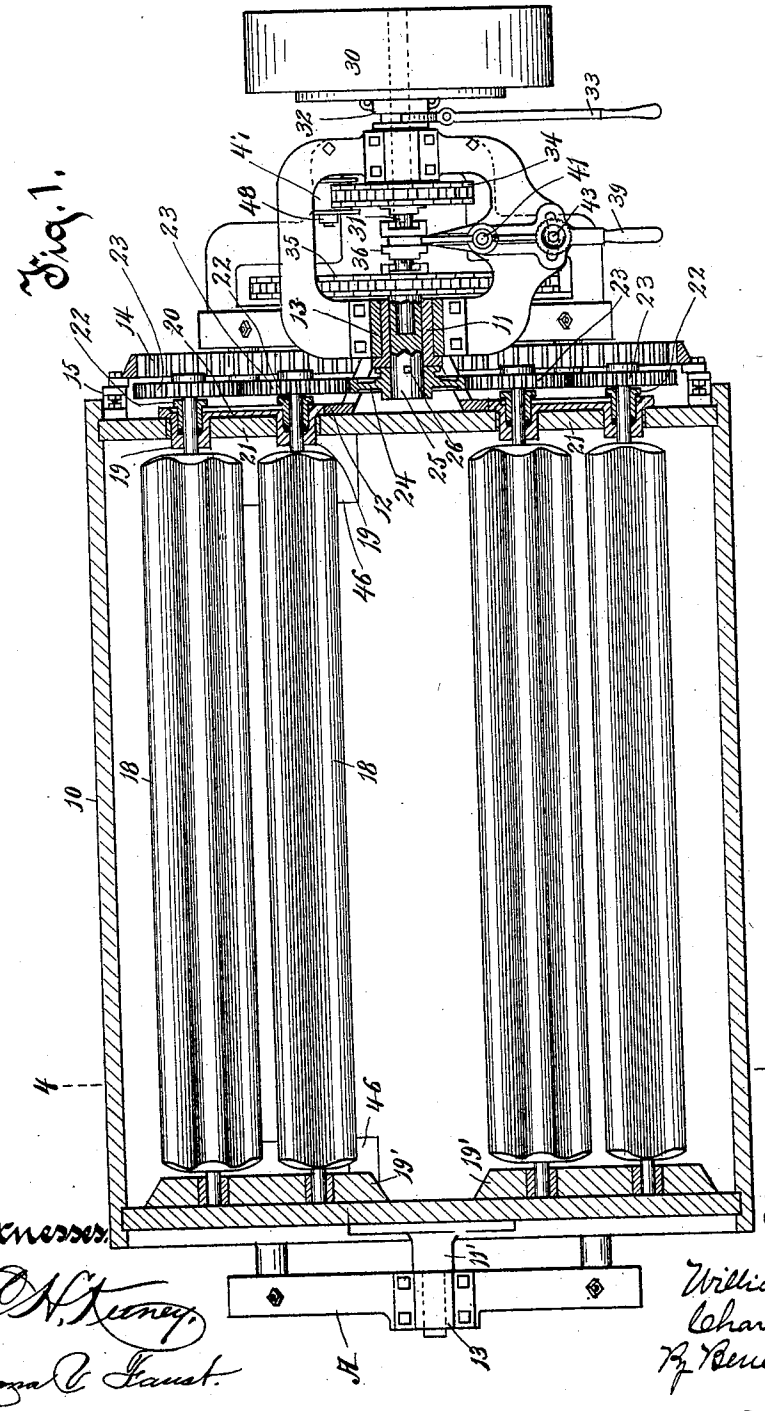
(No Model.) 4 Sheets—Sheet 1.

W. E. PENN & C. S. BROWN.

COMBINED Cchurn AND BUTTER WORKER.

