

(No Model.)

R. B. DISBROW.
COMBINED CHURN AND BUTTER WORKER.

No. 564,977.

Patented Aug. 4, 1896.

Fig 1.

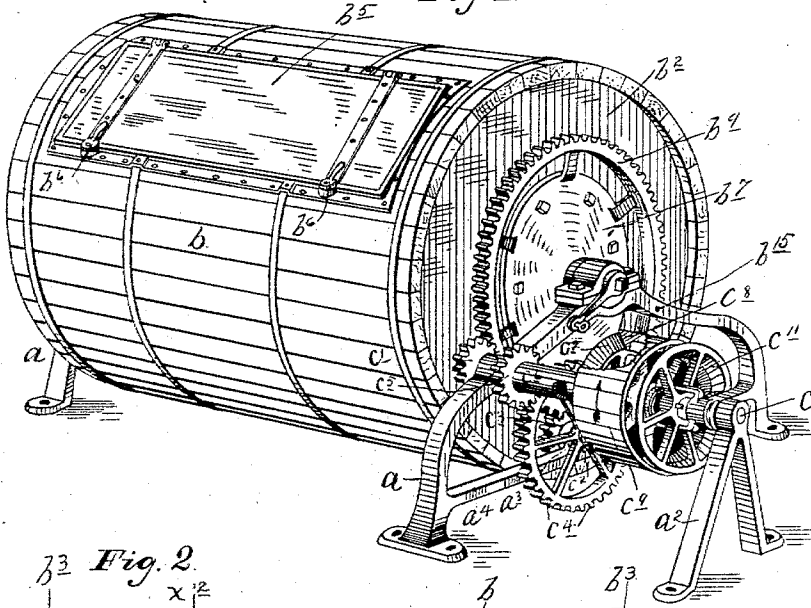


Fig. 2.

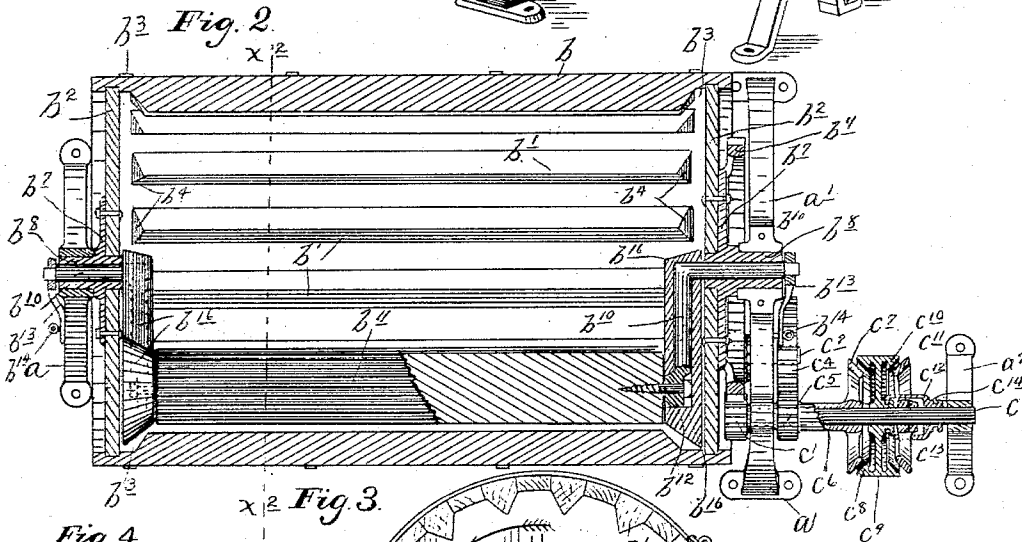
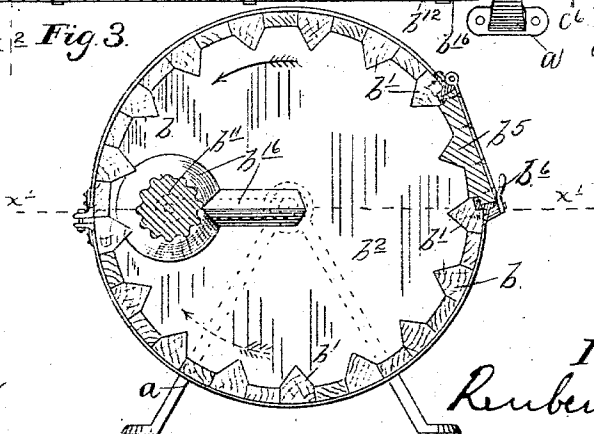


Fig. 3.



