

B. F. BROWN,
 Reducing Wood to Pulp for Paper, &c.
 No. 205,347. Patented June 25, 1878.

Fig 1.

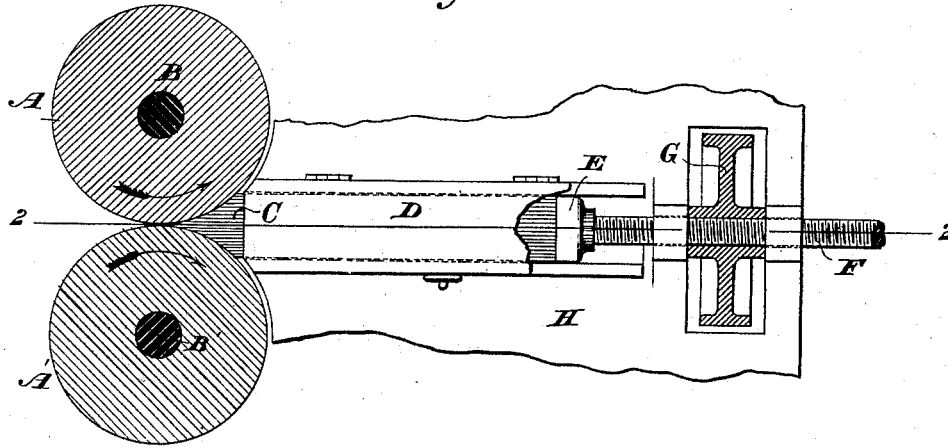


Fig 2.

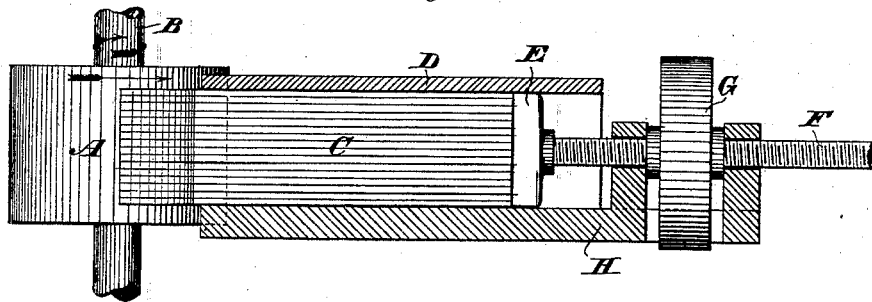
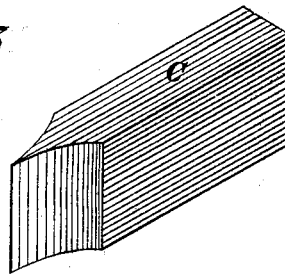


Fig 3.



WITNESSES

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BENJAMIN F. BROWN, OF TILTON, NEW HAMPSHIRE.

IMPROVEMENT IN REDUCING WOOD TO PULP FOR PAPER, &c.

Specification forming part of Letters Patent No. **205,347**, dated June 25, 1878; application filed May 31, 1878.

To all whom it may concern:

Be it known that I, BENJAMIN F. BROWN, of Tilton, in the county of Belknap and State of New Hampshire, have invented a certain new and useful Improvement in the Art of Reducing Wood to Pulp by Grinding, and an improvement in machinery whereby said improvement in the art may in one way be worked out or practiced, of which the following is a specification:

Hitherto wood has been reduced to powder by attacking the ends of the fibers presented perpendicularly to the grinding-surface, or nearly so, and to pulp by rolling out the fibers by means of a grinding-surface acting in substantially the same plane as the fibers, as set forth in the United States Patent to Henry Voelter, Reissue No. 4,418, dated June 6, 1871.

It has also been attempted to reduce wood to fiber "Brooman fashion," as it has been termed—that is to say, by submitting a piece of wood to the action of an ordinary grindstone in such manner that its fibers would lie in lines parallel to a tangent to the stone, said tangent being drawn at the point where the center of the length of the block touched the stone. This latter process cut some of the fibers to powder, slid others out endwise, and made some good pulp.

A block of wood has also been reduced to practically uniform fibers of sufficient length and good felting quality by submitting the wood to the action of the concave surface of a grinding-cylinder, or to the convex surface of an ordinary grindstone, or to the flat surface of a millstone, in such manner that all the fibers were caused to lie at an angle to the grinding-surface, and were acted upon by the asperities thereof in such manner as to attack first the exposed ends of the fibers, and then move diagonally to the grain of the wood toward the covered ends of the fibers. Such process and proper apparatus for practicing it are described and shown in Letters Patent of the United States granted James G. Moore March 19, 1878, No. 201,550, in which a single grinding-surface is employed.

"Two-roll" grinders have also heretofore been employed to separate the fibers from a block or log fed to them in such manner that the fibers presented to and between the grind-

ing-surfaces were rolled out or torn lengthwise from the wood by the action of the rolls or stones as they were rotated at right angles to the fiber's length, or upon axes parallel to the grain of the wood, so as to act on the exterior or exposed fibers from end to end. In some instances a series of such rolls have been caused to compress or crush the wood, so as to prepare the fibers by partial separation or loosening for removal sidewise; and, again, the blocks have been fed up to and partially between the stones, revolving one against and the other with the direction of the feed of the block. The United States Letters Patent of Harrison B. Meech, August 23, 1870, No. 106,710, shows two rolls revolving toward each other, and with the feed acting upon the fibers from end to end, simultaneously and crosswise thereof.

