(No Model.)

N. C. MITCHELL.

RUBBER SHEETING MILL.

No. 418,045. Patented Dec. 24, 1889.

Fig. I.

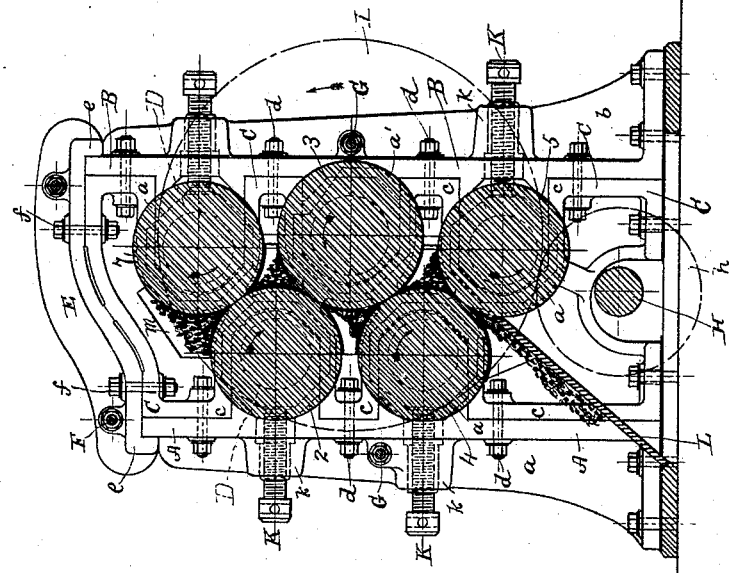
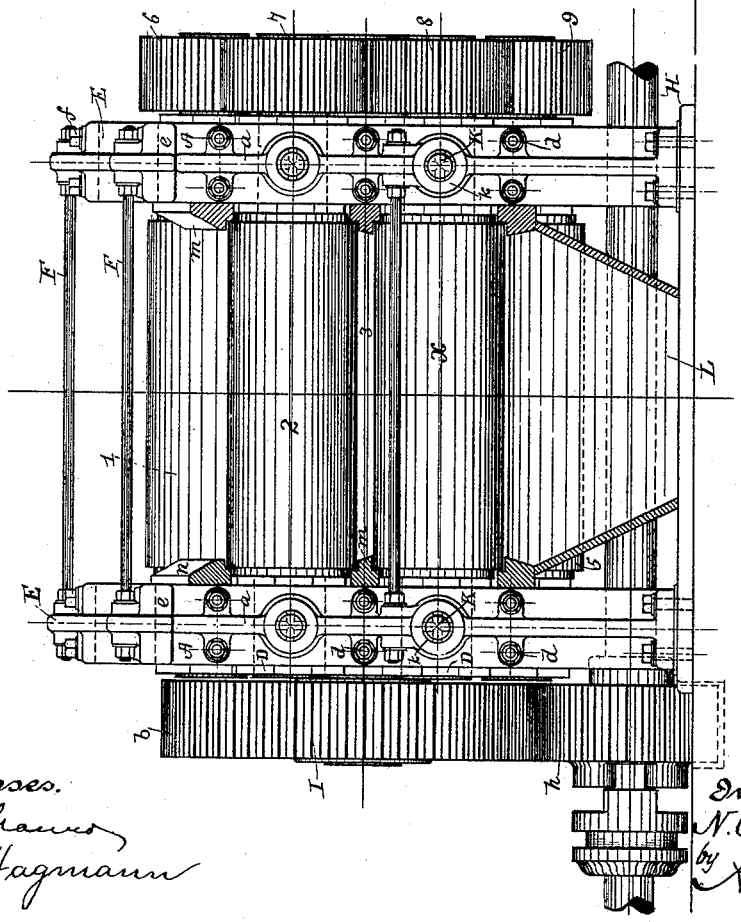


Fig. II.



Witnesses.
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UNITED STATES PATENT OFFICE.

NATHANIEL C. MITCHELL, OF PHILADELPHIA, PENNSYLVANIA.

RUBBER-SHEETING MILL.

SPECIFICATION forming part of Letters Patent No. 418,045, dated December 24, 1889.

Application filed October 3, 1889. Serial No. 325,898. (No model.)

To all whom it may concern:

Be it known that I, NATHANIEL C. MITCHELL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Rubber-Sheeting Mills, which improvement is fully set forth in the following specification.

This invention has reference to the construction of mills for rolling and sheeting rubber.

The ordinary sheeting-mill consists, simply, of a pair of smooth-faced rolls supported in bearings in a strong frame, between which rolls the rubber is carried until it is formed into a sheet, which adheres tenaciously to one of the rolls and has eventually to be severed by a knife and pulled off. The adherence of the sheet to the roll keeps the heat in the latter, rendering it necessary to drive the rolls at a very low speed to prevent injury to the rubber from overheating. Moreover, the operation of detaching the sheet, besides being difficult and awkward, is extremely dangerous, requiring great care on the part of the workmen to avoid accident.

