F. L. FURBUSH.

SQUEEZE ROLL FOR WASHING AND OTHER MACHINES.

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963,540. Patented July 5, 1910.

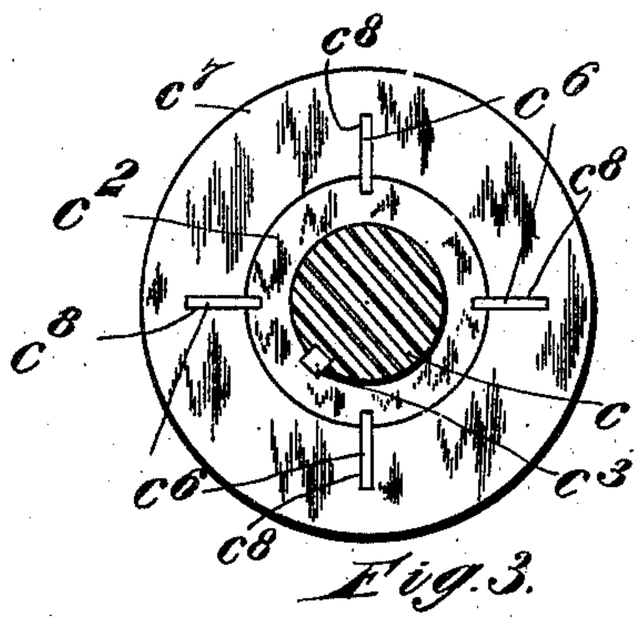

Fig. 3.

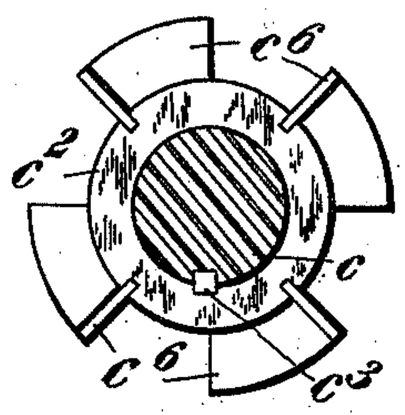

Fig. 4.

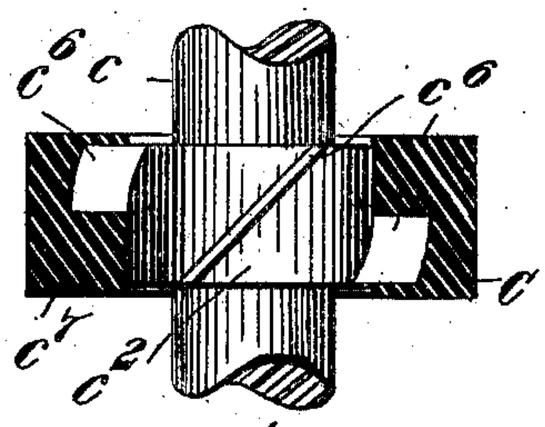

Fig. 5.

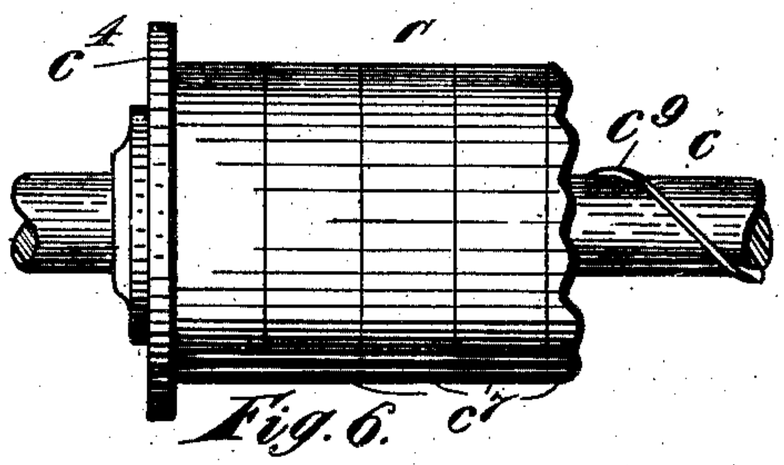

Fig. 6.

