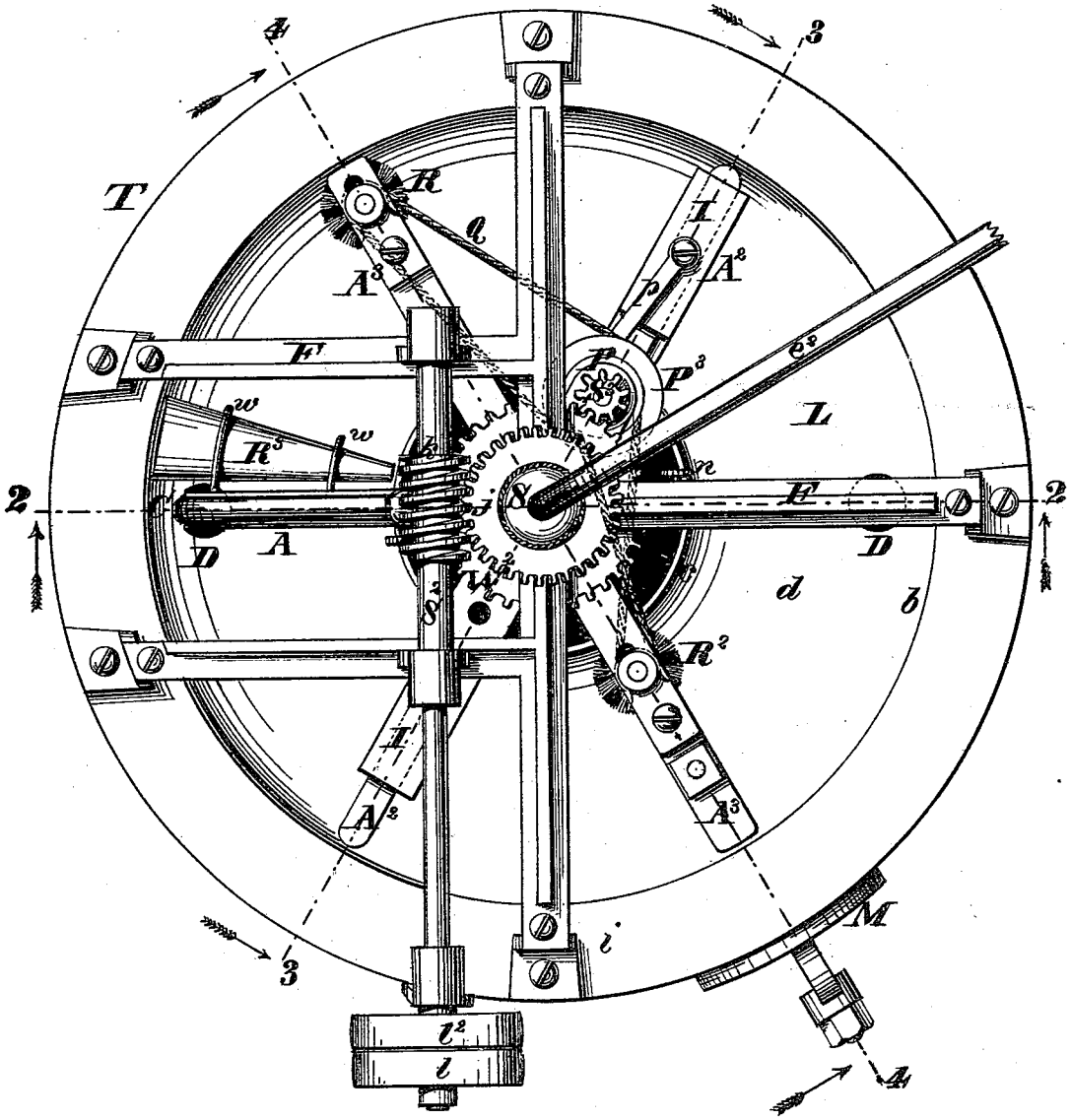
4 Sheets--Sheet 1.

# F. E. ROCKSTROH.

## Lard-Cooler.

No. 165,617. Patented July 13, 1875.

FIG. 1.




WITNESSES

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4 Sheets--Sheet 2.

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## Lard-Cooler.