No. 600,168. Patented Mar. 8, 1898.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

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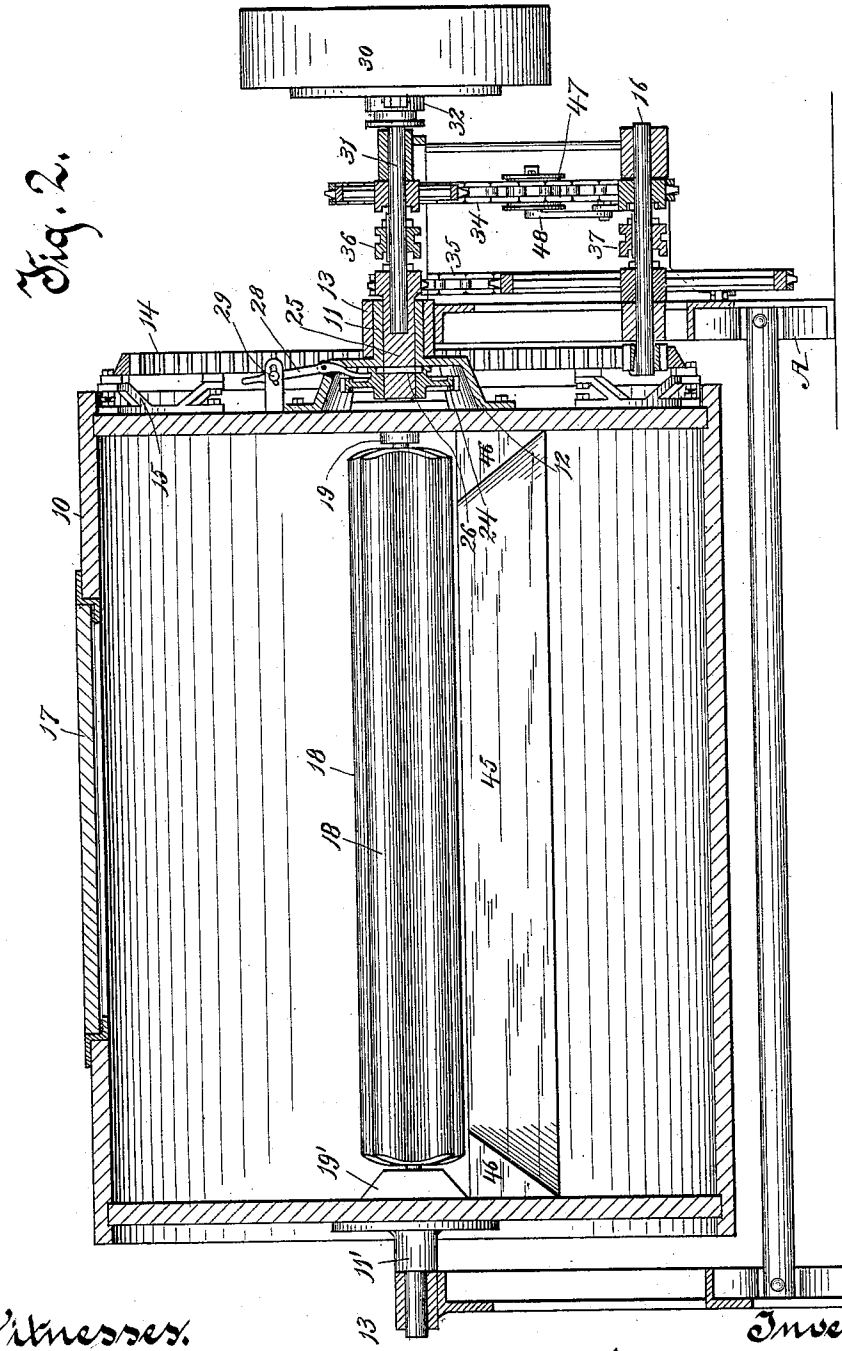
Fig. 2.



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W. E. PENN & C. S. BROWN.

COMBINED Cchurn AND BUTTER WORKER.

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Fig. 3.