UNITED STATES PATENT OFFICE.

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COMBINED CHURN AND BUTTER-WORKER.

SPECIFICATION forming part of Letters Patent No. 564,977, dated August 4, 1896.

Application filed August 15, 1895. Serial No. 559,318. (No model.)

To all whom it may concern:

Be it known that I, REUBEN B. DISBROW, a citizen of the United States, residing at Owatonna, in the county of Steele and State of Minnesota, have invented certain new and useful Improvements in a Combined Churn and Butter-Worker; 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.

My invention relates to combined churns and butter-workers, and has for its object to provide an improved machine of this class with a view of greater efficiency, convenience, and economy. The machine was especially designed to be operated by power for use in creameries or elsewhere where considerable quantities are to be churned at one time; but the machine may be made of a size suitable for operation by hand for small dairies or home use. The machine is also capable of use for other purposes, such as kneading dough, &c.

To the ends above noted my invention consists of the novel devices and combination of devices which will be hereinafter described, and defined in the claims.

The invention is illustrated in the accompanying drawings, therein like letters referring to like parts throughout the several views.

Figure 1 is a perspective view of the machine. Fig. 2 is a horizontal sectional view, the section through the cylinder being taken on the line $x' x'$ of Fig. 3 and the section through the gearing being taken at a lower level; and Fig. 3 is a vertical section on the line $x^3 x^2$ of Fig. 2, looking toward the left. Fig. 4 is a detail.

$a a' a^2$ represent pillow-block castings, in which the rotary drum or cylinder and part of its driving mechanism are mounted.

The drum-body b is provided on its interior with inwardly-projecting radial cleats b' of angular form in cross-section. These cleats b' are obtained by forming every other one of the cylinder-staves of greater thickness than the intervening staves, with the projecting part of the thick staves made of triangular form in cross-section, as clearly shown in Figs. 2 and 3. The cylinder or drum is closed at

both ends by tight heads b^2 . The cleats b' do not extend to the ends of the cylinder, but stop short of the cylinder-heads b^2 , so as to leave an intervening annular space b^3 between the ends of the cleats and the heads b^2 . The cleats b' are also beveled or inclined at their ends, as shown at b^4 in Fig. 2. The body of the cylinder is provided with a door b^5 , secured in working position by clamps b^6 in the usual or any suitable way.

To the left-end member of the drum-heads b^2 is fixed a disk-like casting b^7 , provided with a hollow gudgeon b^8 , which rests in the left-hand pillow-block a as a journal for the left end of the drum or cylinder. To the right-end drum-head b^2 is secured a similar casting b^7 , with a similar gudgeon b^8 and a crown gear-wheel b^9 , cast integral therewith. The gudgeon-wheel of the right-hand casting b^7 rests in the pillow-block a' , and forms the right-end journal for the cylinder or drum.

Within the gudgeons b^8 are mounted the axial arms of a pair of crank-like hangers b^{10} , the other or inside arms of which are located within the drum, and carry at their outer ends a corrugated roller b^{11} . The journals b^{12} for the said roller b^{11} are, as shown, in the form of screw-bolts working through suitable bearings in the radial arms of the hangers b^{10} . The axial arms of the hangers b^{10} extend outward through the gudgeons b^8 and are provided with crank-arms b^{13} , having pins b^{14} , which may be made to engage with either of two holes b^{15} on opposite legs of the pillow-block castings $a a'$. Hence by the said arms b^{13} and the said pins b^{14} the said hangers b^{10} and the corrugated roller b^{11} may be locked in either of two extreme positions, one of which is shown in the several views and the other of which would be directly opposite thereto. In whichever position the hangers b^{10} may be set it is of course obvious that the roller b^{11} is free to turn in its bearings under frictional contact with the butter or other material which may at the time be subject to the operation of the machine.

The radial arms of the hangers b^{10} are covered by wooden shields b^{16} , with beveled surfaces facing toward the center of the cylinder. These shields or covers b^{16} are for the purpose of filling up the space between the radial

arms of the hangers and the drumheads and preventing the lodgment of the butter or other material in the said spaces. The angular outer ends of the shields or covers b^{16} work in the annular spaces b^3 between the cleats b' and the drumheads b^2 as the drum revolves, and thereby serve to keep the said annular spaces b^3 clear and maintain perfect freedom of circulation around the ends of the cleats b' .

Said covers b^{16} also throw the butter toward the longitudinal centers of the drum as it falls back from the roller b^{11} .

