

(No Model.)

W. D. GRAY.
GRINDING MILL.

No. 251,217.

Patented Dec. 20, 1881.

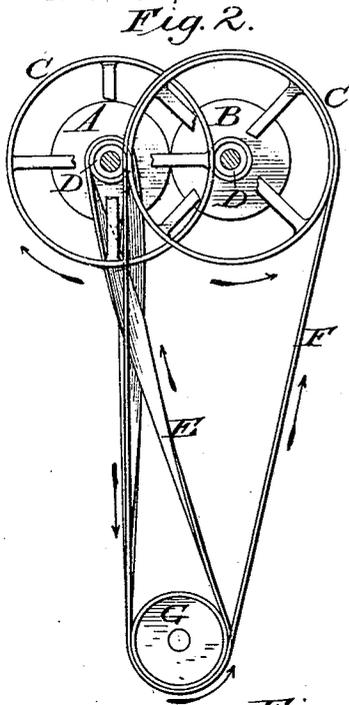


Fig. 2.

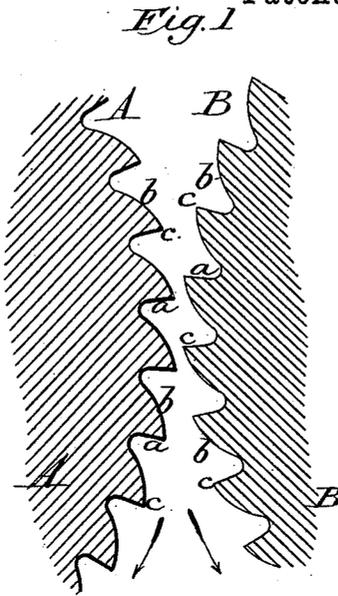


Fig. 1.

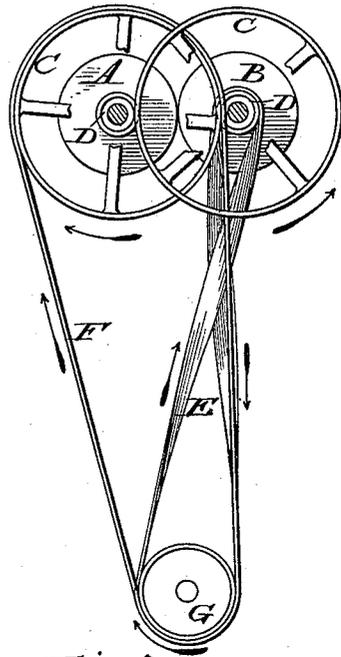
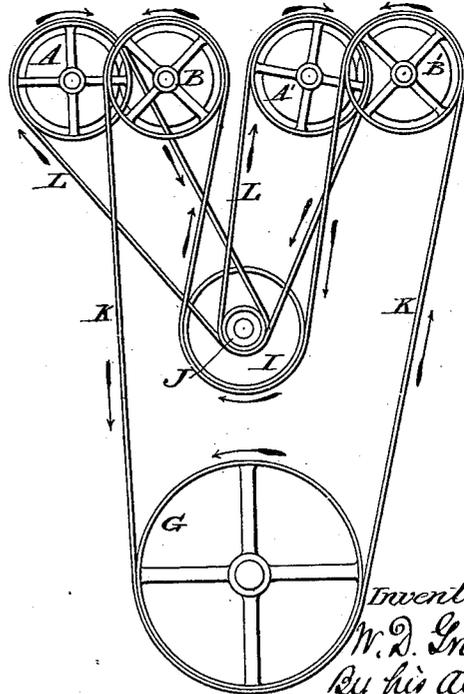
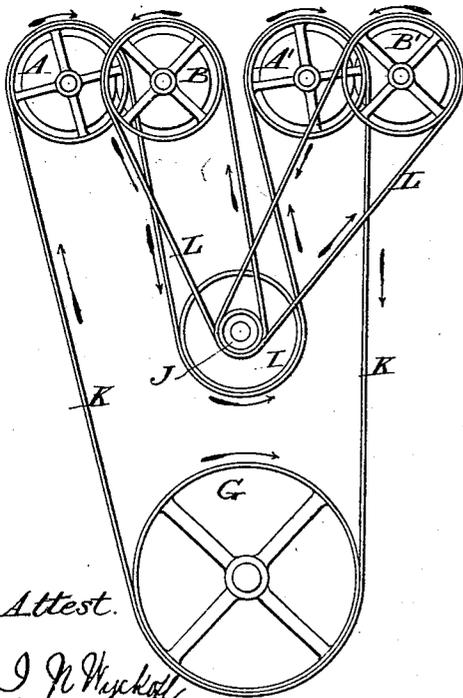


Fig. 3.

Fig. 4.

Fig. 5.



Attest.

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GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 251,217, dated December 20, 1881.

Application filed August 8, 1881. (No model.)

To all whom it may concern :

Be it known that I, WILLIAM D. GRAY, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain Improvements in Roller Grinding-Mills, of which

the following is a specification. This invention relates more particularly to that class of roller grinding-mills which are employed for the purpose of reducing wheat.

The object of the invention is to provide a mill which may be adjusted at will to operate with a cutting or with a crushing action, as may be required.

To this end it consists in the combination of two co-operating rolls having ribs made of such form and so disposed with reference to each other that when one roll is given the highest speed the mill will operate with a crushing action, and that when the other roll is given the highest speed the mill will act with a cutting effect, and driving devices by means of which either roll may be driven faster than the other at will.

The mill may be modified in its details and in the form of its parts without departing from the limits of my invention, provided the above-named features are retained.

