

F. A. CUSHMAN.  
Wood Pulping Machine:

No. 201,501.

Patented March 19, 1878.

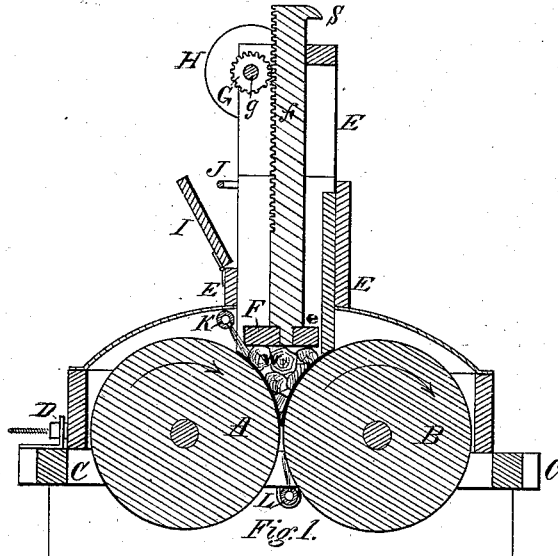


Fig. 1.

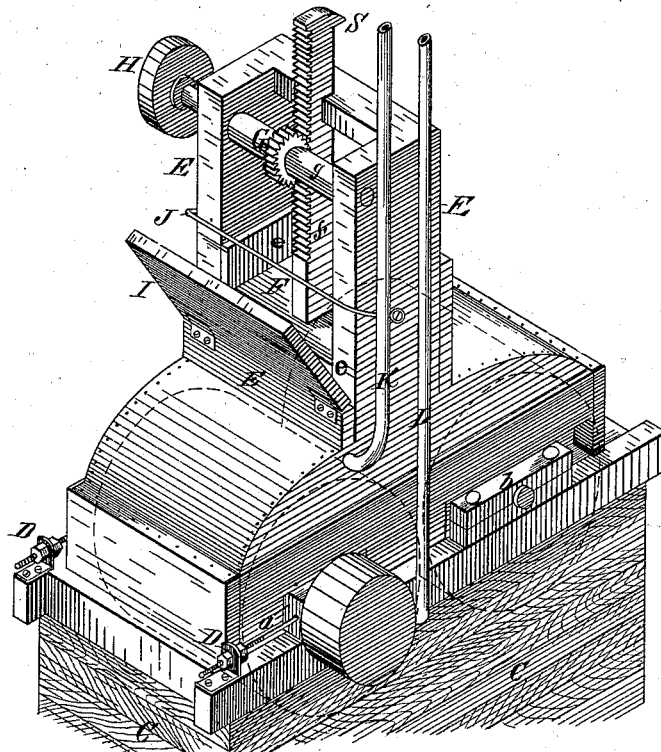


Fig. 2.

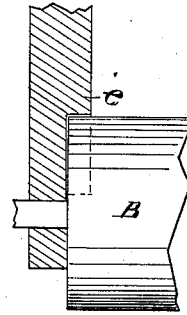


Fig. 3.

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# UNITED STATES PATENT OFFICE.

FRANCIS A. CUSHMAN, OF LEBANON, NEW HAMPSHIRE.

## IMPROVEMENT IN WOOD-PULPING MACHINES.

Specification forming part of Letters Patent No. **201,501**, dated March 19, 1878; application filed December 20, 1877.

*To all whom it may concern:*

Be it known that I, FRANCIS A. CUSHMAN, of Lebanon, New Hampshire, have invented certain Improvements in Wood-Pulping Machines; and that the same are fully described in the following specification, and illustrated in the accompanying drawings.

The object of my improvement is to facilitate the reduction of blocks or chips of wood, or other fibrous material, to a pulpy mass of disintegrated fiber.

My invention consists in the combination of a pair of rotary grinders, mounted side by side horizontally on a suitable frame or vat, with a pocket located over the stones, and forming side and end guides or barriers for the wood; also, in said apparatus, in combination with mechanism to press the wood upon the peripheries of the rotary stones.

My invention also consists in the combination of two horizontal grinders, rotating in the same direction, having their peripheries in close proximity, with a separate water-supply pipe for each grinder, located relatively thereto, as described; also, in such devices, in combination with adjusting mechanism for the bearings of one of the grinders.

Figure 1 is a vertical section of a machine embodying my invention. Fig. 2 is a perspective view of the same; and Fig. 3, a detail view, showing the end guides in position.

