J. CHASE.

WOOD PULP ENGINES.

No. 182,891. Patented Oct. 3, 1876.

Fig. 1.

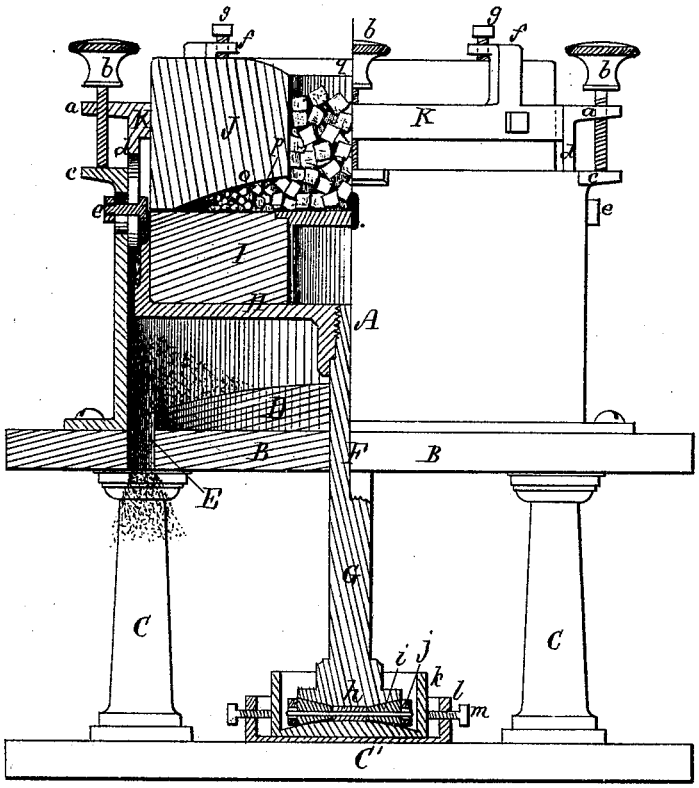
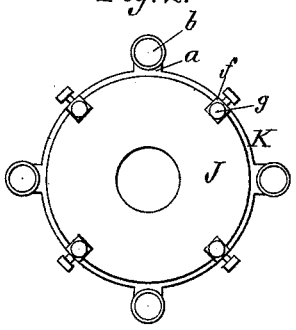


Fig. 2.



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JEFFERSON CHASE, OF ORANGE, MASSACHUSETTS.

IMPROVEMENT IN WOOD-PULP ENGINES.

Specification forming part of Letters Patent No. **182,891**, dated October 3, 1876; application filed May 8, 1876.

To all whom it may concern:

Be it known that I, JEFFERSON CHASE, of Orange, Franklin county, Massachusetts, have invented certain Improvements in Wood-Pulping Engines, of which the following is a specification:

This engine is designed to reduce blocks of wood to pulp for the manufacture of paper mainly, the method by which I reduce the wood to a fine granular condition consisting in the employment of two circular stones, disposed one over the other within a suitable curb, one of such stones, preferably the lower, being rotary, and the other stationary, while the resulting grinding action effects the requisite disintegration of the wood.

The general arrangement of the two stones in my engine is similar to those usually employed in grist-mills, but the forms of their adjacent or grinding faces are radically different, in that the face of one is flat, or practically flat, while that of the other is concave, the result being that the intervening grinding chamber or space gradually diminishes in depth from the axis of the stones, at which point the wood is introduced to the periphery, at which the ground wood or pulp is discharged or thrown off; and I consider the most important feature in my present invention to consist in such a formation of the stones that the intervening area shall be of the form last explained.

My invention further consists in constructing the curb or case in which the rotary stone is disposed with a convex or crowning bottom, in order that the pulp shall have no tendency to seek the center of such curb and accumulate there, but shall be conducted to the wall of the curb and to the discharge-outlets.

Details of my invention consist, among minor features, in the means by which I suspend and adjust the upper stone with respect to the lower, and compensate for the wear upon the former, as well as regulate the engine, to the degree of fineness or length of fiber of the pulp to which the wood is to be reduced.

The drawings accompanying this specification represent, in Figure 1, a sectional elevation of a pulping-engine embodying my improvements, Fig. 2 being a plan of the upper stone and its support.

In these drawings, A represents an upright circular case or curb, supported, in the present instance, upon a platform or floor, B, which is mounted upon posts C C erected upon the foundation C′ of the mill or structure in which the engine is placed; or the curb may be disposed upon one floor of the structure, which is represented by the stage B and the driving mechanism in the basement below.

The bottom or floor D of the curb A is convex or crowning, as represented, and at the corner or angle of the bottom B and the walls of the curb I create one or more outlets, E, for escape of pulp. The center of the bottom of the curb, as well as the adjacent part of the floor B, is pierced with an orifice, F, to receive the upper end of a vertical shaft, G, which extends upward into the curb from below the floor B, while secured to the upper extremity of said shaft G is a horizontal circular rotary platform or frame, H, whose diameter is somewhat less than that of the interior of the curb, in order to prevent the pulp, after being reduced between the stones, and thrown outward to their peripheries by centrifugal action, to pass downward between the circumference of the lower one and the wall of the curb, and be discharged by the outlet E.

The lower stone is shown in the drawings at I as a circular disk, whose upper face is flat, or approximately so, such stone being supported by or within the rotary platform H, and having its upper face reduced to a series of channels, or otherwise roughened or abraded, or to a comparatively smooth surface, according to circumstances.

