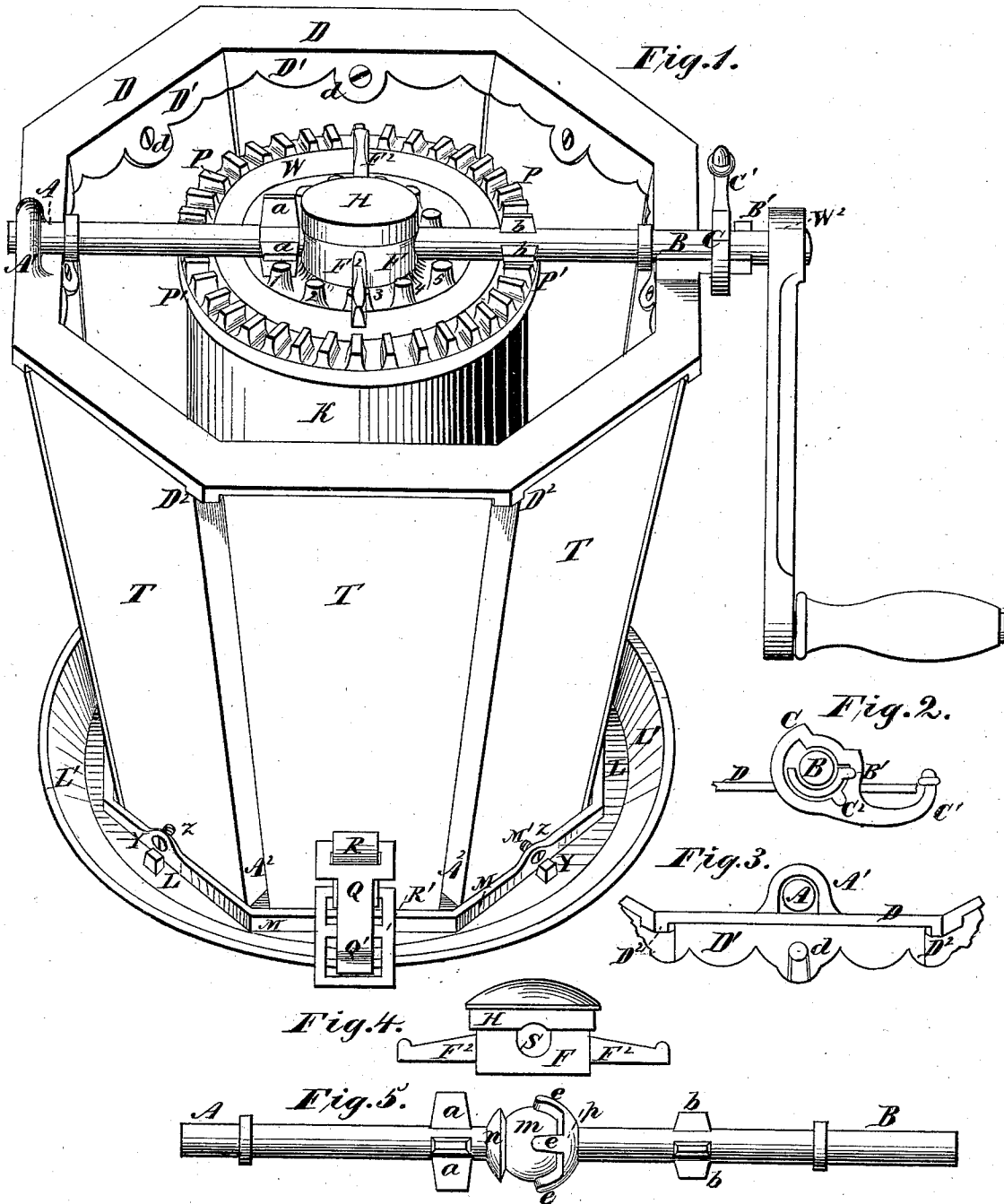


T. WEAVER.

Improvement in Ice Cream Freezers.

No. 124,992.

Patented March 26, 1872.



Witnesses:

Peter Nucker.
William Woley.