In the drawings, A and B are the two grinders, preferably of stone, rotating in suitable horizontal bearings *a b* upon the frame or tank C. The stones are so mounted that their peripheries are in very close proximity or in actual contact, and the bearings of either or both may be made adjustable, so as to vary their distances from each other, as desired, and to provide for wear of the grinding-surfaces. The stones thus act upon each other, and each serves to true up the surface of the other.

A suitable adjusting device is shown at D, which operates by a screw and nuts, as will be readily understood without detailed description.

The grinders may revolve in the same or in opposite directions, and may have the same or different rates of speed. The machine represented in the drawing is, however, particularly adapted for rotation, as indicated by the

arrows—that is, both of the stones turning the same way—which I regard as decidedly the best plan, since it obviates the danger that pieces not properly disintegrated will be carried between the stones, which might result in great injury to the machine, and would render the pulp inferior in quality. I prefer that the stone A shall have a surface-speed somewhat greater than its fellow, as the grinding capacity of the machine is thereby increased, and the tendency of the grinder B to carry the wood with it is overcome.

Above the grinders I provide a strong pocket, E, the side and ends of which form barriers or guides, to prevent the wood W, or other material which is placed within the pocket, resting directly upon the stones, from escaping beyond the periphery of the grinders until reduced to pulp. The end guides *e* overlap the stones, and extend downward in curved lines, which meet between the grinders near their line of contact. The pocket may extend upon each side of this line to the vertical plane of the roller-axes, so that about one-fourth of each stone acts as a grinding-surface; but I prefer to restrict the width of the grinding-surface to about one-sixth of the periphery of each of the grinders, as shown in the drawing.

Within the pocket is a follower, F, which rests upon the wood and bears it down upon the grinders with more or less pressure. It is provided upon its stem with a rack, *f*, which engages with a gear, G, on a shaft, *g*, rotating in suitable bearings, and supplied with a pulley, H, carrying a belt or rope, to which a weight is applied. It is obvious that the weight may be applied directly to the follower F, or that other pressure mechanism may be employed. A suitable stop, S, checks the downward movement of the follower, and prevents its contact with the grinders.

For convenience in renewing the supply of wood to be ground, I provide a hinged door, I, in the pocket, which may be secured, when closed, by a cross-bar, J, hinged to the hopper ends, or in any convenient manner.

It is necessary to supply an abundance of water upon the face of the grinders to prevent their glazing by the action of the wood upon them. To avoid throwing off by centrifugal action, the water should be continuously ap-

plied to each grinder along its face, where, in its rotation, it is entering beneath the wood. To accomplish this object, a spray-pipe, K, plays upon the roller A, and another pipe, L, upon the roller B, along their surfaces, from end to end, in lines about as indicated in the drawing. A copious supply of water facilitates the reduction of the wood to fibrous pulp; and, if desirable, a pipe may also convey water into the pocket direct. As the grinders are completely incased, the water is all received, with the pulp, in the tank below, and from thence it is conveyed together, by pumping or otherwise, to screens, for separating the coarse from the fine material, and finally to the making-cylinder.

The operation of my machine, as illustrated in the drawing, is as follows: The grinders being provided with suitable driving mechanism, and properly inclosed, with the guides or barriers in position, a supply of wood or other material to be disintegrated is placed in the pocket, and pressure applied through the follower in addition to that due to gravitation. An abundant supply of water is furnished through the pipes, as described, and the grinders are rotated at a high rate of speed. Both act upon the wood at the same time, and the thrust of the roller A, tending to carry the wood along by surface-friction, is met and resisted by the grinder B, the surface of which, at their line of closest approach, is moving in the opposite direction. The tendency of these opposing forces, as applied to the same stick

of wood, is to prevent it from being carried between them, but to turn it over and over upon its own axis, with friction against the adjacent sticks pressing upon it, while the fibers removed are carried by the flow of water away from this part of the machine to the tank below.

I claim as of my invention—

1. The combination of the horizontal peripheral grinders A B with the pocket E and curved end guides e, substantially as and for the purposes set forth.

2. The combination of two horizontal peripheral grinders with a pocket and guides adapted to receive and retain the material to be disintegrated, and suitable pressure mechanism, substantially as and for the purposes set forth.

3. The combination of two horizontal peripheral grinders, adapted to rotate in the same direction, with their peripheries in close proximity, and a water-supply for each grinder, located relatively thereto, substantially as and for the purpose set forth.

4. The combination of the spray-pipes K and L with the peripheral grinders A B and suitable adjusting mechanism for their bearings, substantially as and for the purpose set forth.

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Witnesses:

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