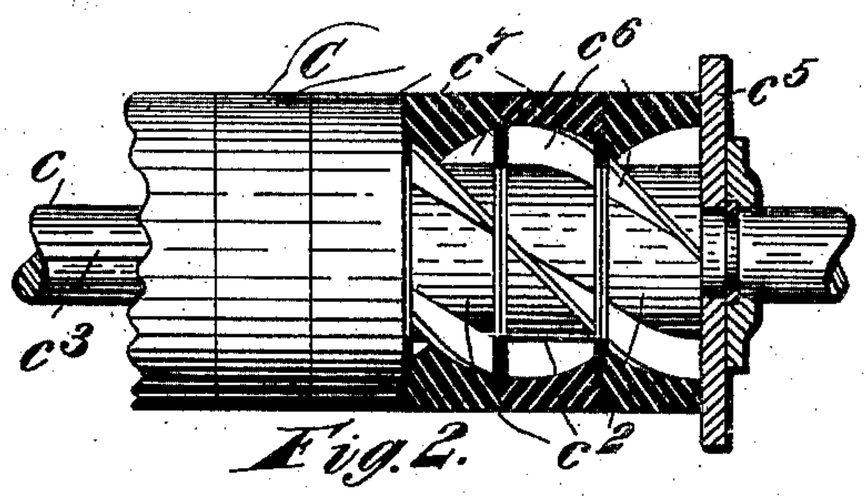

Fig. 2.

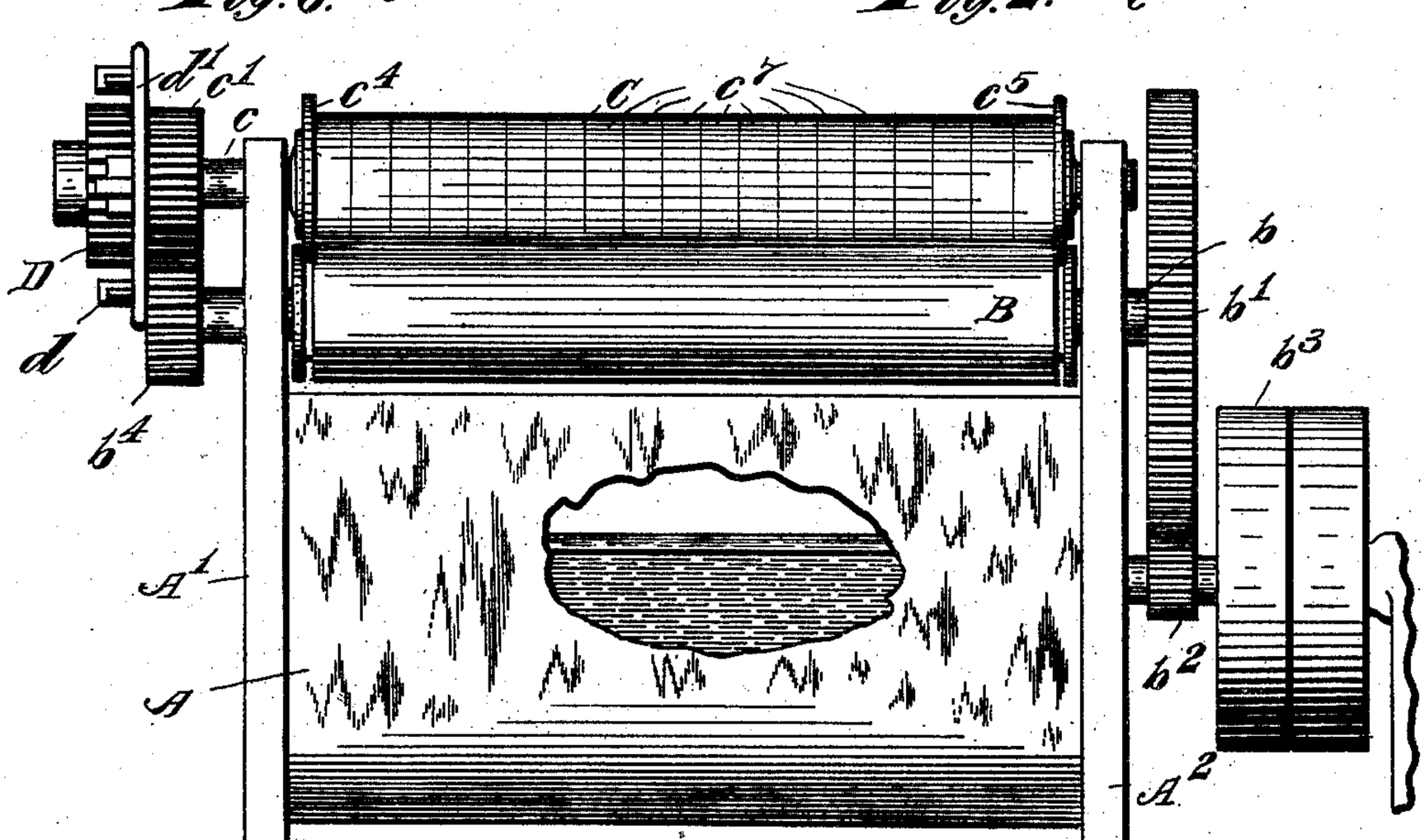

Fig. 1.