Inventor:

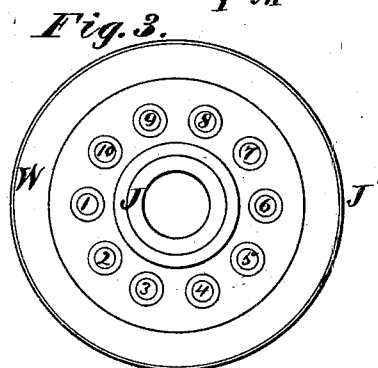
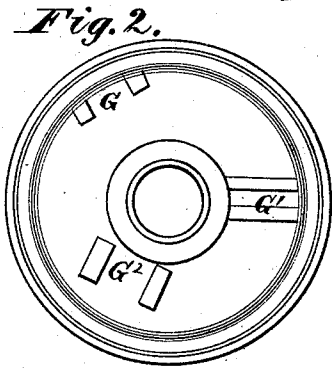
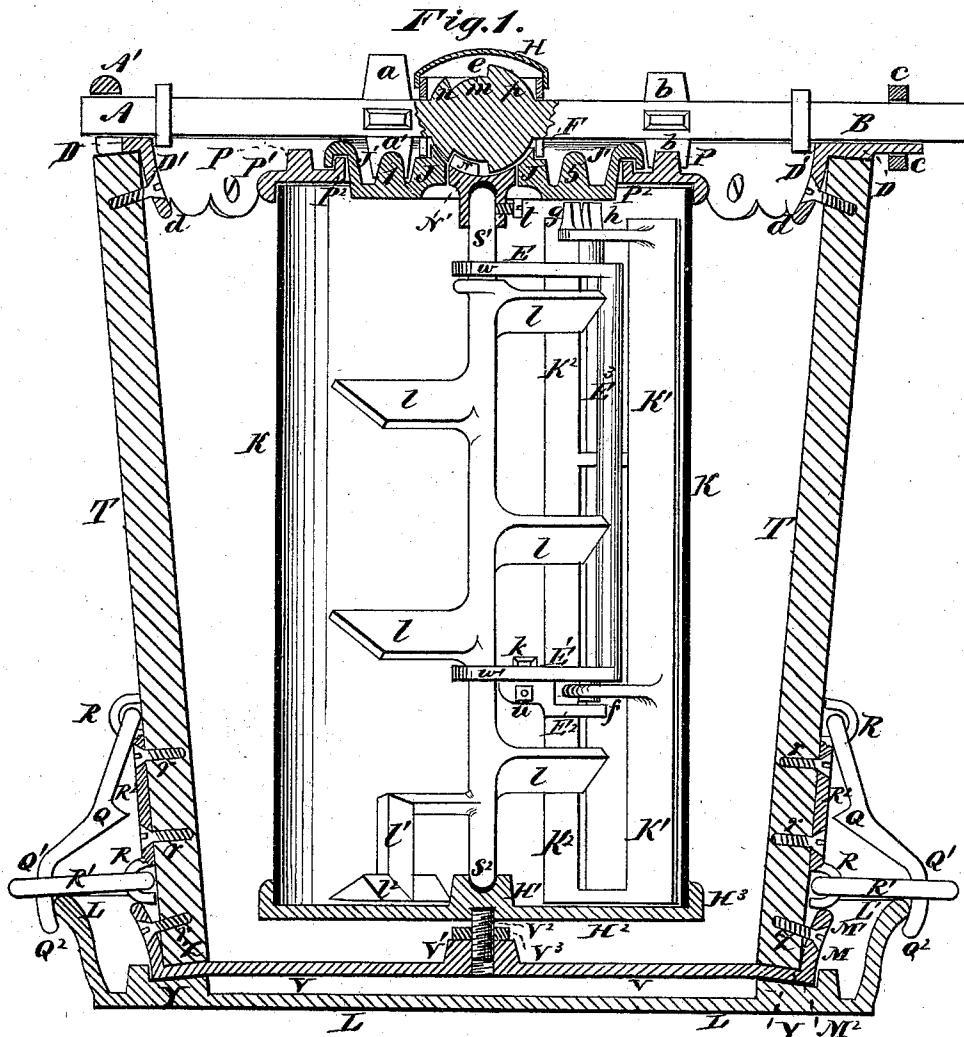