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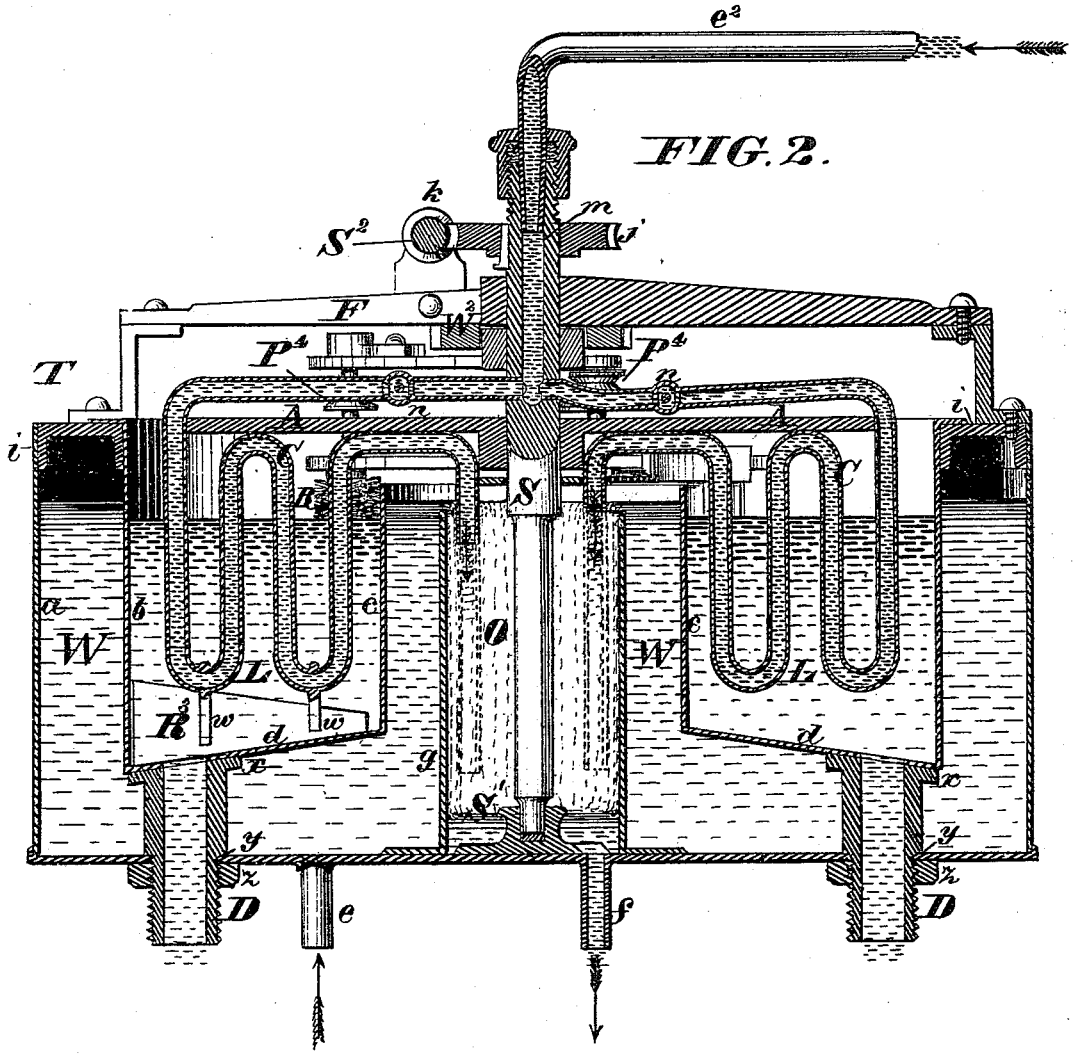
FIG. 2.

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4 Sheets--Sheet 3.