Having regard now to the means for imparting rotary motion to the drum, I provide for this purpose an interchangeable power and speed drive, by means of which the drum may be rotated with the speed suitable for churning in one direction and be rotated at the slower speed with increased power in the opposite direction, suitable for working the butter, from a single shaft running in a constant direction. To these ends a shaft c is journaled in the pillow-blocks a' and a^2 , which has at its inner end a pinion c' , fixed to the shaft and constantly in gear with the crown gear-wheel b^9 on the right-hand drumhead-casting b^7 . In a suitable bearing a^3 , formed on the cross-bar a^4 , which connects the legs of the pillow-block a' , is mounted a short shaft c^2 , having at its inner end a pinion c^3 , which also constantly engages with the crown gear-wheel b^9 on the casting b^7 . At its outer end the said short shaft c^2 is provided with a gear c^4 , which engages constantly with the pinion c^5 , formed on a sleeve c^6 , which is loose on the shaft c . The said sleeve c^6 has at its outer end a half member c^7 of a friction-clutch for coöperation with the corresponding half member c^8 on a pulley c^9 , which is loose on the shaft c and receives motion in a constant direction from a suitable line-shaft, (not shown,) or other source of power. At its outer or right-hand edge the said pulley c^9 is provided with another half-clutch surface c^{10} for coöperation with the half-clutch c^{11} , which is pinned or otherwise made fast to the shaft c . All the said clutch-surfaces c^7 , c^8 and c^{10} , c^{11} are friction-surfaces. The half-clutches c^7 and c^{11} are so spaced apart as to give the pulley c^9 room for sliding motion between the two, which is effected by a shipper-fork sleeve c^{12} , mounted on the shaft c , with its arms extending through suitable openings in the half-clutch c^{11} and engaging over a collar c^{13} on the outer hub of the pulley c^9 .

The shipper-fork lever for operating the sleeve c^{12} is not shown, but would be applied to the groove c^{14} of the sleeve c^{12} in the usual way; and means would be provided for locking the shipper-fork lever in either of its two extreme positions to hold the pulley in working engagement either with the half-clutch c^{11} or the half-clutch c^7 , as desired, or to throw the pulley into its intermediate or idle position. With this construction it is obvious that when the pulley c^9 is thrown to the right into working engagement with the half-clutch

c^{11} the shaft c will be forced to turn with the pulley c^9 and the drum will receive motion from the pinion c' on the main shaft c ; and, on the other hand, when the pulley c^9 is thrown to the left, into working engagement with the half-clutch c^7 , the sleeve c^6 would be caused to turn with the pulley c^9 on the shaft c , and thereby, through the gear c^4 , shaft c^2 , and the pinion c^3 , motion will be imparted to the crown-gear b^9 and the drum, but in the opposite direction. The intermediate gear c^4 is made relatively large as compared with the pinion c^5 , and in the proper proportion to impart motion to the drum at the desired slower speed, with the corresponding increase of power from the pulley c^9 .

Having regard now to the operation of the machine as a whole, the drum, when churning, is driven directly from the shaft c and the pinion c' in the direction shown by the full-line arrows in Fig. 3, supposing the corrugated roller to be set on the left side of the drum-axis, as shown in the said view. For the proper churning action I prefer to rotate the drum at the rate of about thirty revolutions per minute. Supposing the drum to be filled with cream to the proper extent, then, under the rotary motion of the drum in the direction shown by the full-line arrows in Fig. 3, the cream will be kept in a constant state of agitation until the separation is effected and the butter has come. In this churning action the cream not only receives a beating directly from the cleats b' , but is carried up thereby to a point above the normal level of the body of the cream and is thrown therefrom radially and downwardly with a dashing action. The beating and dashing action peculiar to the rotary motion of the drum and the coöperation of the cleats is further reinforced by the stationary hanger-shields b^{16} and the corrugated roller b^{11} , past which the cream must move, or against which it must be dashed in the churning action. When the separation has been completed, the buttermilk drawn off, and the collected butter salted and put in condition for working, all the operator has to do is to shift the clutch so as to throw the pulley c^9 into working engagement with the half-clutch c^7 . The drum will then be rotated in the opposite direction at slow speed, which is preferably about four revolutions to a minute, thereby turning the drum in the direction shown by the dotted-line arrows, and the butter will be worked under the coöperation of the cleats b' and the corrugated roller b^{11} . The said cleats b' will carry the butter upward and work the same against the corrugations of the roller b^{11} , which roller b^{11} , under the frictional contact with the butter, will turn in the same direction as the drum and coöperate therewith to carry the same up under and over the corrugated roller, whence it will be thrown back down into the drum at a point below the level of the corrugated roller. This action will be continuously repeated until the butter is com-

pletely worked, and in this coöperative action of the roller b^{11} and the cleats b' the beveled surfaces of the cleats and the corresponding beveled or rounded surfaces of the corrugations on the roller give a pressing action on the butter which is very effective to force out the water and force in the salt.

