J. G. MOORE. 2 Sheets—Sheet 1.

Machine for Reducing Wood to Pulp for Paper.

No. 201,550. Patented March 19, 1878.

Fig 1.

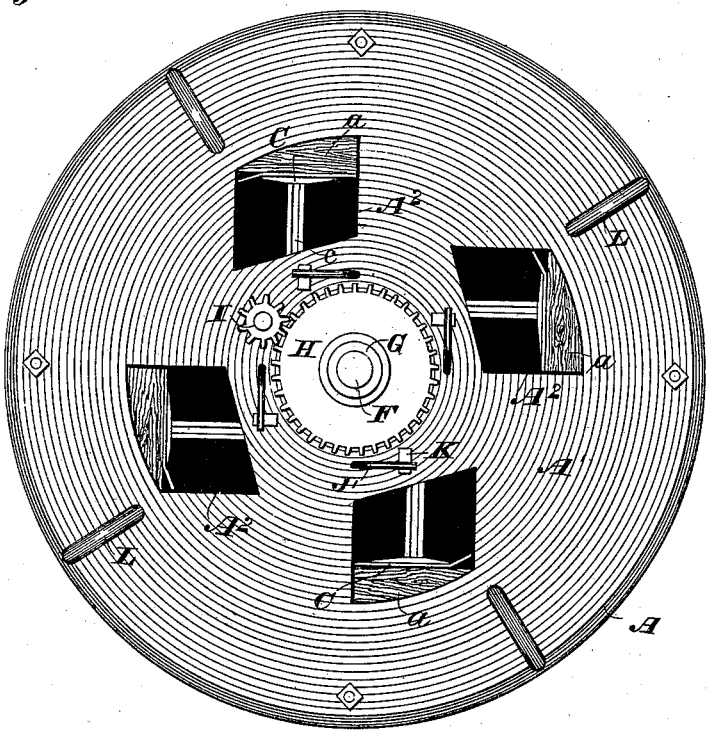
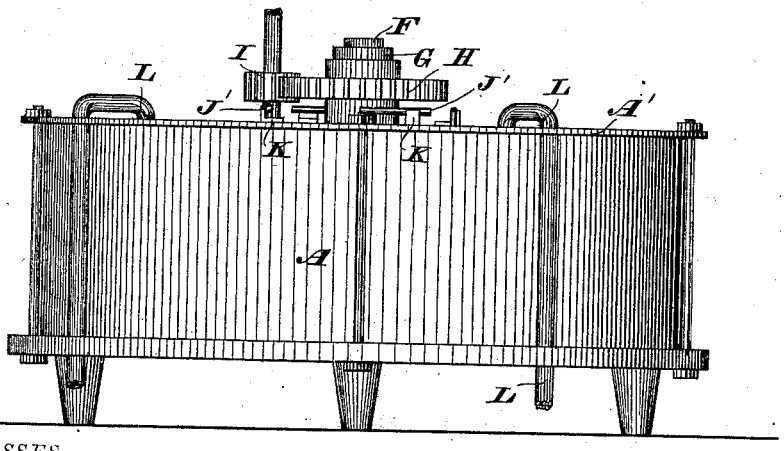


Fig 2.



WITNESSES

Wm A Skinkle

Geo. W. Breck.

INVENTOR

James. G. Moore.

By his Attorneys

Baldwin Hopkins & Peyton

2 Sheets—Sheet 2.

J. G. MOORE.

Machine for Reducing Wood to Pulp for Paper.

No. 201,550. **Patented March 19, 1878.**

Fig 3.