The upper stone, which is stationary, is shown at J as a circular disk, and contained within an annular band or hoop, K, by which it is suspended over the lower stone I, the said band being formed with lugs *a*, through which are extended stout screws *b*, which rest upon corresponding lugs *c* formed upon the top of the curb A, the said screws constituting the means, in this case, whereby the altitude of the stone J with respect to the lower stone is varied according to the wear upon

the two or the relative distance to be maintained between them.

To securely confine the upper stone in position, after its proper altitude has been determined, I add to the under side of the lugs *a* pendent lips *d*, which are furcated or slotted to receive bolts *e*, which extend through the wall of the curb A, the head of such bolts overlapping the sides of the slots, and the nuts screwing up against the outside of the curb, thus securely confining the frame or support K of the stone to the curb A, while, to prevent rising of such stone within the support K as blocks of wood are introduced, I form upon the said support bent ears *f*, which overlap the edge of the stone and prevent rising of the latter within its frame or hoop. Through the ears *f* I pass screws *g*, which screw down upon the top of the upper stone, the purpose of these screws being first to prevent, as before stated, the throwing up or lifting of such stone by the blocks of wood; second, to adjust the slight variations in the space or distance between the two stones, which may be requisite to produce coarse or fine pulp; and, third, to compensate for the wear upon the stones. The hoop K is practically stationary while the stone J is fed downward within it, but when such stone becomes worn to close proximity to the hoop the screws *g* are lowered and the hoop raised to the top of the stone, thus exposing a new portion of the latter to wear, while, at the same time, the bolts *e* are loosened and the hoop raised within the curb to a like distance.

In lieu of bolting the lips *d* to the curb A, as stated, the lugs *a* and *c* may be united by bolts with the same result.

I do not, in any sense, confine myself to the details above explained for supporting and adjusting the position of the upper stone, as these may manifestly be varied to a wide extent.

The lower end or pivot *h* of the shaft G rests upon conical anti-friction rolls *i*, which are journaled within an annular frame or ring, *j*, such ring, in turn, being disposed within a box, *k*, which is disposed in a second box, *l*, placed upon the foundation C′, while adjusting-screws *m* are added to the box *l* to "center" or adjust the position of the rollers *i* to the shaft G.

The under or operative face of the stone J is concave to a marked extent, as shown at *o;* consequently, the grinding chamber or space *p*, which intervenes the two stones, is frusto-conical in form, and deepest in the center, and it is in the form of this chamber that the vital element of my invention consists.

An axial orifice or feeding-throat, *q*, is created in the stone J, through which the blocks of wood are fed when the engine is in operation.

The operation of this engine is as follows: The dry wood is reduced to blocks of the proper size—say, from five to seven inches square—and the blocks are thrown into the mouth *q* of the upper stone, and fall upon the top of the lower stone, which is in rapid revolution. The centrifugal force generated by the lower stone leads the blocks of wood outward, and they are seized between the two stones, and the disintegrating or reducing process begins.

As the depth of the chamber *p* gradually diminishes as its outer boundary is reached, and as the centrifugal force is constantly tending to throw the blocks of wood outward, the latter are gradually reduced in size, until the disintegrated mass or pulp reaches the outer boundary of the stone, and is there thrown off and precipitated into the bottom of the curb A, from whence it passes by the outlet E to the proper receptacle. As the depth of the chamber *p* at the circumference of the two stones I and J determines the grade or fineness or the length of fiber of the pulp, it follows that this depth will be varied slightly when changing from one grade of pulp to another, and as the effect of feeding in blocks of wood at the center of the chamber is to constantly elevate the upper stone against the screws *g*, it follows that to adjust the distance between the stones, and increase or diminish the depth of the said chamber *p*, the said screws are to be raised or lowered.

The pressure which is essential to exert the requisite crushing-force upon the wood is derived from the weight of the stone, or from weights superposed upon it, and as the gradually-contracting depth of the chamber *p* effects in itself the gradual reduction of the wood to pulp without changing the positions of the stones, I am enabled to dispense with all feeding mechanism, and to introduce a continuous supply of wood to the engine, with a consequent continuous discharge of pulp. I am also enabled to reduce the blocks of wood entirely to pulp, thereby avoiding the waste heretofore inherent to machines for grinding wood to pulp, in which the blocks of wood are supported or received at one end within pockets or guides.

I would remark that a supply of water is to be admitted to the grinding-chamber *p* through the throat *q* to aid in the pulping of the wood, and constitute a vehicle for the pulp.

I claim—

1. In engines for pulping wood, the combination, with a suitable curb or case, of two stones, the operative face of one of which is flat or practically flat, while that of the opposite stone is largely concave, the object being to provide an intermediate chamber, which gradually diminishes in depth from its center outward, substantially as and for the purposes stated.

2. In engines for pulping wood, the combination, with the case or curb thereof, of two stones, whose adjoining or operative faces are formed substantially as described, so that the intermediate space or chamber gradually lessens in depth from the center outward, while the upper stone is pierced axially to admit of

passage of wood to the said chamber, substantially as and for purposes stated.

3. The combination, with the upper stone J and its supporting-ring, of the described adjusting and confining devices, whereby the position of the stone with respect to its ring and to the curb of the engine is adjusted to compensate for the wear of the two stones, substantially as shown and described.

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