According to the present invention the mill comprises a series of, say, five rolls supported in the same frame in such manner that the rubber passes between the first and second rolls, then between the second and third, and so on, receiving in its course through the mill as many nips as there are rolls, less one. The sheet does not adhere to one of the rolls, so that the use of a knife for detachment is avoided, and, furthermore, the liability to injury of the rubber by overheating is lessened, making it possible to drive the rolls at a comparatively high rate of speed.

In a concurrent application filed September 26, 1889, Serial No. 325,193, I have described an improvement in the art of restoring rubber, which improvement consists, essentially, in rolling the rubber stock while in a moist condition, and the mill described herein is designed specially for carrying out such process, though obviously its use is not confined thereto.

The accompanying drawings, which form part of this specification, illustrate a mill constructed in accordance with the invention, Figure I being a vertical section, and Fig. II an elevation.

The frame consists of several castings firmly but detachably fastened together. At each end of the mill there is a front upright casting A and a rear casting B, which are substantially alike, except that the upright B is somewhat taller than A. These uprights have longitudinal strengthening-ribs *a b*. Between the uprights A B is the intermediate casting C, (one at each end.) The shape of casting C is shown in Fig. I. It is provided on each side with a series of horizontal arms *c*, forming between them recesses for the reception and support of the journal-boxes D (dotted lines, Fig. I) of the several rolls, which fit in said recesses. As shown, there are three of these recesses on the rear side of the mill and two on the front side, making supports for five rolls; but the construction of the frame-work could readily be modified to support a greater or less number, if desired. Casting C fits snugly between the uprights A B, to which it is firmly secured by bolts *d*.

At the top of each side frame is a cap-piece E, provided at each end with a downwardly-projecting shoulder *e*. These shoulders fit over the upper ends of uprights A B and prevent them from spreading. The cap-pieces E are fastened to casting C by bolts *f*, and the two cap-pieces are connected and braced by the rods F. Other tie-rods G connect the uprights A A and B B. The rolls 1 2 3 4 5 are supported in their respective journal-boxes D, which are slipped into the recesses in casting C, as already described. Roll 3 is of larger diameter than the others, and from it the other rolls are driven. Roll 3 may be about eighteen inches in diameter and the other rolls sixteen inches; but these dimensions are variable. The driving-shaft H has a pinion *h*, which engages a large spur-gear I on the shaft of roll 3. At the other end of the mill is a train of gears 6 7 8 9 on the shafts of rolls 1, 2, 4, and 5, respectively, and driven from a gear-wheel on the shaft of roll 3. The direction of rotation of all the rolls is indicated by the arrows in Fig. I. Each roll rotates in the opposite direction to the one adjacent to it. The gearing should preferably be such that the large roll 3 makes, say, twenty-five revolutions per minute, while the smaller ones make thirty. This would give to all the rolls

the same circumferential speed. The position of the rolls is regulated and determined by jack-bolts K, which are screwed into threaded bosses *k* on uprights A B, and which bear at their inner ends against the journal-boxes D of the several rolls. By means of these jack-bolts the position of each roll can be adjusted independently of all the others. Should it be necessary to remove any one of the rolls, this can be effected without disturbing any of the others by first taking off the top pieces or caps E and then unbolting and removing the uprights A or B, as may be required to give access to the desired roll, which leaves the journal-boxes of the roll free to be withdrawn horizontally from the recesses in the supporting-castings C.

By the arrangement of the rolls, as shown, one below the other, and with their axes alternately to the right and left of a vertical plane, several important advantages are secured. It enables four pinches or nips to be given to the rubber with five rolls, or, in other words, enables five rolls to do the work which heretofore required four pairs of rolls. It makes a very compact machine, occupying but little, if any, more floor-space in the factory than a single mill now takes up; and it permits the adjustment of each roll independently of the others, so that the space between each roll and the one adjacent to it (either above or below) can be regulated to a nicety. Furthermore, the described arrangement effects the feed or passage of the rubber through the machine without special devices for this purpose or manual interference.

As shown in Fig. 1, the rubber after passing between rolls 1 and 2 falls upon roll 3, the direction of whose rotation carries it through the space between 2 and 3. After passing roll 5 the stock falls into an inclined way or chute L, from which it may be gathered and again passed through the mill, if desired. Guide-blocks *m* are arranged at the ends of the rolls to prevent escape of the rubber stock sidewise.

The foregoing description gives what is regarded by me as the best mode of applying the principle of my invention; but it is obvious that in many respects the details of construction and arrangements of parts could be modified without departing from the spirit of the invention.

Having now fully described my said invention and the manner in which the same is or may be carried into effect, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mill for grinding or sheeting rubber, the combination, with a series of rolls, of supporting-castings having on each side recesses for the journal-boxes of said rolls of sufficient size to permit horizontal adjustment of said journal-boxes, upright castings, one on each side of the supporting-castings, and adjusting-bolts carried by said uprights, substantially as described.

2. In a grinding or sheeting mill, the combination, with a series of rolls, of a frame comprising castings having on each side horizontal arms forming recesses for the journal-boxes of said rolls, upright castings confining the journal-boxes in said recesses, and cap-pieces connecting the front and rear uprights, the parts being all firmly bolted together, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

NATHANIEL C. MITCHELL.

Witnesses:
JOEL H. LEEDS,
E. M. MUNDY.