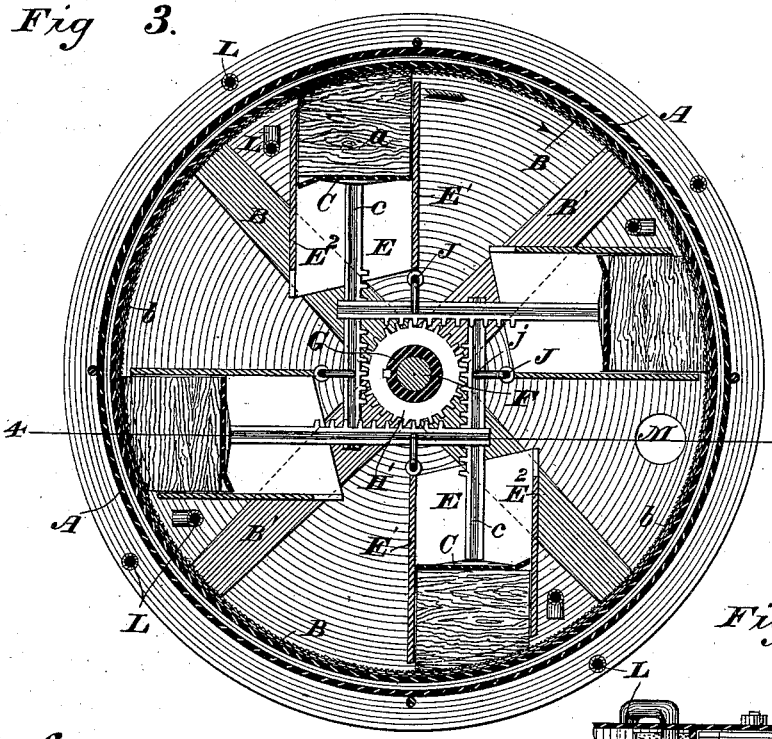


Fig 5.

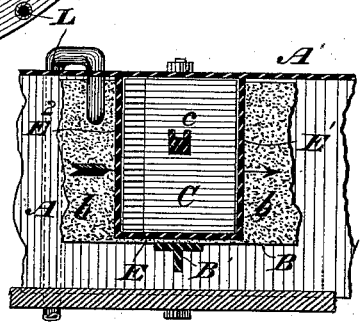


Fig 6.

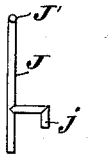
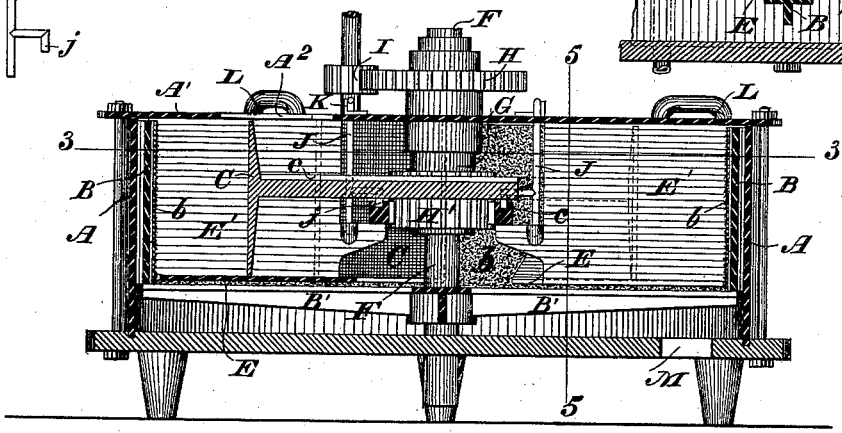


Fig 4.



WITNESSES

Wm A Stinkle

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INVENTOR

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UNITED STATES PATENT OFFICE.

JAMES G. MOORE, OF LISBON, NEW HAMPSHIRE.

IMPROVEMENT IN MACHINES FOR REDUCING WOOD TO PULP FOR PAPER.

Specification forming part of Letters Patent No. **201,550**, dated March 19, 1878; application filed February 7, 1878.

To all whom it may concern:

Be it known that I, JAMES G. MOORE, of Lisbon, in the county of Grafton and State of New Hampshire, have invented a certain new and useful Improvement in the Art of Reducing Wood to Pulp by Grinding, said improvement consisting in a certain manner of tearing out the fibers from the block of wood, whereby pulp of a more uniform quality than usual is produced, and I have also invented certain improvements in machinery whereby said improvement in the art may be worked out or practiced, of which the following is a specification:

Hitherto wood has been reduced to powder by attaching the ends of the fiber presented perpendicularly to the grinding-surface, or nearly so, to pulp by rolling out the fibers by means of a grinding-surface acting in substantially the same plane as the fibers and moving substantially across the fibers, as set forth in the patent to Henry Voelter, Reissue No. 4,418, dated June 6, 1871; and 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 process cut some of the fibers to powder, slid out others endwise, and made some good pulp.

Now, I have discovered that the whole block of wood can be reduced to practically uniform fibers of a sufficient length and of 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 will lie at an angle to the grinding-surface, and will all be acted upon by the asperities thereof in such manner as to attack first the exposed ends of the fibers, and so that these asperities will move diagonally to the grain of the wood toward the covered ends of the fibers.

A reference to Figure 3 of the drawings hereto attached will make my meaning clearer. In this figure the block of wood is represented at *a a* and the grinding-surface at *b*, moving in the direction of the arrow, the wood being forced against the grinding-surface, and the grain or run of fibers of the wood being indicated by the lines drawn on the block.

Inspection of this drawing shows that all the fibers which are being ground are exposed at one end, while at the other end they are covered and held in place by other fibers.

Now, by my plan of grinding, the grinding-surface attacks all the fibers on their exposed or uncovered ends, and partly pulls them out, partly tears them apart; and, in order to work out my improvement in the art, the grinding-surface must attack all the fibers 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.