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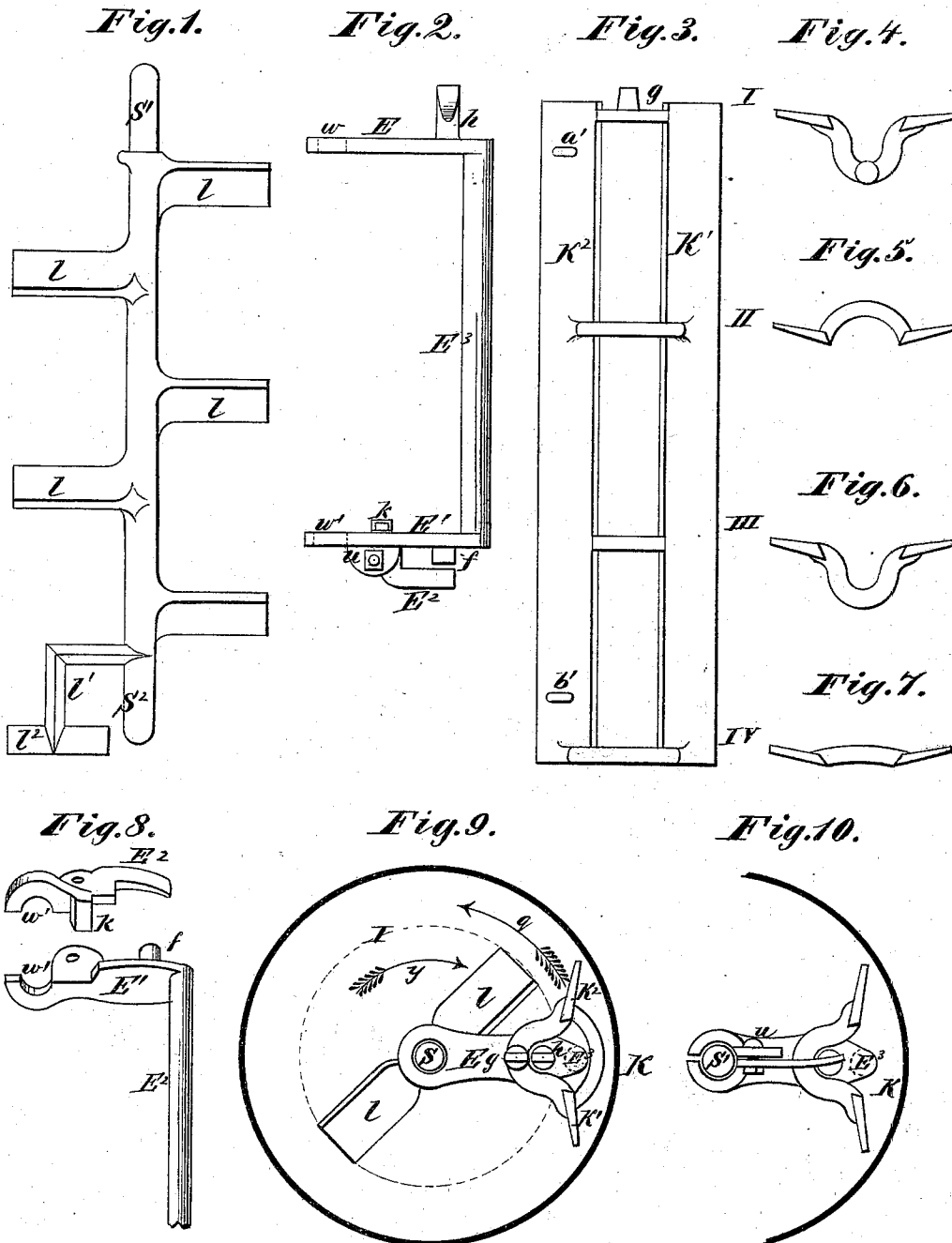
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UNITED STATES PATENT OFFICE.

