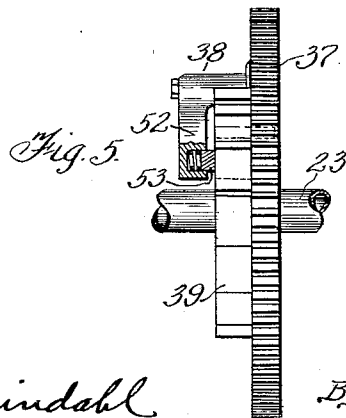
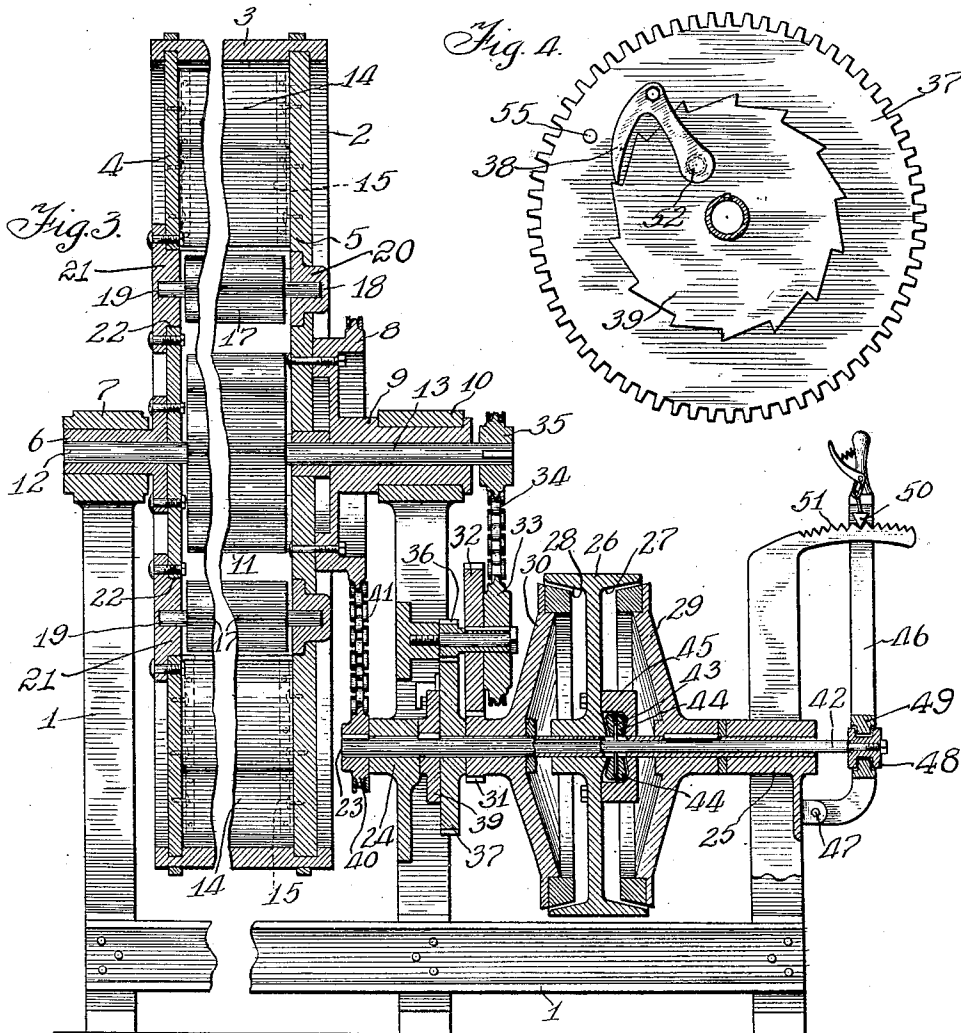


F. J. MACNISH.
 COMBINED CHURN AND BUTTER WORKER.
 APPLICATION FILED NOV. 2, 1910.

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2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

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COMBINED CHURN AND BUTTER-WORKER.

1,051,902.

Specification of Letters Patent.

Patented Feb. 4, 1913.

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To all whom it may concern:

Be it known that I, FREDERICK J. MACNISH, a citizen of the United States, residing at Oak Park, Illinois, have invented certain new and useful Improvements in Combined Churns and Butter-Workers, of which the following is a specification.

The object of this invention, generally stated, is to produce a combined churn and butter worker which shall be thoroughly efficient in operation and simple in construction.

A special object is to reduce the number of parts within the drum as much as possible and to reduce the number of driven parts within the drum to a minimum without sacrificing the efficiency and general usefulness of the machine.

Another object is to provide such a system of actuating devices that the machine may be controlled by means of a single lever when churning the cream, when working the butter, and when changing from one operation to the other.