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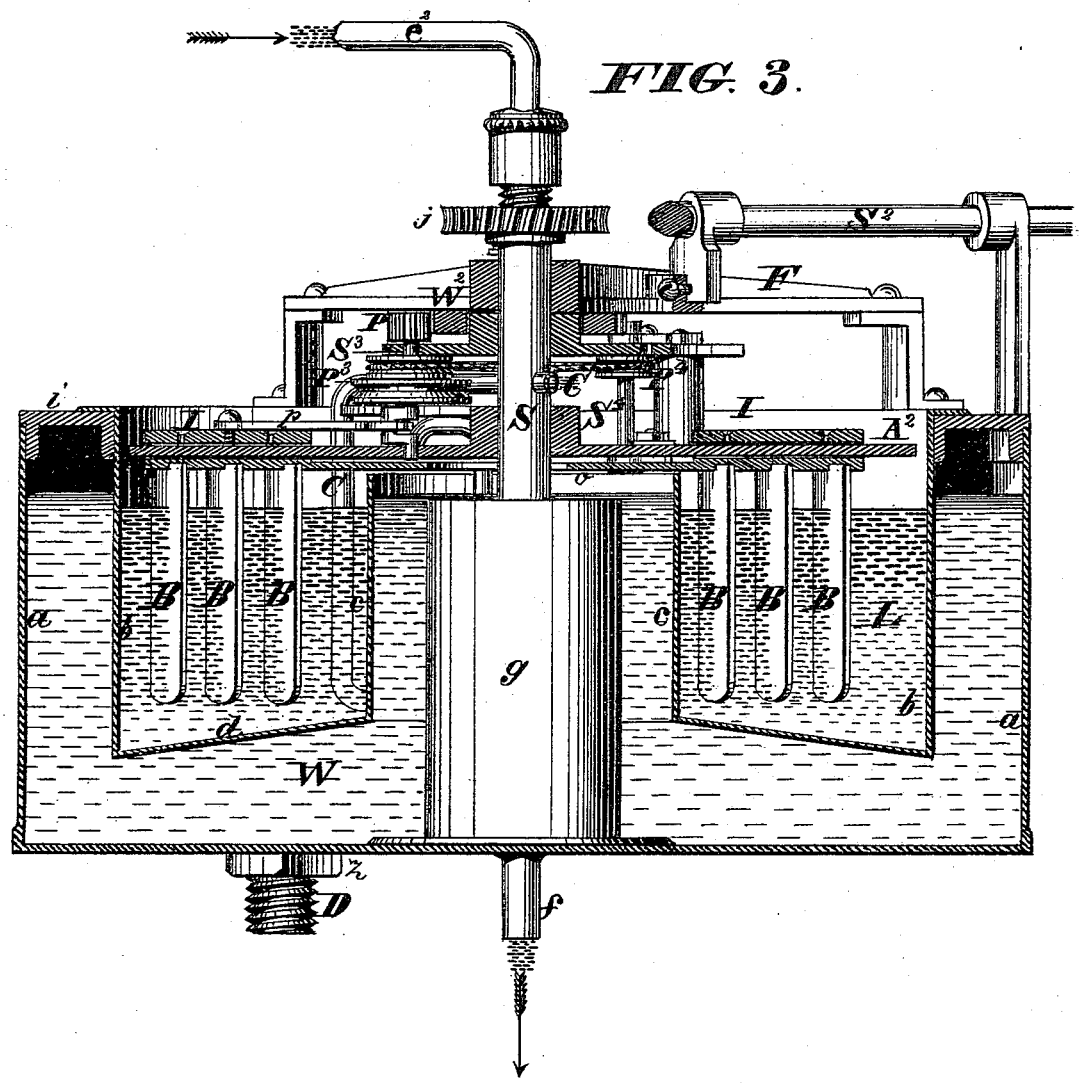
## Lard-Cooler.

No. 165,617. Patented July 13, 1875.

*FIG. 3.*

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4 Sheets--Sheet 4.

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## Lard-Cooler.