THEOPHILUS WEAVER, OF HARRISBURG, PENNSYLVANIA.

IMPROVEMENT IN ICE-CREAM FREEZERS.

Specification forming part of Letters Patent No. 124,992, dated March 26, 1872.

To all whom it may concern:

Be it known that I, THEOPHILUS WEAVER, of the city of Harrisburg, county of Dauphin and State of Pennsylvania, have invented an Improved Ice-Cream Freezer, of which the following is a specification:

The nature of my invention consists in a new and improved ice-tub; in a new mode of supporting the cream-can in the tub; in improved gears; in improved dasher and scraper; and in an improved can-top. The first part of my invention, therefore, relates to the construction of the tub-wall, which is a crib, and its bottom, which is a removable basin, and to certain improved connecting devices, whereby the basin is readily attached to or detached from the crib. The second part relates to certain bearings formed on the top of the tub to receive and support the driving-shaft, which, by the improved spherical gears, is made to support the can in an upright direction, and relates to the driving-shaft coupling. The third part relates to a triplet of gears on the same driving-shaft, of which the central gear is a compound sphere, inclosed in a capped compass-ring, which gear propels the central dasher, and by means of the said ring and the can-lid supports the can in an upright position, the outer gears on the driving-shaft being spur-gears, which rotate the can and the scraper-rack in such manner that each of the three motions is contrary to the next in the series from the center outward, and that the highest speed is central and the slowest exterior. The fourth part relates to a wingless central dasher, provided with a concave-sphere gear on its summit, with side blades and a bottom scraper near its lower journal; and further relates to a swinging bracket supported on the shaft of the central dasher, which in turning supports a balanced two-winged scraper, the bracket and scraper being rotated about the central shaft by the lid of the can. The fifth part relates to an improved ring on the can-sheet, permanently fastened to it, having a circle of teeth and a lip thereon, and relates to a lid having a circle of teeth set in a depressed scroll on its face, and having a lip overhanging exteriorly, and bearings for the parts of the spherical gear interiorly situated.

In the accompanying drawing, Plate 1 represents as follows: Figure 1, a perspective view

of the freezer; Fig. 2, a plan of one end of the driving-shaft and the ring-coupling; Fig. 3, a plan of the other end of the shaft and its support on the tub; Fig. 4, a front view of the capped compass-ring; Fig. 5, a perspective view of the driving-shaft.

Plate 2 represents as follows: Figure 1, a vertical section of the freezer and the tub, showing the dasher and scraper in perspective; Fig. 2, a bottom view of the can-lid; Fig. 3, a top view of the can-lid; Fig. 4, a top view of the concave sphere-gear.

Plate 3 represents as follows: Figure 1, a perspective view of the central dasher; Fig. 2, a side view of the swinging bracket; Fig. 3, a front view of the two-winged scraper; Figs. 4 5 6 7, cross-sectional views of the two-winged scraper taken respectively at the lines I II III IV; Fig. 8, a perspective view of a clutch joint on the swinging-bracket, shown inverted; Fig. 9, a top view of the can, central dasher, the two-winged scraper, and the swinging bracket, the scraper being shown set free from the can for churning; Fig. 10, a bottom view of the same, with the scraper engaged.

In the following description similar letters denote similar parts in all the plates.

In plates 1 and 2, Fig. 1, the staves T are cut tapering on the sides, as usual, but are not beveled to form a close joint. The line of jointure thus leaves a crevice, opening outwardly. This is done not only to cheapen manufacture, but also to gain the advantage of air to cut or dissolve the ice rapidly, thus lessening the amount of salt consumed; and also to render the ice accessible to be raked or agitated at intervals, which may be done with a case-knife blade through the crevices. The staves are supported and spaced by top and bottom cast-iron frames, which have formed on their faces, next to the ends of the staves, wedge-shaped lugs D² A². These lugs space the staves by fitting into the crevices. The top frame D D¹ and the bottom frame M M¹ are regular polygons, and have their face-plates dished, so as to be at right angles to the pitch line of the staves, and have a skirting or escutcheon, D¹ M, parallel to the pitch line of the staves. The top-frame has its skirting inside; the bottom frame has its skirting outside of the staves. This arrangement of the skirting is made to cast certain eyelets or screw-

holes $d M'$, by which the staves are attached by common wood-screws. It is, however, necessary to fasten with screws only two opposite staves, as the rest can be held in place by lugs on the frame faces, and will brace the wall of the crib. This crib is bottomless, and the face of the bottom frame is made narrower than the thickness of the staves, so as to leave the bottom freely open, in order that when the crib is lifted the ice may easily fall out below. The can is supported on a pivot, which is a set-screw and jam-nut, $V^2 V^3$, Fig. 1, Plate 2, on a bridge-tree, $V V^1$, in the diameter of the bottom frame, so that in lifting about the crib the can is supported in its proper place, thus enabling the operator to repack or remove the crib without unshipping the can from its supports. It may thus be set in a tub or large pail and repacked; but, as shown in Figs. 1, in Plates 1 and 2, the crib is made to rest in a basin, $Z Z'$, on chairs Y , a little up from the floors of the basin, and is located on the chairs by lugs on the bottom frame of the crib, which sit astride the chairs. The crib is held down on the chairs by locking, or hooked latches $Q Q^1$, attached to the opposite sides of the crib, which embrace or clasp the rim of the basin. The latch-fixture consists of the hooking-latch $Q Q^1$, the stay-latch R^1 , and the keeper-plate $R R^2$, which is screwed to a stave, and has a bearing under it for a hooking-latch at its top and a bearing for the stay-latch at its lower end. The hooking-latch has a hook, Q^2 , which engages the rim of the basin, a curved part, Q^1 , on which the outer bar of the stay-latch tightens, and a catch, Q , under which the middle bar of the stay-latch stands to release the hook Q^2 . The upper end of the hooking-latch is a buckle, to receive the keeper. The stay-latch is a three-barred tongueless buckle. Its outer end bar is the stay which holds down the hooking-latch. Its inner end is its trunnion under the keeper. Its middle bar is the lift for the hooking-latch to release it, as stated. The hooking-latch plays only between the two outer bars of the stay-latch to perform its offices. The basin is here employed in connection with the crib, as stated, to collect the water from the melting ice, to be easily emptied without tapping, to convey the body of the water away from the can to a good extent, and to form a firm support to the machine while it is being operated.