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SQUEEZE-ROLL FOR WASHING AND OTHER MACHINES.

963,540. Specification of Letters Patent. **Patented July 5, 1910.**

Application filed January 4, 1910. Serial No. 536,265.

To all whom it may concern:

Be it known that I, FRANK L. FURBUSH, a citizen of the United States, residing at Graniteville, in the town of Westford, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Squeeze-Rolls for Washing and other Machines, of which the following is a specification.

This invention relates to squeeze-rolls for washing and other machines in which a pair of parallel squeeze-rolls, one of which is provided with a compressible elastic outer portion, are arranged one above the other and used to express liquids from textile fibers, yarn or fabrics. In machines of this character, although sometimes both rolls of a pair of squeeze-rolls are covered with compressible or elastic material, as vulcanized rubber composition, usually the operating surface of the lower roll is metallic and unyielding.

The compression-surfaces of the squeeze-rolls are sometimes as much as five feet long and owing to the difficulty of making the covering for the upper roll of uniform thickness and surface and to enable the covering to be repaired without too much expense, it is customary to use rings of vulcanized rubber composition placed side by side around the roll and to squeeze them against each other by end-plates, so that when a single ring becomes useless, it may be removed and another substituted for it without incurring the great expense of procuring an entirely new covering.

Commonly the upper compressible roll is driven by friction from the lower metallic roll, the shaft of the lower roll having a gear fast thereon which engages a gear loose on the shaft of the upper roll, in such a manner that the upper roll is not driven positively, except when an unusually large bunch of stock in entering the bite of the rolls prevents the upper roll from turning, in which case a pawl, carried by the gear on the upper roll-shaft, engages a ratchet secured to said shaft concentrically therewith and compels the rotation of the upper squeeze-roll, in a well known manner.

It has been attempted heretofore to compel the elastic rings to rotate exactly with, that is, to stop and start with the upper roll-shaft but this has been found to be almost impossible, certainly impracticable to accomplish, because of the yielding nature of said rings and the fact that they are driven by the friction of the lower roll applied to their outer surfaces while said shaft is driven by its connection with said rings. To this end the rings have been formed with recesses to engage rigid metallic projections on said upper roll-shaft or on collars rotary with said shaft but these recesses are constantly enlarged by the slight relative movement of the rings on said shaft, and soon render the rings worthless because the parts of the rings between the projections unduly yield when the pressure is applied. Again there is a tendency in the outer surfaces of the rings to move at different rates of speed from each other because the rings after being secured in place in close contact with each other, shrink laterally away from each other, so that their sides, not being in sufficiently close contact, do not carry the adjacent rings exactly with them and the movements of the outer surfaces of the rings will vary with variations in the thickness of the different parts of the lap or web of stock passing between the squeeze-rolls and a bunch in the lap may be large enough to prevent the movement of one or more adjacent rings and tear the rings. I endeavor to make use of this tendency of the rings to start in advance of the shaft which carries them and to prevent their tendency to separate by lateral shrinkage by providing the rings with internal spiral recesses and by the use of spiral inclines supported by the shaft, preferably on collars, in such a manner that such movement of the rings will force said rings more closely against each other. To this end, I preferably surround the upper squeeze-roll shaft with collars and provide means which, while allowing the collars to move longitudinally on the shaft, do not permit them to rotate about the shaft, making the collars somewhat narrower than the rings, to allow the collars to approach each other as the rings are compressed, and the collars I provide with spiral projections, all of which are inclined in the same direction and at the same angle to the axis of the shaft.

The collars may be dispensed with by using a spiral rib secured directly to the shaft of the roll and engaging the spiral recesses in the elastic rings. In either case any partial rotation of the rings relatively to the shaft will cause the rings to crowd in a spiral direction toward one end of the

shaft and the ring in advance in this spiral movement being stopped by the usual end-plate, every following ring will be crowded firmly against the next preceding ring, thus preventing the enlargement of the recesses in the rings and protecting the edges of their outer curved faces.

