(No Model.)

J. L. CUTLER.

CHURN.

No. 500,859. Patented July 4, 1893.

Fig. 1.

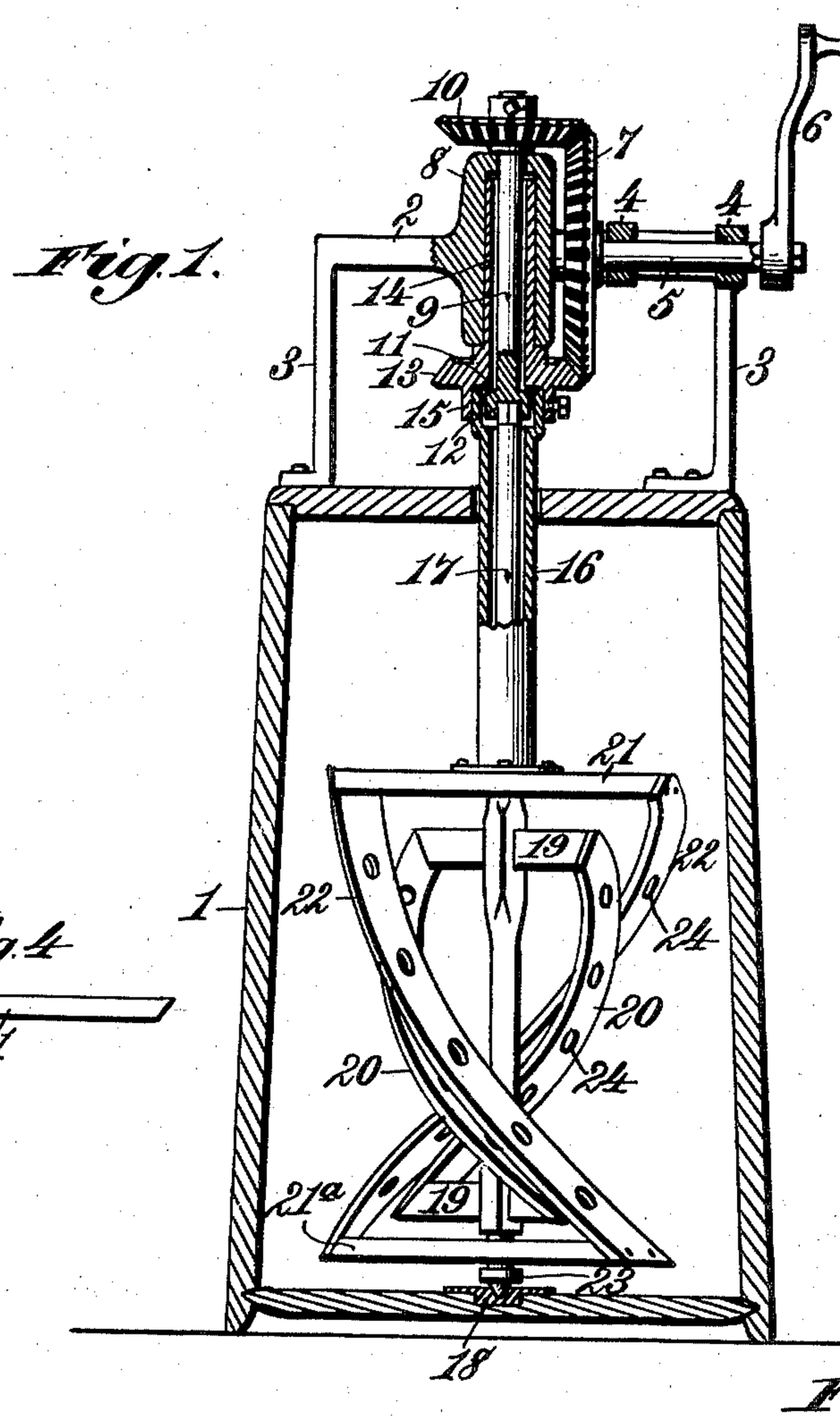


Fig. 4.

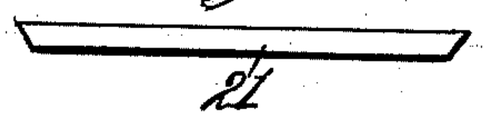


Fig. 5.