I do not limit the use of a crib as constructed to a specific connection with a basin, as here attached, as other devices—for example, brackets on the staves against a hoop on the basin-rim—may be used instead of latches; neither to cream-freezers exclusively, as the crib will constitute a superior flower or tree tub, its crevices being calculated to admit air freely to the soil, and its basin will constitute a very desirable water-tray, without latches or brackets. The bearings formed on the top frame of the tub, shown at $A B$, Plate 1, Fig. 1, are made with reference to expedite the process of hitching or unhitching the driving-shaft with-

out the handling of wrench or other tools, and the opening and closing of the can, as well as its support, are governed by the position of the shaft. The bearing A^1 , as shown in Fig. 3, Plate 1, consists in a loop or arch spanning a cut in the top frame, and an uncut part of the frame in front of the loop, on which the loop confines the shaft when it is hitched at the other end. The cut beneath the loop permits the other end of the shaft to be canted when unhitched, thus allowing the gear on the shaft to find their places. The bearing at B , as shown in Fig. 2, Plate 1, consists in a half-round bed on the top frame, which extends outward beyond the frame in a semi-cylindrical neck, and has formed on its side, near the end, a stop, B' . Between the stop B' and the top frame, around said neck and the embedded shaft-end B , a concentric ring is passed, whose office is mainly to hold the shaft down in the bed, bosses on the shaft being employed to regulate the longitudinal play of the shaft in the top frame. The inner curve of the said ring is made with the radius of the outside of the said neck about two-thirds of a circle, and the complement is made with the radius of the shaft. A cut, C^2 , in the larger curve is made, as shown, to pass the stop B' through it in inserting the ring. The outer contour is similar to the inner, except where the cut C^2 is. The ring is prolonged outward into a gravity handle, C^1 , which, by its weight and position, keeps the cut C^2 below the horizontal plane of the stop B' , thus insuring the coupling, which is uncoupled by simply manipulating the handle, to pass the stop B' out of the cut C^2 ; and this simple act frees the shaft and all the gears of the triple motion hereinafter explained. The driving-shaft, shown in Fig. 5, Plate 1, has formed on that part of it which overlies the can a triplet of gears, of which the extremes or outer sets are spur-gears and the mean or middle one is a spherical gear. The spur-gears are each made with four teeth, and are cast as a part of the shaft to save the expense of drilling and keying; but the pinion a may be made with more teeth in large freezers, and must then be keyed on the shaft, as more than four teeth cannot readily be cast on the shaft. The pinion a has long teeth to reach or dip into the dish of the can-lid, as shown in Fig. 1, Plates 1 and 2, to engage the teeth arranged in a circle therein. The pinion b has short teeth to engage the teeth on the permanent ring on the can, which circulates closely to the shaft beneath it. The motions produced by these two spur-gears are contrary to each other, as they act on opposite sides of the center of the circle. With thirty-two teeth on the can-ring the rate is as 8 to 1, the shaft being unity. This gives a slow motion to the can in the ice, which is sought to avoid friction on the outside of the can. With ten teeth in the dish of the can-lid, the spurs a being four, the rate of speed is as 2 to 5, the shaft rate being unity. This gives a medium rate of speed to the can-lid, and through it to the