If the surface *b* were convex instead of concave, and the wood submitted in the same way to its action, the effect would be substantially the same; and this would also be the case if the surface *b* were that of a flat millstone, provided the block of wood is, in both cases, so held in its feed-box in relation to the surface and line of motion of the stone that the asperities thereof attack first the exposed ends of all the fibers, and then move toward the unexposed or covered ends of such fibers.

I prefer to work out or practice this my improvement in the art of reducing wood to pulp by means of a concave grinding-surface, and to this effect procure a hollow metallic cylinder, B, and line it either with stone or some known composition, *b*, which forms a grinding-surface. This cylinder is mounted upon arms B′ B′, secured to a central shaft, F, the whole construction being such that the cylinder may be revolved. This cylinder is surrounded by a case, A, furnished with a strong top, A^1, which has orifices A^2 in it, for inserting the blocks of wood.

Within the grinding-cylinder are feed and supporting boxes, composed of a bottom, E, and two sides, E^1 and E^2, and these boxes are secured in place, and in proper relative position to the grinding-surface to hold blocks of wood so that they may be reduced, as before set forth, by bolting their sides firmly to the

top A^1. Each feed-box has a plunger, C, secured to a rod provided with a rack and groove, *c*, the whole construction being such that the plungers may advance blocks of wood toward the grinding-surface.

In order to move these plungers, I apply around the shaft F a cannon-shaft, G, which may be held up by a collar on shaft A, or by means of the top A^1. This cannon-shaft is furnished, above the top of the case, with a cog-wheel, H, which may be revolved by a pinion, E, or in any suitable way, and below the top of the case this cannon-shaft is furnished with another cog-wheel, H′, which will, when the racks are in gear with it and the wheel in revolution, force the rods and the plungers, and consequently the blocks of wood, against the grinding-surface.

The racks may be held in gear by means of rods J, (see specially Fig. 6,) pivoted in bearings in the sides E′ of the feed-boxes. These rods are provided with a hooked projection, *j*, and a straight projection or handle, J′. (See Figs. 1 and 2.) This handle can, by means of a stop, K, be held in such angular position that the hooked projection *j*, lying in the groove *c* of the plunger-rods, will hold their racks in gear with the cog-wheel.

When it is desired to introduce a fresh block the rod is lifted a little, so that its handle will rise out of the notch, and is then turned so that the hook on the rod will throw the rack out of gear. The plunger-rod can then be moved back by hand, and a fresh block inserted. A shaft with a cam upon it bearing against the plunger-rod would answer the same purpose, and then the groove in the plunger-rod could be dispensed with.

Pipes L are arranged so as to supply water to the grinding-surface, and an orifice or orifices, M, to permit the escape of water and pulp, are formed in the bed-plate which supports the case A.

Inspection of the drawings will show that the feed-boxes are so arranged with reference to the grinding-surface that when the latter moves, as it is intended to do, in the direction of the arrow the blocks of wood in the boxes will have their fibers attacked and acted upon in the manner heretofore described.

Inspection of the drawings will also show that the line of feed is in planes perpendicular to the axis of the grinding-surface. This is the best line of feed, but the action of the grinding-surface in attacking the exposed ends and tearing out the covered or protected end of the fibers would not be materially modified or substantially changed if the bottom of the feed-boxes were inclined to these planes, or, in other words, supposing the axis of the grinding-surface to be vertical, if the bottoms of the feed-boxes were not horizontal, as shown in the drawings, but inclined to the horizon in the direction of either their length or their width.

I claim as my own invention—

1. The improvement in the art of reducing wood to pulp herein described, which consists in attacking first the exposed ends of all the fibers, and then pulling and tearing out the remainder of the fiber by means of a grinding-surface acting in relation to the fibers, substantially in the manner hereinbefore set forth.

2. A concave grinding-surface, in combination with feed boxes or troughs therein inclosed, when said boxes are so located, substantially as represented, with reference to the concave grinding-surface that blocks of wood held and forced forward therein may be reduced to pulp, in the manner specified, not intending to claim, broadly, a concave grinding-surface in combination with feed-troughs inclosed therein, as I know that combination to be old.

3. The combination of feeding-boxes and plungers acting therein and racks on the plunger-rods with a cog-wheel on a common shaft, whereby the plungers may be forced to feed blocks to the concave grinding-surface, the combination being and operating substantially as described.

4. Feeding-plungers operated by rack-rods, in combination with a contrivance, substantially such as described, for holding the racks in gear and permitting them to move out of gear, the combination being and operating substantially as described.

J. G. MOORE.

Witnesses:

JABEZ S. HOLMES,

J. HENRY TAYLOR.