By actual experience I have demonstrated the efficiency of this machine. With a machine having a drum of four feet diameter by eight feet in length I can, on an average, turning the same at thirty revolutions per minute, and with the cream in the normal creamery condition, and about fifty-four degrees at the start, churn seven hundred and fifty pounds of butter in one hour and work the same in four minutes.

The interchangeable speed and power gearing available from the single pulley running in a constant direction to give the relatively high speed for churning and the relatively low speed with increased power for working is a great convenience, not only on account of the simplicity of the construction, but on account of the economy in time. The machine is always in condition either for churning or for working, at the will of the operator, by simply shifting his clutch-lever. Moreover, the said interchangeable gearing, taken together with the fact that the hanger-arms b^{10} may be locked either to the right or the left of the drum-axis, so as to make the corrugated roller b^{11} either operate to the left of the drum-axis, as shown in the drawings, or to the right thereof at a directly-opposite point, enables the necessary motion for driving the machine to be taken from any line-shaft or other rotary body by belting onto the pulley c^9 regardless of the direction of the line-shaft or source motion. With the parts in the position shown the pulley c^9 is assumed to be running constantly in the direction shown by the arrow in Fig. 1; but it could just as well run constantly in the other direction, provided the hanger-arms b^{10} and the roller b^{11} be shifted to the opposite side of the drum. This is further a great convenience, in the fact that it will permit the machine to be set either end to in respect to a wall or other object, regardless of the direction in which the line-shaft or other source body may be rotating. This will oftentimes make a great difference as to the available position for the machine in a creamery or elsewhere.

Emphasis has so far been given to the machine herein described as applied for churning and working butter; but it must be obvious that the machine might be well adapted for some other uses, such, for example, as kneading dough. It would seem to be well adapted wherever a kneading action is required on a plastic material.

Although shown and described as a power-machine, it will of course be understood that the machine might be made for hand opera-

tion, and whether for power or by hand the machine can of course be made in any size to suit the use intended. It will also be understood that changes might be made in the details of the construction without departing from the spirit of my invention.

What I claim, and desire to secure by United States Letters Patent, is as follows:

1. The combination with a rotary drum, of an inside roller, for coöperation with the inner surface of its shell, mounted in supports which are angularly adjustable about the axis of the drum, and means for setting the roller to work on either side of the axis of the drum or at any desired level within the drum, substantially as described.

2. The combination with the rotary drum having the gudgeons of an inside roller mounted in the radial arms of crank-like hangers b^{10} , the axial arms of which extend out through said gudgeons, and are provided with crank-arms b^{18} for adjusting and setting said roller in any position desired, substantially as described.

3. The combination with the drum having the V-shaped cleats b' , and the annular spaces b^8 , of the roller-hangers b^{10} , the roller b^{11} and the hanger shields or covers b^{16} , all arranged and operating substantially as described.

4. The combination with a rotary drum, of an inside roller mounted in supports which are adjustable about the axis of the drum, for setting the roller to work on either side of the drum-axis, and an interchangeable speed and power gearing comprising as one of its elements, a reversing device, operative, from a single pulley running in a constant direction, to turn the drum in either direction, at will, whereby the motion to the drum may be taken from the line-shaft, or other source, running in any direction, or the drum be faced either end to with respect to any object, substantially as described.

5. The combination with the rotary drum having the gear-wheel b^9 , fixed thereto, of the shaft c , the pinion c' secured on said shaft c and engaging said gear b^9 , the counter-shaft c^2 , the pinion c^3 rigid on said counter-shaft c^2 and engaging also said gear b^9 , the gear c^4 also rigid on said counter-shaft c^2 , the loose sleeve c^6 on said shaft c , the pinion c^5 fixed on said sleeve c^6 and engaging said gear c^4 , the half-clutch surface c^7 on said sleeve c^6 , the half-clutch c^{11} fixed to said shaft c , the loose pulley c^9 provided with the half-clutch surfaces c^8 and c^{10} , the shipper-fork sleeve c^{12} loose on said shaft c , and the inside roller b^{11} mounted in hanger-supports b^{10} , that are adjustable about the axis of the drum, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

REUBEN B. DISBROW.

Witnesses:

JAS. F. WILLIAMSON,
E. F. ELMORE.