scraper, as hereinafter explained. The spherical gear mnp is located on the driving-shaft centrally, and its center is therefore in the line of the axis of the can. It consists of an inner sphere, m , enveloped by segments np of an outer sphere massed in one body, thus constituting a compound sphere. The segments np are employed as journals, which have their bearings in the socket or eye of the can-lid in the wall of the compass-ring, and on the face of the concave pinion on the top of the dasher-shaft, as hereinafter explained. The sphere has curved teeth, which lie on the body of the inner sphere like corsets. They are four in number, and are part of the outer enveloping sphere, as shown. The rate of the sphere being unity, the speed of the dasher surmounted with a three-toothed pinion will be as 3 to 4, and in a contrary direction to that of the scraper. This direction of the dasher motion is effected by applying the corsets to the opposite hemisphere from the spur-gear a . The compound sphere is cast as a part of the driving-shaft, but may be cast separately and keyed onto a wrought-iron shaft. The compass-ring shown in Fig. 4, Plate 1, and Fig. 1, Plate 2, consists of a cylindrical jacket, F , with cuts S oppositely arranged to receive the driving-shaft in such manner that, when the base of the ring rests on a bearing, J , made for it on the can-lid, the shaft will keep the compass-ring to its station, and thus keep the can-lid imposed to close the can, and to keep the can itself vertically imposed on the adjustable pivot beneath it, which is made adjustable to nicely regulate the distance between it and the driving-shaft. Two arms, F^2 , on the compass-ring, extend out oppositely and at right-angles to the driving-shaft, and rest their ends on a swell on the can-lid, allowing the teeth in the dish therein to pass beneath them. The said arms are employed to insure the station of the ring, and may be dispensed with when the base of the ring and its bearing are made broad and nearer up to the driving-shaft. The inner diameter of the compass-ring is a little greater than the sphere diameter. The ring is closed on the top by a cap to exclude water or other matters from without, and to hitch the ring to the shaft, so that when the shaft is removed the ring will accompany it. The mate-gear of the sphere, shown in Fig. 4, Plate 2, is a concave spherically faced three-lobed gear, formed on the end of a hub, into which the upper end of the central dasher-shaft is fixed by a set-screw, as shown at $S' t$, Fig. 1, Plate 2. The disk N^1 on the hub is a journal whose bearing is in the bottom of the spherical socket of the can-lid. The curve of the face of this gear is made to conform to the contiguous surfaces of the compound sphere. Its three lobes are similarly arranged on the circle of the disk, and each lobe occupies about one-ninth part of its circumference at its base, which is outward; and its sides converge centrally and terminate in a rounded end a little distance from the disk

center, thus differing from the pitch of common spur-gears, which taper outward from the axis of rotation. There is thus produced an anomaly in the fact that only three lobes are required in the driven part to effect increased rotary motion. Each of the four corsets on the sphere transfers a lobe of the mate from side to side of the disk, at points which are measured by a cord-line whose length is little less than a corresponding cord-line between two corsets on the sphere, thus insuring clearance. The hemisphere in which the corsets are placed determines the direction of the direct rotary. The corsets and lobes, being both massed on bodies, are stronger than common spurs, and occupy very little space. I do not, therefore, confine the use of these spherical gears to freezers exclusively, as their application is manifold. The central dasher $S^1 S^2 l$, the swinging bracket $E E^1$, and the scraper-frame $K^1 K^2$, are connected together, as shown in Fig. 1, Plate 2, and are first described in detail. The central dasher, as shown in Fig. 1, Plates 2 and 3, is composed of a round shaft, $S^1 S^2$, on which is formed a boss near its upper end, to locate the swinging bracket-arms of blades l , formed on its opposite side, which are offsetted from the line of jointure with the shaft, and set to have a diagonal cut across the can-body, and, therefore, to plunge the cream downward in one direction, and upward in the opposite direction, and outward from the shaft in both directions of the rotary motion; and is further composed of a bottom scraper, which is a triangular piece, l^2 , arranged with its one face flat on the can-bottom and in the line of the blades l , and is joined to the shaft a little distance up from its lower end by an angular arm, l^1 , which is so made to clear a hub, N^1 , on the can-bottom in which the shaft stands as a journal, as shown in Fig. 1, Plate 2. The swinging bracket is attached to the dasher in position, as shown in Fig. 1, Plate 2, and is composed of two arms, $E E^1$, in which are bearings for the dasher-spindle at their inner ends, and connected by a bar, E^2 , at their outer ends, as shown in Fig. 2, Plate 3. The arm E is simple, and has erected on it a connecting stud or point, h , which couples it with certain ledges, recesses, or stops on the lower side of the can-lid, as hereinafter explained. The arm E^1 is divided, as shown in Fig. 8, Plate 3, inverted, to form a bearing, and a swivel-coupling when the parts are united, as shown in Fig. 1, Plate 2, and Fig. 10, Plate 3. The parts are united by a screw-bolt or rivet in ears at u , Fig. 2, Plate 3, and the two pieces are kept properly imposed on each other by a lug, K , and an adjacent shoulder, thus constituting a clutch to embrace the dasher-spindle, and also to form a swivel-joint with the scraper-frame, as follows: One of the parts has a projection, E^2 , which is made to overlies the end of a pivot, f , formed on the heel of the other part, allowing space around said pivot for the insertion of a loop-strut of the dasher-frame, as shown in