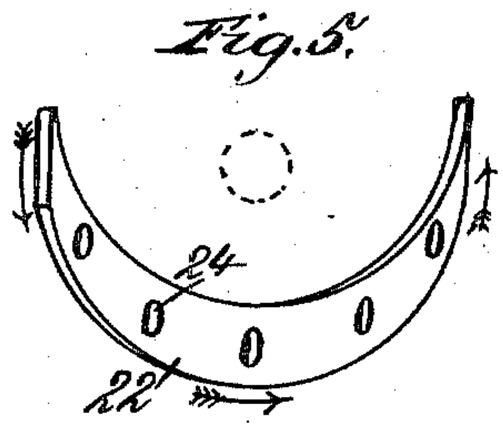


Fig. 2.

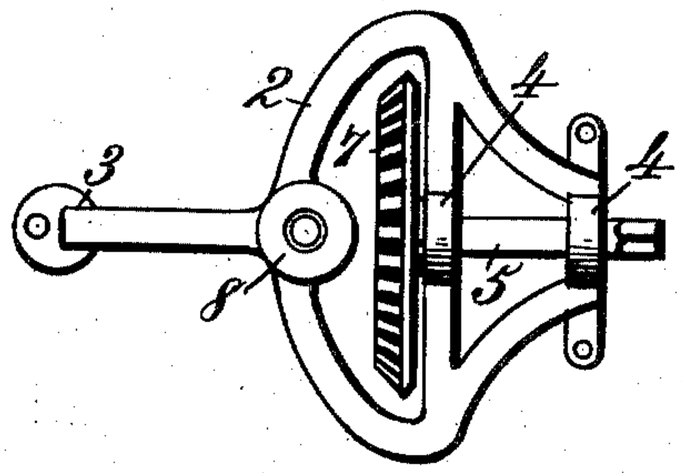
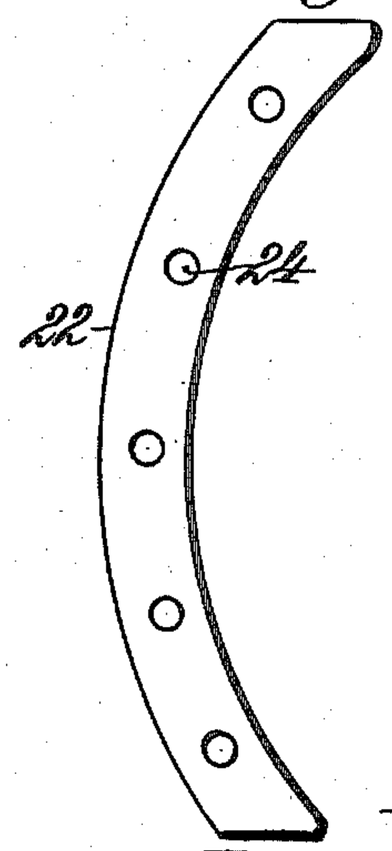


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES L. CUTLER, OF PIKETON, OHIO.

CHURN.

SPECIFICATION forming part of Letters Patent No. 500,859, dated July 4, 1893.

Application filed February 26, 1892. Serial No. 422,866. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. CUTLER, a citizen of the United States, residing at Piketon, in the county of Pike and State of Ohio, have invented new and useful Improvements in Churns, of which the following is a specification.

This invention relates to improvements in the manner of constructing, mounting and operating the spirally arranged agitating blades in that class of churns in which rotary dashers are employed to rupture the fatty globules of cream and separate the butter.

The object of my invention is to provide such an arrangement of agitating blades and operating mechanism that while the upper ends of an outer set of blades will be one-half the diameter of the churn body in advance of their lower ends, an inner set of blades revolving in the opposite direction will have their lower ends a corresponding distance in advance of their upper ends; and thus while the outermost blades tend to depress or push the milk downward and in a direction, say, from right to left the inner blades lift the milk and carry it from left to right. By this arrangement of rotary dashers the contents of the churn are thoroughly agitated with the effect of rapidly breaking up the cream and setting free the butter.

My invention consists in the novel features of construction and new combinations of parts in a rotary churn dasher, as hereinafter more particularly set forth and claimed.

