

(No Model.)

J. B. ALLFREE.
ROLLS FOR GRINDING MILLS.

No. 342,163.

Patented May 18, 1886.

Fig. 1.

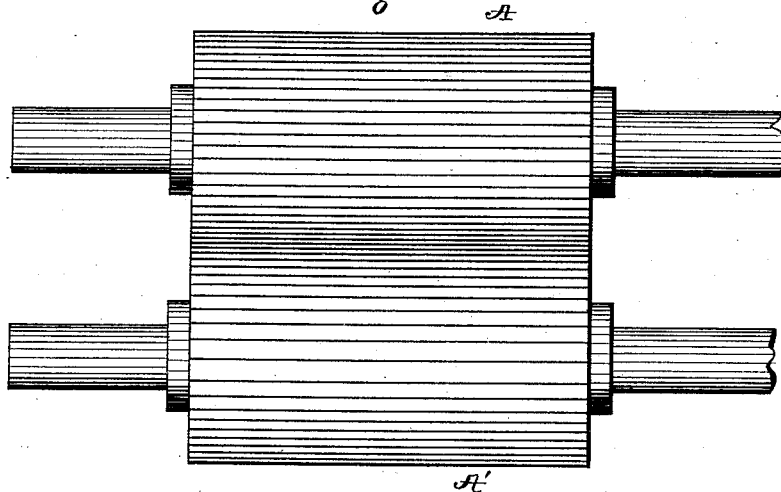


Fig. 3.

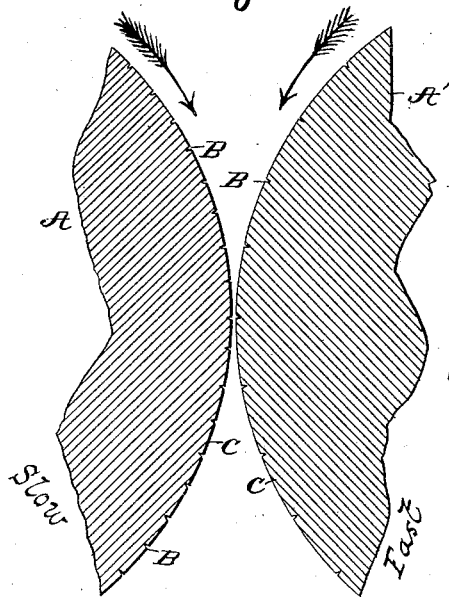
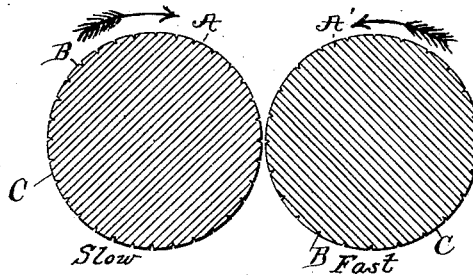


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

JAMES B. ALLFREE, OF CUMBERLAND, MARYLAND, ASSIGNOR OF ONE-HALF
TO ROBERT SHRIVER AND HARRISON SWARTZWELDER, BOTH OF SAME
PLACE.

ROLLS FOR GRINDING-MILLS.

SPECIFICATION forming part of Letters Patent No. 342,163, dated May 18, 1886.

Application filed January 5, 1886. Serial No. 187,678. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. ALLFREE, a citizen of the United States, residing at Cumberland, Maryland, have invented new and useful Improvements in Rolls for Grinding-Mills, of which the following is a specification.

My invention relates to an improvement in the dressing of rolls for use in roller grinding-mills, and particularly in those designed for the reduction of middlings. A pair of rolls, both of which are smooth, co-operating at the same rate of speed, produce only a squeezing or crushing effect; but when one of the pair is made to revolve faster than the other a moderate grinding effect is produced, and this effect is increased in proportion to the comparative increase in the speed of the faster-running roll. About two and one-half to one is the differential speed generally adopted, the best service being attained when two to three revolutions of the faster roll to one revolution of the slower roll are maintained. These facts are equally true with respect to rolls that are corrugated, except that their grinding quality is more "cutting" or "severe" than with smooth rolls. This grinding quality is modified, according to the work to be accomplished, by varying the size and character of the corrugations and their number per inch of the periphery of the rolls.