Fig. 1, Plate 2, and Fig. 2, Plate 3. The dasher-spindle is the axis of motion for the bracket, and the stud h and the pivot f are in the axis of the swivel motion of the scraper-frame. The two axes are distant from each other just far enough to let the dasher and scraper-blades pass each other, as shown by line I , Fig. 9, Plate 3. The two-winged scraper-frame $K^1 K^2$, shown in Fig. 1, Plate 2, has a compound motion, it being rotated by the swinging bracket $E^1 E^2 E^3$ around the dasher, and is made to cant or dip its advanced wing against the can-sheet. The canting is effected partly by the centrifugal force given the cream by the central dasher, and partly by the hitch or inclination of the scraper-blades, which are so arranged that the advanced blade presents more direct opposing surface to the cream than the rear blade, which is made to shear the cream body toward the can-sheet, thus reacting also on the advanced wing which throws the cream partly toward the can-axis. The two scraper-blades $K^1 K^2$, Fig. 3, Plate 3, and Fig. 9, same plate, are parallel to each other and to the can-axis; have dull shear-edges presented toward the can-sheet; have backs beveled sharp toward the can-axis, which are united, joining the blades into a frame by means of two struts, bent inwardly at their middle, as shown in Figs. 4 and 6, Plate 3, and by two struts bent outwardly, as shown in Figs. 5 and 7, Plate 3, both curves being shown vertically in Fig. 9, same plate. The two scraper-blades are inclined so as to make an angle with each other of about one hundred and sixty degrees. The inwardly-bent struts form semi-circular bearings for the pivots on the bracket, as described, and the outwardly-arched strut, shown in Fig. 5, Plate 3, acts as a keeper, against which the bar E^3 of the bracket rides, as shown in Fig. 9, Plate 3, to keep the pivots $h f$ in their half-open bearings in the struts and interlocked, as described. The lowest strut is merely a brace between the scraper-blades. The upper three are not only braces for the said blades, thus making a strong frame with little outlay of material, but they also, in connection with the bracket, form a diverted hinge, which is cheaply constructed. The strut shown in Fig. 4, Plate 3, has erected on it a stud, g , which couples the scraper-frame with the can-lid. When the scraper-frame and the bracket are joined, as shown in Fig. 1, Plate 2, the stud g stands parallel with the stud h , and has a limited back-and-forth throw around it on the side of it toward the can-axis, to allow the studs to be inserted and acted upon, conjointly or independently, in the strips or stops of the can-lid. Should the metallic edges of the scraper-wings be too severe in their action on the can, a strip of cedar or other good wood may be attached to each blade by wood screws through holes in the blades, as shown at $a^1 b^1$, Fig. 3, Plate 3, the strip being on the can-sheet side of the blades and the screw-heads on the opposite sides. The stops on the under side of the can-lid are designed to make separate

or conjoint connection with the stud or studs $g h$ on the swinging bracket and scraper-frame, at pleasure. The stops consist of three sets of ledges, $G^1 G^2$, nearly equidistant from each other in the circle, but unequally distant from its center. The stops $G^1 G^2$ have the ledges widely apart to facilitate the insertion of the studs in putting the lid on the can. The stop G is made to act upon the outer stud h alone, which, being on the bracket, allows the scraper-frame to be canted by the force of the driven cream alone, as already described. The stop G^2 is made to act upon the inner stud g alone, which, being on the strut of the scraper-frame, subjects the advanced wing of the scraper-frame not only to the force of the driven cream from the central dasher, but also to the effect of a short leverage which the stud g has by its position in relation to the stud h , the latter then being the fulcrum. The ledges at G^1 form along narrow receptacle or stop, reaching across the lid far enough to admit both the studs g and h , which, when inserted, suspend the scraper-frame so that neither of its blades touch the can-sheet, as shown in Fig. 9, Plate 3, and carry it around the central dasher simply as a reaction-dasher. In each of the three modes of coupling the stud or studs, the relative action is the same on the scraper-frame in the forward or backward run of the driving-gears. The suspension of the scraper-frame, as stated, converts the machine into a churn, or egg-beater, or batter-whipper. The direct forward motion is employed with the coupling, as described at G or G^2 , in freezing the cream, thus allowing the scraper to remove the film of ice from the can-sheet as fast as it is formed, and to throw it toward the center to be mixed with the body of the can contents, while the rear blade of the scraper shears toward the can-sheet a part of the cream which the central dasher throws upon its edge. There is thus kept up a continuous circulation from the can-sheet to the axis of the can, and vice versa, while, at the same time, the central dasher-blades plunge the cream downward. This multiplied action and reaction minutely mixes the cream and whips it into a fine consistency in the act of freezing, so that little extra labor is needed to sponge or smooth it afterward, which in other freezers is the severest and most tedious part of the work, requiring the ice-tube to be repacked, &c.