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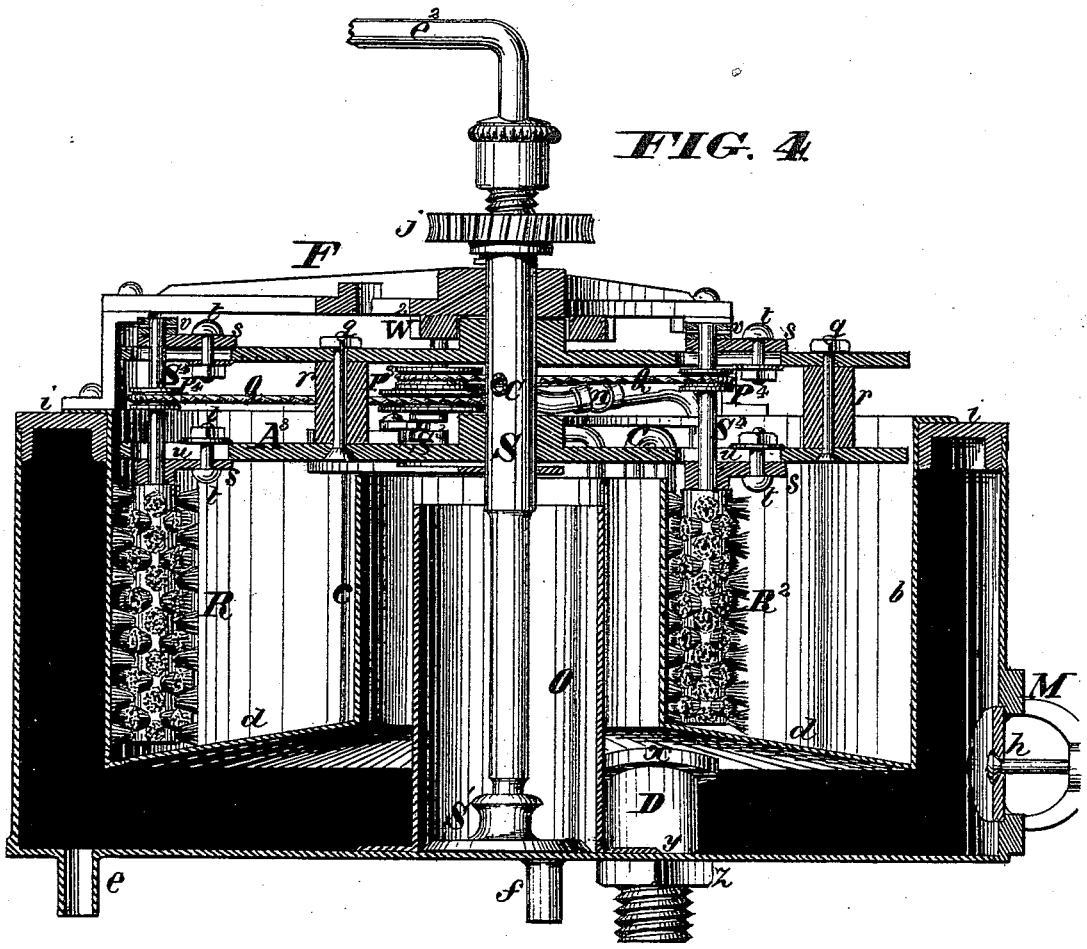
FIG. 4.



WITNESSES

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# UNITED STATES PATENT OFFICE.

FRANCIS E. ROCKSTROH, OF BALTIMORE, MD., ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN N. FOSS AND CHARLES HOMER, OF SAME PLACE.

## IMPROVEMENT IN LARD-COOLERS.

Specification forming part of Letters Patent No. **165,617**, dated July 13, 1875; application filed April 23, 1875.

*To all whom it may concern:*

Be it known that I, FRANCIS EDWARD ROCKSTROH, of the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Lard-Coolers, of which the following is a specification:

This invention relates to the cooling apparatus of lard-manufactories. It relates to that form of lard-cooler in which a jacketed tank or tub is employed, and the lard is agitated within the same by means of revolving stirrers.

The present invention consists, first, in certain peculiarities of construction, having reference to the cooling functions of the jacketed tank or tub. The walls of the tank are concentric cylinders, so as to form a water-space of uniform thickness, and consequently of more nearly uniform cooling capacity from bottom to top, as compared with those of conical tanks or tubs. A central circular wall or curb forms a water-chamber in the middle of the tank or tub, and thus greatly increases the effective cooling-surface. A man-hole in the outer wall of the tank provides for cleaning out the water-chamber with facility. The water used is the waste-water from the ice-house of the establishment, and this deposits a sediment which putrefies and creates a stench, so as to render its removal necessary. In other coolers the stirring apparatus has to be removed to give access to the water-chamber. In this, owing to the provision of the man-hole, a boy can enter and sweep the entire bottom of the water-chamber, and no other trouble or delay is experienced than that which is incident to suspending the cooling operation and drawing off the water.

