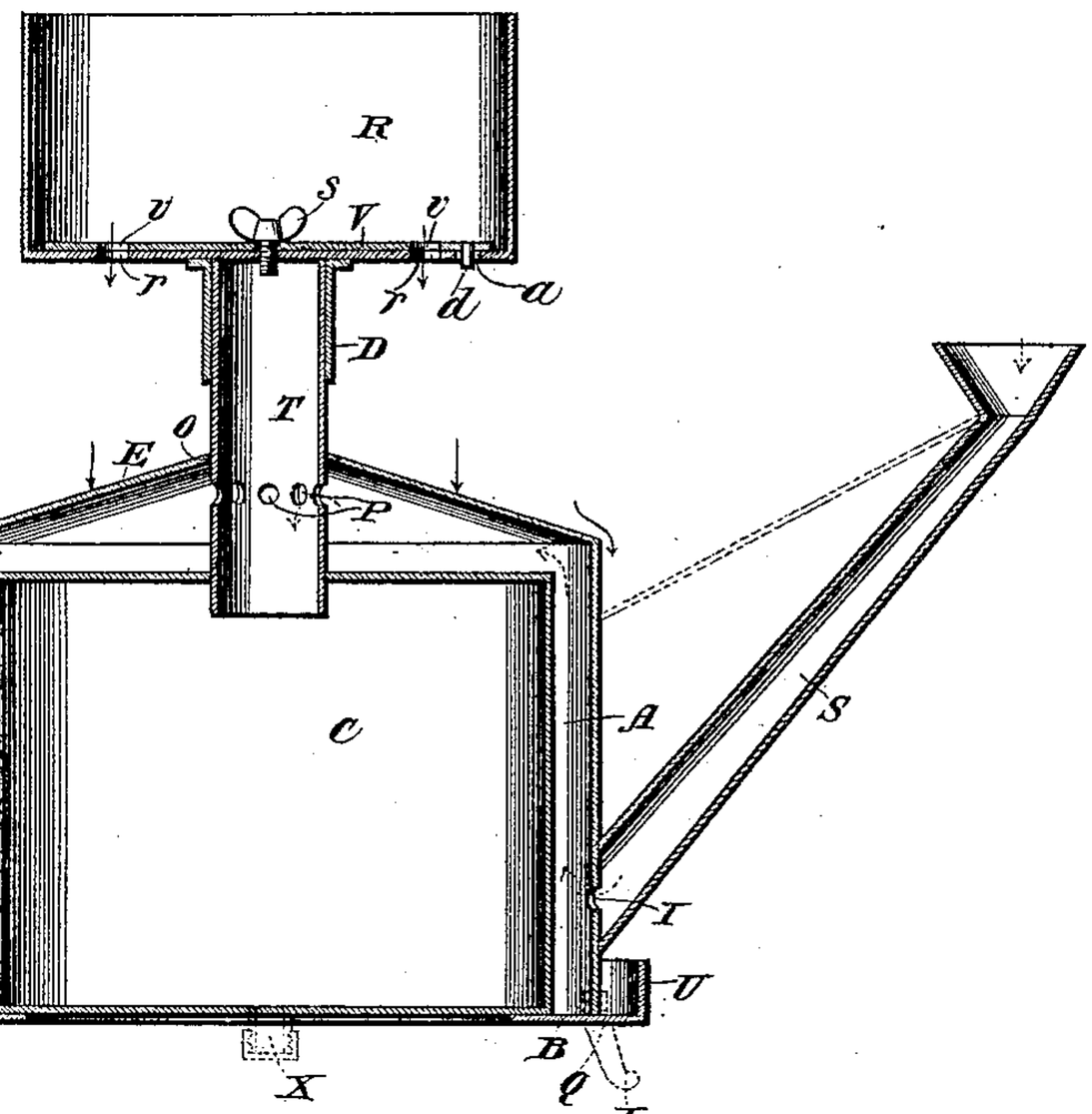


Fig. 2.

