

(No Model.)

J. F. SWAB.
MILK COOLER.

No. 245,026.

Patented Aug. 2, 1881.

Fig. 2.

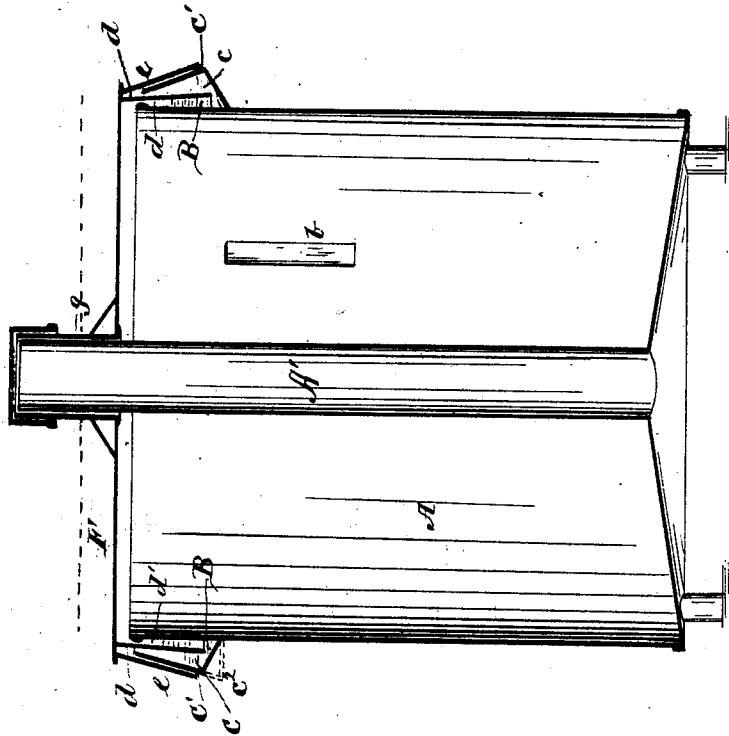
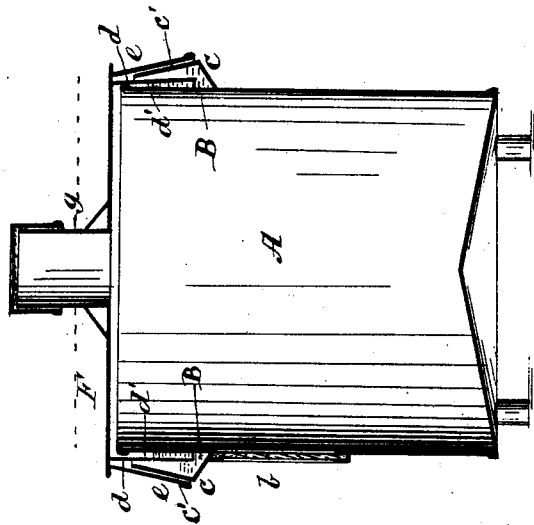


Fig. 1.



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MILK-COOLER.

SPECIFICATION forming part of Letters Patent No. 245,026, dated August 2, 1881.

Application filed February 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH F. SWAB, a citizen of the United States, residing at Cedar Rapids, in the county of Linn and State of Iowa, have invented certain new and useful Improvements in Milk-Coolers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has for its object to furnish a milk-can which may be submerged in water and will be automatically sealed by a column of air compressed below the lid and between two depending rims and the side of an annular trough formed around the outer side and near the top of the can.

It consists in an annular trough open at its upper side and formed around on the outer side and near the top of the can, and a lid or cover having two depending rims fixed to the under side of and near the periphery of the cover, the said rims having their upper ends fixed near together on the lid, while their lower ends diverge, so as to provide a triangular space between them, and one of which dips into, while the other passes down close against the outside of, said trough.

In the drawings, Figure 1 is a vertical section of a can of ordinary size; and Fig. 2 is a vertical section of a can of larger capacity, having a central vertical tube or air-passage.

A is the can when made of large capacity, as shown in Fig. 2. A central vertical tube, A', open at top and bottom, is placed in it, into which the water will rise when the can is submerged.

On the outer side and near the top of the can, I attach a rim or flange, c, constructed and arranged to form a chamber, B, for holding water, and one of the rims of the lid F, as hereinafter more fully described. The flange c has its outer side, c', drawn in at its top end, so that it approaches very close to the side of the can and forms the chamber B into a triangular form, wide at its lower end and narrow at its upper end, the latter being open to permit the insertion of the rim of the lid. The upper edge of the side c' of flange c,

when inclined inward, as described, is brought slightly below the rim of the can, so that there will be a slight space between it and the lid F when the latter is placed in position. The form of chamber B gives to it a large capacity at its bottom and a gradually-diminishing capacity toward its top.

The lid F is provided with a central ventilating tube or neck, g, for ventilating purposes. In large cans the neck g slips loosely over the top of the central tube, A', which projects above the top of the can. The neck g may be covered by any suitable device which will permit the escape of animal-heat from the milk. The cover has fixed to its under side and near its periphery two depending annular rims, d and e. The inner rim, d, dips into the trough; while the outer rim, e, slides down on the outside of and against the flange c' of trough c. The rim e and flange c, when brought together, do not form a water-tight joint. A very small quantity of water will be pressed upward between the rim and flange, and will trickle over the top of the latter and drop to the bottom of the trough. The rims have their upper ends fixed near together, so as to provide space enough to receive the upper end of the flange c' and to permit the water to trickle over, as hereinbefore stated. The rims diverge from their fixed ends downward, so as to bring their lower ends wide apart, and thus provide between them a triangular or cone-shaped space. When the lid is placed on the can and the inner rim is dipped into the trough a triangular or cone-shaped space is provided between the said inner rim and the flange c'. The lower end of the inner rim dips nearly to the bottom of the trough, leaving but a narrow space below it for the water to pass under, for purposes hereinafter explained. In preference the inner rim is set perpendicularly or nearly perpendicular to the lid, and is arranged to enter the narrow opening in the top of the chamber B. It is, by preference, made long enough to reach nearly to the bottom of the chamber. When the lid is placed in position the side c' of flange c is embraced between the rims d and e, and the space included between the upper ends of the said rims serves as a chamber, into which the air will be compressed, as hereinafter explained.