The invention consists, secondly, in the employment or use of one or more revolving stirrers, consisting of coils of pipe carrying currents of water through the lard. The cooling operation is thus materially assisted without complication of parts. This part of the invention consists, further, in means for supplying and regulating the flow of water through the coils, and for receiving and carrying off the discharge.

The invention consists, thirdly, in the employment of revolving stirrers reciprocated radially, so as to work the lard outward and inward alternately against the cooling-surfaces of the tank or tub, and to break the current which might otherwise be produced by the revolving motion of the stirrers. Owing to the peculiar construction and arrangement of these stirrers and their operating mechanism, there are no bearings whatever in the lard-space of the apparatus, and no stationary parts in the lard except the cooling-surfaces, for cleaning which provision is made in the next parts of the invention.

The invention consists, fourthly, in the employment of rotary brushes, revolving in contact with the sides of the tank or tub, as means for removing the chilled lard from the same, where it would otherwise adhere and constitute a non-conductor. The brushes perform this work in the most effective manner, without abrading the surfaces, and without the aid of springs. They are supported and operated from their upper ends, so as to avoid bearings in the lard, and are adjustable relatively to the surfaces which they are to keep clean.

The invention consists, fifthly, in the employment of a revolving roller, sufficiently heavy not to swim in the lard, as means for preventing the formation of a coat of lard on the bottom of the tank. This operates without liability to abrade the metallic bottom by crushing into and thus breaking up the coat of lard as it forms.

The improved apparatus is simple, easily constructed and kept in order, and operates with superior rapidity and economy.

Figure 1 is a top view of this improved lard-cooler. Fig. 2 is a vertical section on the line 2 2, Fig. 1. Fig. 3 is a vertical section on the line 3 3, Fig. 1. Fig. 4 is a vertical section on the line 4 4, Fig. 1.

The operation of the apparatus is illustrated in Figs. 2 and 3.

This lard-cooler will vary in proportions and capacity with the requirements and accommodations of the manufactories in which it is erected and used, and it may rest on one of the floors of the building or upon a bed-frame, as preferred.

A cylindrical jacketed tank or tub, T, contains within hollow walls and a hollow bottom

a water-chamber, W, the contents of which constitute the cooling medium. The outer and inner vertical walls *a b* of the tank or tub are made in the form of concentric cylinders, so as to render the water-space between them of equal thickness from bottom to top. A central circular wall or curb, *c*, extends the water-chamber W upward within the middle of the tank or tub, and constitutes an additional cooling-surface of great value. Between the inner vertical walls *b c*, and above the inner bottom *d* of the tank or tub, an annular lard chamber or trough, L, is formed. The hot lard is conducted into this from the rendering-tank, and it is filled to any depth, so that liability to overflow at the inner wall or curb *c* is avoided. For cooling the lard through the medium of the inner metallic walls of the tank or tub and its inner bottom, the waste-water from the ice-house of the establishment, or cold water from any other source, is conducted into the water-chamber W through a pipe, *e*, opening into the water-chamber at bottom. A water-discharge pipe, *f*, leads from a central overflow-chamber, O, formed by a curb, *g*, extending upward from the outer bottom of the tank or tub, concentrically with the curb or inner wall *c* of the same, and terminating below the upper edge of the latter a sufficient distance to prevent accidental overflow into the lard-chamber, as illustrated in Fig. 2. To provide for removing sediment from the bottom of the water-chamber, a man-hole, M, is formed in the outer wall of the tank or tub, and provided with a tight-fitting door or cap, *h*, with ordinary accessories. A boy can enter by this and thoroughly sweep out the entire surface of the bottom.