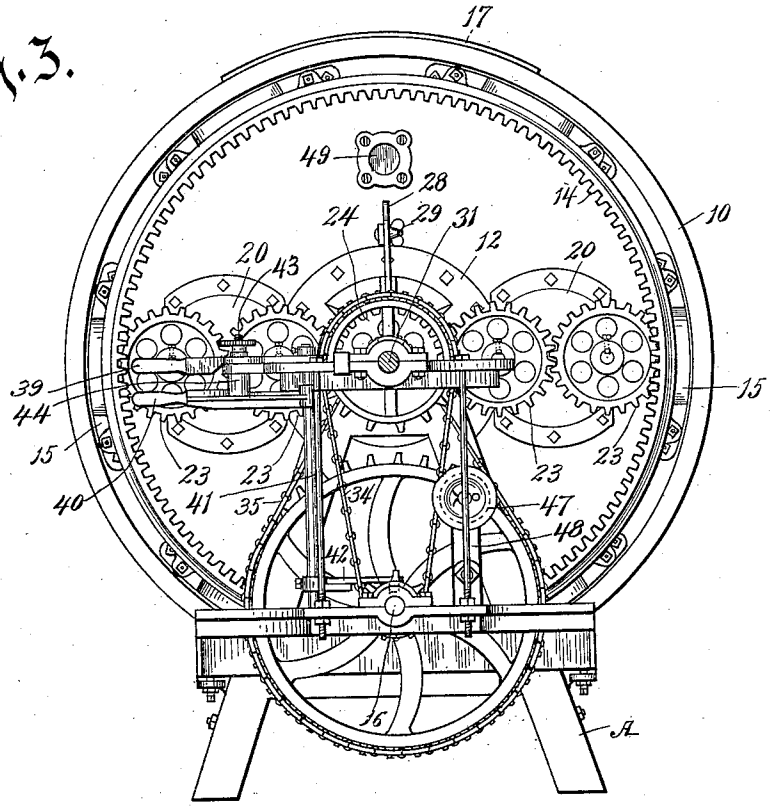

Fig. 6.

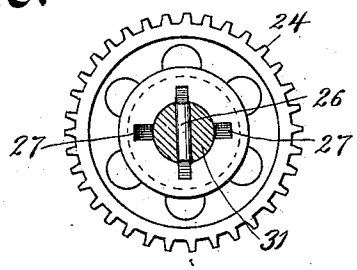

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Fig. 4.

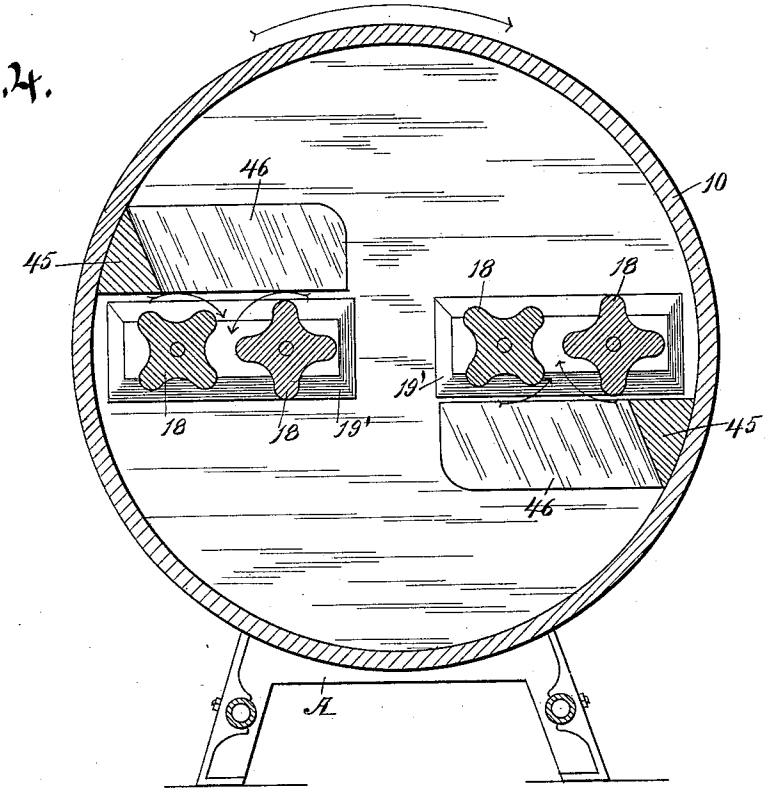
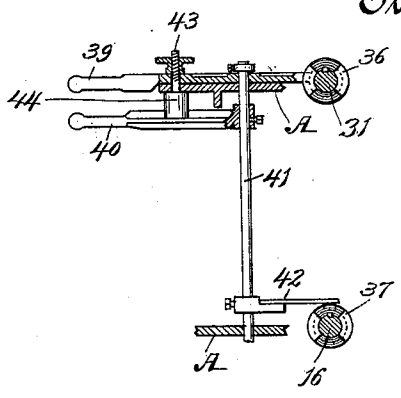