For the reduction of middlings, a pair of "scratched" rolls (the mildest form of corrugation) is often used in order to gain a granulating effect. These rolls have slight grooves or scratched "lines" at intervals on the periphery, and the lines are usually cut about thirty-two to forty-five per inch, and on both rolls alike. When such a pair of rolls (scratched alike) are run together at a differential speed of two and one-half to one, the granulating effect of the lines is augmented, as already described, and the action is therefore too severe for the successful reduction of middlings. The action of a pair of smooth rolls under the same circumstances partakes of the crushing quality, and is too gentle in character to effect the desired end. Smooth rolls, however, approach nearer to what is required than these scratched rolls, and are therefore the most frequently used for reducing middlings; but being polished they lack a "biting" quality possessed

by a slightly-roughened surface and needed to secure the best work.

The object of my invention is to retain a portion of the gentle or crushing effect of the smooth rolls, and to add thereto a portion of the cutting or granulating effect of the scratched rolls, whereby a quality of grinding may be obtained more severe than can be had by the use of smooth rolls alone, and less severe than that obtained by the use of scratched rolls alone, as usually constructed; and, further, to combine the two qualities of grinding in any desired proportion, whereby any degree of severity between the two extremes may be secured; and, further, to more nearly equalize the grinding quality of the two co-operating rolls, notwithstanding their different rates of speed. I attain these objects through the means which I shall now describe, reference being had to the accompanying drawings, in which—

Figure 1 is a top view of a pair of rolls in operative position. Fig. 2 is a cross-section of the same. Fig. 3 is an enlarged section, showing more clearly the relative positions of the lines or scratches.

In the drawings, A A' represent a pair of co-operating rolls. I mount these rolls in a suitable frame and bearings, with means to drive them at different rates of speed in the direction indicated by the arrows; but these parts, being unnecessary to description of my invention, and forming no part of my application, are not shown. These rolls have a smooth surface broken at regular intervals by slight grooves or scratched lines B, trending lengthwise of the rolls, and placed at such distances apart as to leave a portion of the smooth surface or "land" C between the lines. The slower-running roll A is provided with thirty to thirty-six lines per inch of periphery, and the faster roll A' with twenty to twenty-eight lines, depending upon the degree of severity of grinding desired. The number of lines per inch stated above have proven the most useful in practice. The number of lines per inch is reduced on the faster roll in order to compensate for the increased action caused by the greater speed, as already described, and to make the quality of action from both rolls more nearly alike. This reduction of the number of lines may be made to the full proportion of

the difference of speed of the two rolls—that is to say, if the slower roll A has thirty lines per inch of periphery, and the fast roll A' is running at a differential speed of two and one-half times greater than the slow roll A, then the fast roll A' would have twelve lines per inch, ($12 \times 2\frac{1}{2} = 30$;) but as more or less of the cutting or granulating quality may be desired for different classes of work, or to suit the pleasure of the miller, the relative number of lines on the fast roll A' may be more or less and the quality of work correspondingly varied. It will be observed that when a roll is scratched with lines, as described, the face of the roll between the lines remains smooth and performs to some extent the crushing effect, while the lines produce the granulating effect; and, also, that by having in the fast roll A' more land and less lines than in the slow roll A, the action of the two rolls is more nearly equalized, as these differences are more nearly proportioned to their speed; and, further, that just as the granulating action is made to preponderate by having more lines, or subdued by having less lines, on the fast roll A', so the

combined qualities are made more or less severe, and the result regulated as desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a roller grinding-mill, a pair of co-operating rolls, both having smooth surfaces, provided with lines or scratches and adapted to be driven at different rates of peripheral speed, the fast-speeded roll having a less number of lines per inch of periphery than the slow-speeded roll. 30 35

2. In a roller grinding-mill, the combination of a roll having a smooth surface provided with fine lines or scratches trending lengthwise of the roll with a co-operating roll of similar construction, but with a different number of lines per inch of periphery. 40

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses. 45

JAMES B. ALLFREE.

Witnesses:

A. C. PECKHAM,

CHAS. C. LEARNED.