The bottoms and vertical walls and curbs of the tank or tub may be made of light plate or heavy sheet metal of any preferred description, with inner surfaces rendered non corrosible, if necessary. The top of the circumferential water-space is formed by an annular casting, *i*, and this is bridged by a cast-iron skeleton-frame, F. This frame supports the upper end of an axial vertical shaft, S, to which a worm-wheel, *j*, is keyed. The frame F supports also a horizontal shaft $S^2$, carrying a worm or endless screw, *k*, to mesh with and drive the worm-wheel *j*, and provided with tight and loose pulleys *l* $l^2$, or their equivalent, as means for receiving motion and for stopping the shaft at will.

The vertical shaft S carries beneath the frame F, and above the lard chamber or trough L, three pairs of radial arms, A $A^2$ $A^3$, those of each pair being, by preference, in line with each other, and the several arms distributed around the shaft at equal distances apart. These arms constitute a revolving frame or head, by which all the stirrers, &c., are supported and guided.

The first pair of arms, A A, Figs. 1 and 2, carry coils of pipe C, forming stirrers and supplemental cooling mediums, water being conducted continuously through the same by a supply-pipe, $e^2$, and an axial passage, *m*, in the vertical shaft S, from which the coils C lead, being attached by water-tight joints. The discharge ends of the coils C project downward above or into the overflow-chamber O. The discharge ends may preferably be extended downward within the overflow-chamber, as shown in dotted lines in Fig. 2, so as to constitute the coils siphons which will empty themselves automatically when the supply is cut off. The object of this arrangement is to provide for discharging all the water from the coils when the operation of the apparatus is suspended in winter. The discharge ends of the coils may be extended for this purpose by attached nozzles. The coils form effective stirrers, and the water flowing through the same absorbs and carries off a considerable amount of heat from the interior of the body of lard. The coils may be attached to the arms A by any approved means. The cooling action of the coils is regulated by stop-cocks *n*, governing the flow of water.

The second pair of arms, $A^2$ $A^2$, Figs. 1 and 3, carry two sets or gangs of stirring-blades, B, which are reciprocated radially simultaneously with their revolutions, so as to cause them to throw or press the lard alternately against the inner and outer cooling-surfaces of the tank or tub. The blades are set obliquely, and depend from a slide or slides, I, working on the main members of the arms $A^2$ as guides. The inner ends of these arms are rendered double by short parallel arms above them, and within the housing thus formed a small vertical crank-shaft, $S^3$, is mounted on one or each side of the main shaft S as means for reciprocating the blades. In the illustration, the heads of the two sets of blades are connected by a slotted web, *o*, so as to form a single slide, and a single crank-shaft is connected to the slide by a connecting rod or link, *p*. A pinion, P, on the upper end of the crank-shaft $S^3$ meshes with a stationary sun-wheel, $W^2$, attached to the bottom of the frame F concentric with the main shaft S. The blades B and the pinion P revolve in unison with the shaft S, and the pinion, by contact with the sun-wheel, is rotated, and this motion is converted, by the crank-shaft $S^3$ and connecting-rod *p*, into the described reciprocating movement of the blades.

The third and last pair of arms, $A^3$ $A^3$, Figs. 1 and 4, are rendered double throughout their length by parallel arms above those of the main set, stayed in line with the latter and at proper height by bolts and tubes *q r*. These arms carry two rotary brushes, R $R^2$, for removing chilled lard from the outer and inner vertical walls of the lard chamber or trough. The brushes R $R^2$ are applied to or formed on the lower ends of vertical shafts $S^4$, each of which has a pair of bearings, *s*, and these bearings are attached to the arms $A^3$ by bolts *t* occupying slots *u*, which provide for adjusting the brushes relatively to the surfaces in contact

with which they are to revolve. Collars *v* above the upper bearings support the depending brushes.