Fig. 5.



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UNITED STATES PATENT OFFICE.

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COMBINED CHURN AND BUTTER-WORKER.

SPECIFICATION forming part of Letters Patent No. 600,168, dated March 8, 1898.

Application filed July 19, 1897. Serial No. 645,031. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM E. PENN and CHARLES S. BROWN, of Lake Mills, in the county of Jefferson and State of Wisconsin, have invented a new and useful Improvement in a Combined Churn and Butter-Worker, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

Our improvement relates to machines of the class that are adapted for churning and with slight readjustment of parts, so as to secure relatively different movement of those parts, are adapted for working butter.

The object of the invention is to provide a less-complicated and a better-arranged and more desirable machine by reason of its better adaptation to the needs and requirements for churning and butter-working than any heretofore employed and therein and thereabout to more closely group the operative mechanism, to so arrange the parts as to get the best results mechanically and on the material operated on, and, as desirable, general results to lessen the cost of construction and to reduce the expense of operation both in attention to the machine when in use and in cleaning it and putting it in condition for subsequent use after it has been at work.

The invention consists of the mechanism and its parts and combinations of parts, as herein described and claimed, or their equivalents.

In the drawings, Figure 1 is a plan view of a complete machine embodying our improvements, the drum and some related parts being shown in section. Fig. 2 is an elevation of the same complete machine, the drum and some of the other parts being shown in section. Fig. 3 is a front end elevation of the same machine. Fig. 4 is a transverse vertical section on line 4 4 of Fig. 1, looking toward the left. Fig. 5 is a detail of clutch-shipping mechanism. Fig. 6 is an outer end view of the pinion that drives the rolls.

In the drawings, A indicates a frame of suitable size and proportions adapted to support the operative mechanism. This frame may, as shown in the drawings, be made principally of iron, the several parts being suitably bolted together. The drum 10 is preferably of cylindrical form, has tight heads, and is supported revolubly on the frame by means of gudgeons 11 11', fixed to the respective drumheads centrally, the gudgeon 11 at the front end being bored centrally and formed with branching or spider-like legs or flanges 12 12, that directly bear against and are fixed to the drumhead. The gudgeons are journaled directly in boxes 13 13, secured to the frame. For rotating the drum it is provided with a ring-gear 14, fixed on the front head of the drum, but at a little distance therefrom, being secured to brackets or trusses 15, which are fixed directly on the head of the drum. A pinion on the counter-shaft 16 meshes with the ring-gear 14 and is adapted for rotating the drum. The drum is provided with the usual aperture for inserting and removing the material, which aperture is closed by a door 17, secured in place by any well-known means. (Not shown in the drawings.)