If desired to sponge the cream thoroughly, the stop G^1 is employed and the driving-shaft run backward, in which case the central dasher-blades will cut or lift the frozen cream upward, while the scraper-blades will also cut it on the wing. This will speedily and easily lighten the contents to nearly twice the former bulk.

The can-top has some special features, the leading improvement of which is the permanently-attached ring $P P^1 P^2$, shown in Fig. 1, Plate 2. It is permanently soldered to the can-sheet by a lip, P^1 , to add strength to it and to preserve its cylindrical form better than when, as usual, made to detach the top from the sheet,

in which case the vessel is liable to be bent out of regular shape. The ring has a circular standard, P², on its inner edge, around which an overstepping flange or shielding-lip, J', of the lid revolves as a bearing. The teeth P on said ring are cut down to the plane of the top of the ring to allow the salt-water to be delivered away from the flange J', and thus every drop is excluded from the inside of the can, as the cap on the compass-ring was shown to shed away the water from the center of the top to the dish in the lid.

The following synopsis of the foregoing specification embraces what I claim:

1. The ice-crib or tub-wall, composed of staves forming certain crevices with each other, of top and bottom frames skirted and otherwise adapted to receive the staves, substantially as and for the purposes specified.

2. The bridge-tree V in the bottom frame, in combination with the can-bottom by means of the adjustable pivot V², substantially as described.

3. The device of a basin or other detachable vessel, in combination with a crib or skeleton tub, substantially as and for the purpose hereinbefore set forth.

4. The fixture, composed of the hooked latch Q¹, the gravity-latch R¹, and the keeper-plate R, to connect the crib and basin, substantially in the manner herein set forth.

5. The combination of the semi-oval bearing A¹ with the projecting bed B' and with the shaft A B, substantially as and for the purpose herein set forth.

6. The concentric ring C C¹ C², in combination with the stop B', when used to couple the shaft end B to its bearing, substantially in the manner herein set forth.

7. The combination of the transverse driving-shaft A B with the can-top, when it is the sole support to maintain the can erect in the ice-tub, substantially as herein set forth.

8. The relative arrangement of the triplet of

gears on the same driving-shaft, when made to produce three differential and contrary rotary motions, substantially as herein set forth.

9. The spherical gear, when the corsets thereon and the lobes in its mate are arranged substantially as herein set forth.

10. The compass-ring F, provided with arms F² and with cap H, in combination with a spherical gear, substantially as and for the purpose specified.

11. The combination of the compass-ring and the can-lid, when employed to hold the latter closed, in manner herein set forth.

12. The double bearing in the can-lid, in combination with the spherical gear and with its mate, substantially as herein set forth.

13. The central dasher S¹ S², when provided with the triangular floor-scraper and beaters l, arranged in the manner herein set forth.

14. The swinging bracket E¹ E² E³, in combination with the central dasher-spindle and with the scraper-frame K¹ K², substantially as herein set forth.

15. The combination of the parts constituting the swivel or hinge joint, connecting the bracket E E¹ E² and the frame K¹ K², said parts being constructed and arranged to operate substantially as shown and described.

16. The combination of the stops G G¹ G², on the can-lid, with the studs h and g, either separately or conjointly, in the manner as and for the purpose herein set forth.

17. The permanent ring P P¹ P², or its equivalent, in combination with the can-sheet K to strengthen it and preserve its shape, substantially as herein set forth.

18. The rotating can-lid J J', in combination with the rigidly-attached ring P P¹ P², substantially as and for the purpose hereinbefore set forth.

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Witnesses:

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