In practice, when the milk is cooled by sub-

merging the cans, the latter are sunk to a depth to bring one to three inches of water over the lid. If my can be submerged till the water reaches a height about the point marked by the letter *g* on the neck of the lid, the following results will follow, namely, the water will run upward between the outer rim, *e*, and the flange *c'*, and will pass over the latter into the chamber B. As soon as the lower end of the inner flange, *d*, is submerged the rising water will compress the air into the space between the upper ends of the outer and inner rims, and, as the water rises, the capacity contracts, and the air is compressed into still smaller space, and its power is increased. When the can is submerged the water will flow in a small trickling stream upward between the outer rim and the side *c'*, and over the top of the latter, and drop to the bottom of the trough. The stream of water thus flowing is so small that it does not drive the air before it below the end of the rim *d* and into the can. The escape of the air is cut off from the trough outward through the space between the rim *e* and flange *c*, because the said space is full of water. The water, as it rises in the trough, presses the air upward toward the rim. No compression of the air can take place until the water rises and fills the space between the lower end of the inner rim, *d*, and the bottom of the trough *c*. The water, as it rises above and submerges the lower end of the rim *d*, presses the air upward. The air in the space between the rim *d* and the side of the can escapes into the can, so that there is no pressure on the water between said inner rim and the can, except the ordinary pressure of the air. The water, as it rises in the triangular space between the inner rim and the side of the trough, is subjected to a gradually-increasing resistance by the increasing density of the compressed air above it. All avenues of escape being cut off, the air is forced upward and is compressed into the space between the upper end of the flange *c'* and the upper ends of the rims *d* and *e*. The air within the triangular space is subjected to the action of two bodies of water, first, by the outer column of water submerging the can; and, secondly, by the inner column of water as it rises above the lower end of the inner rim, *d*, in the trough *c*. The inner column of water supports the ordinary pressure of the air between the rim *d* and the side of the can and an extraordinary pressure of the denser air compressed in the triangular space between the rims and side of the trough. The dense cushion formed by the pressure of the air upward by the water rising from the bottom of the trough is the resisting medium which prevents the water flowing into the trough after the latter has filled to a given height. It will be understood that as the density of the air in the triangular space increases the greater pressure exerted thereby on the surface of the water will force the latter upward in the space *d'* between the rim *d* and side of the can to a level above the level of the water in said tri-

angular space. If the rims *d* and *e* stood perpendicular to the cover, and parallel with each other, and the flange *c'* was vertical, so that when the cover was put on the can, the said rims and flange would all be parallel, a rectangular chamber would be formed in the same relative position where in my device I show a conical-shaped chamber. In this rectangular space, with a given column of water outside of the can, the air would be compressed into a given vertical column in the upper end of said space. I have found by experiment that this rectangular form will not permit the can to be submerged so as to cover the lid with any appreciable depth of water; but with the space made conical in shape the can may be submerged so as to have from one and a half to three inches of water above the cover. By reason of the gradual contraction of the space between the rims a greater vertical length of column of air above the surface of the water will be maintained with a given height of water outside of the can than can possibly be maintained were the said space between the rims rectangular, as hereinbefore set forth; for as the pressure from the water increases the air is forced into a space narrower horizontally, and as a consequence the vertical length of the column is not so rapidly shortened as it would be if the said space were rectangular. Sufficient compressed air will thus be provided by the time the chamber B is half-full of water to sustain in the ordinary milk-can a column of water as high or higher than that marked by the letter *g*. This result is secured by the gradually-contracting form of the chamber B. As soon as the column of submerging-water is balanced the water will cease to flow over into the chamber B. Before water could flow from chamber B into the can A the latter would have to be submerged to a depth at which the weight of the water above the lid would overcome the power of the compressed air between the rims of the lid.

My invention can be very cheaply made. It may be of any shape, preferably cylindrical. The ordinary can used in commerce is about eight inches in diameter. If made larger than this the central tube, *A'*, should be put in for cooling the central portions of the milk.

By this invention it will be seen there is no compression of air on the surface of the milk. The animal-heat can escape as rapidly as it is possible to expel it from the body of the milk, and the latter will be preserved in all its freshness and sweetness, and entirely free from peculiar orders or taste where the rapid escape of the animal-heat is in the slightest degree retarded.

I am aware that milk-cans have been made having a surrounding-chamber for holding water in which to submerge the lower end of the rim of the lid. I do not claim such construction as my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A milk-can provided with an outer an-

nular trough near its upper edge, in combination with a lid having an upwardly-extending open tube and two depending rims or flanges fixed near together on the under side thereof, and diverging so as to provide a triangular space between them, one of which dips into while the other extends outside of said trough, substantially as set forth.

2. A milk-can provided near its upper edge with an outer annular trough having its outer side inclined inward toward the can, so as to provide a chamber wide at its base and narrow

at its top, in combination with a cover having an upwardly-extending open tube and an inner vertical depending rim which dips into the trough, and an outer-diverging depending rim which extends outside and against the inwardly-inclined side of said trough, substantially as set forth.

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Witnesses:

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