In the accompanying drawings, Figure 1 is a fragmental end elevation of one form of combined churn and butter worker embodying the features of my invention. Fig. 2 is a transverse sectional view illustrating the arrangement of parts within the drum. Fig. 3 is a fragmental longitudinal central section through the machine. Fig. 4 is a detail side view of a pawl and ratchet mechanism comprised in the machine. Fig. 5 is an edge elevation of said pawl and ratchet mechanism.

The mechanism may be supported in a framework of any suitable construction, one form being herein indicated at 1. The drum 2 comprises the peripheral wall 3 and the two end walls 4 and 5. A door or doors 3^a of any preferred construction are provided in the peripheral wall 3. The drum may be supported in any preferred manner in the framework, one end of the drum, in this instance, being shown as provided with a tubular trunnion 6 supported in a bearing 7 in the framework, and the other end of the drum as having fixed thereto in any suitable manner a sprocket wheel 8, said wheel having a tubular hub 9 which constitutes a trunnion for that end of the drum, said trunnion being rotatably mounted in a bearing 10 in the frame 1.

A butter-working roller 11, suitably

ribbed or corrugated, is supported centrally within the drum, said roller being provided with journals 12 and 13 which are rotatably mounted in the trunnions 6 and 9, respectively.

A suitable number of devices for agitating the cream during the churning operation and for lifting the butter during the working operation are attached to the drum within the latter. Herein I have shown shelves 14, two being illustrated, although it will be understood that a greater or lesser number may be employed. In the present embodiment, these shelves are diametrically opposite one another, but it will be clear that they need not be so disposed. The shelves 14 may be secured in place in any preferred manner, as by securing the ends of the shelves to angular brackets 15 (Fig. 3) fixed to the ends of the drum, and by a suitable number of intermediate brackets 16. The outer edges of the shelves 14 may, if desired, be spaced away from the inner peripheral wall of the drum a suitable distance, as herein shown.

Each of the shelves may, if desired, be made slightly concave, as by forming a bend therein, as shown. By reason of this bend the butter lifted by the shelf is retained thereon for a somewhat longer period than if the shelf were flat, and the butter slides off the shelf gradually onto the butter-working devices.

Between each shelf and the central roller is a smaller roll 17 of suitable cross-sectional form, said roll in this instance being journaled in the drum so that the upper side of the roll is approximately alined with the inner edge of the adjacent shelf. Each roll 17 is provided with journals 18 and 19 by means of which it is supported for idle rotation in the drum. The journal 18 may be mounted in a suitable bearing 20 in the end 5 of the drum, while the journal 19 preferably finds a bearing in a plate 21 secured to the end 4 of the drum and filling an opening 22 in said end wall. The opening 22 is of sufficiently large diameter to permit of inserting and removing the roll 17 there-through. It will be understood, however, that the means herein shown for mounting the rolls 17 is not essential, and that any suitable construction may be employed.

In the embodiment selected for illustration, the means for rotating the drum dur-

ing the churning and butter-working operations, and the means for rotating the roller 11 during the butter-working operation, are constructed as follows: A shaft 23 is mounted in bearings 24 and 25 in the supporting frame. Rotatably mounted upon said shaft is a driving pulley 26 having friction clutch surfaces 27 and 28 thereon. A clutch member 29 is rigidly mounted upon the shaft 23 at one side of the driving pulley 26, while a friction clutch member 30 is rotatably mounted upon said shaft at the opposite side of the drive pulley. Secured to the clutch member 30 in any suitable manner is a pinion 31 that meshes with a spur gear wheel 32 which is suitably supported in the framework. Fixed to the gear wheel 32 in any preferred manner is a sprocket wheel 33 carrying a chain 34 that runs over a sprocket wheel 35 fixed on the outer end of the journal 13 of the central roller 11. A pinion 36 is fixed to rotate with the gear wheel 32 and the sprocket wheel 33, and meshes with a spur gear wheel 37 which is loosely mounted on the shaft 23. The gear wheel 37 carries a pawl 38 which is arranged to engage a ratchet wheel 39 fixed in any suitable manner upon the shaft 23. Upon the inner end of said shaft is a sprocket wheel 40 around which, and the sprocket wheel 8, a chain 41 extends.

Any suitable means may be provided for shifting the drive pulley 26 into and out of engagement with the clutch members 29 and 30. The means herein shown, by way of example, comprises a rod 42 mounted within an axial opening in the shaft 23. To the inner portion of the rod 42 is fixed a pin 43 which extends freely through elongated openings in the shaft 23, and upon which are rotatably mounted two rolls 44. The rolls 44 lie within an annular chamber formed between the drive pulley and a housing 45 rigidly attached to said pulley. The rod 42 may be slid back and forth within the tubular shaft 23 by any suitable means, as, for instance, a hand lever 46 pivoted at 47 in the supporting frame and suitably connected with the outer end of the rod 42.