Within the drum for agitating the cream in churning, and especially for working the butter in the butter-working process, we employ longitudinally-disposed parallel rolls 18 18, arranged in pairs eccentric to the axis of the drum, and preferably a plurality of such sets of rolls, the sets of rolls being arranged in radial planes, and when two sets of rolls only are used they are preferably arranged in a plane diametrical to the drum, one set on each side of its axis, as clearly shown in Figs. 1 and 4. These rolls are preferably in corrugated or fluted form and are located a little distance apart in each set, the flutes of one roll being arranged to be opposite or complement the inter-flute space or depression in the other roll of the set. At their rear ends these rolls are provided with journals that are mounted on the rear head of the drum, preferably by being journaled in blocks 19' 19' therefor, secured to the drumhead. At their front ends these rolls are provided with journals that have their bearings in boxes 19 19, formed integrally in each set on a plate 20, which plate is secured to the exterior surface of the drumhead by screws. An aperture is provided in the front drumhead of such size as to include the space occupied by the journal-boxes 19 of one set of rolls, which aperture is also of such size as to admit of

passing the rolls 18 severally therethrough. This aperture, except so much of it as is occupied by the boxes 19 19, is closed by the wood block 21, of the same general structure as the head of the drum and adapted to fit closely into the said aperture, which block is secured permanently to the plate 20, and when the plate 20 is affixed by means of screws to the head of the drum becomes a part of the drumhead, making it a tight head, the block 21 being removable by releasing the plate 20 from the drumhead and removing the plate, the journal-boxes, and the block 21 together from the aperture closed thereby in the drumhead. This construction provides a means for inserting the rolls in the drum and for taking them out for repairs when necessary. The journal-boxes 19 are provided with glands 22, the boxes being so constructed as by means of the glands to be made stuffing-boxes also for the purposes of lubrication and for making them liquid-tight.

For working butter it is necessary to give the rolls rotating movements of their own, which rotation of the rolls in each set is required to be inwardly toward each other on that side of the rolls that comes in contact with the butter, whereby the butter is carried between and past them. For this purpose the journals of the rolls at their front ends outside of the drumhead are provided with pinions 23 23, which mesh with each other, and one of which meshes with a pinion 24, rotatably loose on a hollow roll-driving shaft 25. This shaft 25 is journaled centrally in the gudgeon 11. The shaft 25 is held against movement endwise by means of its enlarged sprocket-wheel head at its outer end and by a pin 26 inserted therethrough, which head bears against the outer end and the pin against the inner end of the hollow gudgeon 11, in which the shaft has its bearing. The projecting ends of pin 26, Figs. 1, 2, and 6, normally enter recesses 27 27 therefor in the hub of pinion 24 and hold that pinion to rotation with the shaft 25. When the pinion 24 is thus in engagement with the shaft 25, the rolls 18 are rotated on their own axes by the rotation of the shaft 25. This rotation of the rolls is always employed when the machine is used as a butter-worker. For shifting the pinion 24 out of engagement with the pin 26, and thereby releasing it from rotation with the shaft 25, we employ a shifting-lever 28, pivoted medially in a flange or leg 12, one extremity of which lever enters an annular groove therefor in the hub of the pinion 24. The lever 28 is locked in position by a bolt and clamping-nut 29, which bolt passes through the lever and through a segmental slot therefor in a bracket fixed on the head of the drum.