In the annexed drawings illustrating the invention, Figure 1 is an elevation of my improved construction of rotary dasher, with the churn-body in section. Fig. 2 is a plan of a frame in which the operating gearing and the upper ends of the dasher shafts are supported. Fig. 3 is a view of one of the agitator blades. Fig. 4 is a view of one of the dasher arms provided with reversely beveled ends. Fig. 5 is a diagrammatic view looking down onto one of the agitator blades in its operative position.

Referring to the drawings, the numeral 1 designates the churn body which may be of any well known construction. On the upper part of the churn, or on its lid, is supported in any suitable and convenient manner a metal frame 2, provided with bearings for the operating mechanism. This frame may be composed of malleable iron, galvanized, or any other suitable metal. The frame 2 may be provided with arms 3 for attachment to the churn body or its lid, or it may be fastened to the churn or its lid in any other convenient and appropriate way. In the frame 2 are bearings 4 to receive a horizontally arranged shaft 5 having a crank handle 6 on one end and carrying a vertically arranged miter gear 7 on its other end. That portion of the frame 2 which is directly over the center of the churn is provided with a vertically elongated boss 8 that is centrally perforated to receive a vertical shaft 9 on the upper end of which is secured a horizontally arranged miter gear 10 through which one set of agitating blades is rotated. On the lower end of the shaft 9 is an annular shoulder 11 having in its under side a square socket 12 for a purpose hereinafter explained.

The shoulder 11 of the shaft 9 affords support for a horizontally arranged miter gear 13 through which the other set of agitator blades is rotated. This gear 13 is secured to the lower portion of a hollow shaft 14 which projects upward through its bearing in the boss 8, surrounding the shaft 9, and extends nearly to the top of said boss. On the lower end of the vertically projecting hollow shaft 14, or on the under side of the gear 13, is a square socket 15 to receive and hold the upper end of a depending hollow shaft 16 that surrounds the upper portion of a shaft 17 which has its upper end secured in the socket 12 of the shaft 9 while its lower end is stepped in a recessed bearing 18 secured to the churn bottom.

At suitable points on the shaft 17 are attached upper and lower parallel arms 19 the ends of which project laterally in opposite directions. To the ends of these arms 19 are attached the spirally arranged inner agitator blades 20 which are arranged in such a manner that their flat sides, at their ends, bear against the extremities of said arms. Both ends of the arms 19 are beveled reversely, as shown, to permit the ready attachment of the flat sides of the opposite ends of said spirally arranged agitator blades to the reverse ends of the upper and lower arms.

To the lower end of the depending hollow

shaft 16 is secured an arm 21 that projects laterally in both directions and loosely sleeved or mounted on the shaft 17 is a similar arm 21^a for attachment of the lower ends of the outer set of spirally arranged agitator blades 22 which have their flat ends bearing against the extreme beveled ends of the upper and lower arms 21 and 21^a in the same manner that the inner set of blades 20 are arranged, as already described. On the lower portion of the shaft 17 may be placed a hub or collar 23 to assist in supporting the outer set of agitator blades.

The agitator blades 20 and 22 may be made of either wood or metal and are preferably of the shape shown in Fig. 3. They are attached to the ends of their supporting arms in such position that their flat sides will bear thereon in the manner above described, without the formation of any twist in the blades, which are thus presented to the contents of the churn in the best position for effecting a thorough agitation and disruption of the cream. It is my purpose to form the arc or curve of each agitator blade of the proper degree to correspond with the length of their supporting arms and the distance between the respective upper and lower arms. For example, if the upper and lower arms 21 and 21^a are eight inches from end to end and the distance between said arms is eighteen inches then the two agitator blades 22 would each have a curve of four inches, so that when fastened to their respective arms, in the manner described, they would, when revolving, describe a circle of eight inches.

The agitator blades are preferably made about one-quarter of an inch in thickness and from one inch to an inch and a half wide, though these proportions may be varied to some extent. Each blade is preferably pierced by five or six openings 24, as shown, to promote a circulation of the churn contents.