In this instance I have shown a head 48 fixed on the rod 42 and rotatably mounted in a hub 49 formed on the hand lever, there being a tongue and groove connection between said head and said hub. The hand lever may be locked in adjusted position by any preferred means, as, for example, a detent 50 engaging notches in a locking sector 51. Said notches may be of graduated size, as shown, in order to provide means for locking the lever in position to maintain the desired degree of pressure between the drive pulley and the clutch member engaged by it. In Fig. 3 the drive pulley is shown in its central or inactive position.

In order to hold the pawl 38 out of en-

gagement with the ratchet wheel 39 when the spur gear wheel 37 is stationary and the ratchet wheel is being rotated by the shaft 23, as occurs during the churning operation, I provide an arm 52 (Fig. 4) on said pawl, which arm carries a spring-pressed block 53 (Fig. 5) that frictionally engages the side of the ratchet wheel. It will be seen that when the gear wheel 37 is stationary and the ratchet wheel is rotated with the shaft, the frictional engagement between the arm and the ratchet wheel will cause said arm, and therefore the pawl, to turn upon their pivotal support thereby raising the pawl out of engagement with the teeth of the ratchet wheel.

55 is a stop pin to limit the disengaging movement of the pawl.

When cream is to be churned, the drive pulley 26 is slid longitudinally of the shaft 23 to bring its friction surface 27 into driving engagement with the clutch member 29 fast on the shaft 23, thereby rotating the drum through the elements 40, 41 and 8, the gearing for rotating the central roller 11 being idle.

When the butter is to be worked, the drive pulley 26 is slid along the shaft 23 to bring its friction surface 28 into driving engagement with the clutch member 30, whereupon the central roller 11 is driven through the pinion 31, the gear 32, the sprocket wheels 33 and 35 and the chain 34; and the drum is rotated through the pinion 31, the gear wheel 32, the pinion 36, the pawl 38, the ratchet wheel 39 and the sprocket chain drive 40, 41 and 8. The drum is rotated in the direction indicated by the arrow *a* in Fig. 2, the central roller 11 being rotated in the opposite direction. When the butter has been lifted by one of the flights 14 slightly above the horizontal central plane of the drum, the butter gradually slides off the shelf onto the roller 11 and the roll 17 between said shelf and the central roller. The rotation of the central roller carries the butter down through the space between the roller 11 and said roll 17, thus causing said roll 17 to be rotated and the butter to be squeezed between the moving surfaces of the rollers. The described arrangement of flights 14, rolls 17 and central roller 11 insures effective working of the butter, inasmuch as the buttermilk is pressed from the butter and the salt worked into the butter between two rolling surfaces, whereby injury to the grain of the butter is prevented.

When cream is being churned, the drum is rotated at relatively high speed, and when the butter is being worked the drum is rotated slowly and the central roller 11 driven at comparatively high speed. It will be understood that any desired relative

speed of the parts may be obtained by properly proportioning the driving elements.

The machine may be started and stopped, and operated as a churn or a butter-worker, by means of the single hand lever 46.

The invention is not limited to the details illustrated and described herein, the present embodiment being susceptible to various changes without a departure from the spirit and scope of the invention.

I claim as my invention:

1. In a combined churn and butter worker, the combination of a horizontal rotary drum; a butter-lifting shelf extending longitudinally of and secured to the inner wall of said drum; a butter-working roller positioned concentrically of said drum and having a plurality of longitudinal corrugations therein; a relatively small idler roller positioned between said central roller and said shelf, the distance between said idler roller and said central roller being substantially equal to the distance between said idler roller and the inner edge of said shelf, the inner portion of said shelf being inclined with respect to the outer portion thereof in the direction of rotation of said drum, said inner inclined portion extending substantially tangentially to said idler roller; and means for rotating said idler roller and said drum in opposite directions, whereby the butter in said drum will be quickly and effectively worked.

2. In a combined churn and butter worker, in combination, a drum; butter-working means therein; a driving element; two opposed clutch members with either of which said driving element is adapted to coact; driving connections between said clutch members and the drum and the butter-working means; and a single hand lever and connections for establishing and breaking clutch relation between said driving element and said clutch members.

3. In a combined churn and butter worker, in combination, a drum; butter-working means therein, said butter-working means being provided with a shaft; a drive shaft; a clutch member fixed to said drive shaft; a driving connection between said drive shaft and the drum; a clutch member loose on said drive shaft; a driving connection between the second mentioned clutch member and the shaft of said butter-working means and between said second mentioned clutch member and said drive shaft for rotating the latter in one direction only; a single hand lever; and means controlled by said hand lever for rotating either of said clutch members.

