(No Model.) 2 Sheets—Sheet 1.

H. HUNGERFORD.

MILL ROLL.

No. 346,817. Patented Aug. 3, 1886.

Fig. 5.

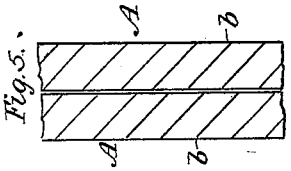


Fig. 3.

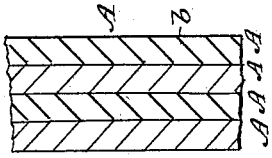


Fig. 2.

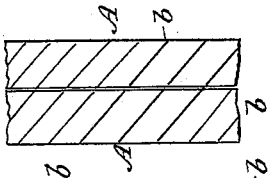


Fig. 4.

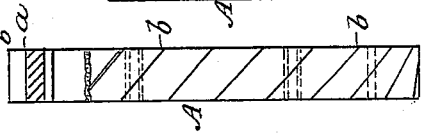
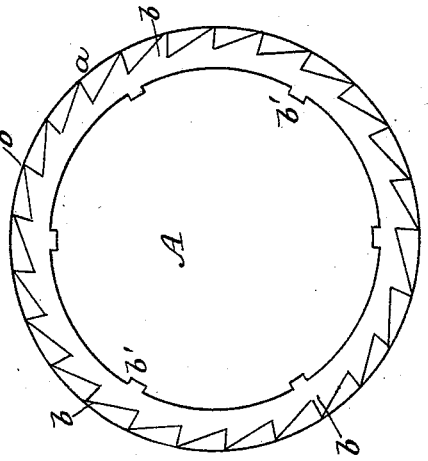


Fig. 1.



Henry Hungerford

INVENTOR

WITNESSES

Hamilton Ruddick

William B. Turner

(No Model.) 2 Sheets—Sheet 2.

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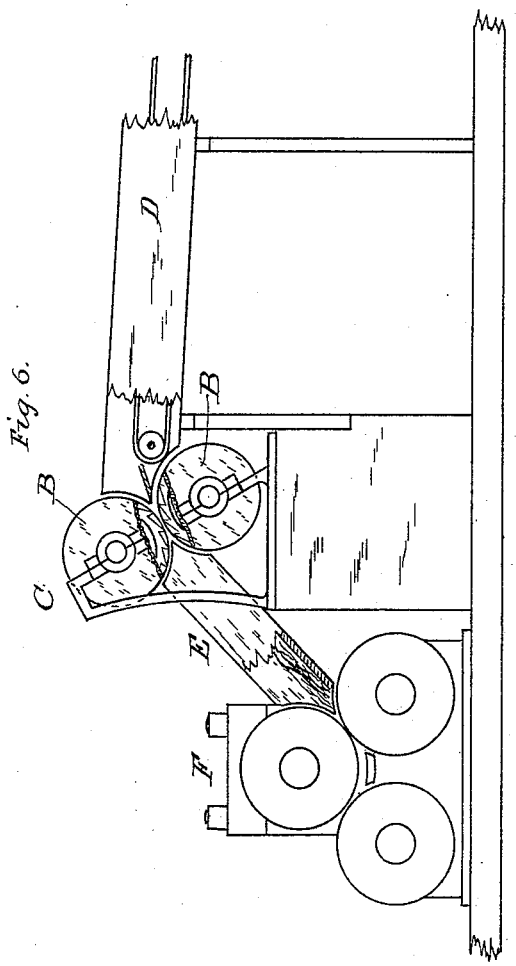
Fig. 6.



Henry Hungerford
INVENTOR

WITNESSES
Hamilton Ruddick
William B. Turner

UNITED STATES PATENT OFFICE.

HENRY HUNGERFORD, OF NORWALK, CONNECTICUT.

MILL-ROLL.

SPECIFICATION forming part of Letters Patent No. 346,817, dated August 3, 1886.

Application filed February 26, 1885. Serial No. 157,068. (No model.)

To all whom it may concern:

Be it known that I, HENRY HUNGERFORD, a citizen of the United States of North America, and a resident of Norwalk, county of Fairfield, State of Connecticut, have invented a new and useful Improvements in Mill-Rolls, of which the following is a specification.

Sugar-cane shredders have recently been introduced into use for shredding or breaking the gathered cane preparatory to its delivery to the mill-rolls, so that the inner portion of the cane shall be more thoroughly exposed to the action of the sugar-mill rolls.

Shredders of several forms have been used with greater or less advantage, and from their working it has been determined that the best final results will be secured by the shredding-mill that will break the cane lengthwise, not crosswise, without decorticating it or grinding its central portion too fine. Crosswise shredding or breaking reduces the cane to such a condition that the sugar-mill rolls cannot readily grasp and draw it through, and hence the continuity of the work of the rolls is often seriously interrupted and delayed.