For rotating the rolls on their own axes and for revolving the drum at differential rates of speed a belt-pulley 30, adapted to receive a belt thereon from any power-supply, is provided, which pulley is loose on the shaft 31, said shaft being journaled medially in the frame and at its inner extremity in the shaft 25, which is suitably bored axially therefor. A collar-clutch 32, splined on the shaft 31, is adapted to be put into and released from engagement with the pulley 30 by means of a shipping-lever 33, pivoted on the frame and having furcate curved fingers that ride in a groove therefor in the collar 32. A sprocket-chain 34 runs on a larger wheel loose on shaft 31 and on a smaller wheel loose on the shaft 16. Another sprocket-chain 35 runs on a small sprocket-wheel which forms the head of the shaft 25, in which the shaft 31 is journaled, and also on a larger sprocket-wheel on the shaft 16. The chains 34 and 35 are respectively put in operation by clutching the wheels on which they run severally to the shafts 31 and 16, respectively, by means of clutches 36 and 37, the former of which is splined on the shaft 31 and the latter on shaft 16. These clutches are adapted to be shifted on the shafts 31 and 16, respectively, into engagement with the wheels of the chain 34 or the wheels of chain 35, the employment of the chain 34 actively being adapted to give a more rapid revolution to the drum, which is required in churning, and the employment of chain 35 actively being adapted to give a slower revolution to the drum, which is required in working butter. Modifications of these principal movements may be obtained, if desired. For shifting the clutches 36 and 37, respectively, we employ shifting-levers 39 and 40, Figs. 1, 3, and 5. The lever 39 is pivoted on a rock-shaft 41 and is provided with a terminal finger that enters a groove therefor in the collar-clutch 36, splined on the shaft 31. The lever 40 is secured adjustably to the rock-shaft 41, adjacent to the lever 39, and an arm 42, also secured adjustably to the rock-shaft 41, is provided with a finger that enters an annular groove therefor in the collar-clutch 37, splined on the counter-shaft 16. The rock-shaft 41 is journaled in the frame. A bolt 43, fixed in the arm 40, projects through a portion of the frame and through the lever-handle 39 in segmental slots therefor, and a nut turning on the bolt 43 is adapted to clamp the lever-handles to the frame releasably. The boss 44 on the lever-handle 40 provides a means for securing the bolt 43 to the lever-handle and also serves as a bearing against the frame on the under side.

A rib or ledge 45, extending the entire length of the drum on the inside, is secured to the inner surface of the drum immediately in front (in the direction of revolution of the drum) of each set of rolls, and this ledge is provided with a beveled inner edge, whereby it is adapted to carry butter away from the peripheral surface of the drum inwardly onto the rolls in such manner that it will be caught by the rolls and by their revolution inwardly toward each other will be carried downwardly between them. It must be understood that in working the machine as a butter-worker it is to

be rotated in the direction indicated by the arrow in Fig. 4, and that the rolls are to be rotated in their several sets in the directions also indicated by arrows adjacent thereto. At the end of the ledge 45 there are other ledges 46 46, continuous therewith, one at each end, secured to the respective heads of the drum immediately in front of the rolls, the surfaces of these end ledges being also beveled or inclined inwardly and thereby adapted to carry butter away from the ends of the drum toward and onto the rolls. This construction prevents the butter from getting into the spaces between the rolls and the periphery of the drum and between the ends of the rolls and the heads of the drum. These ledges, having beveled surfaces, as described, serve as a kind of hopper by which the butter that has fallen to the bottom of the drum is by the revolution of the drum caught up and carried onto the rolls in proper position to be taken by them and passed downwardly between them.

It will be understood that in churning the shaft 31, being in engagement with the pulley 30 by means of the collar-clutch 32, is also put in active mechanical connection with the counter-shaft 16 through the sprocket-chain 34 and that thereby the drum is rotated at a comparatively rapid speed. At the same time, as it is advisable that the rolls shall not be rotated on their axes, but shall be free to go around with the drum, the pinion 24 is by means of the lever 28 shifted out of engagement with the pin 26, so as to be free to rotate on the shaft 25. This allows the pinion 24, being still in mesh with the adjacent pinions 23, to rotate therewith synchronously with the drum, obviating any rotation of the rolls on their axes.

An idle chain-tightening pulley 47, mounted revolubly on a pin on an arm 48, which is pivoted adjustably on the frame, being clamped thereto by a nut on the pivot-bolt, bears against the chain 34 and is adapted to regulate its tension.

49 is a glazed peep-hole in the drumhead to enable the attendant to inspect the interior of the drum.