In all two-roll grinders prior to my invention of which I have knowledge the operation upon the wood to separate the fibers or produce pulp was in one of the following ways: First, the wood was compressed or squeezed between rolls to loosen or partially separate the fibers, which were torn or rolled out by the action of rolls upon them crosswise and from end to end. Second, the compressing of the wood was omitted, and the fibers rolled or torn out in the same manner by rolls revolving toward each other and with the feed. Third, by the action of the rolls upon the wood, one revolving against and the other with the feed or direction of movement of the wood, and both acting upon the fiber from end to end and crosswise thereof.

Now, I have discovered that a billet or block of wood can be reduced to practically uniform fibers of a suitable length and of good felting quality by submitting the wood endwise—that is, with the grain or in the direction of the fiber—to the action of two rolls or grinding-surfaces revolving away from each other, and both rotating against the feed or direction of movement of the block. In this manner all the fibers will lie at an angle to their grinding-surface, and those on each side of the center of the block will be acted upon by the asperities of their respective grinding-surfaces in such manner that the exposed ends of the fibers will first be attacked by the asperities

of the grinding-surfaces, and so that these asperities will move diagonally to the grain of the wood toward the covered ends of the fibers respectively acted on by the two rolls.

The rolls act upon the fibers upon both sides of the center of the block or billet in precisely similar way to tear or pull them out, and a uniform quality of pulp or substantial similarity in the fiber is secured as the wood is forced up to and partially between the rolls.

The blocks or billets are fed endwise, or in the direction of the length of fibers, up to the rolls, with the longitudinal centers of the blocks in or substantially in the line or plane of the adjacent or contiguous surfaces of the rolls, and each block is gradually reduced by the tearing or pulling out of the fibers by the rolls as they rotate against the end of the block, or in the direction opposite to that in which the wood is fed. The grinding-surfaces attack all the fibers on their exposed or uncovered ends, and partly pull them out and partly tear them apart.

In order to work out my improvement in the art, the two grinding-surfaces must attack all the fibers of those parts of the block respectively operated upon by them on their exposed ends, and travel toward their unexposed ends—that is, those ends which are covered by other fibers lying between these unexposed or covered ends and the grinding-surface.

By my invention I am enabled to produce, by the simultaneous action of two rolls, a pulp similar to that produced by the Moore method of grinding, patented as before recited.

The rolls may be mounted in or upon any suitable frame, and actuated by any desired mechanism, and any appropriate mechanism for feeding the block be employed.

The rolls may be mounted either upon horizontal, vertical, or inclined axes, so long as their peripheries rotate in close proximity and in parallel planes.

In the accompanying drawings I have shown so much of the mechanism of a fully-organized two-roll grinder as is necessary to illustrate one way of carrying out my invention. Obviously, however, the details of construction may be varied.

Figure 1 is a view partly in plan and partly in horizontal section; Fig. 2, a view partly in vertical section on the line 2 2 of Fig. 1, and partly in side elevation; Fig. 3, a view in perspective of a partly-ground block or billet of wood.

Two grinding-cylinders, rolls, or grindstones, A A', of any suitable substance or composition of materials, are mounted upon axes B B', geared together, so as to cause the stones to rotate, as represented by the arrows. The stones rotate close together at their adjacent surfaces. The wood to be reduced is cut into blocks or billets C, with the grain running parallel to their length or the direction in which they are fed to the stones. Any suit-

able feeding devices may be employed to present the wood to the stone end foremost, so as to be acted upon against the exposed ends of the fibers by the stones on both sides of its center. In this instance a guideway or case, D, with a hinged lid to admit of inserting and fastening the blocks in place, so as to be free to move endwise in the plane of the space between the stones, is employed. A pusher or follower, E, is actuated by a screw-shaft, F, and a band-wheel, G. The follower abuts against the end of the block, and regularly and gradually forces it to the stones as the band-wheel is revolved. The band-wheel is prevented from moving endwise of the screw-shaft by its bearing in the frame H of the machine, and its female screw or threaded nut gives the required movement of the block, and serves also to withdraw the follower when a new block is to be inserted in the guide-way.

It will be seen that each roll acts obliquely to the fibers and against their exposed ends, and pulls or tears out the fibers from the center or point of the block to its side. Uniform fiber is thus produced very rapidly, as the block is operated upon for its entire breadth and thickness simultaneously and in precisely similar manner.

By my method of grinding, liability to clog the stones, by the passage of the fibers between them, is prevented, as both stones direct the fibers outward, and discharge them on each side of the block. A stream of water may be employed to soften the wood and aid in carrying off the fibers in a well-known way.

I claim as of my own invention—

1. The hereinbefore-described improvement in the art of reducing wood to pulp, which consists in presenting a block or billet, with the grain running parallel to its length and in the direction of the feed, to and between two stones or grinding-surfaces revolving in opposite directions or away from each other and against the feed, and acting on the block on both sides of its center, at its end, against the exposed ends of the fibers and diagonally to them.

2. The combination, substantially as hereinbefore set forth, of two rolls or grinding-surfaces, revolving parallel to each other and in opposite directions or away from each other and against the wood to be acted on, and block or billet feeding and guiding devices, whereby the wood is presented to the rolls and the ends of the fibers pressed against their adjacent peripheries in a direction opposite to that in which they both revolve, for the purpose described.

In testimony whereof I have hereunto subscribed my name.

BENJAMIN F. BROWN.

Witnesses:

J. HENRY TAYLOR,
H. G. CORDLEY.