The object of this invention is to provide a mill or cane-shredder of improved construction, whereby a much larger proportion of the cane may be broken lengthwise than is possible with any of the mills or shredders now in use.

The improved shredder or mill is constructed, essentially, of two toothed rolls set opposite each other and arranged to revolve at different speeds and in opposite directions, in which particulars it is not unlike some other shredders; and the invention consists of rings or annular disks, forming the rolls, whose faces are dressed or toothed in such a manner that by simply adjusting them relatively to each other on a roll drum or shaft the roll may at will be made to present such several forms or arrangements of teeth as will be best adapted for the work to be performed, all of which will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of the specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of one of my improved rings or disks. Fig. 2 is a face elevation of segments of two rings side by side, showing one position in which the teeth may be presented on a roll. Fig. 3 is a face elevation of segments of four rings side by side, showing another position in which the teeth may be presented on a roll. Fig. 4 is a partly-sectional face elevation of my improved ring. Fig. 5 is a face elevation of segments of two rings side by side, showing still another position in which the teeth may be presented on a roll. Fig. 6 is a partly-sectional side elevation, with parts broken away to exhibit other parts, showing my improved mill or shredder in combination with a sugar-cane mill and accessories.

In the drawings, A represents an improved roll-ring, a number of which are designed to be secured in side contact with each other on a drum or shaft to form a mill or cane-shredder roll, as shown at B, Fig. 6. This ring, which may be cast with a solid or hollow rim, as may be desired, has a flat face, on which teeth *b* are formed as integral parts thereof, and on its inner face bearing-bars *b'* are cast or inserted to facilitate the adjustment of the ring on mill drum or shaft. It will be seen that the teeth *b* on each ring are arranged parallel with each other and extend diagonally across the ring-face at angles of forty-five degrees, or thereabout, to the ring-edges. The angle may be made to vary according to the work to which the mill is designed to be applied; and said teeth are cast with their points or cutting-edges as shown in Fig. 1, and also pointing in the opposite direction. While the edges are diagonal and parallel in each disk, those of one disk may be made to be inclined in an opposite direction to those of another, which constitutes what I term "rights and lefts." I may employ, for instance, twice as many disks as are necessary to form a single roll. If I adjust four rights or four lefts upon the shaft, the spiral of the edges will be continuous. If I alternate two of each, the line of the edges will be zigzag. These changes are made at will by taking off the disks and putting them on again under a different arrangement.

In Fig. 2 are seen two rings arranged side by side, so that their teeth *b* form continuous parallel lines that would extend spirally around a roll.

In Fig. 3 four of my improved toothed rings are indicated arranged side by side in such relative adjustment that their teeth *b* form zigzag lines. In this case the cutting-edges of all the teeth point in the same direction; but the transverse inclines of the said cutting-edges are arranged in different directions in adjacent disks, the said disks being formed as rights and lefts.

In Figs. 2 and 5 two rights or two lefts are together, while in Fig. 3 the rights and lefts are arranged alternately.

In Fig. 5 two of my improved toothed rings are indicated arranged side by side, so that the teeth are "staggering." Thus it will be seen that with my improved ring provided with teeth set parallel with each other and at an angle to the ring-edges I am enabled to construct mills or shredders with teeth essentially or practically of several forms, so that by simple adjustment of the rings on shafts or drums I can construct mills for shredding, for which the dressings or arrangements shown in Figs. 2 and 5 would be most suitable, or for grinding bark or other substances, for which the dressing or arrangement shown in Fig. 3 would be most suitable. It is obvious, then that in simplicity of construction these adjustable toothed rings have great advantages over all others designed for like purposes, and that with them a mill adapted for shredding cane can, without additional cost, be readily adapted to grinding bark or other materials, can be readily adjusted by interchanging for grinding a great variety of substances, so that one mill can be made to take the place of several.

In Fig. 6 a mill or cane-shredder, C, formed by two of my improved rolls B is shown in position in proper housings, in combination with cane-carrier D, shredded-cane conductor E, and sugar-mill rolls F. This indicates a suitable arrangement of several of the elements of a sugar-cane mill wherein the cane is fed by the carrier to the shredder, and the shredded cane and juice from the shredder, falling into the conductor, are by their gravity fed to the mill-rolls.

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

1. A shredder or mill constructed with adjustable rings having teeth set parallel to each other and diagonally across the face of each ring, the rings made rights and lefts, as described, whereby the mill-rolls may at will be made to present consecutively two or more forms or arrangements of teeth, as set forth.

2. The combination, with a sugar-cane mill, F, shredded-cane conductor E, and cane-carrier D, of a mill or cane-shredder, C, provided with rolls constructed of drums or shafts carrying rings on whose faces are teeth set diagonally and parallel to each other, as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 25th day of February, 1885.

HENRY HUNGERFORD.

Witnesses:
HAMILTON RUDDICK,
WILLIAM B. TURNER.