To those skilled in the art it is a well-known fact that grain varies greatly in hardness and in other characteristics which require the reducing operation to be varied in its character, the soft grain requiring a sharp or cutting action of the reducing devices, while the harder grain requires to be acted upon with a purely crushing action. Hitherto it has been customary to provide separate and differently-constructed mills for carrying out the cutting and the crushing operations.

My invention is designed to avoid the necessity of having separate mills, the object being to provide a single mill which may be adjusted to cut or to crush as occasion may require, thus enabling the miller with a single apparatus to treat any and all kinds of grain.

Referring to the drawings, Figure 1 is a vertical cross-section, on an enlarged scale, showing the dress which I propose to employ. Figs. 2 and 3 represent an arrangement of belts and pulleys which may be used in connection with a single pair of rolls for imparting the required movement thereto. Figs. 4 and 5 represent

an arrangement which may be used in connection with double mills, or mills containing two pairs of rolls driven from a common source.

Referring to Fig. 1, A and B represent two parallel grinding-rolls, each provided with a dress composed of a series of longitudinal ribs or teeth, which may be formed either in line with or at a divergence from the axis of the roll.

It will be observed that each rib or tooth has one face, *a*, which is in an upright or substantially upright position—that is to say, in a plane occupying substantially a radial position with reference to the rolls—and that the opposite face *b* is of a convex or outwardly rounded form, a sharp cutting-edge, *c*, being formed at the junction of the two faces.

It will be observed that the two rolls have their cutting-edges presented in opposite directions, the upright or cutting edges of the roll A being on the under side, while the upright faces of the roll B are on the upper side of the ribs. When thus arranged the two rolls will co-operate with a cutting or a crushing action, according as one or the other receives the most rapid motion. If the roll A receives a surface speed greater than that of roll B, the cutting-edges of the ribs will first meet and pass each other, and the rolls will then act with a sharp cutting or shearing action. If, however, roll B receives a surface speed greater than that of roll A, it will be seen that the rounded edges of the ribs will approach each other first, and that the grain will be crushed between the rounding surfaces, the rolls in such case operating entirely with a crushing action.

Referring to Figs. 2 and 3, it will be seen that the rolls A and B are provided each at one end with a large driving-pulley, C, and a small driving-pulley, D, and that motion is imparted to said pulleys by means of belts E and F from a driving-pulley, G.

When it is required to have the mill act with a cutting action the belt E is passed from the large driving-pulley G to the small pulley D of roll A, whereby a very rapid motion is communicated to said roll, and at the same time the belt F is passed from the driving-pulley G to the large pulley C of roll B, as represented in Fig. 2, whereby a comparatively slow mo-

tion is imparted to roll B. When thus arranged it will be seen that roll A receives a motion more rapid than that of roll B, thus causing the cutting faces or edges of the ribs to act upon the grain. When it is required to have the rolls act with a crushing action the belts are transposed, the belt F being passed from the large driving-pulley G to the large pulley C of roll A, while the belt E is passed from the pulley G to the small pulley D of roll B, as clearly represented in Fig. 3, this arrangement serving to turn the roll B with a speed greater than that of roll A and causing the rounded or crushing edges of the ribs to co-operate.

Referring now to the arrangement represented in Figs. 4 and 5, designed for a double roller mill, A and B and A' and B' represent the two pairs of rolls, each roll being provided with a driving-pulley at one end.

G represents a driving-pulley from which power is communicated to the machine.

I represents an intermediate pulley or drum mounted upon an axis concentric to the smaller pulley J.

When the more rapid motion is to be imparted to the rolls A A', a driving-belt, K, is passed from the driving-pulley G upward over the pulleys of the rolls A A', and thence downward between them around the large pulley I, imparting a rapid motion to the rolls A A'.

The rolls B B' are driven by means of belts L, passed from their pulleys to the small driving-pulley J, the latter being made of sufficient width to receive both pulleys. Under this arrangement the rolls B B' receive a comparatively slow motion. When the rapid motion is to be transmitted to the rolls B B', the belt K is shifted from the pulleys of rolls A A' to the pulleys of rolls B B', as represented in Fig. 5, and the belts L shifted from the pulleys of rolls B B' to the driving-pulleys of rolls A A', as clearly represented in Fig. 5.

The parts will, of course, be so proportioned as to admit of the belts being transposed without difficulty, the ordinary idlers or tightening devices being applied, if necessary.

Instead of using the arrangements above described, good results may be secured by making the driving-pulleys and the pulleys of the rolls of different diameters and constructing them with special reference to their being transposed or changed from one shaft to another.

I am aware that a pair of rolls dressed substantially as shown in the accompanying drawings is old, said rolls, however, being so arranged and connected with the driving mechanism that one and the same roll is always driven faster than the other. I am not aware that any one has hitherto constructed a grinding-mill provided with rolls dressed as described, in which means were provided for driving either one of the two rolls at will faster than the other.

Having thus described my invention, what I claim is—

1. In an organized machine for performing the two distinct operations of cutting and crushing grain, the combination of two co-operating rolls, each having ribs abrupt on one side and rounded or inclined on the other, with a changeable driving-gear, whereby either one of the two rolls may be driven faster than the other.

2. A combined crushing and cutting mill, consisting of two rolls dressed with teeth of the form described and shown, and driving devices substantially such as described, adjustable at will to drive either one of the two rolls at a high speed and the other roll at a comparatively slow speed.

3. In a grinding-mill, the combination of the pair of co-operating rolls, each dressed with ribs having one upright and one inclined side, and the driving belts and pulleys combined therewith, substantially as described and shown, and adapted to impart the faster speed to one roll or the other at will.

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Witnesses:

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