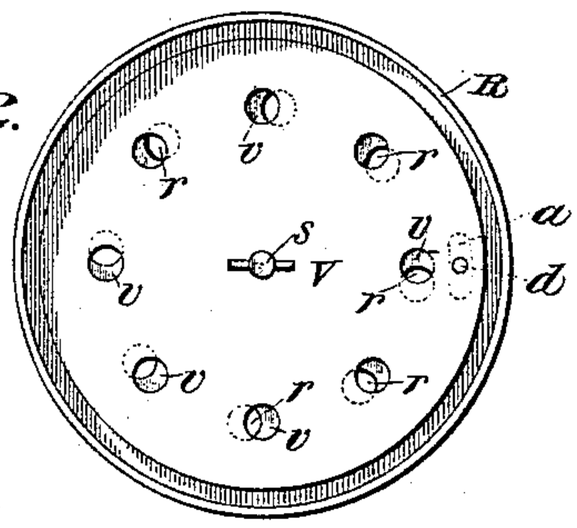
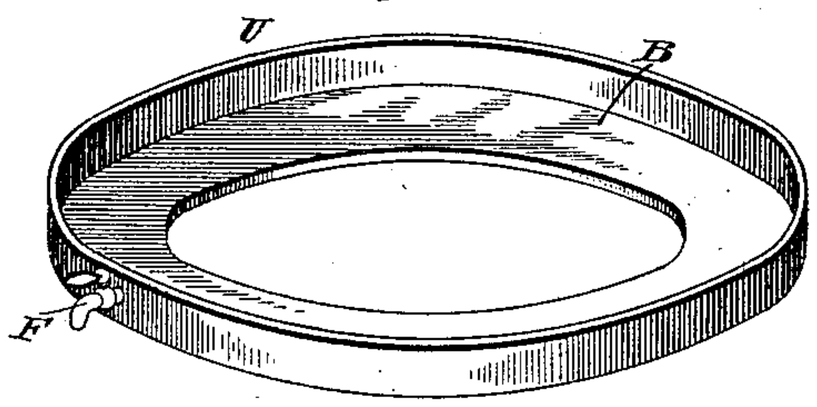


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES A. CLARK, OF RAYMONDVILLE, NEW YORK.

MILK-COOLER.

SPECIFICATION forming part of Letters Patent No. 495,877, dated April 18, 1893.

Application filed August 29, 1892. Serial No. 444,371. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. CLARK, a citizen of the United States, and a resident of Raymondville, St. Lawrence county, State of New York, have invented certain new and useful Improvements in Milk-Coolers; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, ending with the claims particularly specifying the novelties.

This invention relates to milk coolers generally used in the dairy, and more especially to such coolers as effect the circulation of the milk; and the object hereof is to produce certain improvements in devices of this character.

To this end the invention consists in a milk cooler constructed substantially as hereinafter more fully described and claimed, and as illustrated in the accompanying sheet of drawings wherein—

Figure 1 is a central vertical section of this device, indicating the course of the water in dotted arrows and of the milk in full arrows. Fig. 2 is a detail in plan showing the inside of the receiving cup, and the valve for the bottom thereof. Fig. 3 is a perspective detail of the annular base or ring.

Heretofore milk has been cooled by being passed over cans containing water or ice, and also in nested cans the inner of which contained running water and the outer circulating milk; but in the present case a cooler is produced wherein an outer can contains an upwardly moving body of water which may come to rest within the inner can, while over the outer can flows a downwardly moving sheet of milk, which is exposed to aeration on its outer face and to the cooling effects of the outer can on its inner face. The details for carrying out this idea are fully set forth below.

Referring to the drawings, the letter B designates a base which rests on a suitable support and has an upturned circular flange U provided at one point with an open delivery tube or a faucet F. This base is preferably made in the shape of a ring as seen in Fig. 3, although it could be a plate if desired. Resting on the base is a water can C preferably cylindrical in shape with flat heads, and its diameter such that it will overlap the inner edge of the ring-shaped base B. In its lower head the can C may have a suitable exit X for the water, such as a pipe closed by a valve if desired, or a rubber tube leading some distance away; but this is not necessary. Rising from its upper end is a tube T opening through the upper head and also at its upper extremity, and this tube is provided with a ring of perforations P standing some distance above said upper head.

R is a cup-shaped receptacle for receiving the milk, either as it is drawn from the cow or as it is poured from pails into this receiving cup. Depending from its bottom is a collar D of a size to fit closely over the upper end of the tube T, and by this means the receiving cup is supported in position, yet may be removed at will and access thereby had to the interior of the can C.