What we claim as our invention is—

1. The combination with a revoluble drum having tight heads and central drum-supporting gudgeons thereon, a large ring-gear on the front end of the drum and means for rotating the drum through said ring-gear, of rolls in the drum in one or more sets, the set or sets of rolls being severally eccentric to the axis of the drum, pinions outside of the drumhead on the journals of the rolls meshing with each other, a driving-shaft concentric with but not fixed to the drum, a pinion on said driving-shaft in a plane with the roll-journal pinions and meshing with that pinion of the set or sets of roll-journal pinions nearest the axis of the drum, and means independent of the drum for rotating said driving-shaft.

2. The combination with a revoluble drum having tight heads and central drum-supporting gudgeons thereon and means for rotating it, of a plurality of sets of rolls in and parallel with the drum, and non-concentric therewith, pinions outside the drum on the journals of the rolls, the pinions of each set of rolls meshing with each other, a pinion on a driving-shaft concentric with the drum and in a radial plane with said roll-journal pinions and meshing with the adjacent pinions of each set on the roll-journals, and means for rotating said driving-shaft independently of and differentially from the rotation of the drum.

3. The combination with a revoluble drum having tight heads and central drum-supporting gudgeons mounted on a frame, one of which gudgeons is hollow and has branching legs or flanges by which it is affixed to the drumhead, of rolls in and eccentric to the drum having journals that extend at one end through the drumhead, pinions on said journals meshing with each other, a shaft mounted in said hollow gudgeon and a pinion on said shaft within the legs of the gudgeon in the plane of and meshing with the inner of said roll-journal pinions.

4. The combination with a revoluble drum having tight heads and central drum-supporting gudgeons mounted on a frame, one of which gudgeons is hollow and has branching legs by which it is affixed to the drumhead, of rolls in and eccentric to the drum having journals that extend at one end through the drumhead, pinions on said journals meshing with each other, a shaft mounted in said hollow gudgeon, a pinion loose on said shaft within the legs of the gudgeon and in the plane of and meshing with the inner of said roll-journal pinions, and means for putting said shaft-pinion into engagement with its shaft.

5. The combination with a revoluble drum having central drum-supporting gudgeons one of which is hollow and has branching legs by which it is affixed to the drumhead, of rolls in the drum in sets eccentric thereto, pinions outside the drum on the roll-journals, a driving-shaft journaled in the gudgeon, a pinion on said driving-shaft meshing with a roll-journal pinion, a pulley-shaft having a bearing in the driving-shaft, and means for clutching the pulley-shaft to the driving-shaft.

6. The combination with a revoluble drum, having central drum-supporting gudgeons one of which is hollow and has branching legs by which it is affixed to the drumhead, a drum-rotating gear fixed on the drum and a counter-shaft geared to the drum-rotating gear, of a driving-shaft mounted in the hollow gudgeon, a roll-driving pinion on said driving-shaft, rolls in the drum having gears outside meshing with a pinion on the driving-shaft, a pulley-shaft concentric with and having a bearing in said driving-shaft, and mechanism connecting said pulley-shaft and driving-shaft operatively respectively with said

counter-shaft and in such manner as to differentiate the speed of the drum.

7. The combination with a drum provided with rolls therein mounted longitudinally thereof, of a plate provided with roll-journal boxes and secured releasably to the drumhead, a block of substantially the thickness and material of the drumhead fastened to the plate, said block being adapted to enter and close an aperture through the drumhead eccentric to the axis provided for passing a roll through the drumhead.

8. The combination of a revoluble cylindrical drum, rolls in sets in the drum mounted in the heads thereof, each set being eccentric to but parallel with the axis of the drum and in a radial plane thereof, and ledges on the inner surface of the shell and ends of the drum in front of each set of rolls said ledges extending the entire length of the drum and continuously therewith partially across both of its heads and having faces inclined inwardly from the surface of the drum toward the rolls.

In testimony whereof we affix our signatures in presence of two witnesses.

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CHARLES S. BROWN.

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