It will be observed that the arc shaped agitator blades 20 and 22 are formed entirely flat without any twist whatever, but that by attaching the flat sides of these blades to the beveled end surfaces of the arms 19, 21 and 21^a in the manner above described they are caused to present their edges at top and bottom to the milk while only a small portion of the flat side of each blade at the center is directly opposed to the milk and consequently the contents of the churn are effectively agitated with but little expenditure of power. The outside blades 22 revolve from right to left. At their tops they are so fastened to the supporting arms 21 as to present their edges to the milk and their flat sides at right angles to the central shaft. About one half the distance between the top and center of each outer blade, however, the flat side of the blade is no longer at right angles to the shaft but is just quartering with it. At the centers of these blades their edges point directly toward the central shaft while their flat sides beat directly against the milk and although there is no twist in the blades yet their centers while in action are practically at right angles to their tops. The effect of this construction is, first, to split the milk, as by a wedge—the friction being from the top at a minimum, or almost zero, to a maximum at the center of each blade, from which point it gradually decreases to the bottom of the shaft; second, from near the top of these blades the bevel or curvature is such that it tends to throw the milk outward, forward and downward until at the center of the blade where, though the pressure forward and downward still continues, the shape and motion of the blades are such as to draw the milk toward the center. As the inner blades 20 are of the same construction but move in the opposite direction, or from left to right, it follows that for every current caused by the revolution of the outer blades 22 a counter current will be produced by the action of the inner blades 20 and that these currents coming in contact with each other will form numerous other currents and produce a thorough agitation of the milk in such directions as to give the best results in the quantity and quality of butter obtained.

In putting the parts of the churn together, as shown in the drawings, the gear 13 is first attached to its hollow shaft 14 which is then inserted into its bearing 8 from below. The shaft 9 is then run up through the hollow shaft 14 until the shoulder 11 and socket 12 come up within the socket 15, thus holding the gear 13 and its shaft 14 in position, and the gear 10 is then secured to its shaft 9 by a lock-nut or other suitable means. The large vertical gear 7 is fastened to its shaft 5 in such position that it will mesh with the gears 10 and 13, so that when power is applied to the crank 6 the gears 10 and 13 will cause the inner and outer sets of agitator blades to revolve in opposite directions and subject the contents of the churn to thorough agitation. It will be seen that the arrangement of the agitator blades is such that while the outermost set of blades operate to carry the milk around in one direction and with a downward tendency the inner blades act in a reverse manner to shift the milk or cream and rotate it in a direction opposite to that in which it is carried by the other blades. This operation of the agitator blades will thus produce at least four different or opposing currents at the same time as well as the great amount of agitation that will be produced by the friction of the said currents on each other. The contents of the churn are thus subjected to a thorough and uniform agitation by which the fatty globules are rapidly broken up and the butter liberated.

If desired the jointed connection of the shafts 9 and 17 and the similar connection of the hollow shafts 14 and 16 may be omitted and each of the agitator or dasher shafts made in one piece, in which case the churn lid could be made in two parts for convenience in placing and removing the dasher. But I prefer

the construction herein shown and described which permits the employment of a solid churn lid and affords greater facilities for inserting and removing the dasher and repairing the several parts when required.

What I claim as my invention is—

1. In a churn, the combination with the churn body, of a dasher composed of concentric shafts, the inner shaft being stepped to the bottom of the churn body, arms provided with reversely beveled ends, inner and outer sets of spirally arranged flat arc shaped agitator blades having their ends secured flatwise to the beveled end surfaces of said arms, whereby when in action the said blades at top and bottom have their edges presented to the milk, the central portions of said blades having their flat sides presented to and adapted to beat against the milk, and means for rotating the concentric shafts and attached inner and outer sets of agitator blades in opposite directions, substantially as described.

2. In a churn, the combination with the churn body, of a dasher composed of concentric shafts, the inner shaft being stepped to the bottom of the churn body, arms provided with reversely beveled ends, inner and outer sets of agitator blades having their ends secured flatwise to the beveled end surfaces of said arms, the upper ends of the outside set of blades projecting forward of the lower ends of said blades and the lower ends of the inner set of blades projecting forward of the upper ends of said blades, whereby when a current is formed by the action of one set of blades a counter current is produced by the other set of blades, and means for rotating the shafts and blades in opposite directions, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JAMES L. CUTLER. [L. S.]

Witnesses:

S. P. COPPOCK,

W. R. HURST.