I preferably provide the cup R with a valve in its bottom constructed as follows: *s* is a set screw taking into the bottom of the cup at its center, and V is a disk-shaped valve pivoted on this screw under its head. A depending stud *d* on the disk moves in an arc-shaped slot *a* in the bottom of the cup to permit the disk-valve to have a slight circular movement. The cup-bottom and disk are provided respectively with annular rings of perforations *r* and *v* adapted to exactly register with each other. By loosening the set-screw and turning the disk, these perforations can be caused to register more or less exactly, and the flow of the milk from the cup thereby regulated at will, after which the set-screw is reset as is clear.

The letter M designates a milk can open at its lower end and having a conical upper end E with an opening O at its apex of a size to fit closely around the tube T. The can M is larger than the water can C, yet not so great as the upright flange U, and when in place it stands about midway between the water can and flange and forms an outer annular trough and an inner annular space A. Its height is sufficient to cause its upper end at this time to stand about even with or a little above that of the water can, and from this point the conical upper end E rises to the tube T so that the opening O in the end E is above the perforations P in the tube. S is a funnel-shaped supply pipe, preferably rising above the horizontal

line of the perforations P, and this pipe may be of considerable size if desired, in order to constitute a supply reservoir. The said pipe communicates as at the inlet I with the annular space A between the case—permitting the water to pass through the milk can but not into the water can.

In assembling the parts of this improved cooler, the base is first set up, the water can then placed thereon, and then the milk can passed over the water can to position; and the cup is finally put in place with its collar resting over the upper end of the tube to support it firmly yet removably. Where the two cans rest on the base they are preferably soldered or brazed thereto as affording the strongest water-tight joint, and the milk-can is soldered at O to the tube T. This, however, leaves no manner of gaining access to the annular space A for cleaning purposes, though scalding water may be passed through the water-course whenever necessary, and if the bottom of the can C is open as it preferably is, ready access may be had to its interior. But it is generally the surfaces which are in contact with the milk which become foul, and as such surfaces are entirely exterior in this cooler they can be cleaned with ease. In some cases it may be desired that all parts be separable, and then there must be some detachable connection between the lower end of the milk can and the ring so that the can may be lifted off the same. Such connection should be water-tight in order that the water and milk cannot become mixed nor leakage occur beneath the can M. One arrangement would be to provide the base B with two small upright ribs as seen at Q in dotted lines in Fig. 1, and have the lower edge of the milk can pass between these ribs to form a tight joint; but any suitable means may be employed for this purpose.

The device is preferably cylindrical as being most easily cleaned, but it may be square or of any other shape; and the sizes and proportions of parts are not material. The cans M and C are made of tin and zinc respectively to prevent rusting, though they might be of pottery if desired. The lower end of the water can is preferably open; but, as seen in dotted lines in the drawings, legs L may depend from the base B to raise the lower end of the can from the ground, and such end may be then closed and have an exit in the form of a short tube which can be closed by a screw cap or plug when it is not desired to use it. These details will, however, readily suggest themselves to the manufacturer, and I reserve the right to use them without departing from the spirit of my invention.

The operation of this improved cooler may be as follows: If it be small enough, the device is set upon the ground and the milk drawn from the cow directly into the cup R: otherwise it is set on a bench or table and the milk is poured into this cup—preferably through a suitable strainer as usual. The valve V being properly set, the milk flows through the perforations *v* and *r*, falls upon the conical upper end E of the milk can M, thence flows over the corner of such can and down outside its sides in a thin sheet, and finally collects on the base within the flange U in the annular trough formed by such base, its flange, and the can body, whence it is drawn at intervals—or steadily if preferred—through the tube F. During this time water may be poured steadily into the supply funnel S, (or such funnel may be large as seen in dotted lines so as to hold considerable water,) and, entering the milk can M near its bottom through the inlet I, it rises in the annular space A between the cans M and C in a constantly flowing sheet which cools the milk can M by its contact with its inner face, and hence cools the milk which is on its outer face. Flowing at last over the upper end of the can C, the water rises around the tube T until it passes through the perforations P therein, whence it falls into the can C. Here it may collect if the exit X is closed or not used, but it is preferably allowed to flow out the open lower end of the can constantly, as its usefulness is now past. Thus it will be seen that the downwardly flowing milk is cooled by two agencies—the upwardly flowing water in the annular space A and just inside the can M, and the air on the exterior of the milk. Obviously the water cools the milk, while the air aerates it thoroughly; but for the reason that the milk is exposed to the air, it is perhaps advisable that the cooler be employed indoors in order that no foreign substances may fall into the milk as it flows down the device. The speed of the flow, or rather the volume, of milk can be regulated by the valve V as will be clearly understood. It should be particularly noticed that just before the milk is drawn off from the trough, it stands opposite the water where the latter is coolest because it had just entered the space A, and hence the initial cooling effect of the water is utilized to finally give the greatest coolness to the milk. As the water ascends in the annular space and gradually becomes slightly warmer, it stands opposite milk nearer the cup R and hence warmer, and under the conical end E where the milk is warmest the water will be of nearly the same temperature. Thus the milk is cooled slowly by this device: not suddenly, which might injure it. So also as to the water within the can C if it be closed: the warmest water flows through the perforations into the can and stands at the bottom thereof, again opposite the coolest water which has just passed into the annular space A. If this heats the inflowing water too much, the exit X may be opened; or ice could be placed in the can. In fact, the cooling water may be first reduced in temperature in any way; or water cooled by ice in the can could be drawn off and used again.