4. In a combined churn and butter worker, in combination, a drum; butter-working means therein, said butter-working means having a shaft; a drive shaft; a clutch member fixed to said drive shaft; a

driving connection between said drive shaft and the drum; a second clutch member loose on said drive shaft; a gear element driven by the second clutch member; a driving connection between said gear element and the shaft of the butter-working means; a pawl arranged to be driven by said gear element; a ratchet wheel fixed on the drive shaft and arranged to be engaged by said pawl; and means for rotating either of said clutch members.

5. In a combined churn and butter worker, in combination, a drum; butter-working means therein, said butter-working means having a shaft; a drive shaft; a clutch member fixed to said drive shaft; a driving connection between said drive shaft and the drum; a second clutch member loose on said drive shaft; a gear element driven by the second clutch member; a driving connection between said gear element and the shaft of the butter-working means; a pawl arranged to be driven by said gear element; a ratchet wheel fixed on the drive shaft and arranged to be engaged by said pawl; a single hand lever; and means controlled by said hand lever for rotating either of said clutch members.

6. In a combined churn and butter worker, in combination, a drum provided with trunnions; bearings in which said trunnions are rotatably supported; butter-working means within said drum; a shaft for driving said butter-working means, said shaft being supported in one of said trunnions; a drive shaft; a driving connection between the inner end of said drive shaft and the drum; a clutch member fixed on the outer portion of said drive shaft; a second clutch member loose on said drive shaft; a gear element arranged to be driven by the second clutch member; a sprocket wheel fixed to said gear element; a sprocket wheel fixed on the shaft of the butter-working means; a chain extending over said sprocket wheels; a pinion fixed to rotate with said gear element; a gear wheel loose on the driving shaft and meshing with said pinion; a pawl carried by said gear wheel; a ratchet wheel fixed on the drive shaft for engagement by said pawl; and means for rotating either of said clutch members.

7. In a combined churn and butter worker, the combination of a drum, a butter-working device therein, and mechanism adapted to rotate said drum at a relatively high speed during the churning operation, and adapted to rotate said drum at a relatively low speed and to drive said butter working device during the butter-working operation, said mechanism including a pawl and ratchet device whereby the butter working device will be rotated only during the slower rotation of the drum.

8. In a combined churn and butter worker,

in combination, a drum, butter-working means therein, a driving element, means for connecting said element with the drum during the churning operation, and means for
 5 connecting said driving element with the drum and with the butter working means during the butter working operation, the last mentioned means including parts adapted to be disengaged by the operation of the
 10 first mentioned means.

9. In a combined churn and butter worker, in combination, a drum, a butter-working device therein, a drive shaft operatively connected with said drum, a clutch member
 15 fixed on said drive shaft, a clutch member loose on said drive shaft, means connecting said loose clutch member to said drive shaft and to said butter-working device, said means being adapted to permit rotation of
 20 said drive shaft by the first mentioned clutch member without rotating said butter working device, and means for driving said clutch members.

10. In a combined churn and butter
 25 worker, the combination of a drum, a butter working device therein, a drive shaft operatively connected with said drum, a clutch member fixed on said drive shaft, a clutch member loose on said drive shaft,
 30 means including a pawl and ratchet device for connecting said loose clutch member to said drive shaft and to said butter working device, and a single hand lever and connections for controlling movement of said
 35 clutch members.

11. In a combined churn and butter worker, the combination of a drum, a butter working device therein, two clutch members arranged to drive said drum, and a connection between one of said clutch members
 40 and said butter working device whereby said butter working device will be operated only during the movement of said clutch member.

12. In a combined churn and butter
 45 worker, the combination of a drum, a butter working device mounted in said drum and having a projecting shaft, a drive shaft operatively connected with said drum, a member having a permanent driving connection with said drive shaft, a second member having a gear connection with said drive shaft, said gear connection including a pawl
 50 and ratchet device adapted to permit rotation of said drive shaft without rotating the gear connection, and an operative connection between said gear connection and the shaft of said butter-working device.

13. In a combined churn and butter worker, the combination of a drum; a butter-working device therein; a shaft operatively connected to said drum; a driving member; means to connect said driving member with said shaft for driving said
 60 drum; and a second means to connect said driving member to said shaft and to said butter-working device, said second means including a device adapted to be automatically disengaged when said shaft is driven
 70 by the first mentioned connecting means.

14. In a combined churn and butter worker, the combination of a drum; a butter-working device therein; and mechanism adapted to rotate said drum at a relatively high speed during the churning operation
 75 and adapted to rotate said drum at a relatively low speed and to drive said butter-working device during the butter-working operation; said mechanism including an automatically disengageable means whereby
 80 the butter-working device will be rotated only during the slower rotation of the drum.

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

FREDERICK J. MACNISH.

Witnesses:

WALTER MCBROOM,
 JAS. J. ROBERTSON.