In the accompanying drawing, Figure 1 is an elevation of the delivery end of the tank of a wool-washing machine with a pair of squeeze-rolls, one of which embodies my invention, with the roll-driving mechanism; Fig. 2, a plan, partly in central longitudinal section, of a roll provided with my invention; Fig. 3, a vertical cross section of the shaft of said roll, showing in side elevation an elastic ring and a collar with spiral projections; Fig. 4, similar to Fig. 3, but omitting said ring; Fig. 5, a plan of part of the shaft, a collar with spiral projections and a horizontal central section of an elastic ring; Fig. 6 shows a plan of a part of a modified form of my invention, in which the collars are omitted and the shaft is provided with a spiral rib, adapted to engage a corresponding recess in each ring.

A indicates the tank and A^1 A^2, uprights of the frame of a wool-washing machine in which the shaft b (journaled in said uprights) of the squeeze-roll B is provided with a gear b^1 engaged by a pinion b^2, concentric with and rotary with the fast pulley b^3. Near the opposite end of the shaft b is a smaller gear b^4 which engages a gear c^1, loose on the shaft c of the upper squeeze-roll C and having more teeth than the gear b^4. To the shaft c is secured a ratchet D concentrically therewith and a pawl d carried by a plate d^1, fast on said gear c^1, ordinarily slips over the teeth of the ratchet but is caused by a stoppage of the upper squeeze-roll (by a bunch passing between the squeeze-rolls) to engage said ratchet and rotate said upper roll positively instead of by the ordinary friction between the squeeze-rolls or between the web and the upper squeeze-roll,—until such friction is sufficient to drive said upper roll; all of these parts being of usual construction and operation, except the upper squeeze-roll C which is peculiar in the respects hereinafter stated.

On the shaft c of the squeeze-roll C (Figs. 2–5) are arranged collars c^2 of metal or alloy which are prevented by a spline or key c^3 from turning on said shaft but which are free to move longitudinally on said shaft for a distance limited by end-plates c^4 c^5 of the usual construction and operation. These collars are each provided with spiral projections c^6. Around each collar c^2 is placed a ring c^7 of compressible elastic material, as, vulcanized rubber composition, the body of each ring fitting the corresponding collar and being provided with as many spiral recesses c^8 as there are projections c^6 on said collar, said recesses fitting said projections and said collars being slightly narrower than said ring. The projections on the collars are all of the same spiral pitch and are arranged at equal intervals on all the collars and when placed on the shaft, the collars and their projections provide a series of spirals or screw-threads of long pitch broken by the intervals between the collars. The rings are compressed in the usual manner between the end-plates when the roll is new but these rings usually shrink laterally in a short time so as to leave slight openings between the rings or at least to render their outer curved surfaces less firm at the edges of the ring and require further compression against each other. The friction of the lower squeeze-roll or of the web of stock passing between the squeeze-rolls rotates these rings slightly and causes them to run along on the spirals toward one end of the squeeze-roll and their movement in this direction being limited by the end-plate at this end of the roll, the rings are crowded firmly together in such a manner as to protect their edges and to maintain a proper firmness of the elastic covering of said squeeze-roll. Any space left by the spiral movement of the rings between the last ring and adjacent end-plate may be filled by winding therein, slubbing or roving.

I claim as my invention:—

1. A squeeze-roll comprising a central longitudinal supporting shaft, a spiral projection carried thereby, and rings of elastic material provided with corresponding spiral depressions to receive said projection, whereby any rotative movement of said rings relatively to said shaft will cause them to move longitudinally on said shaft.

2. A squeeze-roll comprising a central shaft, collars arranged thereon, means for preventing any rotative movement of said collars on said shaft, but permitting a longitudinal movement of said collars on said shaft, said collars having spiral projections, and rings of elastic material surrounding said collars and having corresponding spiral recesses to receive said projections.

3. A squeeze-roll comprising a central shaft, collars arranged thereon and splined thereto and having spiral projections, and rings of elastic material surrounding said collars and having corresponding spiral recesses to receive said projections.

4. A squeeze-roll comprising a central shaft, collars arranged thereon and splined thereto and having spiral projections, all of said projections having a uniform direction and pitch, and rings of elastic material surrounding said collars and having corresponding spiral recesses to receive said projections and each ring having a greater lateral thickness than the corresponding collar.

5. A squeeze-roll comprising a central

shaft, collars arranged thereon and splined thereto and having spiral projections, all of said projections having a uniform direction and pitch, rings of elastic material surrounding said collars and having corresponding spiral recesses to receive said projections and each ring having a greater lateral thickness than the corresponding collar, and a fixed stop to limit the longitudinal movement of said rings and collars on said shaft.

In witness whereof, I have affixed my signature in presence of two witnesses.

FRANK L. FURBUSH.

Witnesses:
ALBERT M. MOORE,
WILLIAM F. CURTIN.