What is claimed as new is—

1. In a milk cooler, the combination with a

can having a conical upper end through which rises a tube, a collecting trough around said can, and means for producing a current of water flowing up inside the sides and up under the upper end of said can to the tube; of a receiving cup having a flat bottom closed except for a circular series of perforations larger than said tube and a concentric slot, a depending collar on said bottom fitting removably over said tube, a disk within said cup provided with a row of perforations adapted to register with those in the cup, and a stud on the disk moving in said slot, as and for the purpose set forth.

2. In a milk cooler, the combination with an outer can having a conical upper end, means for delivering milk upon said end, and a collecting trough around said can; of an inner can smaller than the outer and forming an annular space between, and means for causing an upward current of water within this space and up along said conical top, as and for the purpose set forth.

3. In a milk cooler, the combination with an outer can having a conical upper end, a tube projecting through the apex of the cone and perforated below its point of passage therethrough, means for delivering milk upon said end around the tube, and a collecting trough around the can; of an inner can smaller than the outer and having a closed upper end through which said tube passes, a base closing the annular space between the cans, and a supply tube opening into such space near the base, as and for the purpose set forth.

4. In a milk cooler, the combination with an outer can having a conical upper end, a collecting trough around this can near its lower end, and means for delivering milk upon said upper end around its apex; of an inner can smaller than said outer and producing an annular space between them, a base closing the lower end of this space, a supply tube opening into such space near said base, a tube opening from the inner can into the outer at a point near its apex, and an exit in the bottom of the inner can, as and for the purpose set forth.

5. In a milk cooler, the combination with an outer can having a conical upper end, a collecting trough around this can, and means for delivering milk upon said upper end near its apex; of an inner can smaller than said outer and producing an annular space between them, a base closing the lower end of this space, a tube opening through the upper end of the inner can to a point near the apex of the outer can, and a supply reservoir secured to the outer can through which it opens in a small inlet near said base, the reservoir rising above the apex, as and for the purpose set forth.

6. In a milk cooler, the combination with an inner can, a concentric outer can having an open lower end, there being an annular space between the cans, and a base closing the lower end of such space and having an upright flange concentric with the outer can and forming a trough exterior thereto; of a supply pipe opening into said space near the base, a tube opening from the top of the inner can to within the top of the outer, said latter top being conical, and means for delivering milk upon said conical top around its apex, as and for the purpose set forth.

7. In a milk cooler, the combination with a ring-shaped base having a flange rising from its outer edge, an outer can secured on said base and smaller than said flange, an inner can also secured upon said base and smaller than the outer, forming an annular space between the cans, and means for passing a current of water up such space, along under the top of the outer can, and into the inner; of a milk receptacle supported above and delivering onto the top of the outer can, as and for the purpose set forth.

8. In a milk cooler, the combination with a ring-shaped base having supporting legs, a flange rising from the outer edge of said base, an outer can secured on said base inside said flange, and an inner can also secured on said base and inside the outer, leaving an annular space between; of an exit in the lower end of the inner can, a cap for closing the exit, means for passing a current of water up said space and into the inner can, and a receiving cup delivering onto the upper end of the outer can, as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my signature on this the 26th day of August, A. D. 1892.

CHARLES A. CLARK.

Witnesses:
W. F. PHELPS,
H. F. DREW.