Grooved pulleys $P^3$ $P^4$ on the shafts $S^3$ $S^4$, and connecting-bands Q Q, provide for driving the rotary brushes R $R^2$ from the pinion P, the latter receiving its motion, as before described, by contact with the sun-wheel $W^2$ during the revolutions of the stirrers and brushes. The brushes R $R^2$ may be clothed with stiff bristles, but vegetable fiber is preferable; or the fibers may be of whalebone. They operate to keep the cooling-surfaces free from congealed lard, by rotating in contact therewith simultaneously with their slow revolving movement. For preventing any accumulation of chilled lard on the bottom of the lard chamber or trough, a loose roller, $R^3$, conforming to the bottom of the tank, is arranged beneath one or each of the coils C, and attached thereto by yokes *w*, which cause the roller to revolve therewith, while they permit the same to rise and fall freely. This roller is, of necessity, sufficiently heavy not to swim in the lard, and may be made of metal coated with wood. It operates by crushing into any coat of chilled lard which may form, and thus breaking up the same, without the possibility of abrading or otherwise injuring the metallic bottom. One roller is deemed sufficient; but two or more may be employed, and they may be connected to the revolving frame in any preferred way. The inner bottom *d* of the tank or tub, forming the bottom of the lard chamber or trough L, is convex, so as to shed the lard outward. Two or more discharge-tubes or outlets, D, are thus accommodated, and abundant means are afforded for drawing off the lard without delay when it has been reduced in temperature to the proper degree. The discharge-tubes D have flanges *x* at their upper ends, by which they are attached to the inner bottom *d* of the tub or tank, shoulders *y*, to rest on the outer bottom of the tank or tub, and clamping-nuts *z* on threaded extremities beneath the outer bottom. The hollow bottom of the tank or tub is thus braced or stayed, and supplemental support is afforded to the inner bottom *d*, so as to prevent any yielding or sagging thereof under the weight of the lard. A step-bearing, $S^1$, to support the lower end of the main shaft S, is arranged within the overflow-chamber O, so as to have a firm support on the outer bottom of the tank or tub, out of reach of the lard.

The following is claimed as new in this invention, namely:

1. A jacketed cooling tank or tub, having an inner wall or curb, *c*, forming a water-space in the middle of the same, in continuation of the main water-chamber, as herein specified, to extend the cooling-surface.

2. The lard-cooling tank, consisting of the inner and outer walls, provided with a manhole, M, to give access to the water-chamber for cleaning the bottom of the same, in the manner herein set forth.

3. The hollow central shaft S, carrying the revolving arms A A, with the stirring and cooling coils C depending therefrom, in combination with the annular trough-shaped lard chamber L, as herein specified, for the purpose stated.

4. The combination of a central vertical shaft, S, having an axial cavity, *m*, stirring and cooling coils C leading therefrom, a water-supply pipe, $e^2$, leading to the axial cavity of the shaft, a central chamber, O, to receive the discharge, and an escape-pipe, *f*, leading from the latter.

5. One or more revolving stirrers, B, reciprocated radially simultaneously with their motion around the axis of the tub or tank, for throwing or pressing the lard alternately against the opposite vertical walls of the lard chamber or trough.

6. The combination of the central vertical shaft S, carrying arms $A^2$ above the lard chamber or trough, the slide or slides I, carrying the stirring-blades B, the sun-wheel $W^2$, planet-pinion P, crank-shaft $S^3$, and connecting-rod *p*, for revolving and simultaneously reciprocating said stirring-blades, in the manner set forth.

7. The combination, in a lard-cooler, of a tank or tub having circular jacketed walls, forming cooling-surfaces, and one or more rotary brushes revolving in contact with the latter, for keeping them clear of congealed lard, in the manner set forth.

8. The combination of the central vertical shaft S, carrying arms $A^3$ above the lard chamber or trough, the parallel shafts $S^4$, having the rotary brushes R $R^2$ depending therefrom, the sun-wheel $W^2$, planet-pinion P, shaft $S^3$, pulleys $P^3$ $P^4$, and endless bands Q, for supporting and operating the rotary brushes, in the manner set forth.

9. The combination, with the double arms $A^3$, of the sliding bearings *s*, bolts *t*, and slots *u*, for adjusting the depending rotary brushes R $R^2$ relatively to the surfaces they are to revolve in contact with, as described.

10. The combination, in a lard-cooler, of an annular lard chamber or trough, having a cooling-bottom, and a revolving roller, for preventing the formation of a coat of chilled lard on the latter, in the manner specified.

11. The combination of the central vertical shaft S, having arms A above the lard chamber or trough, depending stirrers C, carried thereby, and yokes *w*, attached to the latter, for operating a revolving crushing-roller, $R^3$, on the bottom of the lard chamber or trough, in the manner set forth.

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Witnesses:
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